C4

QUICK START GUIDE

VERSION 1.1

SMARTRISE

Document History

Date	Version	Summary of Changes
June 17, 2024	1.1	Replaced “S-curve” with “Digital S-curve Technology ™ (U.S. Patent Pending)”.
March 14, 2024	1.0	Initial Release.

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1 Construction Mode

1.1 Construction Mode Setup

Before power can be supplied to the controller, the controller should be placed in Construction Mode. The required temporary connections and jumpers on a C4 controller under Construction Mode is shown in Figure 1. Once the controller is in Construction Mode, it can be powered on.

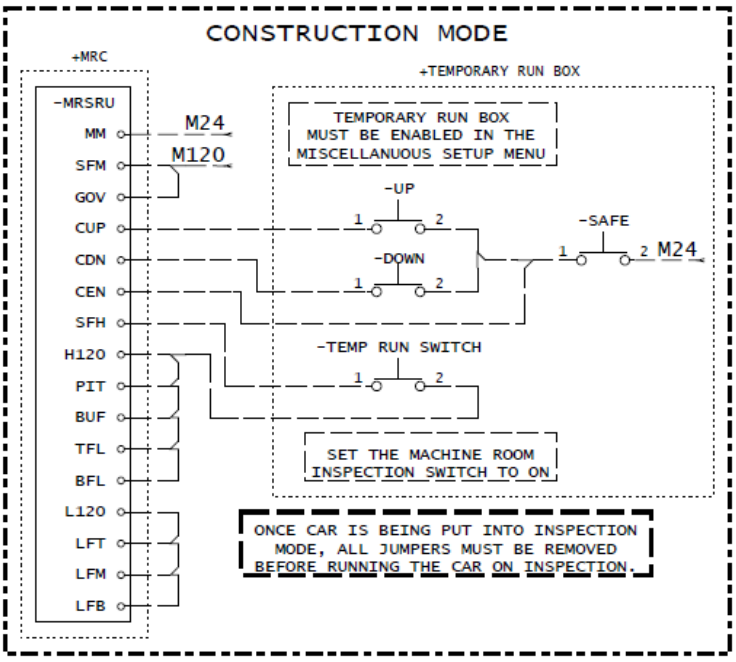

Figure 1: Construction Mode Connections on a C4 Controller

1.2 Drive Setup

Once the controller is powered on, the motor drive can be set up. See the *Drive Specific Manual* to know how to set up the drive.

Induction (geared) motors can run immediately after the wiring is completed; however, if the drive type is KEB, it is recommended to tune the motor first.

Permanent Magnet (gearless) motors will need to be tuned before they can operate. Follow the initial tuning steps on the *Drive Specific Manual*.

1.3 Fire Service Bypass

To bypass the Fire Service, turn on DIP B6 and set parameter 01-0131 to ON.

Follow these instructions to set parameter 01-0131 to ON:

1. Navigate to MAIN MENU.
2. Go to DEBUG.
3. Go to EDIT PARAMETERS.
4. Go to HEX FORMAT.
5. Select BIT 1 [indicated as '01' on the LCD].
6. Set the ADDRESS to 0131.
7. Set the PARAMETER to ON.

1.4 Normal Terminal Stop Bypass

If the elevator is running at a lower speed, usually 10 FPM, than the Inspection Speed requested by the controller, it could be that the Normal Terminal Stop (NTS) device is active.

To bypass the NTS feature during Construction Mode, turn ON DIP B1 to invert the NTS output to drive.

NOTE: it may not always be possible to bypass the NTS using the B1 DIP. An Alternative method is as follows:

Magnetek drives:

- Configure (C0) -> Logic Inputs (C2) -> NTSD Input 1 -> set function to NO. Remember to revert back after Construction mode is completed.

KEB drives:

- Input -> Input 1 Function (LI04) -> set to 21 (Emergency Slowdown (ESD)).

1.5 Running the Car on Construction Mode

On Construction Mode, most things are either suppressed or bypassed. As such, the controller must not exhibit any faults; however, if the controller has an active fault, red LED(s) will illuminate.

