# GAL Conversion Kit MOVFE-HH to replace existing SEC QKS14 and QKS15 Operators

# INSTALLATION MANUAL

RETAINING EXISTING HEADER, TRACKS, HANGERS, CLUTCH, AND INTERLOCKS

**REV A**


GAL
A VANTAGE Company

50 E. 153rd St.
Bronx, NY 10451-2104
Ph: 718.292.9000
Fax: 718.292.2034

info@gal.com
www.gal.com
sales@vantageelevation.com
www.vantageelevation.com

VANTAGE
THE POWER TO MOVE
REGIONAL SERVICE CENTERS

| | |
|---|---|
| Chicago | 877.300.5830 |
| New York | 917.336.4597 |
| Miami | 877.241.9354 |
| L.A. | 877.300.5816 |
| Dallas | 469.706.9316 |
| Toronto | 888.425.2262 |

INTENTIONALLY LEFT BLANK

# CONTENTS

# 1. INTRODUCTION

It is the intent of this manual to give the reader certain key points of information critical to the proper installation of the door operator conversion kit. This retrofit kit is designed to replace an existing Schindler QKS-14 or QKS-15 operator with GAL's MOVFE-HH operator.

The mechanical profile of the MOVFE-HH is identical to the existing QKS operator. The header, tracks and hangers are retained, allowing the user to easily replace the operator with minimal adjustments required.

When properly installed, GAL door operators will give many years of trouble-free service and reliability.

## IMPORTANT NOTES

All equipment must be installed, adjusted, tested, and maintained to comply with all Federal, State/Provincial, and Local codes.

Kinetic Energy and Stall Force must be adjusted to comply with ASME, A17.1, Rule 112.4/5, and CSA/B44, Rule 2.13.4/5.

Before mounting the operator, check that the car door is plumb, free and moves easily without binding. Check the attached standard measurement sheets and install the operator according to the measurements supplied.

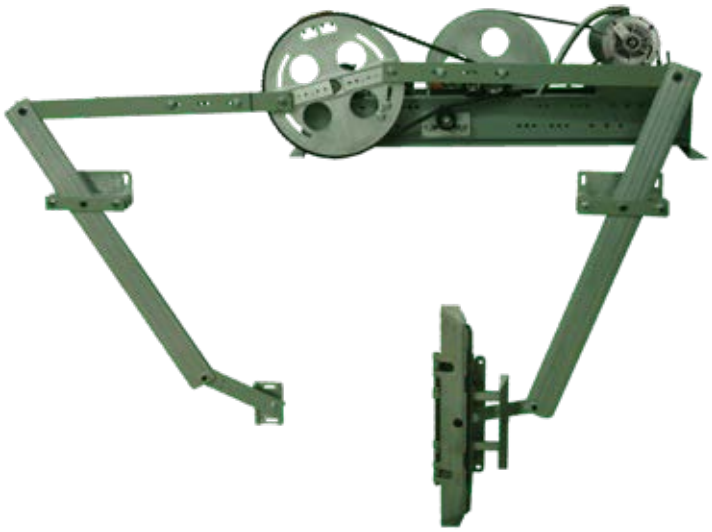
Contact G.A.L. if the following label shown in *Figure 1* is missing from the door operator.


*Figure 1: Door operator label*

## 1.1. DETERMINING THE HAND OF THE OPERATOR

*RIght Hand Operator*

*Left Hand Operator*



*Center Parting Operator*

Hand determined standing in the hall looking to the cab.
**Right hand** – Door closes from left to right
**Left hand** – Door closes from right to left

# 2. INSTALLATION AND SETUP

## 2.1. COMPONENTS

**KIT03-4001L** - QKS14/15 TO MOVFE HH SS/2S KIT, 115V, 3D

| PART NUMBER | DESCRIPTION |
|---|---|
| – | Left Hand Operator, 115V<br>w/ Drive Arm, SS/2S, Universal Length |
| MOVFE-0008N | Parameter Unit |
| FUSE-0006N | 6 Amp Fuse (Qty. 2) |
| HRNS-0042N | QKS-14/15 To MOVFE-HH Wiring Harness |
| DOC-0155N | Installation Manual |

**KIT03-4001R** - QKS14/15 TO MOVFE HH SS/2S KIT, 115V, 3D

| PART NUMBER | DESCRIPTION |
|---|---|
| – | Right Hand Operator, 115V<br>w/ Drive Arm, SS/2S, Universal Length |
| MOVFE-0008N | Parameter Unit |
| FUSE-0006N | 6 Amp Fuse (Qty. 2) |
| HRNS-0042N | QKS-14/15 To MOVFE-HH Wiring Harness |
| DOC-0155N | Installation Manual |

**KIT03-4003N** - QKS14/15 TO MOVFE HH CP KIT, 115V, 3D

| PART NUMBER | DESCRIPTION |
|---|---|
| – | Center Parting Operator, 115V<br>w/ Drive Arm Pair, CP, Universal Length |
| 2500-3029 | Drive Arm Pivot Bracket |
| MOVFE-0008N | Parameter Unit |
| FUSE-0006N | 6 Amp Fuse (Qty. 2) |
| HRNS-0042N | QKS-14/15 To MOVFE-HH Wiring Harness |
| DOC-0155N | Installation Manual |

## 2.2. PRELIMINARY STEPS

Remove the car from service, in compliance with standard safety policies. Disconnect the existing operator from the controller.

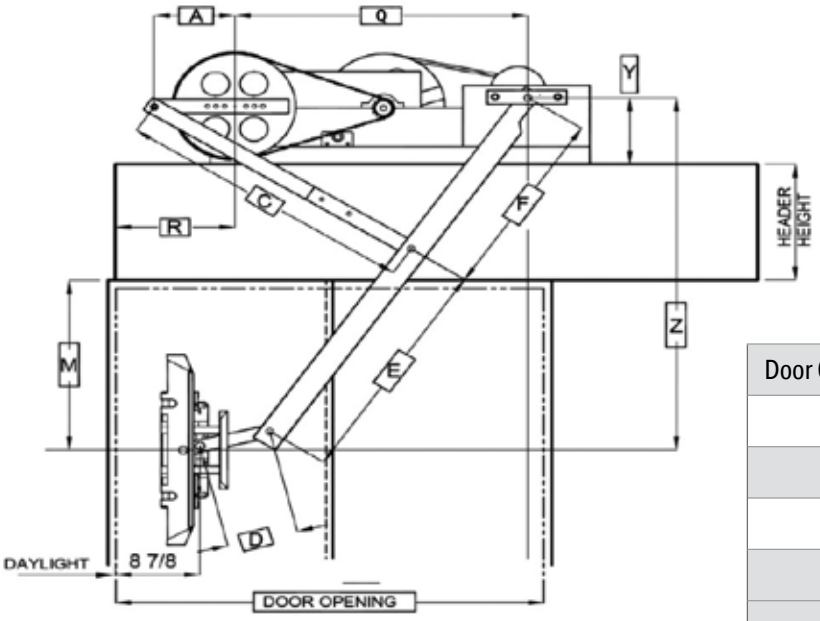
**NOTE: Do not remove wires from their connectors at this time. A wiring harness is included to simplify wiring the new operator. See Section 2.6 for details.**

Unwire the existing gate switch and leave installed. This will need to be rewired into the new control box later.

## 2.3. DATA TABLES

A table has been provided to measure the existing arms. This will aid in adjusting the new arms and operator.

