



SMARTRISE

MADE STRONG

DRIVE STARTUP MANUAL

KEB Drive

Permanent Magnet Installation



KEB Introduction

EQUIPMENT/SETTINGS VERIFICATION

Verify that the Job Specification parameter table on the drawings “Sheet 1: Getting Started” matches the actual equipment.

Below is a sample table showing the important values that will affect operation.



Scroll through the motor parameters and verify that they are set to the motor nameplate values prior to performing the Motor Learn procedure.

Sample: Sheet 1: - Getting Started

Job Specifications:																
Car	Group #	Group Car ID	Contract Speed	Floors	Capacity	Main Line Voltage	Motor Volts	Motor HP	Motor FLA	Motor Poles	Motor RPM	Motor Freq	Drive AWG	Motor AWG	Disc. Size	Drive
1	N/A	N/A	200	2	3500	480	328	12.3	21.1	20	96	16	10	10	40	HPV900-4021-2E1-01

Car	Doors	DR Voltage	Brake Pick	Brake Hold	Brake Ohm	Brake Amp	M. Cont. P/N	S.1 Cont. P/N	Encoder PPR	EBrake	S.2 Cont. P/N	EBrake Pick	EBrake Hold	EBrake Ohm	EBrake Amp	DBR Ohm	DBR Watts
1	2	240	90	45	84	1.08	CA7-37	CA7-12	2048	Sheave	CA7-12	90	45	84	1.08	20	6800

Diagram showing parameter verification flow:

- Motor Volts points to Main Line Voltage
- Motor Amps points to Motor HP
- Motor RPM points to Motor Poles
- Motor Frequency points to Motor Freq
- Brake Volts Pick/Hold points to Brake Pick and Brake Hold
- Encoder PPR points to Encoder PPR

CONTROLLER GROUNDING REQUIREMENTS

NOTE – For the controller to function properly it is very important to provide proper building ground connections to the controller.

- ❖ Examples of a proper building-to-controller ground connection is to attach the ground cable to:
 - The street side of the incoming water main.
 - To a grounding rod that has been driven into the pit flooring.
- ❖ The controller has a common ground bus terminal connection.



- ❖ All grounds need to land at this common point including building, motor, transformer, and filter grounds. This prevents ground loops, and will limit the impedance between the grounds and noise will be channeled back to building ground.

Providing a proper ground is mandatory and will improve the performance of the controller.

WIRING – (Check off box when complete)

**** Refer to the Appendix for the following connections ****

Power – (Sheet 3: Machine Room connections)

- ☐ Connect main line power to terminal block L1/L2/L3.
- ☐ Connect the ground wire to the yellow/green terminal block next to L1-L3.

Brake – (Sheet 5: Brakes)

- ☐ Connect the main brake wiring to terminals K1 / K2 and the secondary brake wiring (if equipped) to terminals J1 / J2 located on the terminal block next to the M contactor.
- ☐ Jump EB to the terminal listed in the Construction box located on “Sheet 01 – Getting Started” and connect either the rope gripper or shieve brake to EBR (if installed).

Motor / Encoder – (Sheet 4: Drive and Motor)

