C4
DRIVE STARTUP
MANUAL
KEB Drive
Induction Motor Installation

SMARTRISE
2601 FAIR OAKS BLVD. SACRAMENTO, CA 95864
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.
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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

<table>
<thead>
<tr>
<th>Car</th>
<th>Group</th>
<th>Swing</th>
<th>Transformer Speed</th>
<th>Floor</th>
<th>Capacity</th>
<th>Main Line</th>
<th>Motor</th>
<th>HP</th>
<th>Motor</th>
<th>Poles</th>
<th>Encoder</th>
<th>Main Line</th>
<th>Drive</th>
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<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>N/A</td>
<td>100</td>
<td>4</td>
<td>1000</td>
<td>100</td>
<td>100</td>
<td>35</td>
<td>5</td>
<td>780</td>
<td>275</td>
<td>100</td>
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<table>
<thead>
<tr>
<th>Car</th>
<th>Group</th>
<th>Drive</th>
<th>Encoder</th>
<th>Main Line</th>
<th>Drive</th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>240</td>
<td>100</td>
<td>100</td>
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</table>
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 located on the terminal block next to the M contactor.

**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 encoder card mounted on the drive. The table below contains wiring references for common encoders.

<table>
<thead>
<tr>
<th>ENCODER</th>
<th>IMPERIAL / PG-X3</th>
<th>MAGIL</th>
<th>IH740 / IH950</th>
<th>ACCU-ENCODER</th>
<th>WACHENDORFF</th>
<th>INDUSTRIAL ENCODER (CANADA)</th>
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<tr>
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<td>RED (2)</td>
<td>RED (2)</td>
<td>BROWN (2)</td>
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<tr>
<td>COM</td>
<td>BLACK (1)</td>
<td>BLACK (1)</td>
<td>WHITE (1)</td>
<td>WHITE</td>
<td>WHITE (SHIELD)</td>
<td>WHITE</td>
</tr>
<tr>
<td>A</td>
<td>WHITE (3)</td>
<td>WHITE (3)</td>
<td>GREEN (3)</td>
<td>GREEN</td>
<td>GREEN</td>
<td>GREEN</td>
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<tr>
<td>/A</td>
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<td>PINK (6)</td>
<td>YELLOW</td>
<td>RED</td>
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<td>/B</td>
<td>RED/BLACK (7)</td>
<td>BLUE (7)</td>
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<td>Z</td>
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<td>GRAY</td>
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<td>VIOLET</td>
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<tr>
<td>SHIELD</td>
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</tbody>
</table>
The following instructions are from the job drawings: “Sheet 1 – Construction”. Refer to the job’s specific drawings for connections.

**Construction Box (Sample)**

Once car is being put into inspection mode, all jumpers must be removed before running the car on inspection.
All Safety inputs are functional during construction mode on the “C4” product. When these devices are installed they should be connected per sheet 2 of the prints, even if still on construction mode. The following will assume that none of these devices have been installed prior to beginning on construction mode.

- Connect a jumper from L120 to terminals LFT, LFM, LFB. Do the same for LRT, LRM, and LRB if you have rear doors.
- Connect a jumper from H120 to PIT, BUF, BFL, TFL, and SFH.
- Connect M120 through your machine room run/stop switch and connect it to SFM. A closed switch will indicate run; an open switch will indicate stop. If no run/stop switch is being used just connect M120 to SFM.
- Connect your run bug. Wire the up button to input CUP and the down to input CDN. If no run bug is being used, leave the inputs unwired.
- Connect a jumper from 24VDC to MM.
- Verify the car door bypass and Hoistway bypass switches are in the off position.
- Place the inspection switch to “Inspection”.
POWERING UP

(Check off box when complete)

☐ Apply external power by closing the main disconnect.
☐ Close all of the pushbutton breakers.
☐ Verify that the LCD on the Smartrise board and the KEB Drive come on.
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. On the Machine Room Board, Toggle Dip 6 A (Top bank) to on. Upon successful completion LED1 and LED 2 will blink green and red until inspection is dropped.
2. Once complete turn off Dip 6 A

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 Synchronization, 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

1. Encoder Synchronization

   The Encoder Synchronization process will determine the correct A/B encoder channel phasing and direction of rotation for Induction motors.

   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. 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 CUP comes on when commanding the UP direction and IO CDN 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

- Brake terminal block
- GND terminals
- Main Line terminals L1/L2/L3
- Motor terminals T1/T2/T3
- Encoder card location on drives
- Encoder wiring terminals

Encoder card

X3B Channel 2

X3A Channel 1
APPENDIX 2

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 scalings 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”.

<table>
<thead>
<tr>
<th>Defaulting the drive:</th>
</tr>
</thead>
<tbody>
<tr>
<td>US.03: Choose opposite drive configuration (PM &gt; Induction / Geared &gt; Gearless)</td>
</tr>
<tr>
<td>US.05: Write Configuration to Drive</td>
</tr>
<tr>
<td><strong>Reload the original drive configuration using the previous (2) steps</strong></td>
</tr>
</tbody>
</table>

RE-LOAD OEM VALUES (PROGRAMMED BY SMARTRISE):

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

<table>
<thead>
<tr>
<th>Restoring Smartrise Defaults:</th>
</tr>
</thead>
<tbody>
<tr>
<td>US.05: Restore OEM Defaults (To Reload Smartrise Settings)</td>
</tr>
</tbody>
</table>

**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.