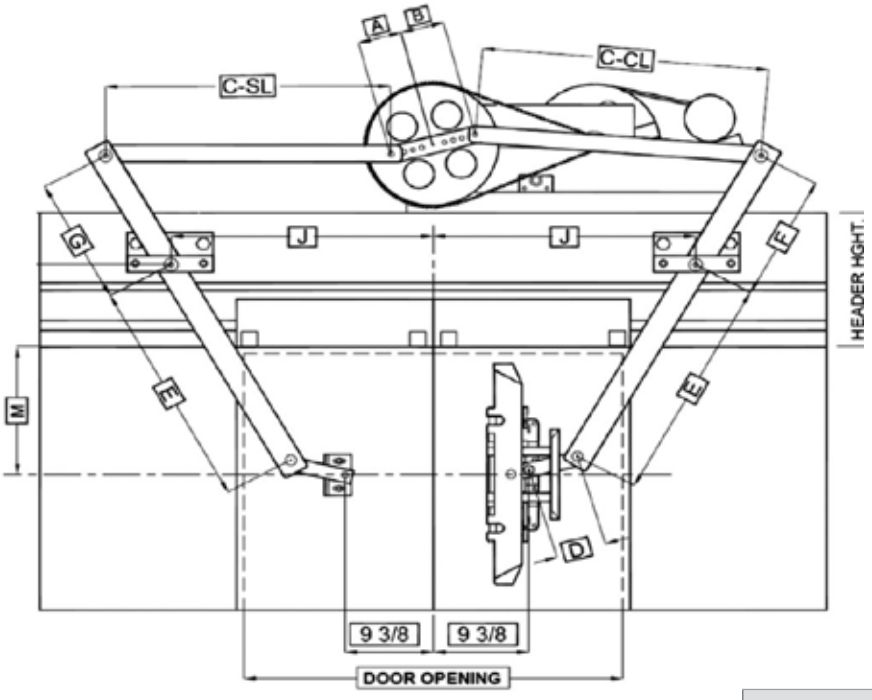
SIDE SLIDE




| Door Opening | Measurements | |
|---|---|---|
| A | | Crank Arm |
| C | | Connecting Link |
| D | | Clutch Link (not included) |
| E | | Drive Arm |
| F | | |
| M | | Top of door to Clutch Center |
| Q | | Center of Pulley to Pivot Center |
| R | | Daylight to Center of Pulley |
| Y | | Operator Base to Pivot Center |
| Header Height | | |

# QKS-14 AND QKS-15 TO MOVFE-HH CONVERSION KIT

CENTER PARTING

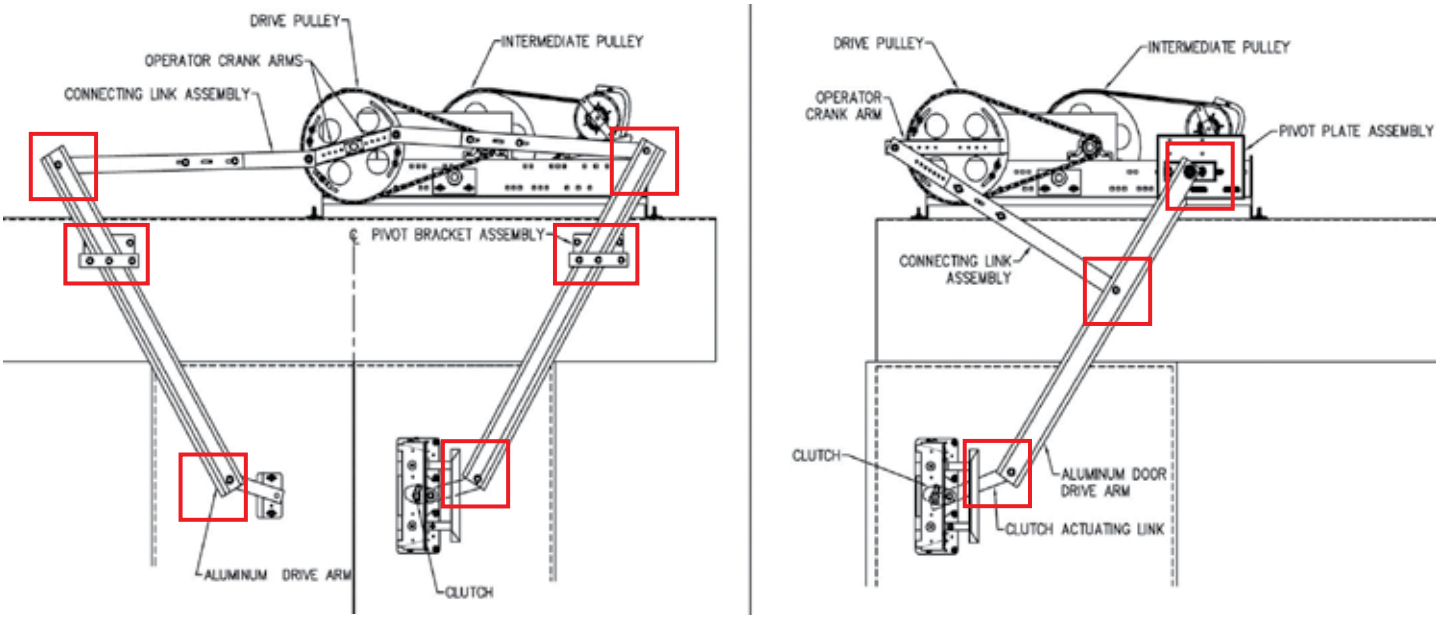



| Door Opening | Measurements | |
|---|---|---|
| A | | Crank Arms |
| B | | |
| C-SL | | Connecting Links |
| C-CL | | |
| D | | Clutch Link (not included) |
| E | | Drive Arms |
| F | | |
| G | | |
| J | | CL of Opening to Center of Pivot |
| M | | Top of door to Clutch Center |
| Header Height | | |

## 2.4. REPLACING THE DRIVE ARMS

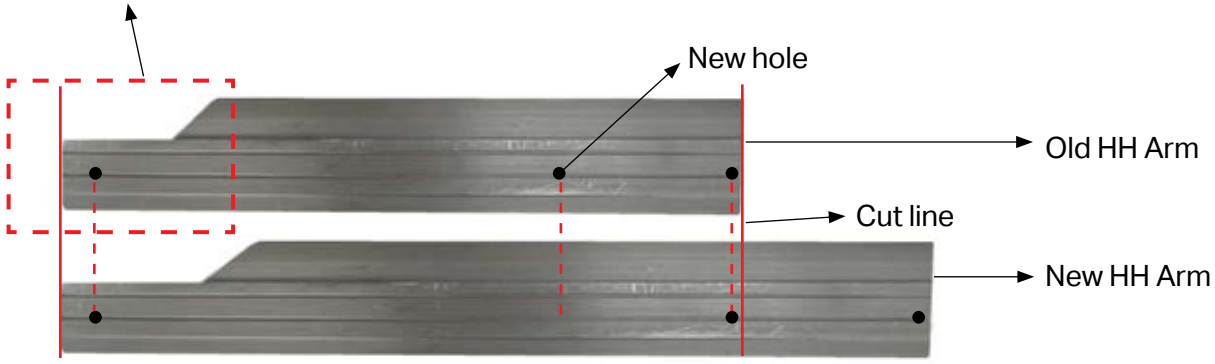
All necessary operator measurements are listed in the previous section. They are restated here for completion.

Detach the existing aluminum drive arm from the clutch, connecting link and pivot assembly. Remove the existing support brackets from the header (center parting only). Detach points are boxed in Red.




Line up the old drive arm with the new HH arm, included in the kit.

**Note: Be sure to line up the arms in the same direction. The "C" shape should face the same way and the chamfers (side slide only) should be on same end.**



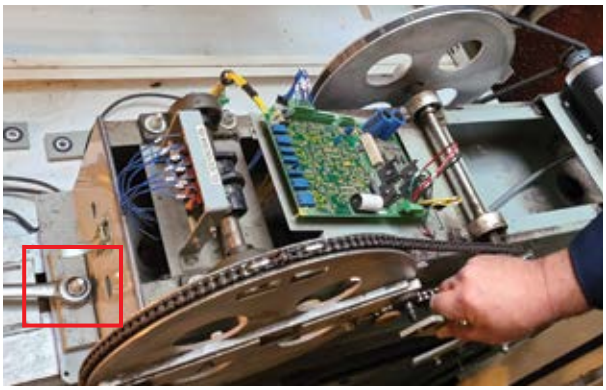

Mark where the existing holes are and the bottom of the old drive arm. Drill (2) 3/8" diameter through holes in the new drive arm and cut and file to match the existing. There may be extra holes on the drive arm. Make sure to note which ones match the old arm.

**MAKE SURE NOT TO CUT THE CHAMFERED EDGE OFF THE SINGLE SPEED DRIVE ARM.**

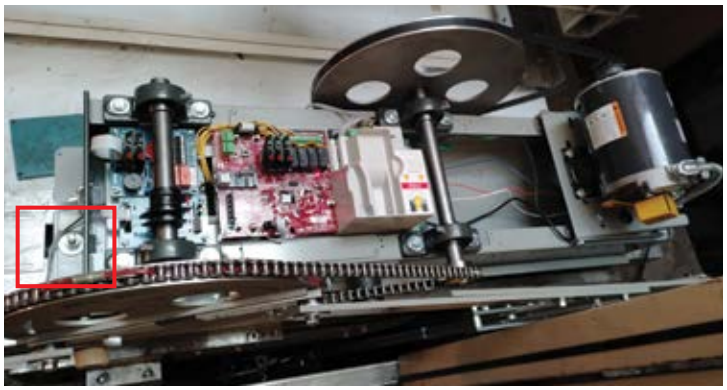
## 2.5. INSTALLING THE OPERATOR

Measure the existing connecting link(s) and crank arm(s). Unbolt and remove the existing operator. Secure the new operator in the existing mounting points.