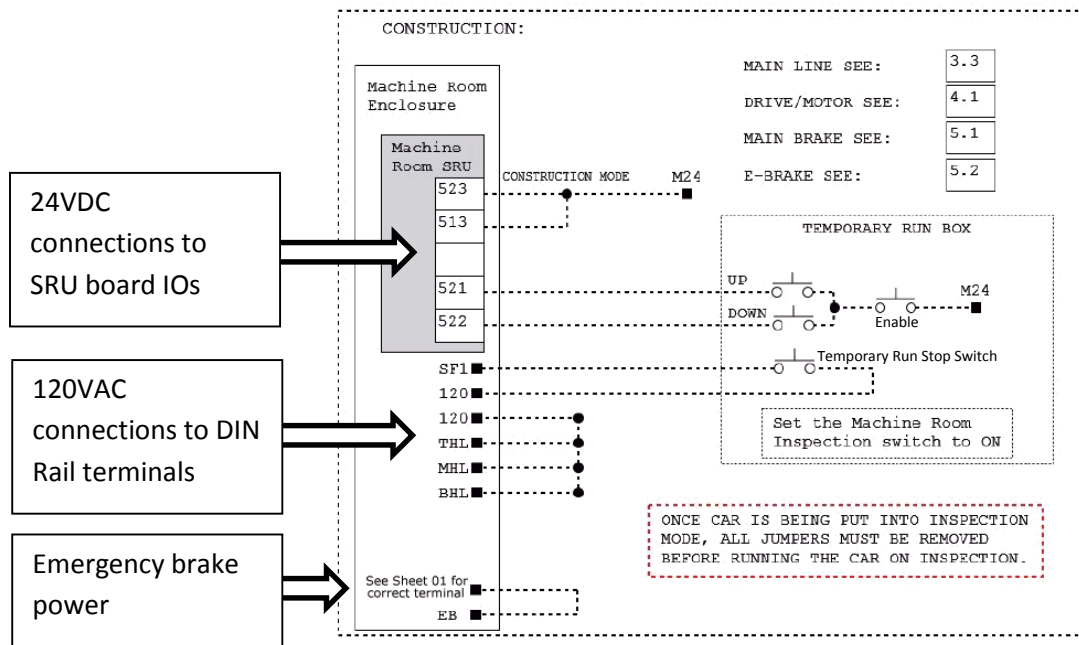
- ☐ Connect motor leads to the M contactor at T1/T2/T3.
- ☐ Connect the encoder cable wiring to the Endat card mounted on the drive. The following table contains wiring references for common encoders.

ENCODER	HEIDENHAIN	ZEIHL	TORIN ECN413	HOLLISTER WHITNEY
PWR	GREEN/BLUE + BROWN	GRAY/GREEN	RED/PINK	BROWN
COM	GREEN/WHITE + WHITE	PINK/YELLOW	BLACK + RED/WHITE	WHITE
A	GREEN/BLACK	GRAY/PINK	GREEN + BLACK	GREEN
/A	YELLOW/BLACK	RED/BLUE	YELLOW + BLACK	YELLOW
B	BLUE/BLACK	BLUE	BLUE + BLACK	BLUE
/B	RED/BLACK	RED	RED + BLACK	RED
Z	-	-	-	
/Z	-	-	-	
CLK+	GRAY	WHITE	GRAY	BLACK
CLK-	PINK	BROWN	SILVER	VIOLET
DAT+	VIOLET	VIOLET	PURPLE	GRAY
DAT-	YELLOW	BLACK	WHITE	PINK
SHIELD	SHIELD	SHIELD	SHIELD	SHIELD

CONSTRUCTION – (Sheet 1: Construction)

The following instructions are from the job drawings: “Sheet 1 – Construction”. Refer to the job’s specific drawings for connections.

Construction Box (Sample)



24v DC connections

- ☐ Install jumpers between M24 and the IOs listed on “Sheet 1: Getting Started – Construction”.
- ☐ Install jumpers between M24 any additional IO’s (if required):
 - * Pre-Transfer
 - * Governor
 - * Emergency Power
- ☐ IMPORTANT! REMOVE FACTORY WIRES ON INPUTS 521/522
 - Install the Run Bug Up/Down Switch to IO’s 521/522

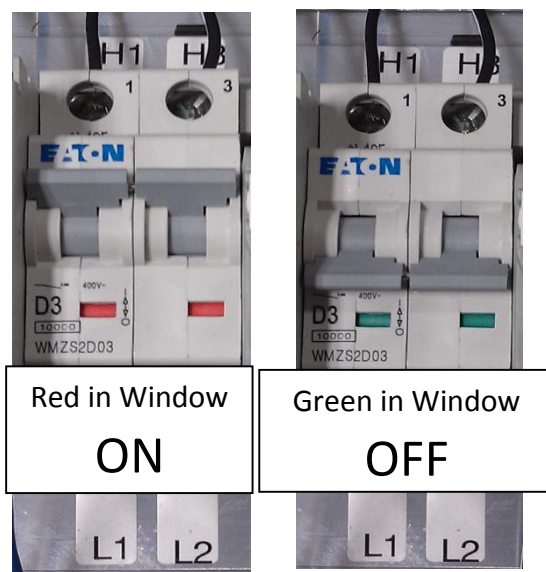
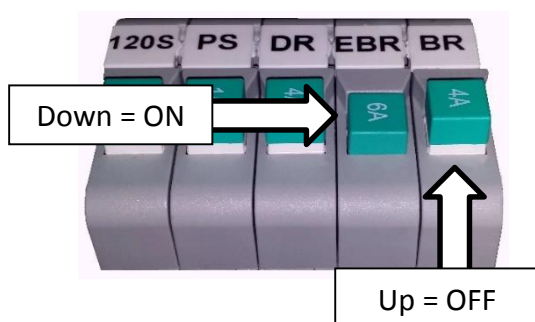
120v AC connections

- ☐ Install the temporary run switch between 120 and terminal SF1 and 120 to THL/MHL/BHL terminals on the DIN rail.
- ☐ Install a jumper between EB and the terminal listed on the drawings on “Sheet 1: Getting Started – Construction”.