To Check for faults, follow this procedure:

1. Navigate to MAIN MENU.
2. Go to FAULTS.
3. Go to ACTIVE FAULTS.

See the *Fault and Alarm Manual* for C4 controllers.

If no active faults are detected, a zero-speed test is recommended to verify that the brakes are receiving the right picking voltage.

To perform a zero-speed test, follow this procedure:

1. Navigate to MAIN MENU.
2. Go to SETUP.

3. Go to SPEEDS.
4. Go to INSPECTION SPEED.
5. Set the speed to 0 FPM.

To ensure the brakes are receiving the right picking voltage, follow this procedure:

1. On the controller, hit the SAFE button and CONSTRUCTION UP *or* CONSTRUCTION DOWN buttons simultaneously.
2. On the brake board, check the brake outputs using a multimeter.
3. Verify that the brakes are lifting completely off the sheave (it may not always be possible to check for an air gap when the brakes are lifted).

When certain that the brakes are clearing the sheave, increase the Inspection Speed to default or any desired value (max 150 FPM), and run the car. If the car is roped and balanced, the car should move in the direction demanded. If the car is moving in the opposite direction, the direction can be reversed:

Magnetek drives:

- Configure (C0) -> User Switches (C1) -> Motor Rotation -> set to REVERSE.

KEB drives:

- Swap Encoder Channel (LE03) -> set value to 2 (Inverted Rotation).

If the car is moving in the right direction but there is a squeal at the start, it could be that the rotation is happening before the brakes have a chance to fully pick. Perform the following steps to fix this issue:

1. Navigate to MAIN MENU.
2. Go to SETUP.
3. Go to RUN TIMERS.
4. Go to START Timers.
5. Go to ACCEL DELAY (INSP).
6. Start at 1000 msec and increase until the noise disappears.

If the car travels smoothly but stops harshly when the command is off, increase the time the drive stays engaged by executing the following steps:

Navigate to MAIN MENU.

1. Go to SETUP.
2. Go to RUN TIMERS.
3. Go to STOP TIMERS.
4. Go to DRIVE DROP DELAY (INSP).
5. Increase until the noise disappears.

At this point the car should be traveling smoothly.

1.6 Landing System

Once the car is running smoothly, install the landing system (see the *CEDES/ELGO Installation Manual*).

1.7 Speed Control via Feedback from Landing System

After the landing system has been installed, run the car, and observe the actual vs. demanded speed of the elevator. The CEDES landing system is very accurate, and the elevator speed can be observed on the main display screen under “FPM: __”. However, a tachometer can also be used to verify the speed displayed. If the car is running faster or slower than demanded, change the following:

Induction motor:

Magnetek:

- Adjust (A0) -> Drive (A1) -> Contract Motor Speed -> reduce the RPM if the car is running faster than the demanded speed / increase the RPM if the car is running slower than demanded speed. (Good values to start with are +/- 10RPM).

KEB:

- Machine Data -> LN01 -> change the sheave diameter until the speeds match (good values to start with are +/-1 RPM).

Permanent Magnet motor:

It is rare for a gearless machine to run at a different speed than the one demanded, but if adjustments are needed, the same method stated above applies. Note that if the rope ratio is 1:1, the RPMs will only need to be adjusted by a very small amount. (Good values to start with are +/- 1 RPM).

2 Inspection Mode

2.1 Connecting the Car Top and Car Operating Panel Boards

See the *Traveler Connections* page to know how to connect the machine room controller with the Car Top (CT) and Car Operating Panel (COP) boards. The most common mistake is a miscommunication on the CAN1/2 network (Double/triple check the wirings).

All the locks and hoistway safety devices should be wired. Once the connections are made, the construction jumpers can be taken off.

If the door operator is connected, the 'Door and Lock' status should appear across all three boards on the controller.

2.2 Hoistway Learning

After connecting the CT and COP to the controller, the next step is to learn the hoistway.