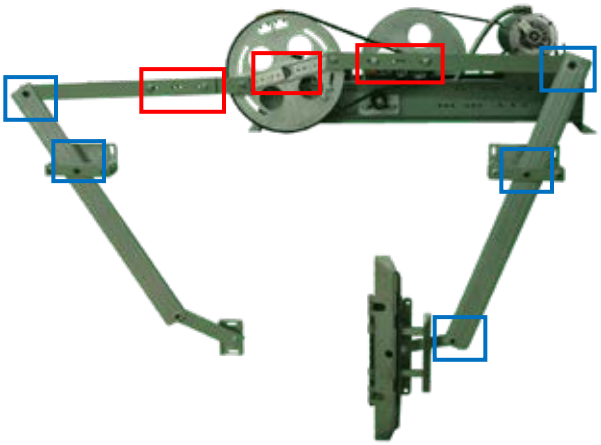
Loosen the 2 bolts holding the crank arm to the pulley. Slide the link to match the QKS measurement. Tighten the bolts. Loosen the 2 bolts holding the new connecting link(s) together. Adjust to the measured length and tighten. You may need to use different slots or tapped holes. Repeat this process for the other side on a center parting operator.



*Old Operator*

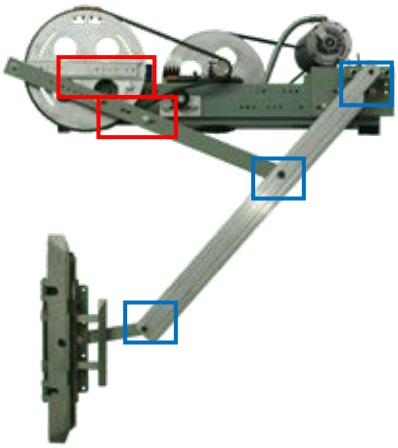


*New Operator*



***Red:*** *Crank / Connecting link adjustment locations*

***Blue:*** *Drive arm attachment points*



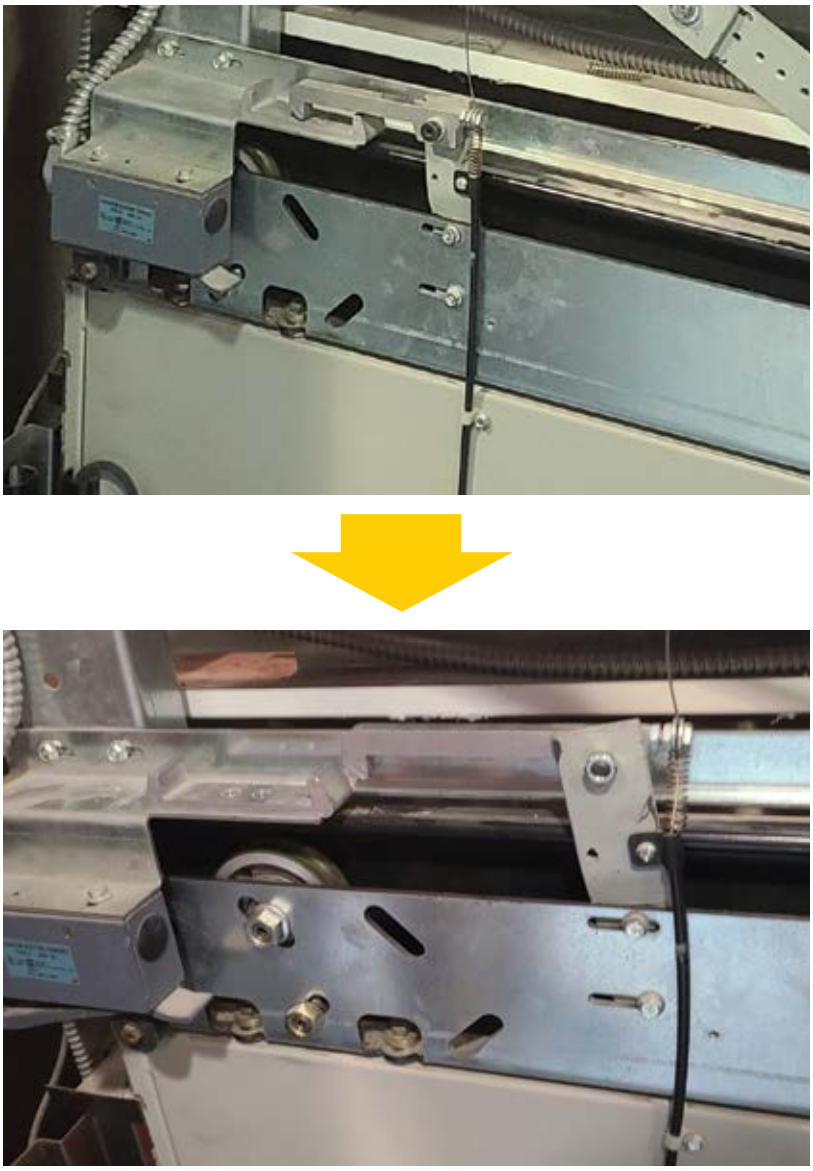
**Center parting:** Attach the drive arm support brackets to the new drive arms. Then, attach the brackets to the header. **Make sure to insert the bearing into the arm before bolting it to the bracket.** Connect the bracket at the end of the left drive arm to the door in the existing holes.

**Side slide:** Connect the chamfered end of the drive arm to the pivot bracket.

**Both:** Connect the drive arms to the clutch and the connecting link(s).

## 2.6. CLUTCH TROUBLESHOOTING

If retaining the original clutch, it is possible the keeper on the zone lock will interfere with the drive arm. In that case, the moveable arm can be moved to the backside of the bracket. Otherwise, an LWZ-2 series clutch can be ordered to replace the entire clutch and zone lock assembly.

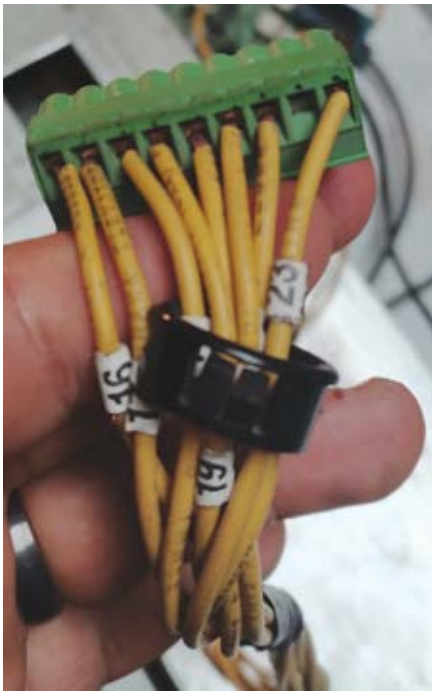


## 2.7. FIELD WIRING

The existing CIO board is in the car operating panel. The existing encoder and line filter can be removed before rewiring to the new MOVFE board. Wiring harnesses and connectors have been included to simplify the rewiring process. Some manual rewiring is still required.

The first 5 pins of HRNS-0042N is for P2-1 through P2-5 and don't require additional wiring for the TDC or TRX5 boards. P2-6 through P2-9 are not wired into the 16-pin connector. Follow the diagrams on the next two pages to wire the harness for your specific board and software.