POWERING UP

(Check off box when complete)

- ☐ Apply external power by closing the main disconnect.
- ☐ Close the L1/L2 breaker, the M24, PS, BR and EBR breakers.
- ☐ Verify that the LCD on the Smartrise board and the KEB Drive come on.



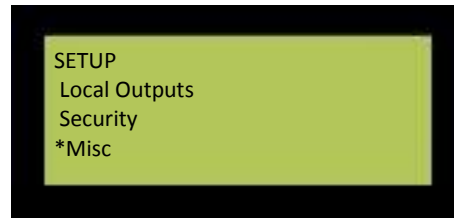
FINAL SETUP

(Check off box when complete)

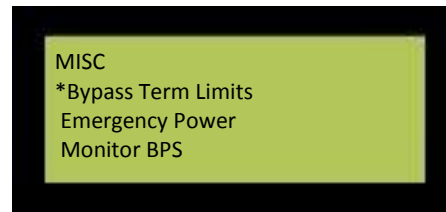
- ☐ Toggle the Inspection/Normal switch to the “INSP” position.
- ☐ Set **BYPASS TERM LIMITS** to **YES**:
 - On the Smartrise Machine Room controller board, press the Left Arrow (ESC) button several times to get to the **MAIN SCREEN**.
 - Press the Right Arrow to go to **MAIN MENU**. Use the Up / Down Arrow keys and move the asterisk to **SETUP** and press the enter key.



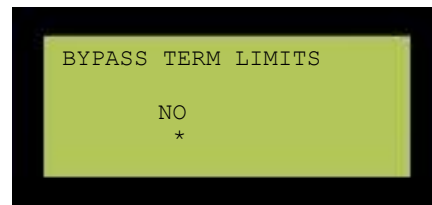
- Use the Up / Down Arrow keys and move the asterix to **MISC** and press the enter key.



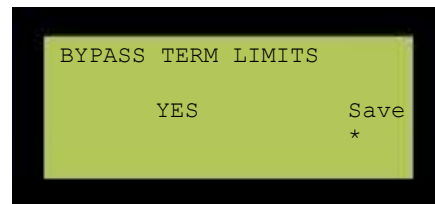
- **BYPASS TERM LIMITS** should be the first item listed. If it's not there use the Up / Down Arrow keys and move the asterix to **BYPASS TERM LIMITS** and press the enter key.



- Use the Up / Down Arrow keys to change the word "**NO**" to "**YES**".



- Use the RIGHT Arrow key and move the asterix under the word "**SAVE**" and press enter.



- Hit the LEFT Arrow (ESC) button several times to get to the **MAIN SCREEN**.
- Verify the LCD displays "Construction" Mode on the **MAIN SCREEN**.

KEB Encoder Installation

Encoder Cable

Proper connection of the encoder cable to the drive is key to a proper running elevator. Many drive issues can be attributed to a defective encoder, encoder cable or the encoder (or cable) not installed properly.



The cable shall be kept a minimum of 8 inches (20 cm) away from all wires having greater than 24VDC on them. For best results run the encoder cable in a separate conduit from the controller to the motor.



It is absolutely necessary to ensure these signals are well shielded! Noise on the analog signals resulting from breaks in the shield or improper shield termination will result in vibration in the motor and poor ride quality.

KEB Motor Learn

NOTE: Smartrise programs the KEB drive with factory defaults to properly communicate with the controller. After factory testing, customer motor data (from customer's EDF) is programmed into the drive to provide an easier "out of box" installation.

Initial Start Up

The complete motor data must be learned with the automated learn function.

The Motor Learn function can be found under the Tune Parameters group from the Programming menu (*Home > Prog > Tune Parameters > LL01*).

