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SI-DCP (DCP 3/4)
Set-up Guide

E300 Elevator Drive

Closed Loop RFC-A, RFC-S Operation

Part Number: 0479-0032-01
Issue: 1

Original Instructions

For the purposes of compliance with the EU Machinery Directive 2006/42/EC, the English version of this manual is the Original Instructions. Manuals in other languages are Translations of the Original Instructions.

Documentation

Manuals are available to download from the following locations: **http://www.drive-setup.com/ctdownloads**

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Contents

This SI-DCP (DCP 3/4) Set-up Guide provides set-up and commissioning information for operating the E300 Elevator drive within a DCP Lift system.

The information is in logical order for configuration set-up and operation. Chapter 1 Safety information contains general safety information, it is essential that all information is observed

1 Safety information

1.1 Warnings, Cautions and Notes

A Warning contains information which is essential for avoiding a safety hazard.

A Caution contains information which is necessary for avoiding a risk of damage to the product or other equipment.

NOTE A **Note** contains information, which helps to ensure correct operation of the product.

1.2 Important safety information. Hazards. Competence of designers and installers

This guide applies to products which control electric motors either directly (drives) or indirectly (controllers, option modules and other auxiliary equipment and accessories). In all cases the hazards associated with powerful electrical drives are present, and all safety information relating to drives and associated equipment must be observed.

Specific warnings are given at the relevant places in this guide.

Drives and controllers are intended as components for professional incorporation into complete systems. If installed incorrectly they may present a safety hazard. The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury. Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning/start-up and maintenance must be carried out by personnel who have the necessary training and competence. They must read this safety information and this guide carefully.

1.3 Responsibility

It is the responsibility of the installer to ensure that the equipment is installed correctly with regard to all instructions given in this guide. They must give due consideration to the safety of the complete system, so as to avoid the risk of injury both in normal operation and in the event of a fault or of reasonably foreseeable misuse.

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation of the equipment.

1.4 Compliance with regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses or other protection, and protective ground (earth) connections.

This guide contains instructions for achieving compliance with specific EMC standards.

All machinery to be supplied within the European Union in which this product is used must comply with the following directives:

2006/42/EC Safety of machinery.

2014/30/EU: Electromagnetic Compatibility.

1.5 Electrical hazards

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive. Hazardous voltage may be present in any of the following locations:

- AC and DC supply cables and connections
- Output cables and connections
- Many internal parts of the drive, and external option units

Unless otherwise indicated, control terminals are single insulated and must not be touched.

The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

The STOP and Safe Torque Off functions of the drive do not isolate dangerous voltages from the output of the drive or from any external option unit.

The drive must be installed in accordance with the instructions given in this guide. Failure to observe the instructions could result in a fire hazard.

1.6 Stored electrical charge

The drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energized, the AC supply must be isolated at least ten minutes before work may continue.

1.7 Mechanical hazards

Careful consideration must be given to the functions of the drive or controller which might result in a hazard, either through their intended behaviour or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

With the sole exception of the Safe Torque Off function, none of the drive functions must be used to ensure safety of personnel, i.e. they must not be used for safety-related functions.

The Safe Torque Off function may be used in a safety-related application. The system designer is responsible for ensuring that the complete system is safe and designed correctly according to the relevant safety standards.

The design of safety-related control systems must only be done by personnel with the required training and experience. The Safe Torque Off function will only ensure the safety of a machine if it is correctly incorporated into a complete safety system. The system must be subject to a risk assessment to confirm that the residual risk of an unsafe event is at an acceptable level for the application.

1.8 Access to equipment

Access must be restricted to authorized personnel only. Safety regulations which apply at the place of use must be complied with.

1.9 Environmental limits

Instructions in this guide regarding transport, storage, installation and use of the equipment must be complied with, including the specified environmental limits. This includes temperature, humidity, contamination, shock and vibration. Drives must not be subjected to excessive physical force.

1.10 Hazardous environments

The equipment must not be installed in a hazardous environment (i.e. a potentially explosive environment).

1.11 Motor

The safety of the motor under variable speed conditions must be ensured.

To avoid the risk of physical injury, do not exceed the maximum specified speed of the motor.

Low speeds may cause the motor to overheat because the cooling fan becomes less effective, causing a fire hazard. The motor should be installed with a protection thermistor. If necessary, an electric forced vent fan should be used.

The values of the motor parameters set in the drive affect the protection of the motor. The default values in the drive must not be relied upon. It is essential that the correct value is entered in the Motor Rated Current parameter.

1.12 Mechanical brake control

Any brake control functions are provided to allow well co-ordinated operation of an external brake with the drive. While both hardware and software are designed to high standards of quality and robustness, they are not intended for use as safety functions, i.e. where a fault or failure would result in a risk of injury. In any application where the incorrect operation of the brake release mechanism could result in injury, independent protection devices of proven integrity must also be incorporated.

1.13 Adjusting parameters

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

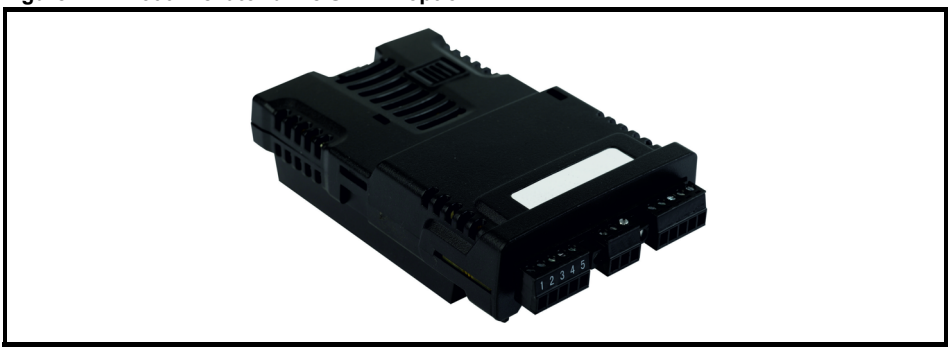
1.14 Electromagnetic compatibility (EMC)

Installation instructions for a range of EMC environments are provided in the relevant Power Installation Guide. If the installation is poorly designed or other equipment does not comply with suitable standards for EMC, the product might cause or suffer from disturbance due to electromagnetic interaction with other equipment. It is the responsibility of the installer to ensure that the equipment or system into which the product is incorporated complies with the relevant EMC legislation in the place of use.

2 Introduction

Before reading this SI-DCP (DCP 3/4) Set-up Guide it is assumed that the user is familiar with the E300 Elevator drive and user documentation, along with the SI-DCP option required to support DCP3 or DCP4 operation. This SI-DCP (DCP 3/4) Set-up Guide contains the required detail for set-up and commissioning of the E300 Elevator drive with a SI-DCP option by a qualified person for operation within a DCP Lift system. Detail includes configuration and set-up only, and does not include the complete detailed functionality of the DCP3, DCP4 software. For full parameter descriptions refer to both the Elevator drive Design guide and Parameter Reference Guide.

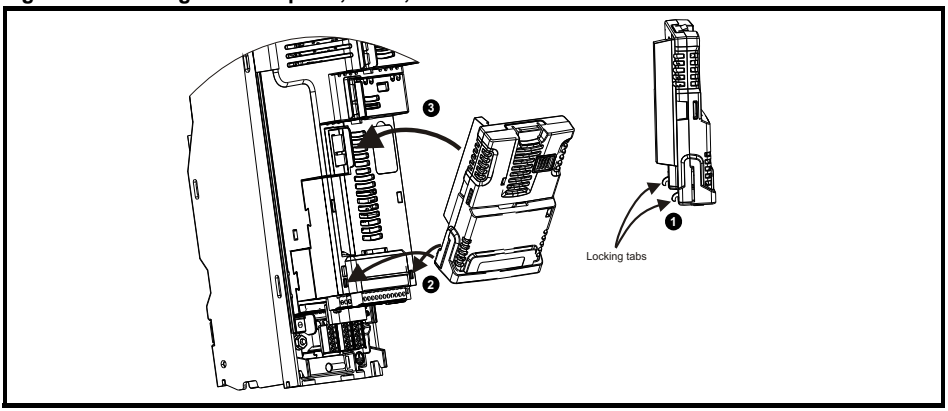
Figure 2-1 E300 Elevator drive SI-DCP option



2.1 Fitting SI-DCP Option

In order for the E300 Elevator drive to support DCP3, DCP4 operation the SI-DCP option should be fitted to the drive as detailed following. The SI-DCP option includes both DCP hardware and firmware. The E300 Elevator drive must be powered down when the SI-DCP option is fitted. To fit the SI-DCP module press down until it clicks into place, the SI-DCP option will only fit into Slot 3 as shown following.

Figure 2-2 Fitting SI-DCP option, Slot3, E300 Elevator drive

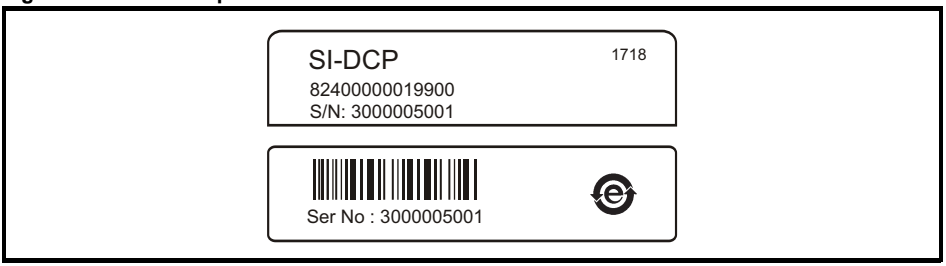


(1) Locate locking tabs of SI-DCP option onto **(2)** Slot 3 location of the E300 Elevator drive and press into **(3)** location.

2.2 Identifying SI-DCP Option

Once the SI-DCP option is fitted to the E300 Elevator drive confirmation of the SI-DCP option and its firmware can be verified as follows. The following labelling is also used to identify the SI-DCP option

Figure 2-3 SI-DCP option labels



The following E300 Elevator drive parameter and SI-DCP option parameters can be used to identify the firmware versions.

- **R01** SI-DCP option code (308)
- **R02** Firmware version, SI-DCP option
- **R49** Program ID, SI-DCP option
- **J04** Firmware version, E300 Elevator drive

2.3 SI-DCP Option Interface, Lift (Elevator) Controller

SI-DCP option hardware interface to the Lift (Elevator) controller is as follows.

Figure 2-4 SI-DCP option control terminal

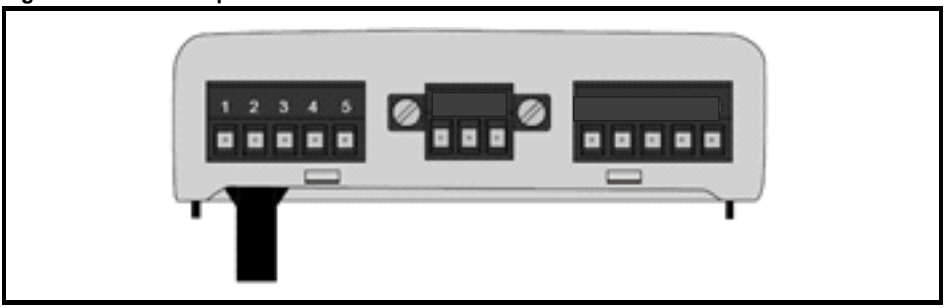
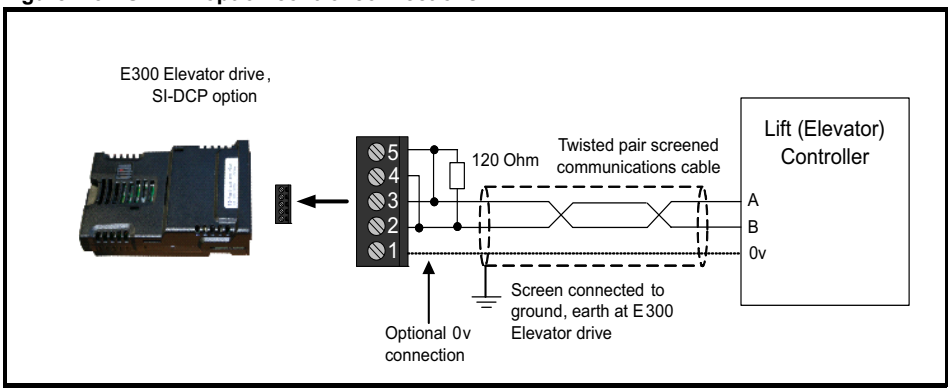


Table 2-1 SI-DCP option control terminal descriptions

Terminal	Function	Description
1	0V SC	0V connection EIA-485 port
2	/RX	EIA-485 Receive line incoming
3	RX	EIA-485 Receive line incoming
4	/TX	EIA-485 Transmit line outgoing
5	TX	EIA-485 Transmit line outgoing

When the EIA-RS485 system is used the transmit and receive pairs should have a termination resistor of 120 Ω installed across them in order to reduce common mode distortions

Figure 2-5 SI-DCP option control connections



The SI-DCP option communications cable should not run parallel to any power cables, especially ones that connect the drive to the Motor or braking resistor circuit. If parallel runs are unavoidable, ensure a minimum spacing of 300 mm (1 ft) between the communications cable and the power cable. Cables crossing one another at right angles are unlikely to give trouble.

The maximum cable length for a EIA- RS485 jumper (link) is 1200 metres (4,000 ft). This is at low baud rates only. The higher the baud rate the lower the maximum cable length. It is recommended that the shield of the communications cable be connected by a low inductance path to a 'clean' ground point. This must only be done at one pointc

Table 2-2 SI-DCP control connections to Lift (Elevator) Controller

E300 Elevator drive SI-DCP option	Kollmorgen Control MPK400	Osma Controller BMPS SUB-D9	Böhnke & P. BP304 / BP306	NEW Control. FST SUB-D9	Strack SLC 4 Controller
3, 5 A, RX, TX	87 Terminal strip	Pin 6	T.7 DCP Plug	Pin 4, Pin 7	L4 (White)
2, 4 B, /RX, /TX	88 Terminal strip	Pin 7	T.6 DCP Plug	Pin 8, Pin 9	L5 (Black)
1 0v		Pin 5	T.5 DCP Plug	Pin 5	

3 E300 Elevator Drive Keypad

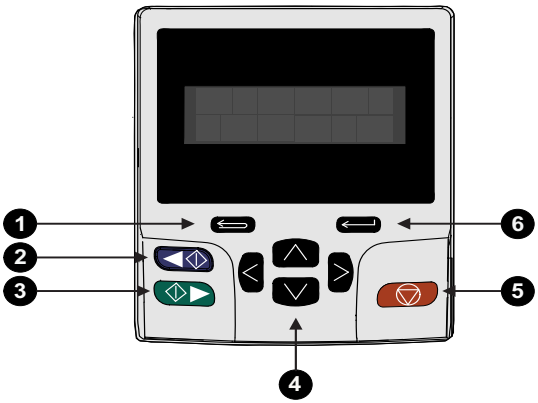
For setting the DCP parameters in the E300 Elevator drive and SI-DCP option there are the following options

- Parameters can be set-up directly on the E300 Elevator drive using the LCD keypad. The LCD Keypad display can be fitted or removed with the E300 Elevator drive powered up and operating. The E300 Elevator drive can also be operated without the LCD keypad.
- It is possible to set-up the E300 Elevator drive via the DCP Protocol from the Lift (Elevator) controller. The set-up of the E300 Elevator drive is done with the Lift (Elevator) controller keypad. So it is not necessary to have an LCD keypad fitted to the E300 Elevator drive. The parameters can be displayed on the LCD keypad of the E300 Elevator drive if required.