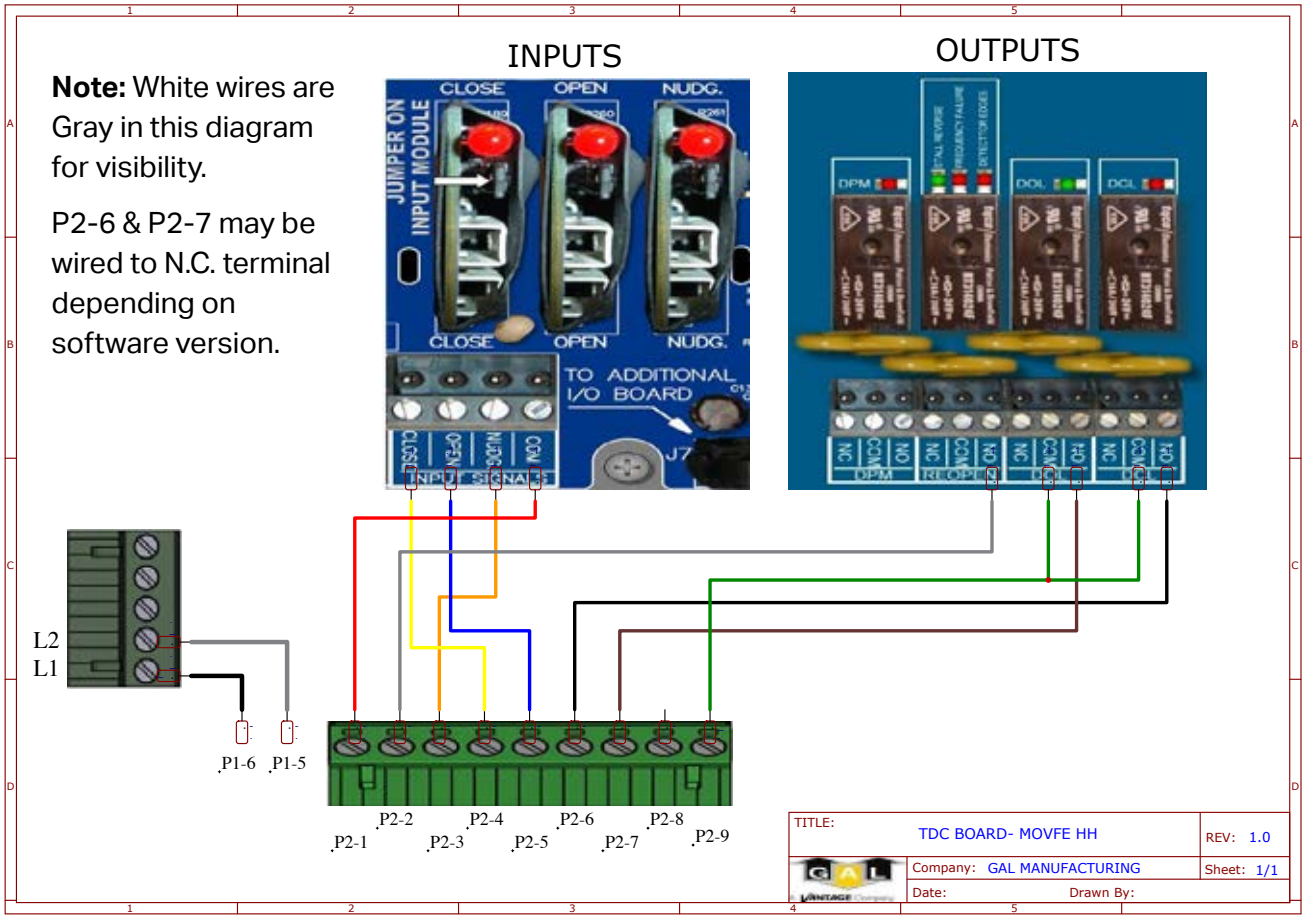
**Note:** There will be a 16-pin connector already installed on the MOVFE-HH board. This needs to be replaced with the 16-pin connector on harness HRNS-0042N.



*Existing connector for P2*


*Existing 16-pin connector.*
*To be replaced with wiring harness.*

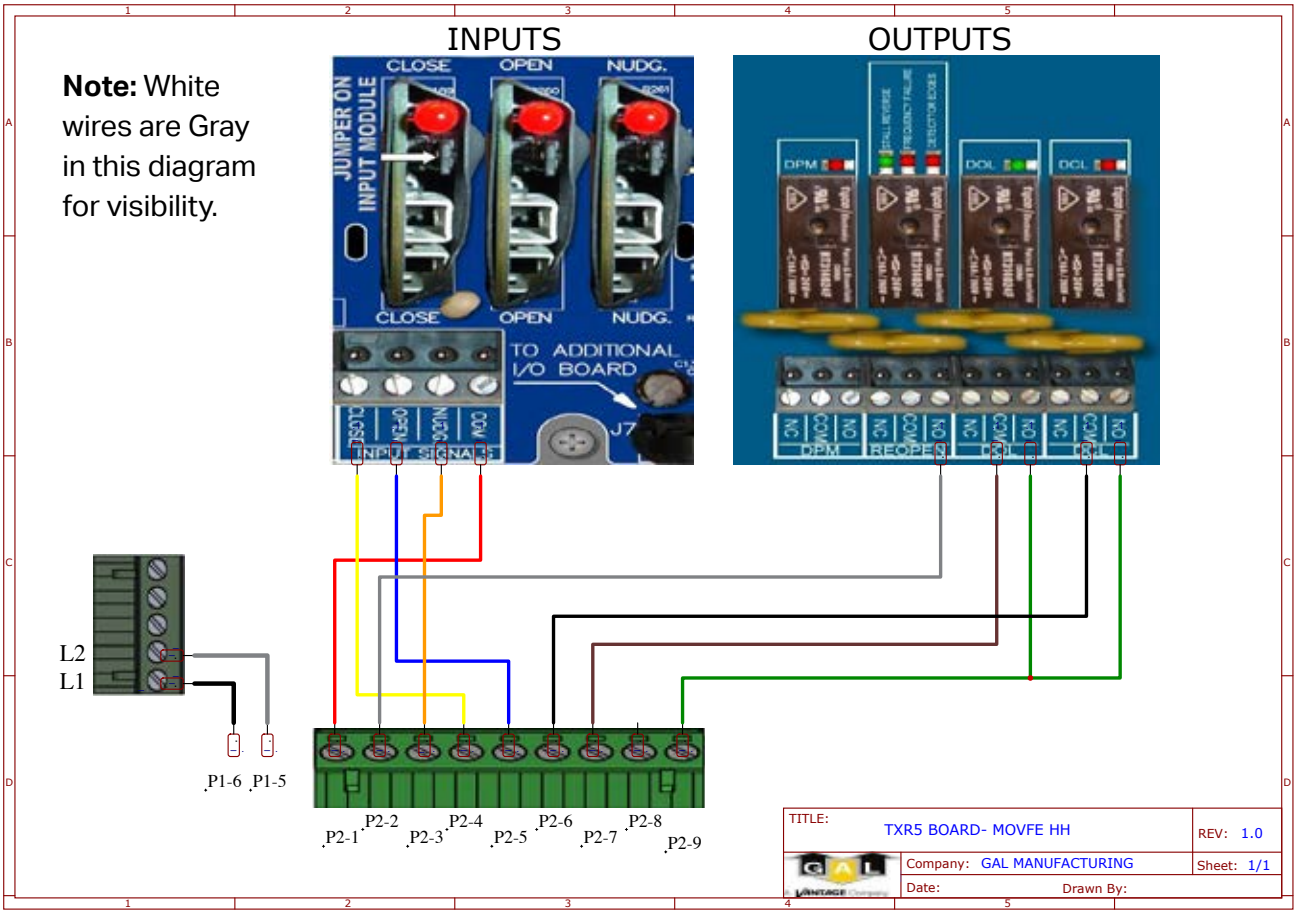
## 2.7.1 FOR TDC BOARDS




| SCHINDLER SIGNAL | TDC BOARD (EXISTING) | MOVFE-HH BOARD (NEW) | WIRE COLOR |
|---|---|---|---|
| Door PWR Neutral 110VAC | P1-5 | L2 | Existing (Black above) |
| Door PWR Hot 110VAC | P1-6 | L1 | Existing (Gray above) |
| +24 (jumper to nudge, open and close input commons) | P2-1 | COM (Input) | Red |
| KSTE (no connection when Schindler edge is retained) | P2-2 | Reopen (Output) | White |
| DNUDGE | P2-3 | Nudge (Input) | Orange |
| DCLOSE | P2-4 | Close (Input) | Yellow |
| DOPEN | P2-5 | Open (Input) | Blue |
| KDFC* | P2-6 | DCL (Output)* | Black |
| KDFO* | P2-7 | DOL (Output)* | Brown |
| DHVY (rarely used, left unwired in harness) | P2-8 | Heavy | N/A |
| G24 (jumper to DCL/DOL common) | P2-9 | DCL/DOL (COM) | Green |