Begin the procedure by setting:

- **Motor Tuning LL01 = Start**

Follow the instructions on the LCD screen. The user is instructed to:

1. Disable the brake (turn off the BR and EBR breaker).
2. Set command to zero on the MR SRU board under **MAIN MENU | SETUP | SPEED AND SLOWDOWNS | INSPECTION SPEED** – set to "0".
3. On the controller press and hold inspection (speed + direction + enable inputs) until completed.

The process should take 2-5 minutes and will emit a high pitched noise while the drive measures various motor parameters.



If not performing the Encoder Learn function, turn on BR and EBR breakers and return the inspection speed to factory setting on the controller.

SETUP OF THE MOTOR LEARN IS NOW COMPLETE!

KEB Encoder Learn



For absolute encoders on PM motors, if at any time the physical relation between the motor shaft and encoder changes (i.e. encoder replaced, encoder slippage, etc.) the encoder position must be relearned.

1. SPI Encoder Learn - Stationary

SPI can be done with the ropes on and the brake set. To start the SPI functionality go to LL05 and follow the instructions on the LCD:

Begin the procedure by setting:

- **Motor Tuning LL05 = SPI (Start)**

Follow the instructions on the LCD screen. The user is instructed to:

1. Disable the brake (turn off the BR and EBR breaker).
2. Set command to zero on the MR SRU board under **MAIN MENU | SETUP | SPEED AND SLOWDOWNS | INSPECTION SPEED** – set to “0”.
3. On the controller press and hold the inspection (direction + enable button) until completed.

During the SPI process, the motor will make a series of chirps and the LCD display will show the encoder position samples.

Proceed to Section #3 “**Encoder Synchronization**” for further details.

If the Encoder Synchronization process has previously been completed, the user may abort the Encoder Synchronization step without losing the learned Encoder Pole Position.

2. Encoder Pole Position Learn – (Optional)

The Encoder Pole Position Learn is only used when the car is balanced or the ropes have not been installed as this procedure requires frictionless movement (un-roped sheave or balanced car). It sets the correct A/B channel phasing in addition to the pole position.

Begin the procedure by setting:

- **LL06 - Encoder Pole Position Learn = Start**

The user will be prompted to:

“Press and hold the inspection (direction + enable button) until finished.”
The controller speed should still be at “0” FPM.

If the A/B phasing is incorrect the process will stop and notify the user. Then it will resume and automatically make the change and prompt the user to hold the inspection buttons again.

When the process is complete, the keypad will prompt the user to release the inspection buttons.

Proceed to Section #3 “**Encoder Synchronization**” for further details.

If the Encoder Synchronization process has previously been completed, the user may abort the Encoder Synchronization step without losing the learned Encoder Pole Position.

3. Encoder Synchronization

The Encoder Synchronization process will determine the correct A/B encoder channel phasing and direction of rotation for PM motors and immediately follows either method of learning the encoder pole position.

Begin the process by setting:

- **LL07 - Encoder Synchronization to “Start”**

Follow the directions on the keypad. The drive will run the elevator and swap the phasing and direction of the A/B channels as needed.



Turn on the BR and EBR breakers and return the inspection speed to factory setting on the controller.

SETUP OF THE ENCODER LEARN IS NOW COMPLETE!

OPERATION

(Check off box when complete)

Run the car and verify the following:

No Faults

- ☐ Make sure the car is moving without triggering a fault either on the Smartrise SRU or the drive. If the SRU board displays a “Drive Fault” on the SRU, look at the drive to see what the fault is.
 - Go to “***Troubleshooting – Drive Fault / Encoder Flt***” for corrective actions.

Proper Direction

- ☐ Make sure the car is moving in the same direction as the control switch on the Run Bug.
 - Go to “***Troubleshooting – Wrong Direction***” for corrective actions.

At Speed

- ☐ Make sure that the car is moving at the proper inspection speed (approx. 50 FPM).
 - Go to “***Troubleshooting – Car Moving Too Slow or Rough***” for corrective actions.

Under Control

- ☐ Make sure that the car is moving under full control. The car should stop when commanded from the Run Bug. Verify that the car runs with no faults for 10 seconds or more.
 - Go to “***Troubleshooting – Brake Not Lifting***” for corrective actions.