3.1 E300 Elevator Drive Display

The parameter display on the E300 Elevator drives LCD keypad or the Lift (Elevator) controller are the same. This makes it possible to use the same representations of functions and settings in the following document.

Figure 3-1 LCD Keypad



1. **Escape button** - Used to exit from parameter edit or view mode. In edit mode, if parameter values are edited and exit button pressed, the value will be restored to the value it had on entry to edit mode.
2. **Start reverse (Auxiliary) button** - Not used.
3. **Start forward button** - Not used.
4. **Navigation keys (x4)** - Used to navigate through menu and parameters and edit values.
5. **Reset button** - Used to reset the drive.
6. **Enter / Mode button** - Used to toggle between parameter edit and view mode.

The E300 Elevator drive has a full set of menus from User Menu A up to Menu AC, with Menu AC being specifically for DCP. Menus and parameters are defined as follows, Menu number mm, Parameter number nnn.

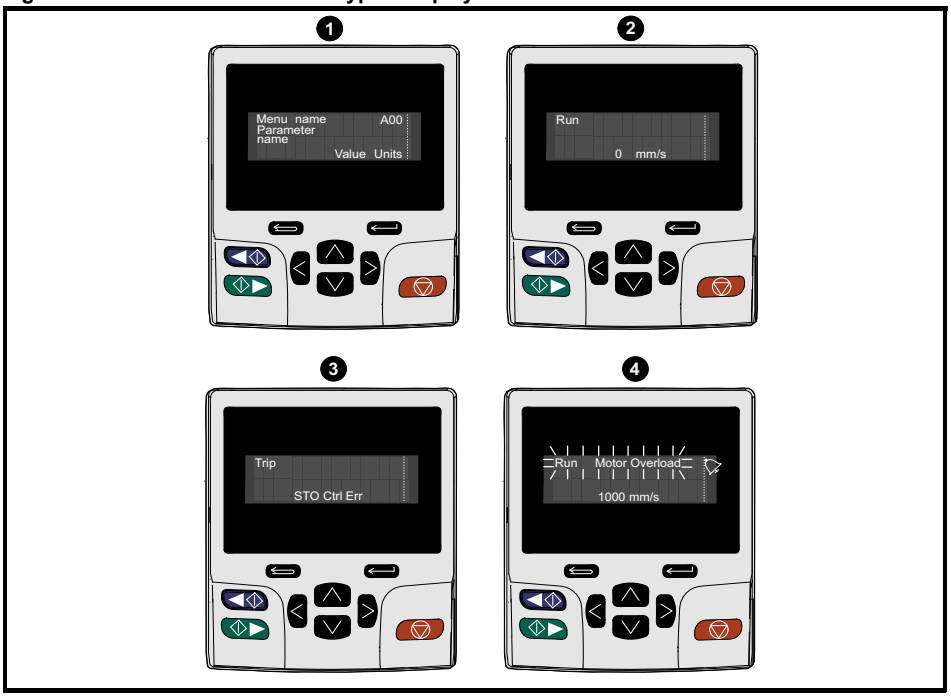
Table 3-1 Elevator drive LCD keypad functions

Key	Function	Description
	Drive State	-- : --
M	Change to Edit Mode	Change to Display Mode
⇑	Increase Parameter number	Increase Parameter value
⇓	Decrease Parameter number	Decrease Parameter value
⇐	Decrease Menu number	Increase Decimal place
⇒	Increase Menu number	Decrease Decimal place

Four display modes can be seen during operation as shown following

1. **Parameter view mode**
   Menu and parameter view mode, read write (RW) or read only (RO)
2. **Status mode**
   If the drive is OK and the parameters are not being edited or viewed, the upper row of the display will show one of the following Inhibit or Run.
3. **Trip status mode**
   When the drive is in a trip condition the upper row of the display will indicate that the drive has tripped and the lower row of the display will show the trip code.
4. **Alarm status mode**
   During an 'alarm' condition the upper row of the display flashes between the drive status Inhibit or Run (drive not in parameter view or edit mode) and the alarm condition.

Figure 3-2 Elevator drive LCD keypad display



3.2 Remote Keypad Operation Lift (Elevator) Controller & DCP

Where the DCP Interface is used it is possible to set up the parameters via the Remote keypad operation on the Lift (Elevator) controller keypad. The set-up of the parameters via the Lift (Elevator) controller keypad is similar to the Elevator drive keypad.

After enabling the Remote keypad operation the parameter displayed at power up is **A06**, the same as the E300 Elevator drive. The following figure shows an example of the Remote keypad buttons on the Remote keypad for five different Lift (Elevator) controllers.

Figure 3-3 Lift (Elevator) controller Remote keypad operation, example 1

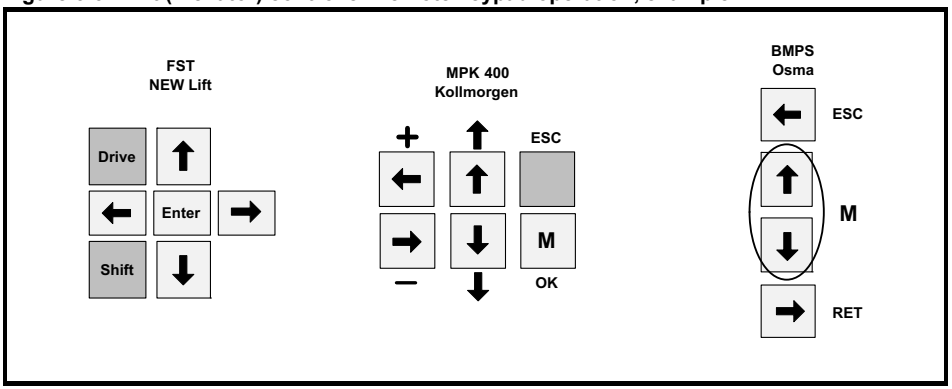
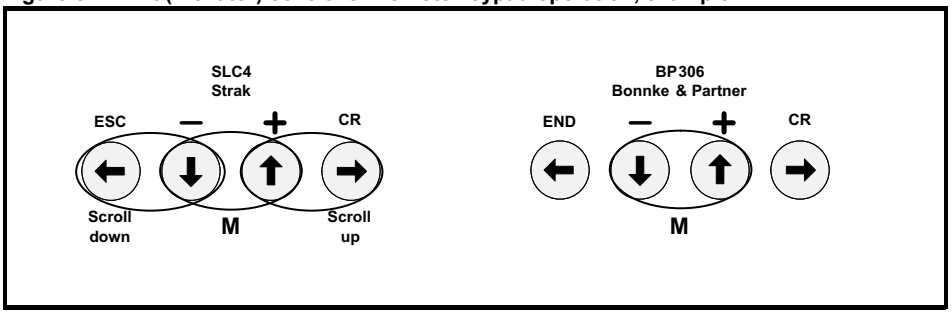


Figure 3-4 Lift (Elevator) controller Remote keypad operation, example 2



The handling of the Remote keypad operation on the Lift (Elevator) controller is as follows:

Table 3-2 Lift (Elevator) controller Remote keypad operation

Keypad Button Action	**Action in status mode (Static display)**	**Action in edit mode (Digit is flashing)**
Enable Remote keypad operation **M key**	Display Status of drive and parameter A06	-- : --
⇑ **key**	Increase parameter number	Increase parameter value
⇓ **key**	Decrease parameter number	Decrease parameter value
⇐ **key or** ⇒ **key**	a) User Menu A ⇒ No function c) Menu A – AC access ⇒ Change menu number	Increase / Decrease digit
M key or ⇑ **and** ⇓ together (Böhnke / Osma / Strack)	Enter edit mode	Return to Status mode
Leave Remote keypad operation	**ESC** for 3 s **MPK400** **END** for 3 s **BP306** **ESC+CR** **SLC4** **ESC+RET** **BMPS**	

For the Lift (Elevator) controller Remote keypad 4 lines are available with 16 characters for simulation of the E300 Elevator drive LCD keypad display.

Table 3-3 Lift (Elevator) controller Remote keypad display

Display line	**Left justified**	**Right justified**
1. line:	Status (INH, RUN, FAULT, …)	Type of parameter (RW or RO)
2. line:	Parameter number (mm.nnn)	Parameter value
3. line:	Parameter name 1. line	
4. line:	Parameter name 2. line	

4 SI-DCP (DCP 3/4) Set-up, Configuration

4.1 Smart Card, NV Media Card Set-up

The most effective was to set-up the E300 Elevator drive parameter set is to use a pre-programmed Smart card, NV Media Card as follows

Figure 4-1 E300 Elevator drive, Fitting SMARTCARD, NV Media Card

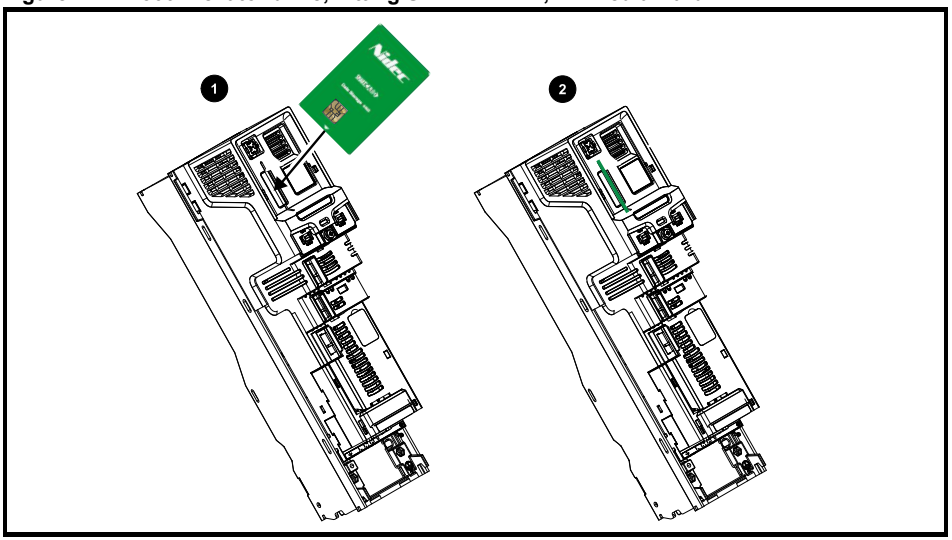


Figure 4-2 E300 Elevator drive programming from SMARTCARD, NV Media Card

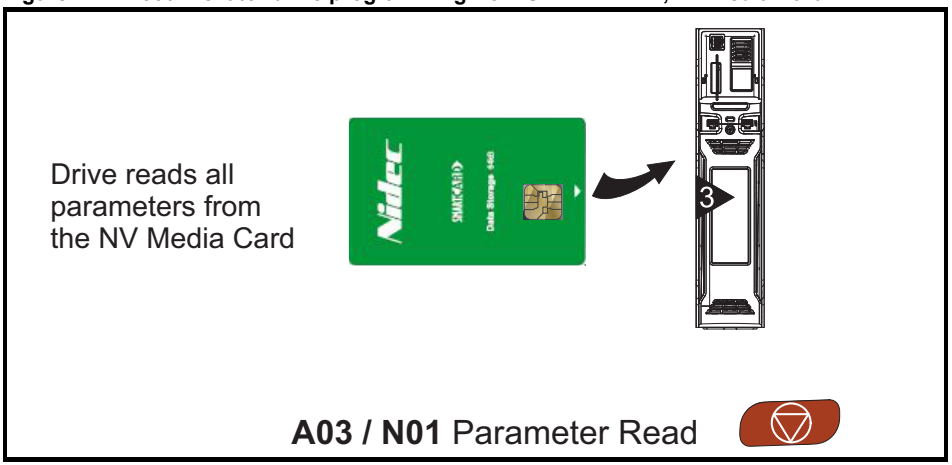
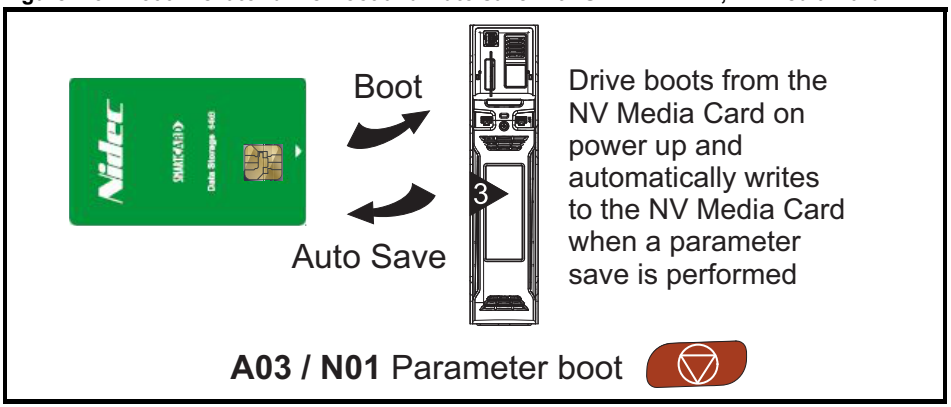


Figure 4-3 E300 Elevator drive Boot and Auto save with SMARTCARD, NV Media Card



If a **Card Rating** trip (186) occurs the parameter data is being transferred from a SMARTCARD, NV Media Card to the drive, but the current and / or voltage ratings are different between source and destination drives.

This trip also applies if a compare (using parameter **mm000** set to 8yyy) is attempted between the data block on a SMARTCARD, NV Media Card and the drive. The **Card Rating** trip (186) does not stop the data transfer but is a warning that rating specific parameters with the RA attribute may not be transferred to the destination drive.

Recommended actions

- Reset the drive to clear the trip
- Ensure that the drive rating dependent
- parameters have transferred correctly

When transferring parameters from one drive to another **C13** Position Feedback Phase Angle is also copied. If the phase angle between drives and motors is different, it should be noted before and restored after the SMARTCARD, NV Media Card transfer.