*wired N.C. or N.O. depending on software version

## 2.7.2 FOR TRX5 BOARDS




| SCHINDLER SIGNAL | TDC BOARD (EXISTING) | MOVFE-HH BOARD (NEW) | WIRE COLOR |
|---|---|---|---|
| Door PWR Neutral 110VAC | P1-5 | L2 | Existing (Black above) |
| Door PWR Hot 110VAC | P1-6 | L1 | Existing (Gray above) |
| +24 (jumper to nudge, open and close input commons) | P2-1 | COM (Input) | Red |
| RPHTL (no connection when Schindler edge is retained) | P2-2 | Reopen (Output) | White |
| VRV-RT | P2-3 | Nudge (Input) | Orange |
| VST-S | P2-4 | Close (Input) | Yellow |
| VST-O | P2-5 | Open (Input) | Blue |
| KET-S | P2-6 | DCL (Common) | Black |
| KET-O | P2-7 | DOL (Common) | Brown |
| VHEAVY (rarely used, left unwired in harness) | P2-8 | Heavy (Input) | N/A |
| GND (jumper to DCL/DOL N.O.) | P2-9 | DCL/DOL (Output) | Green |

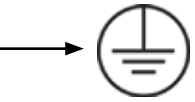
## 2.8. INITIAL ELECTRICAL SETUP

### 2.8.1. CONNECTIONS TO THE MAIN ELEVATOR CONTROLLER

Connect wires to the main elevator controller (See "Field Wiring Diagrams")

The major connections are:

- **EARTH GROUND**
- **115VAC** or **230VAC** between L1 & L2
- **DOL** (Door Open Limit)
- **DCL** (Door Close Limit)
- **CLOSE** (Door Close)
- **OPEN** (Door Open)
- **NUDG.** (Nudging)





**Note:**

- Check the MOVFE-HH drives to apply 115VAC or 230VAC appropriately. Power Requirement: 1KVA, Max Slow-Blowing External Fuse Size: 4Amp for 230VAC & 8Amp for 115VAC
- If the Input Voltage for OPEN, CLOSE, and NUDG are less than 60VAC or DC, jumpers on the top of the input modules of the MOVFE-HH drives must be removed
- In automatic mode, the MOVFE-HH will only accept input signals from the elevator controller.
- REOPEN output relay is optional.

### 2.8.2. INITIAL SETUP

The following initial procedure is helpful for users, if needed. The initial procedure is to assure the following:

- The motor is in the correct direction.
- The encoder is in the correct direction.
- The correct default parameter set is downloaded (written) to the MOVFE-HH drive
- The door width is learned.
- The operation source is selected.

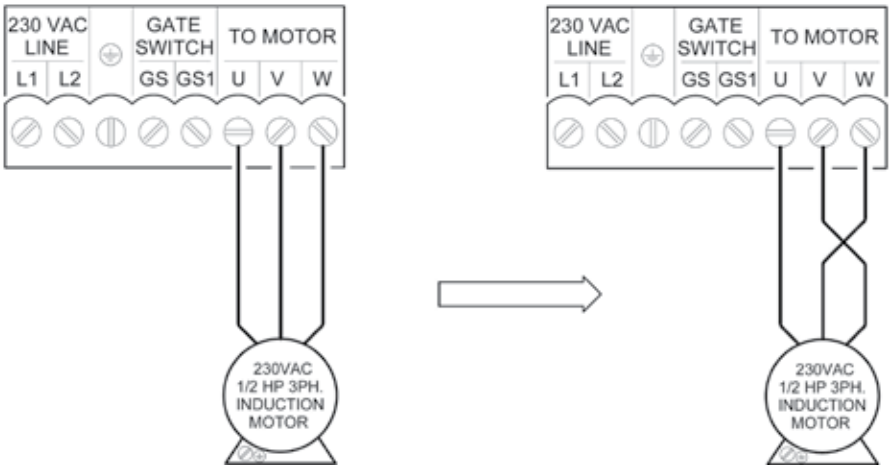
**1. Turn Power ON**


**2. Motor direction:**

a. Run the door in Manual mode.

b. If the door closes and opens in the correct direction go to 3

c. Otherwise swap any 2 of motor wires as shown on next page, and test again.




**Note:** 230 VAC drive displayed above, 115 VAC drive procedure is identical.

**3. Encoder direction**

a. Press VOLT PULSE. Run the door in Manual mode using the toggle switches.

b. If the door Closes and the counter Decreases, or the door Opens and the counter Increases, then the encoder Direction is Correct.

c. Otherwise, change parameter 42 from 1 to 2 or vice versa.

**4. Learn the door width**

a. Flip the RUN|SETUP switch to SETUP. Set Par. 63 = 1.


b. Flip the RUN|SETUP switch to RUN.

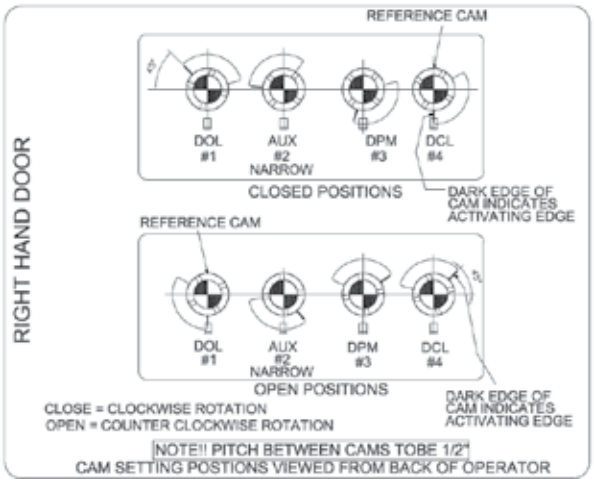
c. Use Manual mode to run the door from DOL to DCL, or vice versa.

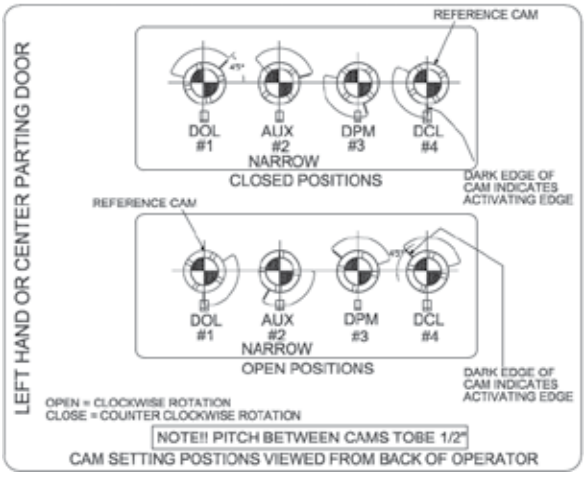
d. Follow the prompts on the LCD display. LEARN DOOR WIDTH LED will flash and turn off when the learning process is completed. Par. 63 will set itself back to Zero.

## 2.9. OPTICAL CAMS

For the harmonic model, there are 4 optical cams to set the final limits, door protection monitor, and an AUX. cam for the narrower door. The Optical cam board, 2500-3056, carries the optical sensors, and the table below describes the functions of those sensors.


| NUMBER ON FIGURE | LABEL | REMARKS |
|---|---|---|
| 1 | DOL | Door Open Limit. The MOVFE utilizes the DOL limit signal for door width learning. After the door width learning process is completed, MOVFE utilizes the DOL limit as HOME position whenever power is restored after an interrupt. |
| 2 | AUX NARROWER | Set Par. 199=0 to use the AUX/NARROWER sensor as the DOL input of the narrower door. Set par. 199 = 1 to deselect the AUX/ NARROWER sensor. |
| 3 | DPM | DPM: Door Protection Monitor. The DPM cam triggers the DPM Relay and activates ½ inch before the Gate switch makes. |
| 4 | DCL | Door Close Limit. The MOVFE utilizes the DCL limit signal for door width learning. After the door width learning process is completed, MOVFE also utilizes the DCL limit as HOME position whenever power is restored after an interrupt. |