TROUBLESHOOTING

DRIVE FAULT / ENCODER FLT

1. The most common fault at startup with drive startup is the Encoder fault.
 - a. Check for a solid *shield-to-ground* connection at the motor and drive.
 - b. Check for correct colored encoder wires to the terminals.
 - c. Swap the wires on A with A/ or swap A & A/ with B & B/.
 - d. Perform the “**Encoder Synchronization**” process after swapping any encoder wires.

BRAKE NOT LIFTING

1. If the brake is not picking make sure that it is wired according to Sheet 5 – Brakes and verify that the EB terminal is jumped to the terminal listed on “Sheet 01 – Getting Started”. If it has the proper voltage check the following:
 - a. During a run command, check for DC voltage between points K1 / K2 and J1 / J2 (if 2nd brake installed). Verify the voltages are also at the Brake Coil(s) when commanded to pick.
 - b. Verify that the voltages match the Brake Coil voltages shown on “Sheet 1: Getting Started” table.

WRONG DIRECTION

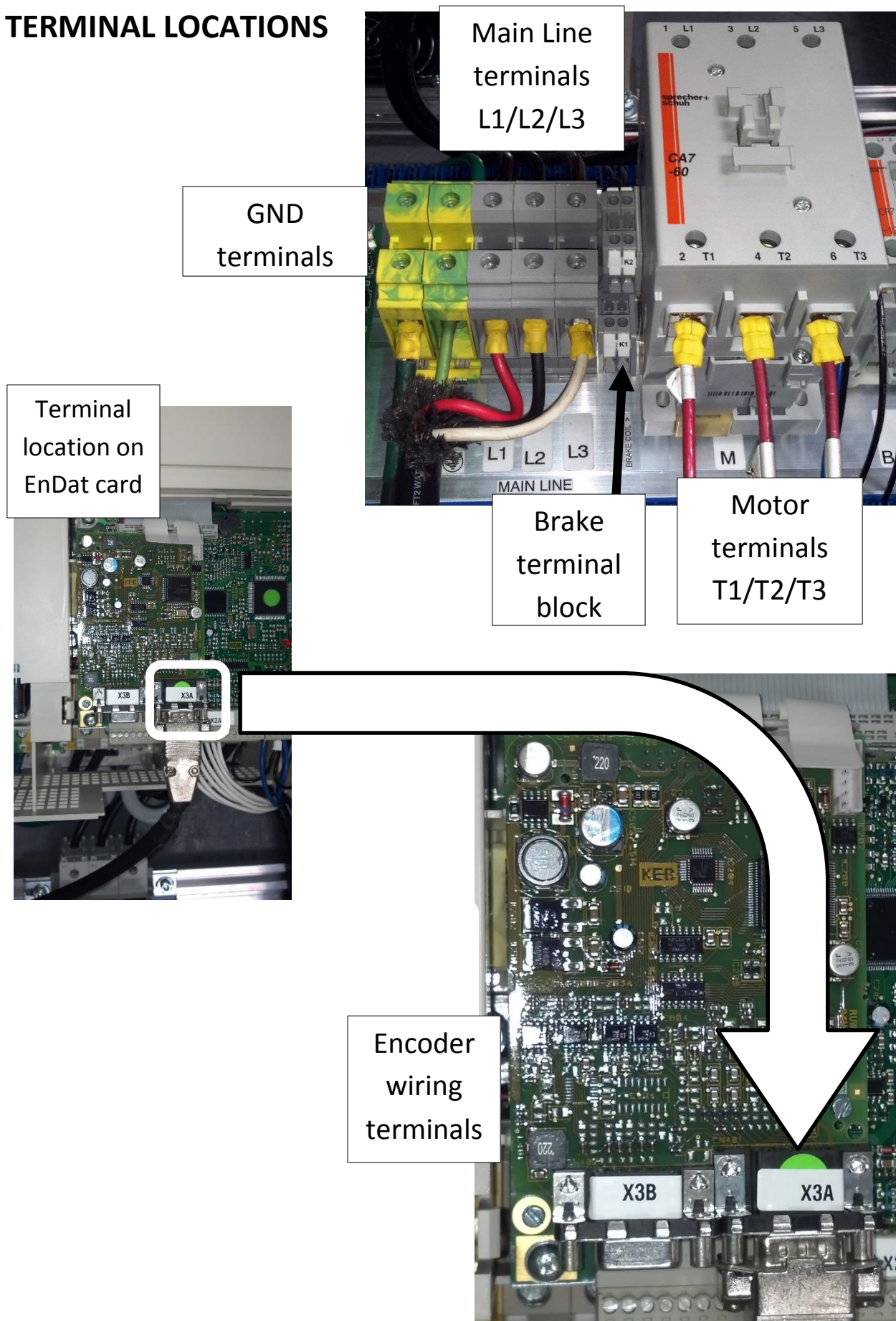
1. If the car is moving in the wrong direction:
 - a. On the Smartrise controller board make sure that IO 521 comes on when commanding the UP direction and IO 522 comes on when commanding the DOWN direction.
 - b. Swap two of the motor leads (T1 with T2).