After SMARTCARD, NV Media Card operation the set-up could be continued with … **4.4 First Test**

4.2 Electronic Nameplate Set-up

The set up of a PM Elevator Motor in RFC-S mode with a suitable Position feedback device with Electronic Nameplate is as follows:

Parameter mm.000 = 24006

… wait 5 s

… mm.000 = 0

… Electronic nameplate transfer complete

After programming with the electronic nameplate the set up can continue with … **4.4 First Test**

4.3 Manual programming

4.3.1 Selecting Motor Type

The default operating mode for the E300 Elevator drive is set to RFC-S mode for operation in closed loop with a Permanent Magnet Motor

- **A02** (**B01**) = RFC-S

To change the operation mode for a different Motor type:

- **mm.000** = 1253

Induction Motor with encoder:

- **A02** (**B01**) = RFC-A

Confirm operating mode change for an induction Motor, press Reset button

Remote keypad operation: Wait 3 s

4.3.2 Selecting Interface DCP3, DCP4

The DCP operating mode should be selected as follows:

- **A10** (**H11**) = Analog Run Permit (0)
- **A10** (**H11**) = Analog 2 Directions (1)
- **A10** (**H11**) = 1 Direction Priority (2)
- **A10** (**H11**) = 1 Direction Binary (3)
- **A10** (**H11**) = 2 Directions Priority (4)
- **A10** (**H11**) = 2 Directions Binary (5)
- **A10** (**H11**) = Control word, Modbus (6)
- **A10** (**H11**) = **DCP3** (**7**)
- **A10** (**H11**) = **DCP4** (**8**)

Save operating mode

- **mm.000** = Save parameters + Reset button

4.3.3 Position Feedback Device Set-up

The following section provides guidance for set-up of the position feedback device when operating in RFC-A and RFC-S operating modes. When operating in RFC-S mode an absolute position feedback device is required such as an SC.EnDat or SC.Hiperface

Encoder A, A/, B, B/, Z, Z/

Parameter	Description	Setting
A12 / C01	Encoder Type	**Ab**
A13 / C02	Auto Configuration	**Off**
A14 / C03	Encoder count	**1024**
A15 / C04	Encoder supply voltage	**Encoder**

SinCos EnDat (Default encoder selection)

SC EnDat encoder default setting for **A13 / C03** Auto Configuration = On (1) therefore only the Encoder supply voltage requires settings if > 5V.

Parameter	Description	Setting
A12 / C01	Encoder Type	**SC.EnDat**
A13 / C02	Auto Configuration	**On**
A14 / C03	Encoder count	**2048**
A15 / C04	Encoder supply voltage	**5V**
A16 / C13	Encoder phase offset value	**0.0 °**

SinCos - Geber

Parameter	Description	Setting
A12 / C01	Encoder Type	**SC**
A13 / C02	Auto Configuration	**Off**
A14 / C03	Encoder count	**1024**
A15 / C04	Encoder supply voltage	**Encoder**

SinCos Hiperface

SC Hiperface encoder default setting for **A13 / C03** Auto Configuration = On (1) therefore only the Encoder supply voltage requires settings if > 5V.

Parameter	Description	Setting
A12 / C01	Encoder Type	**SC.HiPEr**
A13 / C02	Auto Configuration	**On**
A14 / C03	Encoder count	**2048**
A15 / C04	Encoder supply voltage	**8V**
A16 / C13	Encoder phase offset value	**0.0 °**

4.3.4 Motor Data Setting

The following provides guidance to set-up the Motor data, for settings refer to Motor nameplate.

Parameter	Description	Setting
A18 / B02	Motor nominal current	**... A**
A19 / B03	Motor nominal voltage	**400 V**
A20 / B05	Motor pole count	**4 Pole**
A21 / B06	Motor rated frequency	**50 Hz**
A22 / B07	Motor, Nominal speed	**1450 rpm**
B04	RFC-A: Motor Power factor	**0.850**
A25 / B13	Drive switching frequency	**6, 8, 12, 16 kHz**

The default switching frequency for the E300 Elevator drive is 8 kHz with the highest switching frequency being 16 kHz. Higher switching frequencies will provide operation with lower acoustic noise at the Motor. Switching frequency modulation under higher levels of load, current is active.

4.3.5 Adjusting Symmetrical Current Limit

The final setting for **A24 / B16** Symmetrical Current Limit (default = 175 % RFC-A and RFC-S) will be dependent upon a number of factors including the Motor, Drive rating, and Elevator system profile.

- **Symmetrical current limit: A24 / B16 = … %**

4.3.6 Auto Tuning

When carrying out an auto-tune using **A26 / B11** the following tests will be done automatically.

- Measurement of motor stator resistance and inductance
- Automatic set-up of the current loop gains **Start I03, I04** and **Run I08, I09**
- Set-up of the Motor power factor (RFC-A) **B04**
- Set-up the position feedback phase offset angle (RFC-S) **A16 / C13**

If the position feedback phase offset value **A16 / C13** is unknown for operation in RFC-S mode a Stationary auto tune should be carried out **A26 / B11** = Stationary (1) or Full stationary (5).

The position feedback direction of rotation is not checked during a Stationary auto tune, but is checked during a rotating auto tune. The rotating auto tune if required, **A26 / B11** = Rotating (2) can only be carried out with the ropes removed, lifted.

4.3.6.1 Induction Motor & Position Feedback

Stationary auto tune setting up current loop gains. During this test the Motor will not rotate and the brake will not be released

- **A26 / B11** = Stationary (1)
  Inspection start and hold until complete (40 s)
- **A26 / B11** = None (0)
  Inspection stop
- Check auto tune calculated current loop gains

Parameter	Description	**Value** (default)
I03	Start Current Loop Kp	150
I04	Start Current Loop Ki	2000
I08	Run Current Loop Kp	150
I09	Run Current Loop Ki	2000

By default the Start and Run current loop gains are used, the auto tune current loop gains are calculated based on the motors parameters measured during the auto tune and recommended for operation however if the motor becomes acoustically noisy during operation the current loop Kp can be reduced by up to 50 %.

4.3.6.2 PM Servo Motor & Position Feedback

If the encoder phase angle is provided on the motor nameplate (e.g Wittur Motor) this can be manually setup in **A16** / **C13** Position Feedback Phase Angle. A stationary auto tune should then be carried out once the encoder phase angle is entered to setup the current loop gains.

Stationary Auto Tune, Position Feedback Phase Angle, Current Loop Gains

If the position feedback phase angle is not provided this can be measured during the stationary auto tune and automatically updated in **A16 / C13** Position Feedback Phase Angle together with current loop gains as follows. During this test the Motor will not rotate and the brake will not be released, both the current loop gains will be set-up along with the position feedback phase angle.

- **A26 / B11** = Stationary (1) or Full stationary (5)
  Inspection start and hold until complete (3 min)
  Full stationary (5) is needed for non-salient Motors with similar inductances in the d- and q-axis
- **A26 / B11** = None (0)
  Inspection stop
- Check **A16 / C13** Position Feedback Phase Angle
- Check auto tune calculated current loop gains

Parameter	Description	**Value** (default)
I03	Start Current Loop Kp	150
I04	Start Current Loop Ki	2000
I08	Run Current Loop Kp	150
I09	Run Current Loop Ki	2000

By default the Start and Run current loop gains are used, the auto tune current loop gains are calculated based on the motors parameters measured during the auto tune and recommended for operation however if the motor becomes acoustically noisy during operation the current loop Kp can be reduced by up to 50 %.

Rotating Auto Tune, Position Feedback Phase Angle, Current Loop Gains
If a rotating auto tune is to be carried out to setup **A16 / C13** Position Feedback Phase Angle and the current loop gains the following steps can be followed. Lift the ropes from the sheave of the Motor, or if not possible place the lift into a balanced condition for the rotating auto tune with sufficient headroom above and below the Lift car for movement in the Lift shaft

- **A26 / B11** = Rotating (2)
  Inspection start and hold until complete
- **A26 / B11** = None (0)
  Inspection stop
- Check Position Feedback Phase Angle **A16** / **C13**
- Check auto tune calculated current loop gains

Parameter	**Description**	**Value** (default)
I03	Start Current Loop Kp	150
I04	Start Current Loop Ki	2000
I08	Run Current Loop Kp	150
I09	Run Current Loop Ki	2000

By default the Start and Run current loop gains are used, the auto tune current loop gains are calculated based on the motors parameters measured during the auto tune and recommended for operation however if the motor becomes acoustically noisy during operation the current loop Kp can be reduced by up to 50 %.

4.3.6.3 Diagnostics

If a drive trip occurs during an auto tune this could be due to a number of reasons e.g. the rotation of the motor phases or the position feedback device connections. Check wiring connections if required for the drive trip, and refer to the following brief descriptions and the diagnostics section for further details

- **Auto tune 1** The position feedback device position did not change during a rotating auto tune or the Motor did not reach the required speed
- **Auto tune 2** The position feedback direction is incorrect, Motor phases rotated, during a rotating auto tune or the Motor did not reach the required speed
- **Auto tune 3** The commutation signals changed in the incorrect direction during a rotating auto-tune or the measured inertia has exceeded the parameter range or the drive has been unable to identify the Motor inertia
- **Auto tune 4** A position feedback device with commutation signals is being used i.e AB Servo, SC Servo and the U commutation signal did not change during a rotating auto-tune
- **Auto tune 5** A position feedback device with commutation signals is being used i.e AB Servo, SC Servo and the V commutation signal did not change during a rotating auto-tune
- **Auto tune 6** A position feedback device with commutation signals is being used i.e AB Servo, SC Servo and the W commutation signal did not change during a rotating auto-tune
- **Auto tune 7** Initiated during a rotating auto-tune, if the number of Motor poles or the position feedback device resolution have been set up incorrectly where position feedback is being used

4.3.7 Distance & Speed Scaling, Mechanical data

Speeds, acceleration and distance can be set in normal units (mm/s, mm, mm/s^2). The scaling of these settings is done by setting the Mechanical data for the Lift in the following parameters

Parameter	Description	Value (default)
A28 / E01	Nominal Elevator speed mm/s	**1000 mm/s**
A29 / E02	Sheave diameter	**480 mm**
A30 / E03	Roping	**1 = 1:1**
A31 / E04	Gear ratio numerator (RFC-A)	**31**
A32 / E05	Gear ratio denominator (RFC-A)	**1**
A33 / E06	Nominal Elevator speed rpm	**…. rpm**

If mechanical data is not available adjust Nominal Elevator speed rpm **A33 / E07** with the data sheet value or the Motor nominal rpm.

4.3.8 Adjusting Maximum Speed

The maximum Motor speed **A34 / E08** is setup and automatically limited for the speed set-point as well as for the Nominal Elevator speed rpm of the lift **A33 / E07**. The maximum Motor speed **A34 / E08** calculated internally is equivalent of 110 % of Nominal Elevator speed and can be manually adjusted where required following initial set-up using **A33 / E07**.

4.3.9 Direction Invert

By activating the direction input invert **A11** / **H12** the travel direction can be inverted where the control signals to the drive are incorrect, without wiring changes

- Direction Input Invert
  A11 / H12 = Off (0) or On (1)

In addition the following parameters are also available to invert both the position feedback and output Motor phase rotation.

- Drive encoder feedback reverse (this feature cannot be used for SC.EnDat, SC.Hiperface or SC.SSI encoders)
  A17 / C12 = Off (0) or On (1)
- Reverse Motor phase sequence
  A27 / B26 = Off (0) or On (1)

4.3.10 Speeds Reference Settings

The Elevator control software offers up to a maximum of 10 speed selections. With DCP the speed selections are clearly defined as shown in the following table.

Parameter	Description	Setting (default)
A43 / G01	V1 Creep speed V0	50 mm/s
A44 / G02	V2 Releveling speed Vn	10 mm/s
A45 / G03	V3 Intermediate speed Vr	100 mm/s
A46 / G04	V4 Inspection speed Vi	300 mm/s
G05	V5 Low speed V1	500 mm/s
G06	V6 Medium speed V2	800 mm/s
G07	V7 Fast speed V3	1000 mm/s

4.3.11 Soft Start

This feature can be used to overcome starting friction for Elevators fitted with a gearbox, or systems fitted with guide rail pads rather than rollers resulting in a jerk during the start.

Parameter	Description	Setting (default)
A58 / G48	Start optimiser time	1000 ms
A59 / G47	Start optimiser jerk	10 mm/s^3 x 10
A60 / G46	Start optimiser speed	10 mm/s
A61 / G45	Start optimiser enable	Off (0) or On (1)

4.3.12 Profile Parameters

For the Elevator system profile there are a number of different settings including acceleration, deceleration rates, jerk settings and Creep stop optimisation as detailed following.

Parameter	Description	Setting (default)
A35 / G13	Run jerk 1	50 mm/s^3 x 10
A36 / G14	Run jerk 2	100 mm/s^3 x 10
A37 / G15	Run jerk 3	100 mm/s^3 x 10
A38 / G16	Run jerk 4	80 mm/s^3 x 10
A39 / G18	Creep stop jerk	100 mm/s^3 x 10
A40 / G11	Acceleration rate	500 mm/s^3
A41 / G12	Deceleration rate	800 mm/s^3
A42 / G17	Creep stop deceleration rate	1000 mm/s^3

4.3.13 Brake Control Delay Times

Using the drives adjustable brake control delay times the brake operation can be optimised. The target is to have a continuous and fast transition from standstill to travel and onto stop without any jerk impacting on the ride quality.

Parameter	Description	Setting (default)
A47 / D04	Brake control release delay	500 ms
A48 / D05	Brake control apply delay	500 ms

In addition to the brake control release and apply delays above there is an additional parameter which defines the time taken to build torque during the start, prior to brake release, and releasing the load from the motor to the Motors mechanical brake during the stop as follows, preventing acoustic noise during operation

Parameter	Description	Setting (default)
D02	Motor torque ramp time	100 ms
D32	Motor torque ramp down time	100 ms

4.3.14 Current Control Loop Gains

The current loop gains are automatically set-up during the auto tune and normally no further adjustment is required with these being set-up based upon the Motors parameters (stator resistance and inductance). As default dual current loop gains are used, Start and Run.

Parameter	**Description**	**Value** (default)
I03	Start Current Loop Kp	150
I04	Start Current Loop Ki	2000
I08	Run Current Loop Kp	150
I09	Run Current Loop Ki	2000

The auto tune current loop gains are calculated based on the motors parameters measured during the auto tune and recommended for operation however if the motor becomes acoustically noisy during operation the current loop Kp can be reduced by up to 50 %.Reducing the current loop proportional Kp gain can provide damping of high frequency noise overcoming Motor acoustic noise.

4.3.15 Current Demand Filter

Using the current demand filter time constants it is possible to damp control noise, position feedback induced noise and quantisation at the Motor to overcome Motor acoustic noise. For the Elevator drive there are filters available to support Start and Run. Values in the region of 1.0 to 5.0 ms are typical.