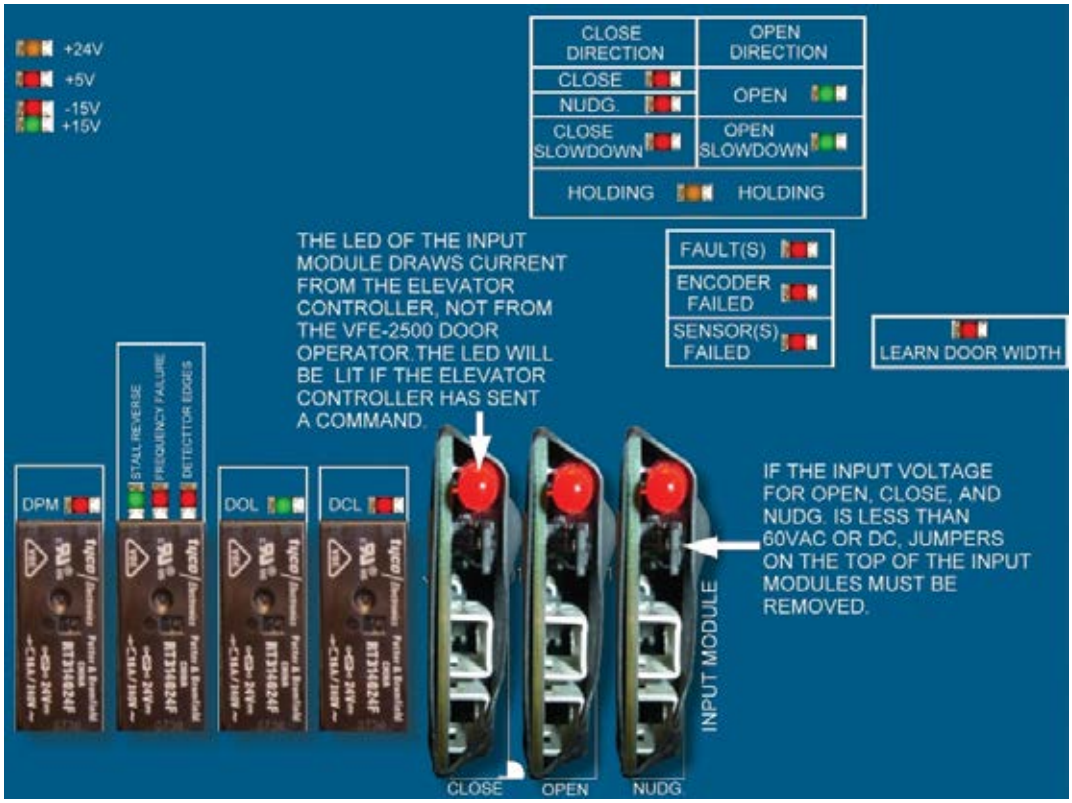



## 2.10. LED INDICATORS

A red LED is provided on each of the input modules (Open, Close, or Nudge). Heavy and Narrow inputs are optional and require an additional I/O board, which will be provided on request to carry out the Heavier and Narrower door functions.

Note that if the input signals voltage is 60V or less, the jumpers on each input module must be removed.

There are 20 more LEDs, on the main board, to indicate the completion of the door width learning, the directions, the final limit positions, nudging, holding, dynamic slowdown distances, input signals, output signals, and voltage levels. The illustration below identifies those LEDs.



## 2.11. MOVFE-HH DRIVE

The MOVFE-HH drive is an integral part of the MOVFE-HH system. Velocity and distance feedbacks are combined to deliver precise and smooth stops at DOL or DCL every time.

**MOVFE-HH drive provides the connections for:**

- Single phase input power supply between L1 & L2 terminals.
  - **Note:** 230V +/-15V or 115V +/-15V, 50/60Hz, and minimum 500VA are required.
- Earth ground
  - **Note:** A True Earth Ground is required.
- Convenience Gate switch terminals: GS & GS1.
  - **Note:** GS & GS1 are only convenience terminals. They have no internal connection to the MOVFE-HH.
- 3-phase induction motor on U, V, W terminals.

The connector is a pluggable type to ease the connection and swapping the drive. The RJ12 mating connector for the parameter unit is located on the MOVFE-HH drive.


The International Ground Symbol is the True Earth Ground that is connected to the system. A connector and a green screw, size 8/32 x 3/8, are provided by GAL as shown. Use position 22-14 of the crimping tool to crimp the wire into the connector and use the green screw to screw the ground connector to the chassis of the MOVFE-HH door operator. The following materials are recommended:

- A minimum # 14 AWG conductor size for Ground wire.
- Crimping tool made by SARGENT/USA.

## 2.12. PARAMETER UNIT

The Parameter Unit (P/N: MOVFE-0008N) is a tool that plugs into the MOVFE-HH drive and permits changing values of relevant parameters.

- Learning the door widths of the regular door and narrower door.
- Changing accelerations, decelerations, speeds, torques, and all pertinent parameters of peripheral devices. See the defaults parameters table for more details.
- Downloading (copying, reading), uploading (writing) to and from the drive.
- Storing all default sets of parameters and a reference working set of parameters.
- Monitoring currents, voltages, inputs, outputs, faults, encoder directions, closing time.
- Resetting the drive.


The followings will describe in depth about the parameter unit:

### 2.12.1. CONNECTIONS TO THE

- Press SET. Enter a parameter number
- Press READ. Enter a new value. Press WRITE. Wait for the Completed signal from the LCD display.

### 2.12.2. HOW TO READ (COPY) FROM A DRIVE

- Press SET. Press △
- Press READ. Wait for the Completed signal from the LCD display.

### 2.12.3. HOW TO WRITE (DOWNLOAD) TO A DRIVE

- Press SET. Press △
- Press READ. Wait for the Completed signal from the LCD display.

## 2.12.4. DEFAULT PARAMETERS

| CLOSING | PR.# | RANGE | DEFAULT VALUE | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | HARMONIC | | LINEAR | | | |
| | | | | | STRAIGHT | | GEARED | |
| | | | C/P | S/0 | C/P | S/0 | C/P | S/0 |
| MAX CLOSE SPEED | 136 | 0-60 | 30 | 30 | 30 | 30 | 35 | 35 |
| HOLDING TORQUE | 137 | 0-3 | 0.6 | 0.6 | 0.6 | 0.6 | 0.1 | 0.2 |
| HOLDING SPEED | 138 | 0-400 | 2 | 2 | 2 | 2 | 2 | 2 |
| HOLDING BEGINS | 139 | 0-100 | 3 | 3 | 2 | 2 | 2 | 2 |
| CLOSE TORQUE ▲ | 140 | 0-400 | 243 | 173 | 270 | 270 | 100 | 120 |
| HIGH SPD (HSC) | 141 | 0-400 | 25 | 19 | 30 | 25 | 30 | 25 |
| FINAL SPD (FSC) | 142 | 0-400 | 5 | 5 | 3 | 2 | 4 | 5 |
| FSC BEGINS | 143 | 0-100 | 6 | 10 | 5 | 5 | 5 | 10 |
| NUDGING SPD | 144 | 0-400 | 15 | 9 | 10 | 15 | 15 | 15 |
| ACCEL. TIME | 145 | 0-360 | 4 | 6 | 6 | 6 | 6 | 2 |
| DECEL. TIME | 146 | 0-360 | 8 | 10 | 15 | 20 | 10 | 4 |
| STALL REV. FORCE | 148 | 0-4.5 | 1.6 | 2.0 | 1.4 | 1.4 | 0.6 | 0.9 |