The Learn Speed should be adjusted before learning the hoistway. The Learn Speed may be increased by performing the following steps:

1. Navigate to MAIN MENU.
2. Go to SETUP.
3. Go to SPEEDS.
4. Go to LEARN SPEED.

To learn the hoistway, follow these instructions:

1. Position the car at the top or bottom landing. The start does not have to be at the floor level - just within the 6" of the door zone blade.
2. Turn on DIP A5.
3. Switch from INSPECTION to NORMAL mode (the main display should show "Hold Enable and UP/DOWN to start").
4. Press Enable and UP *or* DOWN (depending on the direction to learn) using the inspection buttons until car starts moving, then release.

3 Automatic Mode

3.1 High Speed Runs

Once the hoistway learning is completed, the elevator can start making multiple floor runs.

Manual car calls can be placed using the following steps:

1. Navigate to MAIN MENU.
2. Go to DEBUG.
3. Select ENTER CAR CALLS.
4. Select FRONT or REAR.

Disable the doors by turning on DIP A3.

Perform the following steps for Workout Mode:

1. Navigate to MAIN MENU.
2. Go to DEBUG.
3. Go to DEBUG RUNS.
4. Select DWELL TIME.

3.2 Digital S-curve Technology ™ (U.S. Patent Pending) & Slowdown Distance Adjustments

Digital S-curve Technology ™ (U.S. Patent Pending) adjustments can be done from the controller by following these instructions:

1. Navigate to MAIN MENU.
2. Go to SETUP.
3. Go to S-CURVE.

The slowdowns are calculated automatically depending on how aggressive the Digital S-curve Technology ™ (U.S. Patent Pending) is set. However, the final leveling distance may be increased, if desired, by applying these instructions:

1. Navigate to MAIN MENU.
2. Go to SETUP.
3. Go to S-CURVE.
4. Select NORMAL PROFILE.
5. Select LEVELING DISTANCE.

3.3 Vibrations on High Speed

If the car is running at the commanded speed and without faults but there are vibrations felt both inside the car and in the machine room, try the following:

Induction motors:

I. Try running in Open loop, in other words, no Encoder feedback.

Magnetek:

- Utilities (U0) -> Basics (U9) -> Drive mode -> Open loop

KEB:

- Control Setting -> Control Mode (LC01) -> set parameter to 0 (Open Loop).

If the car is running smoothly in Open Loop, it may be an indication that there is an issue with the encoder or the encoder wiring.

II. If running in Open loop made no difference, try the following:

Magnetek:

- Adjust (A0) -> Drive (A1) -> Response -> decrease the value of the response -> if no changes, set the value back to 10 (default).

KEB:

- Control Setting -> LC03 - LC12 -> cut all gains by half and confirm.

III. If the above two methods made no difference, make sure the vibrations are not mechanical. Drift the car with no power and determine the source of the vibrations, if there are any. Follow these instructions to drift the car with no power:

1. Position the car at the bottom landing. It is best to add some weight inside the car to prevent the car from running too fast.
2. Disable the doors by setting DIP A3 on machine room board to ON.
3. Enable unintended motion test by setting DIP B8 on the machine room board to ON and set parameter 01-0052 to ON.
4. Push in the B1 contact. The car will start drifting upwards.

Permanent Magnet motors:

Magnetek:

- Under User Switches (C1) -> Endat Interp and Endat Out Mult -> try lowering one parameter at a time by 1 count each time.
  NOTE: the lower the setting for either parameter, the less there is control over the machine.
- Adjust (A0) -> Drive (A1) -> Response -> decrease the value of the response -> if no changes, set the value back to 10 (default).

- Adjust (A0) -> Drive (A1) -> Inner Loop Xover -> decrease the value -> if no changes, set the value back to 2 (default).

KEB:

- Control Setting -> LC03 - LC12 -> cut all gains by half and confirm.

If the above methods made no difference and the car still vibrates, make sure the vibrations are not mechanical. Drift the car with no power and determine the source of the vibrations, if there are any. Follow these instructions to drift the car with no power:

1. Position the car at the bottom floor. It is best to add some weight inside the car to prevent the car from running too fast.
2. Disable the doors by setting DIP A3 on machine room board to ON.
3. Enable unintended motion test by setting DIP B8 on machine room board to ON and set parameter 01-0052 to ON.
4. Push in the B1 contact. The car will start drifting upwards.