Parameter	**Description**	**Setting** (default)
A51 / I05	Start current loop filter	1.0 ms
A54 / I10	Run current loop filter	1.0 ms

4.3.16 Speed Control Loop Gains

The speed loop gains are adjusted separately for the Start and Run. The optimal values for high ride quality are dependent upon the Motor, Position feedback device and installation along with the Mechanics of the Lift. The values below are basic values for geared induction Motors and gearless PM Motors with high resolution position feedback devices, installed correctly, these values could be increased by up to 10…20 times.

Parameter	**Description**	**Setting** (default)
A49 / I01	Start Speed Loop Kp	1.0000 s/rad
A50 / I02	Start Speed Loop Ki	20.00 s^2/rad
A52 / I06	Run Speed Loop Kp	0.5000 s/rad
A53 / I07	Run Speed Loop Ki	10.00 s^2/rad
C09	Encoder Feedback Filter	Disabled (0)

In addition to the Start and Run speed loop gain settings there is a Drive encoder speed feedback filter **C09** which may be required for systems where there is noise present on the speed feedback from the position feedback device due to the installation, or where a low resolution position feedback device is being used and there is quantisation present. These effects unless overcome will result in limited speed loop gain settings.

4.3.17 Start Locking Position Loop

The Start locking position controller applies compensation during starting preventing movement during start brake release, roll back and jerk in the Lift car when the Motor brakes are opened. In order to get the best performance from the Start locking position control and Lift control a high resolution position feedback device should be used (for example ECN 413, ECN 1313). The P gain

value given is a basic value and will require some adjustment to reach the optimal value which is also dependent upon the Start speed loop gain settings, position feedback device resolution and installation.

In order to get the best performance during starting without roll-back, and also preventing brake noise **I23** Start Lock Position Change Max can be set-up and adjusted for example from 0.25…0.50 %.

Parameter	**Description**	**Setting** (default)
A55 / I22	Start Lock Enable	Off (0) or On (1)
A56 / I21	Start Lock P Gain Speed Clamp	100.000 mm/s
A57 / I20	Start Lock P Gain	50.000
I23	Start Lock Position Change Max	0.00 %

4.4 First Test

To check the control of the Lift and the direction of movement of the Lift car carry out a travel with **A46 / G04** V4 Inspection speed Vi and observe the direction of movement of the Lift car.

- Display **J23** Percentage load
- Start Inspection travel
- Check **J23** Percentage load > 0
- Check correct movement, direction of Motor and Lift car

Display “Run” does not occur

- Check control terminal T26 (Run) input and **F05** T26 Digital I/O 03 State
- Check T31 (Safe Torque Off (STO), Drive enable) input and F10 T31 STO Input State
- Check DCP interface

No movement of the Motor during the start

- Check **J09** Reference parameter selected
- **J09** Reference parameter selected = No Selection
- Check control interface to Elevator drive and settings
- Ensure Start Optimser Speed **G48** > Brake Release Frequency **D08**

J23 Percentage Load = 0

- Check output Motor contactor control from the Elevator drive **B31** or Lift (Elevator) controller and control interface

Elevator drive trips **Speed err** or **Distance err**

- Check **Speed err** threshold in parameter **H15** and **Distance err** threshold in parameter **H16** are set correctly
- Check both Motor and Encoder connections
- Check and ensure correct Position Feedback Phase Angle **A16 / C13**
- Check speed loop gain settings

Parameter	**Description**
A49 / I01	Start Speed Loop Kp
A50 / I02	Start Speed Loop Ki
A52 / I06	Run Speed Loop Kp
A53 / I07	Run Speed Loop Ki

Elevator drive trips **Motor Too Hot**

- Check Motor loading and counter balance
- Check and ensure correct Position Feedback Phase Angle **A16 / C13** is correct

High Motor acoustic noise (gearless Lift and PM Motor)

- Reduce value of current loop Kp gain for Start, and Run
  The current loop Kp gain can be reduced by up to a maximum of 50 % in steps of 10 %

Parameter	Description
I03	Start Current Loop Kp
I08	Run Current Loop Kp

Motor rotates a short distance and stops with **J24** Torque producing current > 0

- Check Motor poles in **A20 / B05**
- Check position feedback lines per revolution **A14 / C03**

If Motor rotates in the opposite direction to the demanded direction for the travel

- Set **A11 / H12** Direction input invert = Off (0) or On (1)

For closed loop RFC-A operation with an induction Motor or RFC-S operation with a PM Motor and where poor Motor control, operation can be seen

- Check encoder connections to the drive, screening and termination of the position feedback cable

Other Elevator drive issues, trips

- Refer to the diagnostics section

Where no Elevator drive trips, issues are seen and stable operation in the correct direction at **A46 / G04** V4 Inspection speed Vi continue optimisation of the Elevator drive speed loop gain settings

Parameter	Description
A49 / I01	Start Speed Loop Kp
A50 / I02	Start Speed Loop Ki
A52 / I06	Run Speed Loop Kp
A53 / I07	Run Speed Loop Ki

Diagnostic parameters which can be used during the First Test are as follows

Parameter	Description	Setting
A06 / J40	Actual speed	… mm/s
J09	Reference parameter selected	… V1 – V7
A46 / G04	V4 Inspection speed Vi	… mm/s
J23	Percentage load	… %
AC19	DCP Process Data Messages Per Second	… 1/s

4.4.1 Adjusting Speed Loop Gains

The default speed loop gain values provide acceptable out of box operation, and adjustment will be required to the speed loop gain settings to reach improved performance. It is recommended that **A46 / G04** V4 Inspection speed Vi is used during tuning of the speed loop gains.

Parameter	Description
A49 / I01	Start Speed Loop Kp
A50 / I02	Start Speed Loop Ki
A52 / I06	Run Speed Loop Kp
A53 / I07	Run Speed Loop Ki

Start speed loop gains

Tuning the Start Speed Loop Ki gain

- Increase the value of **A50** / **I02** Start Speed Loop Ki (default value 20.00) in steps of 1.00 until Motor becomes noisy or unstable to prevent movement, roll back on brake release

If Motor becomes noisy

- Increase **A51 / I05** Start current loop filter to between 2... 6 ms

If Motor becomes unstable

- Reduce **A50 / I02** Start Speed Loop Ki value in steps of 1.00

Setting the Start Speed Loop Kp gain

- The default value for **A49 / I01** Start Speed Loop Kp is 1.000) optimise if during start if there is undershoot or vibration

Undershoot on start of profile

- Increase **A49 / I01** Start Speed Loop Kp in steps of 0.500

Vibration on start of profile

- Reduce **A49 / I01** Start Speed Loop Kp in steps of 0.100

Run speed loop gains

Tuning the Run Speed Loop Kp gain

- Increase **A52 / I06** Run Speed Loop Kp (default value 0.5000) in steps of 0.1000 until Motor becomes noisy or unstable to overcome overshoot at the end of acceleration or vibration during constant speed

If Motor becomes noisy

- Increase **A54 / I10** Run current loop filter to between 2... 6 ms

If Motor becomes unstable

- Reduce **A52 / I06** Run Speed Loop Kp by up to 60 % of the value in steps of 10 %

Setting the Run Speed Loop Ki gain

- Set the value of **A53 / I07** Run Speed Loop Ki (default value 10.00) = 10 x **A52 / I06** Run Speed Loop Kp value

The current loop filters ca\n be used to overcome control noise, position feedback noise and quantisation overcoming Motor acoustic noise

Parameter	**Description**	**Setting** (default)
A51 / I05	Start current loop filter	1.0 ms
A54 / I10	Run current loop filter	1.0 ms

4.4.2 Further Optimisation

Further optimisation can be carried out to achieve a fast, smooth travel meeting the ride quality of the customer based upon their Lift system. In addition to the ride comfort felt within the Lift car during optimisation, CT Scope can also be used to further examine the Elevator travel and control.

Optimisation of the Lift should be carried out with a range of travels, including single and multiple floor travels with an empty and full Lift car. Also refer to the Elevator drive Design guide and Parameter Reference Guide detailed descriptions of the software functions and further optimisation.

Modifying the profile parameters during further optimisation can lead to the Lift car not reaching maximum speed or overshooting the floor levels and reaching limit switches and. or end stops.

4.4.3 Brake Release

Jerk and movement of the Motor sheave when the Motor brakes open

- Increase **A57 / I20** Start Lock P Gain for faster response on brake release until control noise / instability appears where **A51 / I05** can be adjusted, increased to overcome Motor noise.
- Increase **A50 / I02** Start Speed Loop Ki for stiffer control and maintaining zero speed.

If Jerk and movement of the Motor sheave is still present

- Increase **A57 / I20** Start Lock P Gain further along with **A66** / **I21** Start Lock P Gain Speed Clamp for the start locking position control
- If vibrations start to occur with the higher gain setting reduce **A57 / I20** Start Lock P Gain in steps of 1.00 from the current setting.

Parameter	Description	Setting
A55 / I22	Start Lock Enable	Off (0) or On (1)
A56 / I21	Start Lock P Gain Speed Clamp	100.000 mm/s
A57 / I20	Start Lock P Gain	50.000
I23	Start Lock Position Change Max	0.0

4.4.4 Brake Release & Controlled Start

Jerk during start following Motor brake release

- Decrease **A35 / G13** Run Jerk 1 to introduce a softer, slower start profile.

If there are high levels friction during the start

- The Start Optimiser can be enabled with **A61 / G45** Start Optimiser Enable. The active time for the Start Optimiser can be increased with **A58 / G48** Start Optimiser Time, if the start takes too long, reduce **A58 / G48** Start Optimiser Time.

If the profile has starting against the Motors brakes

- Increase **A47 / D04** Brake Control Release Delay time. If the Motor is at standstill following Motor brake release reduce **A47 / D04** Brake Control Release Delay time

4.4.5 Start & Acceleration

Overshoot or undershoot following start to acceleration to profile speed

- Decrease **A36 / G14** Run Jerk 2 for a soft controlled transition from acceleration to end of acceleration and onto travel.
- Increase **A36 / G14** Run Jerk 2 for a harder transition from acceleration to end of acceleration and onto travel.

Vibrations during constant acceleration

- Check to see if the drive is operating in current limit, **L15** Current Limit Reached = On (1)

If the drive is operating in current limit

- Increase **A24 / B16** Symmetrical Current Limit where to low and still possible to increase further
- Reduce acceleration ramp time in **A40 / G11** Acceleration Rate

4.4.6 Constant Speed

Vibrations present in the Lift car during constant speed travel up to deceleration

- Increase **A52 / I06** Run Speed Loop Kp to provide a faster response
- Increase **A53 / I07** Run Speed Loop Ki to provide stiffer control

If Motor acoustic noise increases

- Optimise **A54 / I10** Run Current Loop Filter, maximum 6 ms
- If instability reduce **A53 / I07** Run Speed Loop Ki

4.4.7 Deceleration

Adjusting deceleration distance (operating in DCP3 mode)

Increase the deceleration distance by

- Rreducing **A40 / G11** Acceleration Rate to be slower
- And / or reduce **A36 / G14** Run Jerk 2 to be softer

Decrease deceleration distance by

- Increasing **A40 / G11** Acceleration Rate to be faster
- And / or reduce **A36 / G14** Run Jerk 2 to be harder

4.4.8 Approaching Stop

Stopping with a jerk at the end of the profile

- Reduce **A38 / G16** Run Jerk 4 to provide a softer transition to stop at the end of travel

Movement of the Motor sheave during Motor brake apply

- Check the drives enable state in the Lift controller and ensure this is not too soon

L06 Drive Active

- Increase **A48 / D05** Brake Control Apply Delay to maintain Motor torque whilst Motor brakes fully close

4.5 Save Parameter Settings

4.5.1 Save Elevator Drive Parameter Settings

To save parameters in the Elevator drive use the following procedure

- Save drive parameters
  ... **mm.nn** = Save parameters
  ... Reset button
  ... Wait 3 s
- Save drive parameters
  ... **mm.nn** = 1001
  ... Reset button
  ... Wait 3 s

4.5.2 Save Elevator Drive Parameter Settings To Smart Card, NV Media Card

To save the Elevator drive parameters to the Smart Card, NV Media Card the following two options are available

- A save can be carried out setting **A03 / N01** Parameter Cloning = Program + Reset, Wait 3 s

Programs all drive parameters to the NV Media Card

NOTE
Overwrites any data already in data block 1

A03 / N01 Parameter Cloning = Program

- An Auto save can be carried out setting **A03 / N01** Parameter Cloning = Auto + Reset Button

Drive automatically writes to the NV Media Card when a parameter save is performed

A03 / N01 Parameter Cloning = Auto

5 User Menu A

Parameter		Parameter Description	Setting
A00		Parameter 00 for code entry	No Action (0), Save parameters (1), Load file 1 (2), Save to file 1 (3), Load file 2 (4), Save to file 2 (5), Load file 3 (6), Save to file 3 (7), Show non-default (8), Destinations (9), Reset 50 Hz defs (10), Reset 60 Hz defs (11), Reset modules (12) Read enc. NP P1 (13), Read enc. NP P2 (14)
A02	H02	Drive Control Mode	Open loop (1), RFC-A (2), RFC-S (3)
A10	H11	Control Input Mode	Analog Run Prmit (0), Analog 2 Dir (1), Priority 1 Dir (2), Binary 1 Dir (3), Priority 2 Dir (4), Binary 2 Dir (5), Control Word (6) DCP3 (7) DCP4 (8)
A12	C01	Drive Encoder Type	AB (0), FD (1), FR (2), AB Servo (3), FD Servo (4), FR Servo (5), SC (6), SC Hiperface (7), EnDat (8), SC EnDat (9), SSI (10), SC SSI (11), SC Servo (12), BiSS (13), SC SC (15), Commutation Only (16)
A13	C02	Drive Encoder Auto Configuration Select	Disabled (0) or Enabled (1)
A14	C03	Drive Encoder Rotary Pulses Per Revolution	1 to 100,000 ppr
A15	C04	Drive Encoder Voltage Select	5 V (0), 8 V (1), 15 V (2)
A62	B06	Motor Rated Frequency	0.0 to 550.0
A18	B02	Motor Rated Current	+ VM_RATED_CURRENT A
A19	B03	Motor Rated Voltage	+ VM_AC_VOLTAGE_SET V
A20	B04	Number Of Motor Poles	Automatic (0) to 480 Poles (240)
A63	B07	Rated Speed	0.00 to 33000.00
A64	B20	Motor Thermal Time Constant 1	0.0 to 3000.0
A65	B04	Motor Rated Power Factor	0.000 to 1.000
A16	C13	Position Feedback Phase Angle	0.0 to 359.9°
A25	B13	Maximum Switching Frequency	2 kHz (0), 3 kHz (1), 4 kHz (2), 6 kHz (3), 8 kHz (4) 12 kHz (5), 16 kHz (6)
A24	B16	Symmetrical Current Limit	± VM_MOTOR1_CURRENT_LIMIT %
A26	B11	Motor Auto tune	None (0), Static (1), Rotating (2) Inertia 1 (3) Inertia 2 (4) Full Stationary (5)
A29	E02	Sheave Diameter	1 to 32,767 mm
A30	E03	Roping	1:1 (1), 2:1 (2), 3:1 (3), 4:1 (4)
A32	E05	Gear Ratio Denominator	1 to 32767
A31	E04	Gear Ratio Numerator	1 to 32767
A28	E01	Nominal Elevator Speed mm/s	0 to 4000 mm/s
A33	E07	Nominal Elevator Speed Rpm	1.00 to 4000.00 rpm
A34	E08	Motor Maximum Frequency Speed Clamp	1.1 x **A33 / E07**
A11	H12	Direction Input Invert	Off (0) or On (1)
A43	G01	Creep Speed V1	0 to *Nominal Elevator Speed* (**A28**)
A44	G02	Releveling Speed Vn	0 to *Nominal Elevator Speed* (**A28**)
A45	G03	Intermediate Speed Vz	0 to *Nominal Elevator Speed* (**A28**)
A46	G04	Inspection Speed Vi	0 to *Nominal Elevator Speed* (**A28**)
A65	G05	Low Speed V1.	0 to *Nominal Elevator Speed* (**A28**)