CAR MOVING TOO SLOW OR ROUGH

1. Swap the encoder wires A+ and A- on drive.
2. Verify the brakes are lifting fully.

APPENDIX

TERMINAL LOCATIONS



APPENDIX

KEB PROGRAMMING MENU

The programming menu is where all manual parameter adjustment is made and can be accessed at *Home > Prog (F3)*.

The Parameter menu contains the following groups:

Operator System: OS00...OS22

These parameters provide general information about the operator and drive hardware and software. Additionally, the operator password level is set here which allows for different access levels.

Basic Setup: US02...US06

These parameters provide the very basic information needed to configure the drive, including: motor type, control type, and contract speed.

Inputs: LI01...LI20

These parameters define the logic of the inputs and assign control functionality to the digital inputs.

Motor Data: LM01...LM33

These parameters define and display all relevant motor values and motor protection settings.

Encoder Data: LE01...LE36

These parameters define the settings and scaling of the drive encoders

Machine Data: LN01...LN05

These parameters define the machine data, including: sheave diameter, roping ratio, and rated load values.

Speed Profile: LS01...LS55

These parameters adjust the speed, acceleration, and jerk values across the elevator run profile.

Tune Parameters: LL01...LL17

These parameters contain the automatic tuning parameters. Here you can program the system inertia, motor data, and motor pole positions.

Control Setting: LC01...LC44

These parameters contain advanced adjustment parameters which affect the motor gains, system inertia gains, pre-torque, etc.

Timer Parameters: LT01...LT13

These parameters adjust brake and drive signaling timers.

Positioning Parameters: LP01...LP08

These parameters contain the adjustments needed for the drive

Special Functions: LX01...LX18

These parameters allow advanced adjustment of the drive and facilitate function tests of drive components.

Configuration Handling: CH01...CH03

These settings allow a user to save parameters and default to OEM settings.

Analog I/O: LA01...LA40

These parameters define and adjust the analog inputs and outputs.

Outputs: LO01...LO20

These parameters define the functionality of the relay and solid-state drive outputs.

ADVANCED TROUBLESHOOTING

The following list of troubleshooting steps are to help with the startup and smooth running of the drive.

STARTING OVER! (DEFAULTING DRIVE)

Sometimes parameters get changed (and forgotten) or certain functions that should work are not working for no apparent reason. In this case, starting over with factory defaults may solve these issues.

DEFAULT DRIVE TO FACTORY SETTINGS:

1. Go to US.03 and load the opposite configuration of what is shown:
(example: *PM Gearless* – load *Induction Geared* / for *PM Geared* load *Induction Gearless*) and save. After this value is saved, go back and load the correct type. This does a complete background default on the drive.
2. Go to US.05 and choose “Write Configuration to Drive”.

Defaulting the drive:
US.03: Choose opposite drive configuration (PM > Induction / Geared > Gearless)
US.05: Write Configuration to Drive
Reload the original drive configuration using the previous (2) steps

RELOAD OEM VALUES (PROGRAMMED BY SMARTRISE):

1. Go to US.05 and choose “Restore OEM Defaults”.

Restoring Smartrise Defaults:
US.05: Restore OEM Defaults (To Reload Smartrise Settings)

MOTOR NOISE / VIBRATION

1. Vibration:
 - a. Cut the KP (LC03, LC04) and KI (LC08, LC09) gains in half.
2. Noise:
 - a. Change LE.05 to 8 (PM)

MOTOR NOT RUNNING WHEN GIVEN COMMAND:

1. Check LI.01: Needs to be NPN for the drive to receive signals from controller.
2. Verify that parameters LF.41 through LF.43 are set to correct values. Refer to parameter sheet located in job binder for correct values.