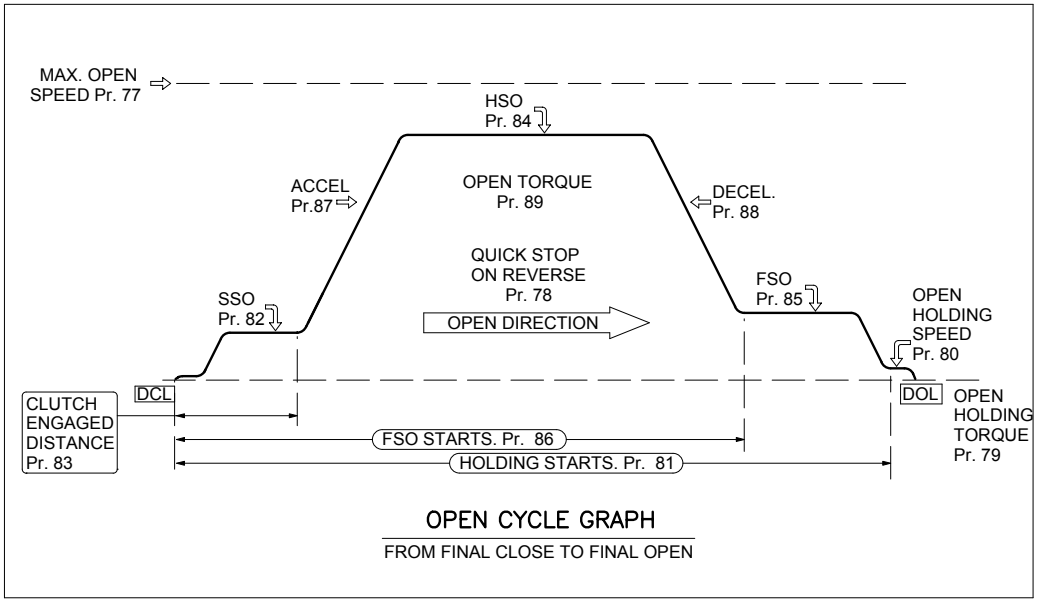
| OPENING | PR.# | RANGE | DEFAULT VALUE | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | HARMONIC | | LINEAR | | | |
| | | | | | STRAIGHT | | GEARED | |
| | | | C/P | S/0 | C/P | S/0 | C/P | S/0 |
| QUICK STOP ON REV. | 78 | 0-4.5 | 1.2 | 1.4 | 2.0 | 2.0 | 1.2 | 1.2 |
| HOLDING TORQUE | 79 | 0-3 | 0.6 | 0.6 | 0.6 | 0.6 | 0.2 | 0.2 |
| HOLDING SPEED | 80 | 0-400 | 2 | 2 | 2 | 2 | 2 | 2 |
| HOLDING BEGINS | 81 | 0-100 | 99 | 99 | 99 | 99 | 99 | 99 |
| SLOW SPD (SSO) | 82 | 0-400 | 5 | 5 | 3 | 5 | 3 | 5 |
| CLUTCH ENG. DIST. | 83 | 0-100 | 2 | 2 | 2 | 2 | 4 | 2 |
| HIGH SPD (HSO) | 84 | 0-400 | 31 | 45 | 45 | 45 | 45 | 50 |
| FINAL SPD (FSO) | 85 | 0-400 | 7 | 7 | 3 | 5 | 2 | 5 |
| FSO BEGINS | 86 | 0-100 | 95 | 95 | 98 | 99 | 90 | 95 |
| ACCEL. TIME | 87 | 0-360 | 6 | 4 | 6 | 4 | 4 | 2 |
| DECEL. TIME | 88 | 0-360 | 12 | 14 | 12 | 12 | 12 | 4 |
| OPEN TORQUE ▲ | 89 | 0-400 | 120 | 120 | 80 | 80 | 80 | 100 |

| COMMON | PR.# | RANGE | DEFAULT VALUE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | HARMONIC | | | OLINEAR | | | | | |
| | | | | | | STRAIGHT | | | GEARED | | |
| SELECTION OF THE HAND OF THE DOOR (L=LEFT R=RIGHT C/P=CENTER PARTING) | 42 | 1-2 | L | R | C/P | L | R | C/P | L | R | C/P |
| | | | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| CARRIER FREQUENCY | 1 | 0-60 | 12 | | | | | | | | |
| SCAN FREQUENCY | 61 | 0-400 | 9 | | | | | | | | |
| LEARNING FREQUENCY | 62 | 0-400 | 9 | | | | | | | | |
| DOORWIDTH LEARNING | 63 | 0-1 | 1: ENABLE 0: DISABLE | | | | | | | | |
| EDGES DELAY TIME | 197 | 0-180 | 10 | | | | | | | | |
| EDGES BUZZER TIME | 198 | 0-180 | 10 | | | | | | | | |
| DOOR TYPE | 201 | 0-2 | 1: HARMONIC 0: LINEAR | | | | | | | | |
| EDGES TYPE | 202 | 0-2 | 0: NO EDGES 1: NPN 2: PNP | | | | | | | | |
| OVERLOAD | 217 | 0-6 | 2.5 | | | | | | | | |

▲ TO LOWER TORQUE, INCREASE THE VALUE.

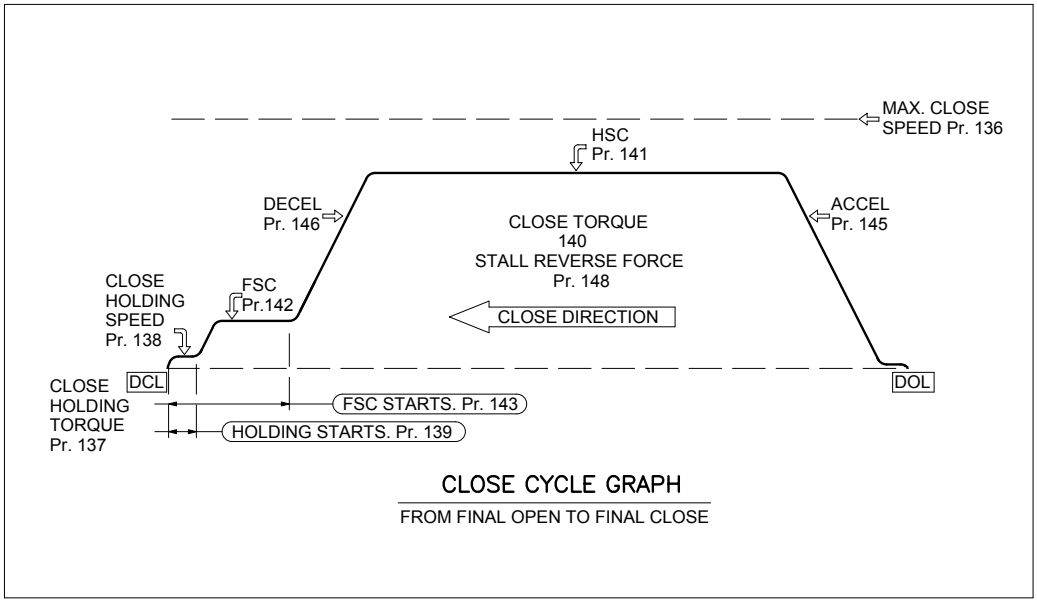
## 2.12.5. SLOW MODE PARAMETERS

GAL has preset parameters for "slow mode" to optimum levels. If customers need to adjust them, however, reference the graphs below for the adjustments of Slow Speeds & Torques.




OPEN CYCLE GRAPH

FROM FINAL CLOSE TO FINAL OPEN




CLOSE CYCLE GRAPH

FROM FINAL OPEN TO FINAL CLOSE

### 2.12.6. CONVENIENCE KEYS

- Press SPEED to display speeds in Hz.
- Press I/O to display input and output signals.
- Press FAULT to display recent faults.
- Press △ or ▽ to view all recent faults.
- Press AMP to display currents.
- Press RESET to reset the drive.

### 2.12.7. LED INDICATORS

There are 7 LEDs on the Parameter Unit. DO, DC, NUD, HLD, PRG, FLT, and OVT. They have the following meanings:

- **DO** = Door Open.
- **DC** = Door Close
- **NUD** = Nudging
- **HLD** = Holding
- **PRG** = Programming Mode
- **FLT** = Fault
- **OVT** = Over Torque

## 2.12.8. THE VIEW KEY

The VIEW key will help users navigate through the Parameter Unit seamlessly.

Press VIEW then press △ or ▽ to navigate all items under the VIEW section.