Parameter		Parameter Description	Setting
A66	G06	Medium Speed V2	0 to *Nominal Elevator Speed* (**A28**)
A67	G07	Fast Speed V3	0 to *Nominal Elevator Speed* (**A28**)
A58	G48	Start Optimiser Time	0 to 10000 ms
A40	G11	Acceleration Rate	0 to 10000 mm/s²
A41	G12	Deceleration Rate	0 to 10000 mm/s²
A35	G13	Run Jerk 1	1 to 65535 mm/s³ x10
A36	G14	Run Jerk 2	1 to 65535 mm/s³ x10
A37	G15	Run Jerk 3	1 to 65535 mm/s³ x10
A38	G16	Run Jerk 4	1 to 65535 mm/s³ x10
A47	D04	Brake Control Release Delay	0 to 10000 ms
A48	D05	Brake Control Apply Delay	0 to 10000 ms
A51	I05	Start Current Loop Filter	0.0 to 25.0 ms
A54	I10	Run Current Loop Filter	0.0 to 25.0 ms
A68	I03	Start Current Loop Kp	0 to 30000
A69	I08	Run Current Loop Kp	0 to 30000
A49	I01	Start Speed Loop P Gain	0.0000 to 200.0000 s/rad
A50	I02	Start Speed Loop I Gain	0.00 to 655.35 s2/rad
A52	I06	Run Speed Loop P Gain	0.0000 to 200.0000 s/rad
A53	I07	Run Speed Loop I Gain	0.00 to 655.35 s2/rad
A57	I20	Start Lock P Gain	0.000 to 1000.000
A70	J24	Torque Producing Current	±VM_DRIVE_CURRENT A
A06	J40	Actual Speed	0 to 10000 mm/s
A71	J09	Reference Parameter Selected	0 to 10
A72	Keypad.00	Keypad Language: English / German	Press  and  on keypad to access Keypad menu
A73	J04	Firmware Version	to 99999999

6 Diagnostic

6.1 Trip Codes and corrective actions

The E300 Elevator drive protects itself, the control environment and Motor by many monitoring functions and operating levels. If the monitor system detects a problem, a trip is initiated. To identify the causes of a trip refer to the following diagnostics section, the Elevator drive Design Guide and Parameter Reference Guide.

Trip	Description / Recommended action
Autotune 1	**Position feedback did not change or required speed could not be reached**
11	The drive has tripped during a rotating auto tune. **Recommended actions:** • Ensure the motor is free to turn i.e. mechanical brake was released • Ensure **C01** Drive Encoder Type is set correctly • Check feedback device wiring is correct • Check encoder mechanical coupling to the motor
Autotune 2	**Position feedback direction incorrect**
12	The drive has tripped during a rotating auto tune. **Recommended actions:** • Check motor cable wiring is correct • Check feedback device wiring is correct • Check setting of **C12** Drive Encoder Feedback Reverse • Rotate motor phases **B26**
Autotune 7	**Motor number of poles / position feedback resolution set incorrectly**
17	An Auto tune 7 trip is initiated during a rotating auto tune, if the motor poles or the position feedback resolution have been set up incorrectly where position feedback is being used. **Recommended actions:** • Check line per revolution for feedback device **C03** • Check the number of poles **B05**
Autotune No Dir	**Direction signal not received when starting an auto tune**
78	Direction signal not given while attempting to perform auto tune. A direction signal must be given within 6 s of drive enable **Recommended actions:** • Check Direction Input 1 **G39** and Input 2 **G40** ensuring a direction signal is received. • Check control wiring is correct. • Check control wiring is undamaged. • Check control sequence from Lift (Elevator) controller

Trip	Description / Recommended action
Autotune Stopped	**Auto tune test stopped before completion**
18	The drive was prevented from completing an auto tune test, because the Safe Torque Off (STO), Drive enable, Fast Disable or the Run command were removed. **Recommended actions:** • Check the Safe Torque Off (STO), Drive enable signal on T.31 is active **F10** • Check the Fast stop is active, where used • Check the direction command is active **G39**, **G40**
Brk Ctrl Release	**Conditions not met for Motor brake release during start**
68	The brake release control conditions were not met within 6 s to transition from state 3 to 4. **Recommended actions:** • Check motor torque ramp time in Motor Torque Ramp Time **D02** • Check correct motor map settings • Check Motor Magnetized Indication **D01** • Check motor contactor control • Check motor electrical connections • Check the Brake release threshold set by Upper Current Threshold **D06**, Lower Current Threshold **D07** and Brake Release Frequency **D08**
Brake Contact	**Motor brake contacts detected in the incorrect state**
72	This trip indicates that there has been a brake contact error. This trip can only happen when brake monitoring is enabled, where Brake contact monitoring select **D11** > None (0). This trip is detected where the brake monitoring feedback does not follow the Brake Control Output **D03** for the Brake Contact Monitoring Time **D14** seconds. This is a delayed trip where the travel will complete before the drive trips where possible. If a fault has been detected during travel Global Warning **L04** = On (1) indicating the delayed trip at end of the travel. Once a Brake Contact trip has occurred and Brake Contact Monitoring has been selected for Unintended Car Movement (UCM) Brake Contact Monitoring Select **D11** = 1 + UCM to 1, 2, 3 & 4 + UCM the trip can only be cleared by setting **mm.nnn** to 1298 in line with the requirements of EN 81-20 and EN 81-50 **Recommended actions:** • Check Motor brake contact feedback is connected as required from inputs 1 to 4 • Check monitoring is configured correctly in Brake Contact Monitoring Select **D11** • Check correct Motor brake contact operation at Motor brakes • Check operating times for Motor brake contacts, Brake Contact Monitoring Time **D14**

Trip	Description / Recommended action
Brake R Too Hot	**Braking resistor overload timed out (I^2t)**
19	The Brake R Too Hot indicates that braking resistor overload has timed out. The value in Braking Resistor Thermal Accumulator **D17** is calculated using Braking Resistor Rated Power **D15**, Braking Resistor Thermal Time Constant **D16** and Braking Resistor Resistance **D18**. The Brake R Too Hot trip is initiated when Braking Resistor Thermal Accumulator **D17** reaches 100 %. **Recommended actions:** • Ensure the values entered are correct • If an external thermal protection device is being used and the braking resistor software overload protection is not required, set **D15**, **D16** or **D18** = 0 to disable the function.
Card Access	**NV Media Card Write fail**
185	The Card Access trip indicates that the drive was unable to access the NV Media Card. If the trip occurs during the data transfer to the card the file being written may be corrupted. If the trip occurs when the data is being transferred to the drive the data transfer may be incomplete. If a parameter file is transferred to the drive and this trip occurs during the transfer, the parameters are not saved to non-volatile memory, and so the original parameters can be restored by powering the drive down and up again. **Recommended actions:** • Check NV Media Card is installed / located correctly • Replace the NV Media Card
Card Data Exists	**NV Media Card data location already contains data**
179	The Card Data Exists trip indicates that an attempt has been made to store data on a NV Media Card in a data block which already contains data. **Recommended actions:** • Erase the data in data location • Write data to an alternative data location
Card Compare	**NV Media Card file/data is different to the one in the drive**
188	A compare has been carried out between a file on the NV Media Card, a Card Compare trip is initiated if the parameters on the NV Media Card are different to the drive. **Recommended actions:** • Set parameter **mm.nnn** = 0 and Reset the trip • Check to ensure the correct data block on the NV Media Card has been used to compare

Trip	Description / Recommended action
Card Drive Mode	**NV Media Card parameter set not compatible with current drive mode**
187	The Card Drive Mode trip is produced during a compare if the drive mode in the data block on the NV Media Card is different from the current drive mode. This trip is also produced if an attempt is made to transfer parameters from a NV Media Card to the drive if the operating mode in the data block is outside the allowed range of operating modes. **Recommended actions:** • Ensure the destination drive supports the drive operating mode in the parameter file. • Clear the value in parameter **mm.nnn** and Reset the drive • Ensure destination drive operating mode is the same as the source parameter file
Card Full	**NV Media Card full**
184	The Card Full trip indicates that an attempt has been made to create a data block on a NV Media Card, but there is not enough space left on the card. **Recommended actions:** • Delete a data block or the entire NV Media Card to create space • Use a different NV Media Card
Card No Data	**NV Media Card data not found**
183	The Card No Data trip indicates that an attempt has been made to access non-existent file or block on a NV Media Card. **Recommended actions:** • Ensure data block number is correct
Card Rating	**NV Media Card voltage, or current rating of source and destination drive are different**
186	The Card Rating trip indicates that parameter data is being transferred from a NV Media Card to the drive, but the current and, or voltage are different between source and destination drive. This trip also applies if a compare (using parameter **mm.nnn** set to 8yyy) is attempted between the data block on a NV Media Card and the drive. The Card Rating trip does not stop the data transfer but is a warning that rating specific parameters with the RA attribute may not be transferred to the destination drive. **Recommended actions:** • Reset the drive to clear the trip • Ensure drive rating dependent parameters have transferred correctly

Trip	Description / Recommended action
Card Product	**NV Media Card data blocks are not compatible with the drive derivative**
175	The Card Product trip is initiated either at power up or when the card is accessed, if Drive Derivative **J96** is different between the source and target drives. The trip can be reset and data transferred in either direction between the drive and card **Recommended actions:** • Use a different NV Media Card • This trip can be suppressed by setting parameter **mm.nnn** to 9666 and Reset the drive
Card Read Only	**NV Media Card has the Read Only bit set**
181	The Card Read Only trip indicates that an attempt has been made to modify a read-only NV Media Card or a read-only data block. A NV Media Card is RO when the RO flag is set. **Recommended actions:** • Clear the read only flag by setting parameter **mm.nnn** to 9777 and Reset the drive. This will clear the read-only flag for all data blocks in the NV Media Card
Current On Stop	**Current flowing at drives output at end of travel, prior to opening motor contactors**
67	The current at the drives output has not decayed after a stop. Total Output Current **J22** > 25 % of the Motor rated current after 4 s in State 14 (end of travel and motor contactor control) **Recommended actions:** • Check control signals from Elevator controller to Elevator drive ensuring travel complete • Check Motor brakes applied as requested, correct Motor brake operation
DCP Initialise	**DCP initialization error from the Elevator controller**
130	A DCP x0xx1001 command word message has been received from the Elevator controller before extended communications have been initialised. **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface • Refer to controller supplier
DCP4 Distance	**Remaining distance error detected in DCP4 mode from the Elevator controller**
131	DCP4 control mode is selected and a valid remaining distance reference has not been received from the Elevator controller for DCP4 Remaining Distance Time **AC06** ms **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface • Refer to controller supplier

Trip	Description / Recommended action
DCP Dir Change	**Direction changed incorrectly during travel**
132	DCP travel was in progress and a speed selection message was received from the Elevator controller changing the direction of travel from the one accepted at the beginning of travel. **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface • Refer to controller supplier
DCP CRC	**Bad CRC detected during travel from Elevator controller**
133	A DCP travel was in progress and a bad CRC was detected in the last 10 messages from the Elevator controller. **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface. • Check EMC compliance of power & signal cables wiring
DCP Transmit	**DCP transmit error from Elevator controller**
134	A DCP travel was in progress and the last 10 messages sent from the drive to the Elevator controller were reported by the Elevator controller to be received with an error e.g. CRC. **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface. • Check EMC compliance of power & signal cables wiring
DCP Wire Break	**Wire break detected during a travel**
135	A travel was in progress and DCP Wire-break Trip Enable **AC02 =** On (1) and 10 consecutive DCP messages have not been received in 150 ms or less. **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface • Check EMC compliance of power & signal cables wiring
DCP Bad Sequence	**DCP control error from Elevator controller**
136	Travel in progress and an incorrect sequence of Elevator controller command word messages has been received. **Recommended actions:** • Check DCP communication quality, wiring of the DCP interface. • Check controller approval for DCP operation with E300. • Refer to controller supplier.
Destination	**Two or more parameters are writing to the same destination parameter**
190	The Destination trip indicates that multiple parameters are writing to the same parameter. **Recommended actions:** • Set parameter **mm.nnn** to 'Destinations' or 12001 and check all visible parameters in all menus for parameter write conflicts

Trip	Description / Recommended action
Dir Changed	**Direction signal from elevator controller changed during travel**
76	The direction input signal has changed from the original selection in either single or dual direction input modes, and a controlled stop occurs. This is a delayed trip where the travel will complete. If a delayed trip has been scheduled during travel then Global Warning **L04** = On (1) indicating a trip will be generated on travel complete. **Recommended actions:** • Check drive control connections and sequence from Lift controller to Elevator drive • Check control from Lift Elevator controller to Elevator drive during operation • Check correct set-up of the drive control for the Elevator controller, Control Input Mode **H11**
Distance Err	**Excessive distance error during travel**
63	RFC-A and RFC-S, this trip indicates a distance error greater than the level defined in Maximum Distance Error Threshold **H16**. The distance error detection is the integral of the difference between Profile Speed **J39** and Actual Speed **J40** for closed loop operation. The calculated distance error is compared to the user defined distance error threshold in Maximum Distance Error Threshold **H16** and where this is exceeded a trip is generated. The distance error is displayed in Maximum Distance Error **J56** independent of the activation of the distance error detection and is reset to zero at the start of each travel. **Recommended actions:** **Motor** • Check motor power connections • Check motor phase rotation • Check motor brake control **Position feedback** • Check position feedback mechanical mounting • Check position feedback phase rotation • Check position feedback wiring arrangement, risk of induced noise • Position feedback device failure, replace feedback device **Drive set-up** • Check motor details and parameter set-up, including current limit • Check position feedback device parameter set-up • Check position feedback device phase offset, static auto tune has been completed • Check speed control loop gain settings where motor instability exists • Increase the maximum distance error threshold • Maximum Distance Error Threshold **H16** = 0 disables the distance error detection

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>Encoder 1</td><td>Drive position feedback interface power supply overload</td></tr>
<tr><td>189</td><td>The Encoder 1 trip indicates the encoder power supply has been overloaded. Terminals 13 &14 on the 15 way D type connector can supply a maximum current of 200 mA @ 15 V or 300 mA @ 8 V and 5 V.