NOTE: achieving the highest degree of control over the machine may not always result in the smoothest motor operation. Sometimes a compromise must be made - sacrificing some comfort to get a more reliable performance.

3.4 Rollback Mitigation without the use of the Load Weigher

Having a Load Weighing Device (LWD) installed and calibrated will always provide the best starting performance. However, on jobs where the LWD is not available, some adjustments can be made with the help of pre-torque.

On the Drive:

Magnetek:

- Adjust (A0) -> Drive (A1) -> Inertia -> decrease the value from the default (2).
- Adjust (A0) -> Drive (A1) -> Response -> increase the value from the default (10).

KEB:

- Control Settings -> LC03-LC12 -> increase parameters to get more gains across the ranges.

On the Controller:

Increase starting speed by following these instructions:

1. Go to SETUP.
2. Go to SPEEDS.
3. Go to MIN ACCEL SPEED.
4. Increase the speed from 1 FPM (default) to 2, 3... up to 5 FPM.

Increase the time before the drive sheave rotates by following these instructions:

1. Go to SETUP.
2. Go to RUN TIMERS.
3. Go to START TIMERS.
4. Select ACCEL DELAY (AUTO) or (INSP).
5. Gradually increase the time.

3.5 Full Load Operation Issues

When having issues running the car with a full weight capacity loaded in, a zero-speed test can help isolate the issue. Set the inspection speed to 0 FPM and command a run - observe for a rollback in either direction.

Follow these steps to resolve the full load operation issues:

Geared Machines:

Set the motor RPM close to the synchronous speed (no slip).

Magnetek:

- Adjust (A0) -> Motor (A5) -> Rated Motor Speed -> set the RPM close to the synchronous speed.

  Example: if the synchronous speed of the motor is 1800, setting the Motor RPM parameter to 1800 will result in Setup Fault 1. Any value less than 1800 (factoring in some slip) will work. Observe the motor current under Power Data (D2). Note down the motor current before and after making the RPM adjustments.

KEB:

- Basic Setup -> Contract Speed (US06) -> set the RPM close to the synchronous speed.

Gearless Machines:

Check if the encoder is functioning correctly. Re-align the encoder (See the *Drive Specific Manual* for detailed instructions). If the encoder is functioning well, follow these steps:

Magnetek:

- Adjust (A0) -> Drive (A1) -> Response -> increase the value from the default (10).
- Adjust (A0) -> Drive (A1) -> Speed Dev Time -> decrease the value from the default (0.5).
- (Only if faulty with speed deviation)
- Adjust (A0) -> Drive (A1) -> Speed Dev Fault Level -> decrease the value from the default (25).

KEB:

- Control Setting -> Pre-torque (LC05, LC10) & Acceleration (LC03, LC08, LC11)-> increase gains for the Pre-torque and Acceleration.

3.6 Inconsistent Floor Levels

Inconsistent floor levels may not always be because of the landing system, most of the time the issue stems from poor motor control at low speeds. Try the following solutions:

Magnetek:

- Adjust (A0) -> Drive (A1) -> Inertia -> try using increments of 0.1 from the default (2).

KEB:

- Control Settings -> Deceleration (LC04, LC09, LC12) -> increase the Deceleration gains one at a time.

3.7 Thump/Clunk Sounds at the End of a Run

A thump or a clunk can be heard or felt at the end of a run when the car stops. This is a mechanical noise when the drive is disengaging and the mechanical brakes are setting in. The weight of the car is being transferred onto the brakes. This issue mostly occurs with gearless machines.

To resolve this issue, try the following:

Magnetek:

- Configure (C0) -> User Switches (C1) -> Ramped Stop Sel-> set to RAMP ON STOP
- Configure (C0) -> User Switches (C1) -> Ramp Down En Src-> set to RUN LOGIC
- Adjust (A0) -> Drive (A1) -> Ramped Stop Time -> start at default (0.2) and increase as needed.

KEB:

- Timer -> Current Hold Time (LT12): increase as needed.
- Timer -> Current Ramp Down Time (LT13): increase as needed.

List of Abbreviations

CT Car Top
COP Car Operating Panel
ESD Emergency Slowdown
LWD Load Weighing Device
NTS Normal Terminal Stop