Recommended actions:
• Check encoder power supply wiring
• Disable the termination resistors C05 = 0 to reduce current consumption
• Check encoder specification, compatibility against the drive encoder power supply rating
• Replace the encoder
• Use an external power supply with higher current capability</td></tr>
<tr><td>Encoder 2</td><td>Drive position feedback wire break</td></tr>
<tr><td>190</td><td>The Encoder 2 trip indicates that the drive has detected a wire break on the 15 way D-type connector on the drive. The exact cause of the trip can be identified from the sub-trip number.

<table><tr><th>Sub-trip</th><th>Reason</th></tr><tr><td>1</td><td>Drive position feedback interface 1 on any input</td></tr><tr><td>11</td><td>Drive position feedback interface 1 on the A channel</td></tr><tr><td>12</td><td>Drive position feedback interface 1 on the B channel</td></tr></table>
Recommended actions:
• Ensure that the position feedback device type selected in C01 is correct
• If wire break detection is not required set C21 = 0000000 (disables Encoder 2 trip)
• Check cable continuity
• Check wiring of feedback signals is correct
• Check encoder power supply is set correctly C01
• Replace encoder</td></tr>
<tr><td>Encoder 3</td><td>Phase offset incorrect while running</td></tr>
<tr><td>191</td><td>The Encoder 3 trip indicates that the drive has detected an incorrect UVW phase angle while running (RFC-S mode) or SinCos phase error.

Recommended actions:
• Check encoder shield connections
• Ensure the encoder cable is one uninterrupted cable
• Check the encoder signal for noise with an oscilloscope
• Check the integrity of the encoder mechanical mounting
• Ensure phase rotation of UVW commutation signals is the same as phase rotation of motor
• For a SinCos encoder, ensure motor and incremental SinCos connections are correct, for forward rotation of motor, encoder rotates clockwise (looking at the shaft of the encoder)
• Repeat the offset measurement test</td></tr>
</table>

Trip	Description / Recommended action
Encoder 4	**Feedback device comms failure**
192	The Encoder 4 trip indicates that the encoder communications has timed out or the communications position message transfer time is too long. **Recommended actions:** • Ensure the encoder power supply setting **C04** is correct • Complete encoder auto-configuration **C02** • Check the encoder wiring • Replace the feedback device
Encoder 7	**Set-up parameters for position feedback device have changed**
195	The Encoder 7 trip indicates that the set-up parameters for the position feedback device have changed. **Recommended actions:** • Reset the trip and perform a save. • Ensure **C07** and **C08** are set correctly, action encoder auto-configuration **C02** = Enabled
Encoder Not Init	**Encoder initialisation failure**
84	The drive's encoder interface has not initialized prior to travel. This may be because the drive enable was applied to soon where the encoder has an older / slower comms interface. Drive Encoder Additional Power Up Delay **C10** can allow extra time for the encoder comms to initialize. Position Feedback Initialize **C18** can be used to manually initialize the feedback, and Position Feedback Initialized Indication **C19** indicates the initialization status. **Recommended actions:** • Ensure the encoder is connected correctly • Ensure that the encoder is compatible • Ensure Elevator controller does not enable drive before the encoder is initialised
Fast Disable Err	**Fast disable control sequence error**
65	The Fast disable input sequence is incorrect i.e. the Fast disable input does not become active, On (1) following brake apply and after 4 s, or the Fast disable input failed to turn Off (0) after 6 s during the start whilst waiting for the Safe Torque Off (STO), Drive enable. **Recommended actions:** • Check the control wiring arrangement (default T.27) Fast disable input • Check T27 Digital Input 04 State **F06** during operation and sequence Off (0) or On (1) • Disable the Fast disable input by setting Fast Disable **B27** to **A00**

Trip	Description / Recommended action
Fast Start En	**Fast start enable sequence error**
80	Fast start enable trip occurs where the Fast Start Enable **H20** = On (1) and remains active after 4 s in state 14 at the end of the travel. **Recommended actions:** • To prevent this trip the Fast start enable input must be set = Off (0) at the end of the travel where the motor contactors are opened or the Safe Torque Off (STO), Drive enable is removed
Fast Start Err	**Fast start sequence monitored distance move error**
69	The Fast start monitoring distance in mm specified by Fast Start Monitoring Distance **H21** has been reached and the drive has been tripped to apply the brake and prevent further movement. **Recommended actions:** • Check movement of Lift car on brake release during the Fast start • For example check Lift car loading, rope slip, rope stretch • Check position holding by the drive, check torque limitation and load compensation
Freeze Protect	**Freeze protection limit exceeded**
60	Freeze Protection Threshold **H28** has been exceeded. This parameter is provided to prevent operation of the drive is sub-zero temperatures. This is a delayed trip, where the travel will complete before the drive will trip. If a delayed trip has been scheduled during the travel Global Warning **L04** = On (1) indicating trip scheduled at end of travel **Recommended actions:** • Check the temperature setting in Freeze Protection Threshold **H28** • Check the actual temperature in Monitored Temperature 3 **J73** • Provide heating, air conditioning, ventilation to support allowable operating temperature
Feedback Rev	**Encoder feedback is reversed**
64	The encoder feedback is reversed with regards to Motor U, V, W connections, and rotation **Recommended actions:** • Check power connections to Motor and rotation • Rotate Motor phase rotation with Reverse Motor Phase Sequence **B26** • Check correct encoder feedback connections to the drive • Rotate feedback rotation with Drive Encoder Feedback Reverse **C12** • Note the setting of **A11** Direction Input Invert **H12** when changing any settings

Trip	Description / Recommended action
I/O Overload	**Digital output overload**
26	The I/O Overload trip indicates the total current drawn from 24 V user supply or the digital output has exceeded the limit. A trip is initiated if one or more of the following conditions is true: **Date Code < 1724** • Maximum output current from one digital output > 100 mA • The combined maximum output current from outputs 1 and 2 > 100 mA • The combined maximum output current from output 3 and +24 V output > 100 mA **Date Code ≥ 1724** • Maximum output current from one digital output is > 200 mA. • The combined maximum output current from outputs 1 and 2 > 200 mA • The combined maximum output current from output 3 and +24 V output is > 200 mA **Recommended actions:** • Check loading on digital circuits supplied from drives 24 V user supply • Check control configuration is correct along with drive set-up • Check control output wiring is terminated correctly and undamaged
Motor Contactor	**Motor contactor**
70	The motor contactors have been detected open or closed when they should be closed or open using the motor contactor monitoring when enabled, and the feedback is connected to the drive from the motor contactors. This is a delayed trip, where travel will complete and then the drive will trip. If a delayed trip has been scheduled during a travel Global Warning **L04** = On (1) indicating a delayed trip when travel completes. **Recommended actions:** • Check control wiring from motor contactor monitoring to the drives control terminal • Check correct signal from motor feedback during operation (Default configuration, Motor contactors open, feedback = +24 V, Motor contactors closed feedback = 0 V) • Disable motor contactor monitoring with Motor Contactor Monitoring Enable **B29**

Trip	Description / Recommended action
Motor Too Hot	**Output current overload timed out (I^2t)**
20	The Motor Too Hot trip indicates motor thermal overload based on the Rated Current **B02** and Motor Thermal Time Constant **B20**. **J26** displays the motor temperature as a percentage of maximum value. The drive will trip when Motor Too Hot **J26** reaches 100 %. **Recommended actions:** • Ensure there is no mechanical issue resulting in stiction or increased loading • Check the load on the motor has not changed • If seen during an auto-tune test in RFC-S mode, ensure the Motor Rated Current in **B02** is ≤ Heavy duty current rating of the drive • Tune the Rated Speed **B07** (RFC-A mode only) • Check feedback signal for noise • Ensure the motor rated current is not zero • Check the Motor Thermal Protection Mode setting in **B19** is as required
No DCP Option	**DCP control mode selected and SI-DCP option not identified in Slot 3**
85	This trip occurs when DCP3 or DCP4 control has been selected through Control Input mode **H11**, a travel is being requested using the control word, Control Word **G51** and an SI-DCP option is not fitted in Slot 3 or was not running at the point travel was requested. **Recommended actions:** • Ensure an SI-DCP option is fitted in Slot 3 of the Elevator drive for DCP3, DCP4 operation • Check setting of Control Input mode **H11** and change if another mode is required
OHt Brake	**Braking IGBT over-temperature**
101	The OHt Brake over-temperature trip indicates that braking IGBT over-temperature has been detected based on software thermal model. **Recommended actions:** • Check braking resistor value is greater than or equal to the minimum resistance value

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>OHt Control</td><td>Control stage over temperature</td></tr>
<tr><td>23</td><td>This OHt Control trip indicates that a control stage over-temperature has been detected. From the sub-trip ‘xx y zz’, the Thermistor location is identified by ‘zz’

<table>
<tr><th>Source</th><th>xx</th><th>y</th><th>zz</th><th>Description</th></tr>
<tr><td>Control system</td><td>00</td><td>0</td><td>01</td><td>Control board thermistor 1 over temperature</td></tr>
<tr><td>Control system</td><td>00</td><td>0</td><td>02</td><td>Control board thermistor 2 over temperature</td></tr>
<tr><td>Control system</td><td>00</td><td>0</td><td>03</td><td>I/O board thermistor over temperature</td></tr>
</table>
Recommended actions:
• Check enclosure / drive fans are still functioning correctly
• Check enclosure ventilation paths
• Check enclosure door filters
• Increase ventilation
• Reduce the drive switching frequency
• Check ambient temperature</td></tr>
<tr><td>OHt Inverter</td><td>Inverter over temperature based on thermal model</td></tr>
<tr><td>21</td><td>This trip indicates that an IGBT junction over-temperature has been detected based on a software thermal model. The sub-trip indicates which model has initiated the trip in the form xx y zz as given below:

<table>
<tr><th>Source</th><th>xx</th><th>y</th><th>zz</th><th>Description</th></tr>
<tr><td>Control system</td><td>00</td><td>1</td><td>00</td><td>Inverter thermal model</td></tr>
<tr><td>Control system</td><td>00</td><td>3</td><td>00</td><td>Braking IGBT thermal model</td></tr>
</table>
Recommended actions with sub-trip 100:
• Check and ensure extended operation is not carried out at zero speed e.g. crash stop
• Check motor loading, reduce if excessive
• Check counter balance loading
• Reduce maximum drive switching frequency
• Increase acceleration / deceleration rates
• Reduce settings for Run and Creep Stop Jerks
• Reduce duty cycle
• Check DC bus ripple
• Ensure all three input phases are present and balanced

Recommended actions with sub-trip 300:
• Reduce the braking load</td></tr>
</table>

Trip	Description / Recommended action
OI ac	**Instantaneous output over current detected**
3	The instantaneous drive output current has exceeded ± VM_ DRIVE_ CURRENT [MAX] This trip cannot be reset until 10 s after the trip was initiated. **Recommended actions:** • If seen during auto-tune reduce the voltage boost • Check for short circuit on the output cabling • Check integrity of the motor insulation using an insulation tester • Check feedback device wiring • Check feedback device mechanical coupling • Check feedback signals are free from noise • Ensure the speed loop gain settings and start locking are not excessive • Has the phase angle auto tune been completed for RFC-S operation
OI Brake	**Braking IGBT over current: short circuit protection for the braking IGBT activated**
4	OI Brake trip indicates an over current detected in the braking IGBT or braking IGBT protection has been activated. This trip cannot be reset until 10 s after the trip was initiated. **Recommended actions:** • Check brake resistor wiring • Check braking resistor value is greater than or equal to the minimum resistance value • Check braking resistor insulation
OI dc	**Power module over current detected from IGBT on state voltage monitoring**
109	An OI dc trip indicates short circuit protection for the inverter stage has been activated. **Recommended actions:** • Disconnect the motor from the drive, and check both motor and cable insulation • Check and ensure any output motor contactor shorting contactor is not being applied whilst the Elevator drive is enabled • Replace the drive

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>Out Phase Loss</td><td>Output phase loss detected</td></tr>
<tr><td>98</td><td>Out Phase Loss trip indicates a motor phase loss detected. If Reverse Output Phase Sequence B26 = On (1) the output phases to the motor U, V, W are reversed, and so sub-trip 3 refers to physical output phase V and sub-trip 2 refers to physical output phase W.

<table>
<tr><th>Sub-trip</th><th>Reason</th></tr>
<tr><td>1</td><td>U phase detected as disconnected when drive enabled to run</td></tr>
<tr><td>2</td><td>V phase detected as disconnected when drive enabled to run</td></tr>
<tr><td>3</td><td>W phase detected as disconnected when drive enabled to run</td></tr>
<tr><td>4</td><td>Output phase loss detected when the drive is running</td></tr>
</table>
Recommended actions:
• Check motor and drive connections
• To disable the trip set Output Phase Loss Detection Enable H06 = Disabled (0)</td></tr>
<tr><td>Over Speed</td><td>Motor speed has exceeded the over speed threshold</td></tr>
<tr><td>7</td><td>If the Drive Encoder Speed Feedback J51 exceeds Motor Over Speed Threshold E09 in either direction an Over speed trip is produced. If Motor Over Speed Threshold E09 is set to 0.0 the threshold is then equal to 1.2 x the value set in Motor Maximum Speed Clamp E08
Recommended actions:
• Check the motor is not being driven by another part of the system
• Adjust the speed loop proportional gain to reduce overshoot
• Check drive selection and operation in current limit, unable to deliver required torque</td></tr>
</table>

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>Over Volts</td><td>DC bus voltage has exceeded the peak level or maximum continuous level for 15 s</td></tr>
<tr><td>2</td><td>The Over Volts trip indicates the DC bus voltage has exceeded ± VM_DC_VOLTAGE[MAX] for 15 s. The trip threshold varies based on drive voltage rating as below.

<table>
<tr><th>Voltage rating</th><th>VM_DC_VOLTAGE[MAX]</th><th>VM_DC_VOLTAGE_SET [MAX]</th></tr>
<tr><td>200</td><td>415</td><td>410</td></tr>
<tr><td>400</td><td>830</td><td>815</td></tr>
<tr><td>575</td><td>990</td><td>970</td></tr>
<tr><td>690</td><td>1190</td><td>1175</td></tr>
</table>
Recommended actions:
• Check the AC power supply and disturbances which could cause the DC bus to rise
• Check external braking resistor circuit is connected
• Check operation of external braking resistor protection
• Check Elevator balanced correctly
• Decrease the braking resistor value staying above the minimum value for drive model)
• Increase the deceleration rate
• Check motor insulation using a insulation tester</td></tr>
<tr><td>Phase Loss</td><td>Supply phase loss</td></tr>
<tr><td>32</td><td>The Phase Loss trip indicates that the drive has detected an input phase loss or large supply imbalance. Phase loss can be detected directly from the supply where the drive has a thyristor based charge system (Frame size 8 and above). If phase loss is detected using this method the drive trips immediately and the xx part of the sub-trip is set to 01.
In all sizes of drive phase loss is also detected by monitoring the ripple in the DC bus voltage in which case the drive attempts to stop before tripping. When phase loss is detected by monitoring the ripple in the DC bus voltage the xx part of the sub-trip = 00.
Input phase loss detection can be disabled when the drive is operating from a DC supply or single phase UPS Input Phase Loss Detection Mode H08.

<table>
<tr><th>Source</th><th>xx</th><th>y</th><th>zz</th></tr>
<tr><td>Control system</td><td>00</td><td>0</td><td>00: Phase loss detected based on control system feedback.</td></tr>
<tr><td>Power system</td><td>00</td><td>Rectifier number</td><td>00: Phase loss has been detected by the rectifier module</td></tr>
</table>
Recommended actions:
• Check the AC supply voltage balance and level at full load
• Check the DC bus ripple level with an isolated oscilloscope
• Check the output current stability
• Check for mechanical resonance with the load
• Reduce the duty cycle
• Reduce the motor load</td></tr>
</table>

Trip	Description / Recommended action
Phasing Error	**RFC-S mode phasing failure due to incorrect phase angle**
198	The Phasing Error trip indicates that the phase angle in Position Feedback Phase Angle **C13** is incorrect and the drive is unable to control the motor correctly. If sensor-less control is being used this indicates that significant instability has occurred and the motor has accelerated without control. **Recommended actions:** • Carry out an auto tune OR manually set-up the Position Feedback Phase Angle **C13** • Check the encoder wiring • Check the encoder mechanical coupling • Check the encoder signals for noise with an oscilloscope
PSU 24	**24V internal power supply overload**
9	The total user load of the drive and option modules have exceeded the internal user + 24 V power supply limit. The user load consists of the drive digital outputs and main encoder supply. **Recommended actions:** • Reduce the user load and Reset the drive • Remove control connections from the drive and perform a Reset • Remove any option modules and perform a Reset • Remove encoder connection and perform a Reset • Provide an external + 24 V power supply on Control Terminal 2 of the drive • Permanent trip, hardware fault within the drive – return the drive to the supplier
Resistance	**Measured resistance has exceeded the parameter range**
33	The Resistance trip indicates that the measured motor stator resistance during an auto tune test has exceeded the maximum possible value allowable for the drive in Stator Resistance **B34**. The maximum for the stator resistance parameters is generally higher than the maximum value that can be used in the control algorithms. If the value exceeds (VFS / v2) / Full Scale Current Kc **J06**, where VFS is the full scale DC bus voltage then this trip is initiated. **Recommended actions:** • Check the value entered in Stator Resistance **B34** • Ensure the stator resistance of the motor falls within the allowable range of the drive model • Check the motor cable / connections • Check the motor phase to phase resistance at the drive terminals, including motor cables • Check the motor phase to phase resistance at the motor terminals • Check the integrity of the motor stator winding using a insulation tester • Replace the motor

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>SlotX Different</td><td>Option module fitted in Slot X has changed between power cycles</td></tr>
<tr><td>204
209
214</td><td>If the option module fitted in option module Slot X is different to the option module present at the last power-down then this trip is produced. The sub-trip number gives the identification code of the option module that was originally fitted. Drive user parameters must be saved to prevent this trip on the next power-up if the module has changed.

<table>
<tr><th>Sub-trip</th><th>Reason</th></tr>
<tr><td>1</td><td>No option module was fitted previously.</td></tr>
<tr><td>2</td><td>An option module with the same identifier is fitted, but the set-up menu has been changed, and so default parameters have been loaded for this menu.</td></tr>
<tr><td>3</td><td>An option module with the same identifier is fitted, but the applications menu for this option slot has been changed, and so default parameters have been loaded for this menu.</td></tr>
<tr><td>4</td><td>An option module with the same identifier is fitted, but the set-up and applications menu have been changed, and so default parameters have been loaded for these menus.</td></tr>
<tr><td>>99</td><td>Shows the identifier of the module previously fitted.</td></tr>
</table>
Recommended actions:
• Turn off the power, ensure correct option module installed and re-apply power.
• Confirm currently installed option module is correct, ensure option module parameters are set correctly and perform a user save in mm.nnn</td></tr>
<tr><td>SlotX Error</td><td>Slot X option module error</td></tr>
<tr><td>202
207
212</td><td>The option module in Slot X has indicated an error. The option module can give the reason for the error and is shown in the sub-trip number. As default the sub-trip number is shown as a number on the display, however it is possible for the option module to supply sub-trip number strings which will be displayed instead of the number if available.
Recommended actions:
• See relevant Option Module User Guide for details of the trip</td></tr>
</table>

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>SlotX HF</td><td>Option module in Slot X has Hardware fault</td></tr>
<tr><td>200
205
210</td><td>This trip indicates that there is a fault with the option module in option Slot X that means that this module cannot operate. The possible causes of the trip are given by the sub-trip value.

<table>
<tr><th>Sub-trip</th><th>Reason</th></tr>
<tr><td>1</td><td>The option module category cannot be identified.</td></tr>
<tr><td>2</td><td>All the required customisable menu table information has not been supplied or the tables supplied are corrupt.</td></tr>
<tr><td>3</td><td>Insufficient memory available to allocate the comms buffers for this module.</td></tr>
<tr><td>4</td><td>Option module has not indicated it is running correctly during drive power-up.</td></tr>
<tr><td>5</td><td>The option module has been removed after power-up or it has ceased to indicate to the drive processor that it is still active.</td></tr>
<tr><td>6</td><td>The option module has not indicated that it has stopped accessing drive parameters during a drive mode change.</td></tr>
<tr><td>7</td><td>The option module has failed to acknowledge that a request has been made to reset the drive processor.</td></tr>
<tr><td>8</td><td>Drive failed to read the menu table from the option module during power-up.</td></tr>
<tr><td>9</td><td>Drive failed to upload menu tables from option module and timed-out (5 s).</td></tr>
<tr><td>10</td><td>Menu table CRC invalid.</td></tr>
</table>
Recommended actions:
• Ensure the option module is installed correctly
• Replace the option module
• Replace the drive</td></tr>
<tr><td>SlotX Not Fitted</td><td>Option module in Slot X no longer fitted</td></tr>
<tr><td>203
208
213</td><td>Each option module fitted in the drive is identified at power-up and the option fitted is stored by the drive in its non-volatile memory. If an option module was fitted in Slot X at power-down, but that option module has subsequently been removed before power up then this trip is produced. The sub-trip number gives the identification code of the option module that has been removed. The priority order for the option module not fitted trips is Slot1 Not Fitted highest, then Slot2 Not Fitted, then Slot3 Not Fitted then Slot4 Not Fitted. Drive user parameters must be saved to prevent this trip on the next power-up.

Recommended actions:
• Ensure the option module is installed correctly in Slot 4
• Re-install the option module.
• To confirm removed option module is no longer required perform save in mm.nnn</td></tr>
</table>

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>Soft Start</td><td>Soft start relay fault</td></tr>
<tr><td>226</td><td>This trip indicates that the soft start relay in the drive (Drive frame sizes 3 to 6) has failed to close or the soft start monitoring circuit has failed.

Recommended actions:
• Hardware fault - contact the supplier of the drive.</td></tr>
<tr><td>Spd / Dir Select</td><td>Control sequence speed and direction signals to the Elevator drive</td></tr>
<tr><td>81</td><td>This trip is related to speed reference or direction selection timing issues:

<table>
<tr><th>Sub-trip</th><th>Reason</th></tr>
<tr><td>1</td><td>There is no speed reference or direction selected at the end of State 4 Release Motor Brakes.
- There is a 3 s delay after Brake Control Release Delay D04 to activate this trip.
There is no speed reference or direction selected in the end of State 5 Elevator Car Load Measurement when Load measurement time O04 > 0 ms.
- There is a 3 s delay after Load measurement time O04 to activate this trip.</td></tr>
<tr><td>2</td><td>The direction and speed are still selected at the end of travel in State 14 Contactor Control after 4 s. Remove the speed or direction signals to Reset the trip.
- When Control Input mode H11 = Analog Run Prmit (0), the Run Permit signal using Direction Input 1 G39 must be removed at the end of travel.
- When Control Input mode H11 = Analog 2 Dir (0), Priority 2 Dir (4) or Binary 2 Dir (5) the direction signals (Direction Input 1 G39 or Direction Input 2 G40) OR the speed selection (Reference Select Bit 0 Input G32 to Reference Select Bit 6 Input G38) must be removed at the end of travel.
- When Control Input mode H11 = Priority 1 Dir (2) or Binary 1 Dir (3) the speed selection (Reference Select Bit 0 Input G32 to Reference Select Bit 6 Input G38) must be removed at the end of travel.
- When Control Input mode H11 = Control Word (6), the direction signals (Control Word G51 Bit 10 or Bit 11) OR the speed selection (Control Word G51 Bit 0 to Bit 9) must be removed at the end of travel.</td></tr>
</table>
Recommended actions:
• Check control sequence from Elevator controller and drive set-up (Control mode selection and control input logic)
• Check control wiring from Elevator controller to drive, and through external components</td></tr>
</table>

Trip	Description / Recommended action
Speed Err	**Excessive following speed error**
62	The speed error is calculated from the difference between Profile Speed **J39** and Actual Speed **J40**. The calculated speed error is then compared with the speed error threshold in Maximum Speed Error Threshold **H15** and where the threshold is exceeded for more than 100 ms a trip is generated. The speed error during a travel is displayed in Maximum Speed Error **J57** independent of the activation of the speed error detection and this is reset to 0 at each start. **Recommended actions:** • Possible causes for the speed error trip can be due to the following **Motor** Check motor power connections and phase rotation Check motor brake control Check Elevator safety gear **Position feedback** Check position feedback mechanical mounting Check position feedback phase rotation Check position feedback wiring arrangement, risk of induced noise Position feedback device failure, replace feedback device **Drive set-up** Check motor details and parameter set-up, including current limit Check position feedback device parameter set-up Check position feedback device phase offset, static auto tune has been completed Check speed control loop gain settings where motor instability exists • Increase the Maximum Speed Error Threshold **H15** • Maximum Speed Error Threshold **H15** = 0 disables speed error detection
STO Ctrl Err	**Safe Torque Off (STO), Drive enable control sequence error**
66	The Safe Torque Off (STO), Drive enable input sequence is incorrect i.e. the Safe Torque Off (STO), Drive enable was not removed at the end of the travel following motor contactor control and within 4 s, or applied during the start following motor contactor control within 6 s. **Recommended actions:** • Check control connection of Safe Torque Off (STO), Drive enable to T31 on the drive • Check parameter T31 STO Input 1 State **F10** the Safe Torque Off (STO), Drive enable input for the correct sequence during start / stop • Check correct operation of output motor contactors and auxiliary contacts • Check Open / Close delay time of output motor contactors • Check motor contactor delay in Motor Contactor Measured Delay Time **B32**

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>Temp Feedback</td><td>Elevator drive internal temperature feedback error</td></tr>
<tr><td>218</td><td>This trip indicates an internal drive thermistor fault (i.e. open circuit or short circuit)

<table>
<tr><th>Source</th><th>xx</th><th>y</th><th>zz</th></tr>
<tr><td>Control board</td><td>01</td><td>00</td><td>01: Control board thermistor 1
02: Control board thermistor 2
03: I/O board thermistor</td></tr>
<tr><td>Power system</td><td>Power module number</td><td>0</td><td>Zero temperature feedback via power system comms 21, 22 and 23 for direct ELV temperature feedback</td></tr>
<tr><td>Power system</td><td>01</td><td>Rectifier number</td><td>Always zero</td></tr>
</table>
Recommended actions:
• Hardware fault - contact the supplier of the drive.</td></tr>
<tr><td>Th Brake Res</td><td>Brake resistor over temperature</td></tr>
<tr><td>10</td><td>If hardware based braking resistor thermal monitoring is provided and the resistor overheats this trip is initiated. If the braking resistor is not present then this trip must be disabled with bit 3 of Action On Trip Detection H45.
Recommended actions:
• Check braking resistor wiring
• Check braking resistor value is greater than or equal to the minimum resistance value
• Check braking resistor insulation</td></tr>
<tr><td>TH Short Circuit</td><td>Motor thermistor short circuit</td></tr>
<tr><td>25</td><td>This trip indicates that a temperature sensor connected to an Analog input 3 or Terminal 15 on the position feedback interface has a low impedance (i.e. < 50 Ω). The cause of the trip can be identified by the sub-trip number.

<table>
<tr><th>Sub-trip</th><th>Reason</th></tr>
<tr><td>3</td><td>Resistance of thermistor on Analog input 3 is < 50 Ω.</td></tr>
<tr><td>4</td><td>Resistance of thermistor on drive position feedback interface is < 50 Ω.</td></tr>
</table>
Recommended actions:
• Check thermistor connection at drive control terminal, encoder connection
• Check thermistor wiring, continuity and signs of damage
• Replace motor / motor thermistor</td></tr>
</table>

<table>
<tr><th>Trip</th><th>Description / Recommended action</th></tr>
<tr><td>Thermistor</td><td>Motor thermistor over-temperature</td></tr>
<tr><td>24</td><td>This trip indicates that a temperature sensor connected to Analog input 3 or Terminal 15 on the position feedback interface has indicated an over-temperature. The cause of the trip can be identified by the sub-trip number, and checking Motor Thermistor Input Select F74.
This is a delayed trip where the travel completes followed by a drive trip. If a delayed trip is scheduled during the travel Global Warning L04 = On (1)
<table><tr><th>Sub-trip</th><th>Reason</th></tr><tr><td>1</td><td>Trip initiated from thermistor connected to position feedback interface.</td></tr><tr><td>2</td><td>Trip initiated from thermistor connected to Analog input 3.</td></tr></table>Recommended actions:
• • Check motor thermistor wiring connections and continuity
• • Check motor temperature
• • Check motor ventilation, provide additional forced cooling
• • Replace motor / motor thermistor</td></tr>
<tr><td>User 24V</td><td>User 24 V supply is not present on Control terminals 1 (0 V) and 2 (24 V)</td></tr>
<tr><td>91</td><td>A User 24 V trip is initiated, if User Supply Select O10 = On (1) for 24 V backup of the control PCB and no user 24 V supply is present on Control Terminals 1 and 2.
Recommended actions:
• Ensure a + 24 V supply is connected to Control Terminals 1 (0 V) and 2 (24 V)
• Ensure the + 24 V supply meets the specification of the + 24 V user input on the drive
• Disable User Supply Select O10 = Off (0) if not required</td></tr>
<tr><td>User Save</td><td>User Save error / not completed</td></tr>
<tr><td>36</td><td>This trip indicates that an error has been detected in the user save parameters saved in non-volatile memory. For example, following a user save command, if the power to the drive was removed when the user parameters were being saved.
Recommended actions:
• Perform a user save in mm.nnn to ensure trip doesn't occur on next power up
• Ensure the drive has enough time to complete the save before removing power</td></tr>
</table>

Trip	Description / Recommended action
Watchdog	**Control word watching not serviced and timed out**
30	This trip indicates that the control word watchdog has been enabled and has timed out. Watchdog bit must be set = 1 at least every 500 ms or less during operation. A 10 s delay is implemented before calling a Ctrl Watchdog trip during power up and on enabling the Control Word function. If a travel is in progress when the fault occurs the Elevator drive will perform a controlled Stop and then trip. **Recommended actions:** • Check setting on Elevator controller to ensure Control word watchdog bit 12 is serviced
550 Hz Limit	**Drive output frequency exceeded the maximum allowed operating frequency**
83	The values used to configure the drive in the mechanical menu parameters **E01** to **E05** and motor map settings have resulted in the maximum output frequency being > 550 Hz which is not allowed. **Recommended actions:** • Adjust **E01** to **E05** mechanical system data to the correct settings to limit the output frequency. • Ensure motor map settings are correct to prevent excessive output frequencies

6.2 Auto - Reset

The Auto-Reset function can be used to clear Elevator drive trips automatically.

The Auto-Reset is only active, if parameter **H46** Number Of Auto-reset Attempts > None (0) and parameter **H47** Auto-reset Delay is set-up correctly. If the Auto-reset function is active, an attempt is made following every Elevator drive trip to reset the trip after the reset delay, which can range from its default of 1.0 s up to a maximum of 600.0 s

Value	Text
0	None
1	1
2	2
3	3
4	4
5	5
6	Infinite

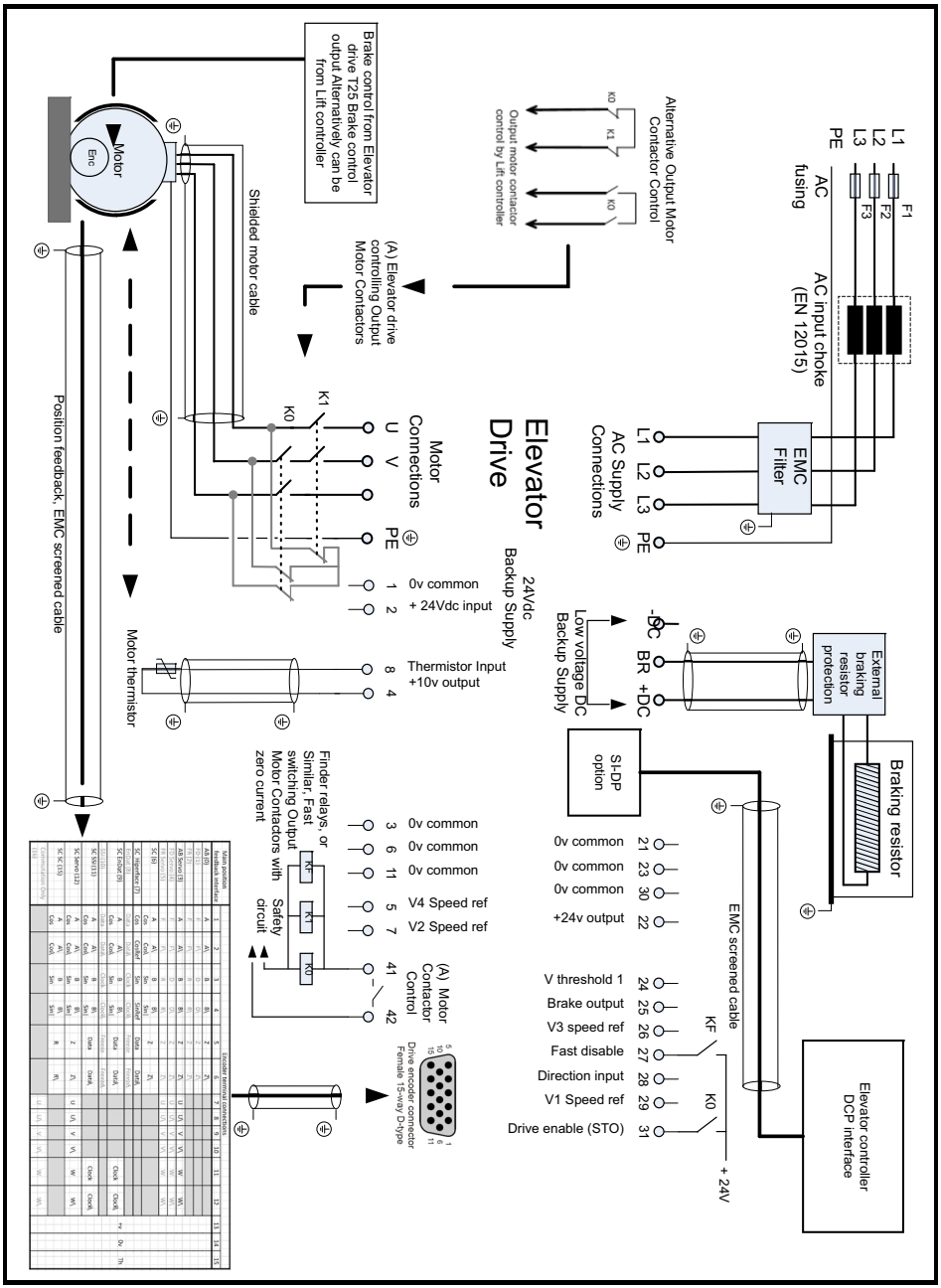
If repeated trips occur, the reset will be repeated up to a maximum number of times as defined in Number Of Auto-reset Attempts **H46** (None (0) to Infinite (6)) using the programmed delay between the attempted trip resets as defined in Auto-reset Delay **H47**. If the Number Of Auto-reset Attempts **H46** reaches the maximum where **H46** = 1(1) 2 (2) 3 (3) 4 (4) or 5(5), the next trip will not be reset.

If no Elevator drive trip occurs for 5 minutes, the trip counter for Number Of Auto-reset Attempts **H46** will be cleared, or when a manual Elevator drive trip reset is carried out the auto-reset counter is also cleared.

Auto reset will not occur after any trips with priority levels 1, 2 or 3.

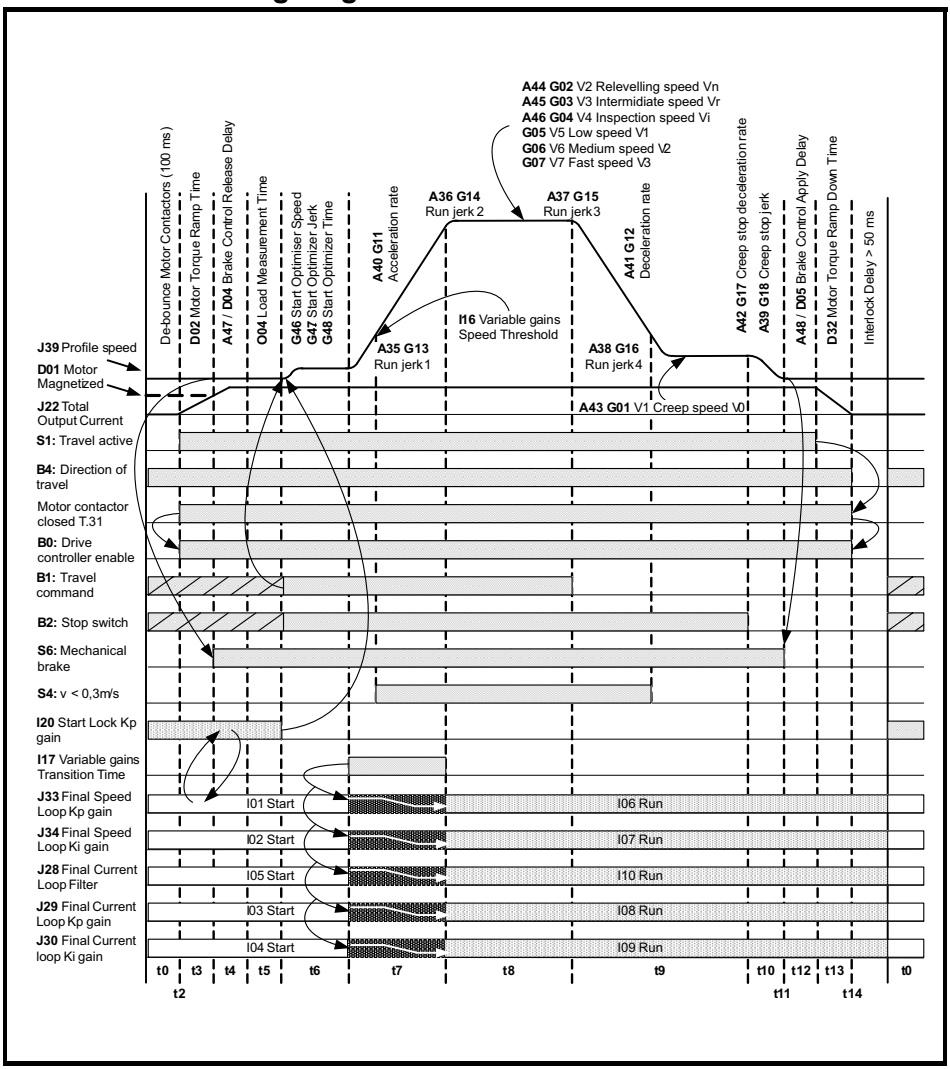
Priority	Category	Trips	Comments
1	Internal faults	HFxx	These indicate internal problems and cannot be reset. All drive features are inactive after any of these trips occur. If a Keypad is installed it will show the trip, but the Keypad will not function.
1	Stored HF trip	(Stored HF)	This trip cannot be cleared unless 1299 is entered into parameter (**mm.nnn**) and a reset is initiated.
2	Non-resettable trips	Trip numbers 218 to 247, (Slot1 HF), (Slot2 HF), (Slot3 HF) or (Slot4 HF)	These trips cannot be reset.
3	Volatile memory failure	(EEPROM Fail)	This can only be reset if parameter **mm.000** is set to 1233 or 1244, or if Default Drive **H04** is set to a non-zero value.
4	NV Media Card trips	Trip numbers 174, 175 and 177 to 188	These trips are priority 5 during power-up.
4	Internal 24V and position feedback interface power supply	(PSU 24V) and (Encoder 1)	These trips can override (Encoder 2) to (Encoder 6) trips.
5	Trips with extended reset times	(OI ac), (OI Brake), and (OI dc)	These trips cannot be reset until 10 s after the trip was initiated.
5	Phase loss and d.c. link power circuit protection	(Phase Loss) and (Oht dc bus)	The drive will attempt to stop the motor before tripping if a (Phase Loss) 000 trip occurs unless this feature has been disabled (see Action On Trip Detection **H46**.The drive will attempt to finish the travel before tripping if an (Oht dc bus) occurs.
5	Standard trips	All other trips	

7 DCP- Connection Diagram

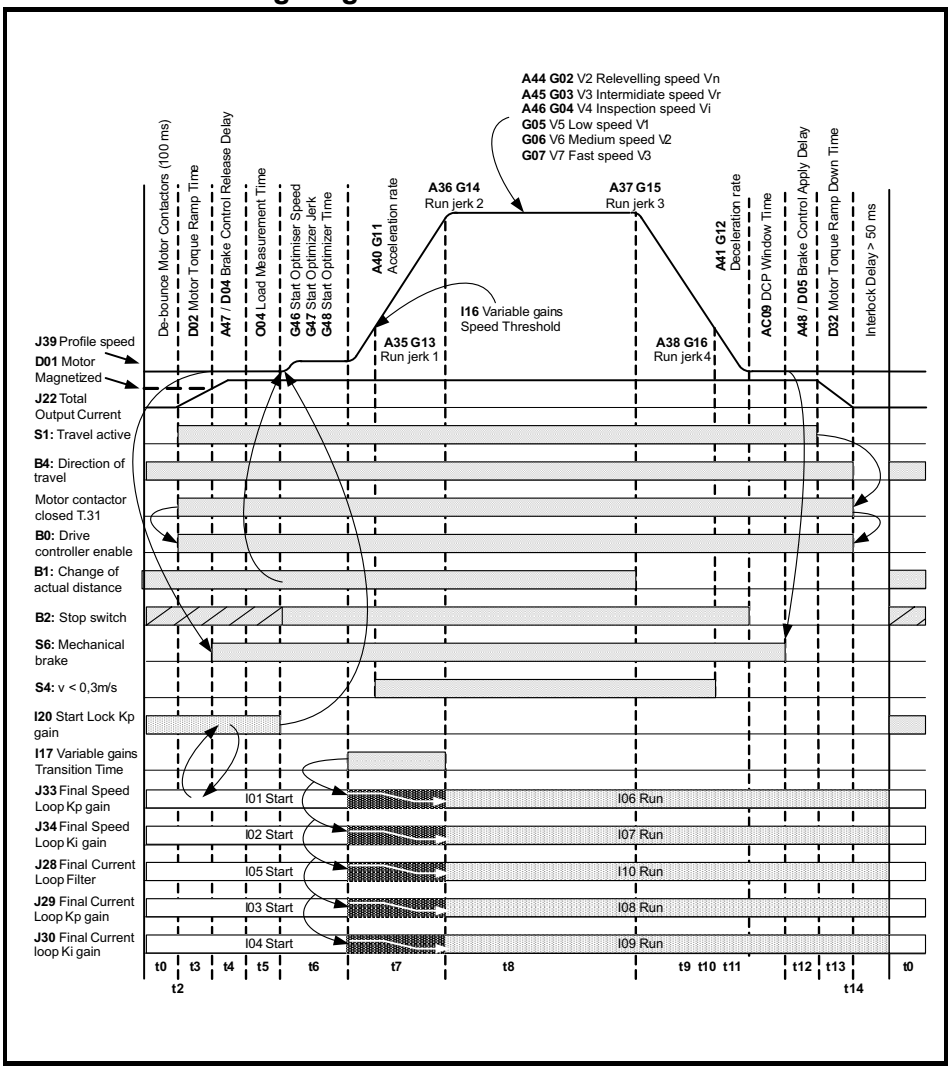


8 Sequence diagrams

8.1 DCP3 Timing diagram



8.2 DCP4 Timing diagram



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