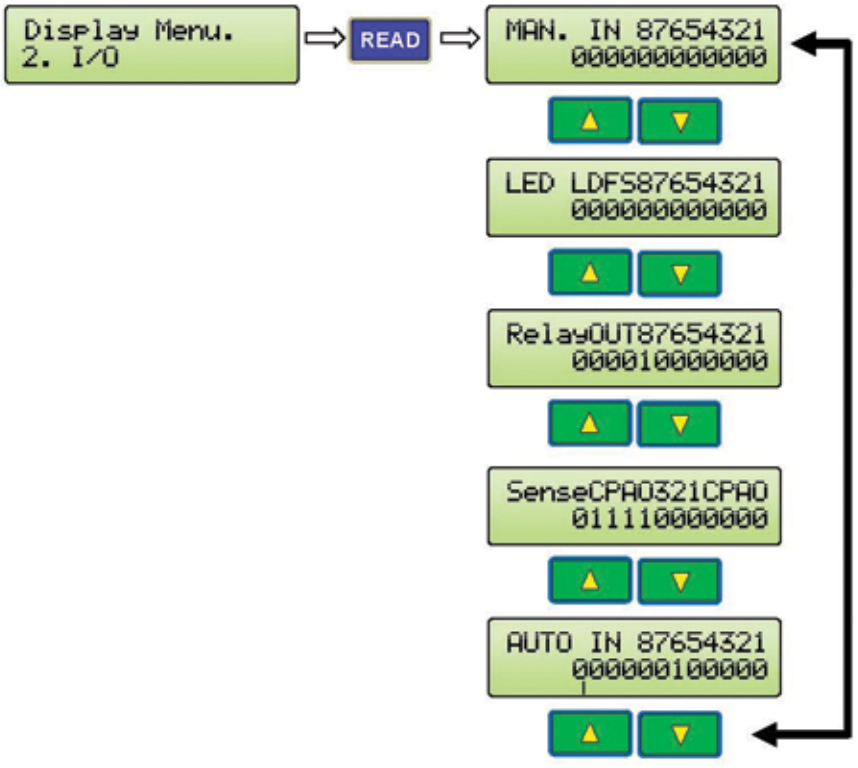
Once the desired item is found, press READ to view an item.

Press ESC at any time to get back to the previous display.

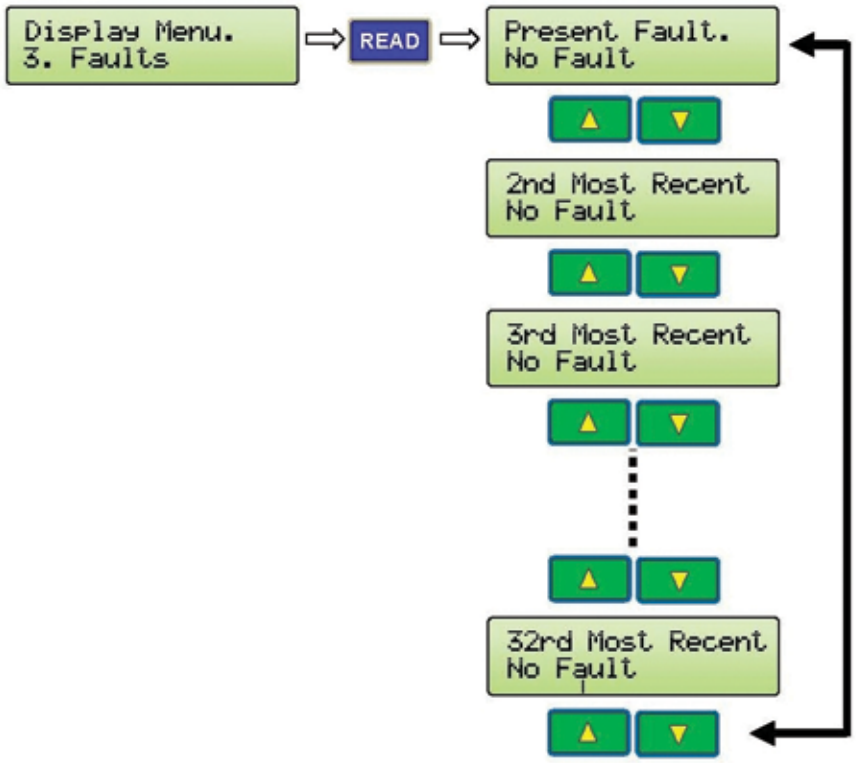
The following items are under the VIEW key:

### 2.12.8.1. Voltage, Current, Command Frequency and Actual Frequency (Hz)

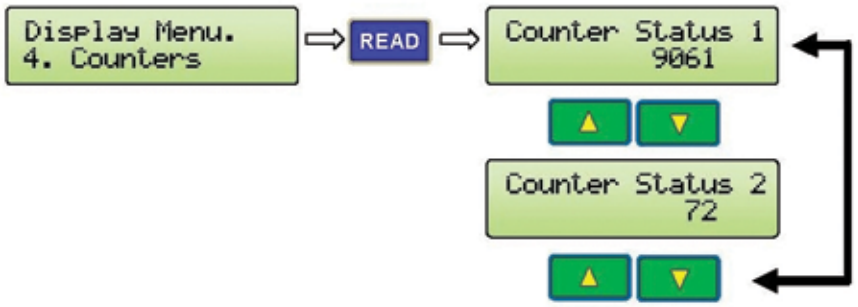

### 2.12.8.2.



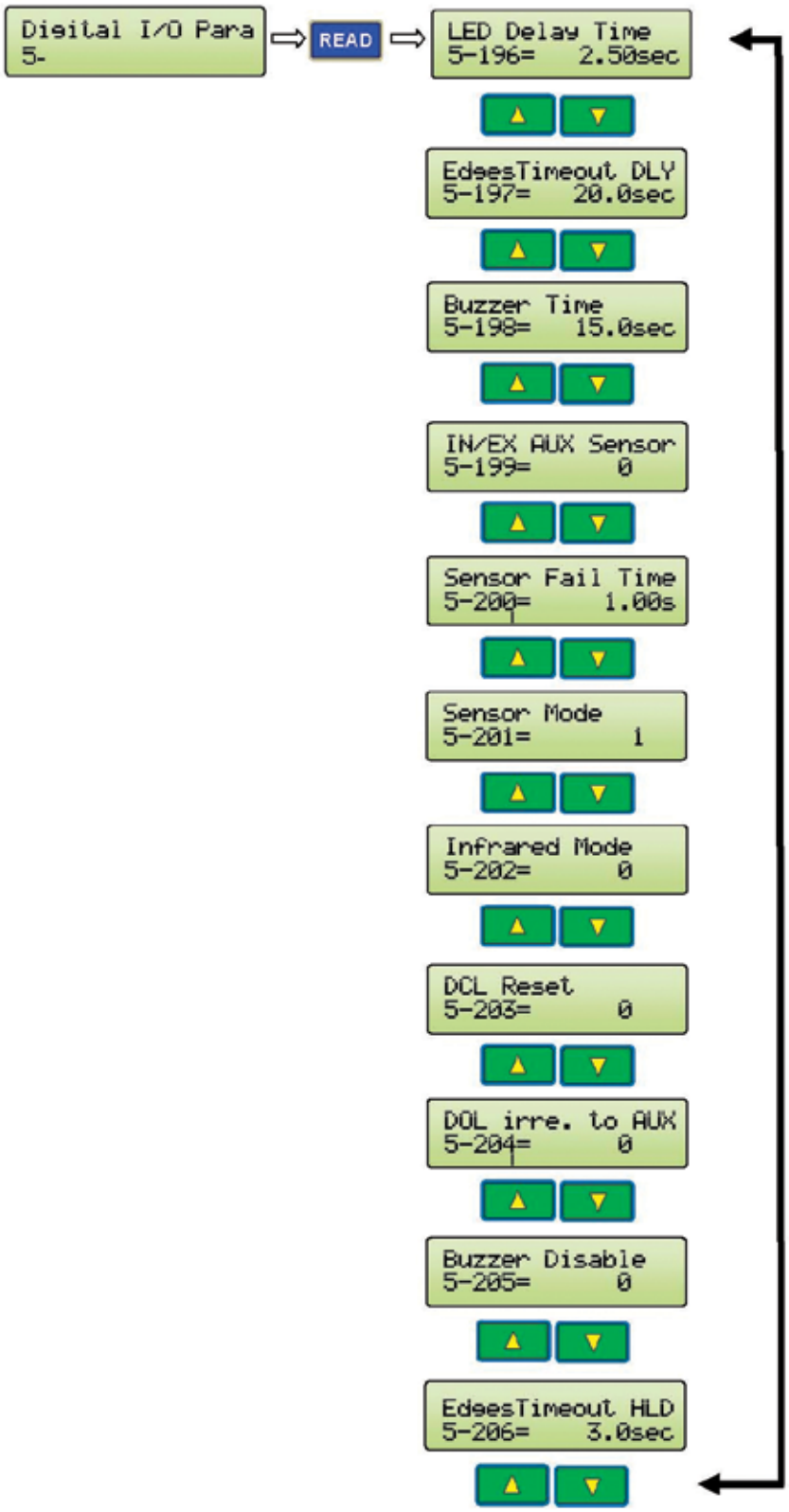
### 2.12.8.3. Faults



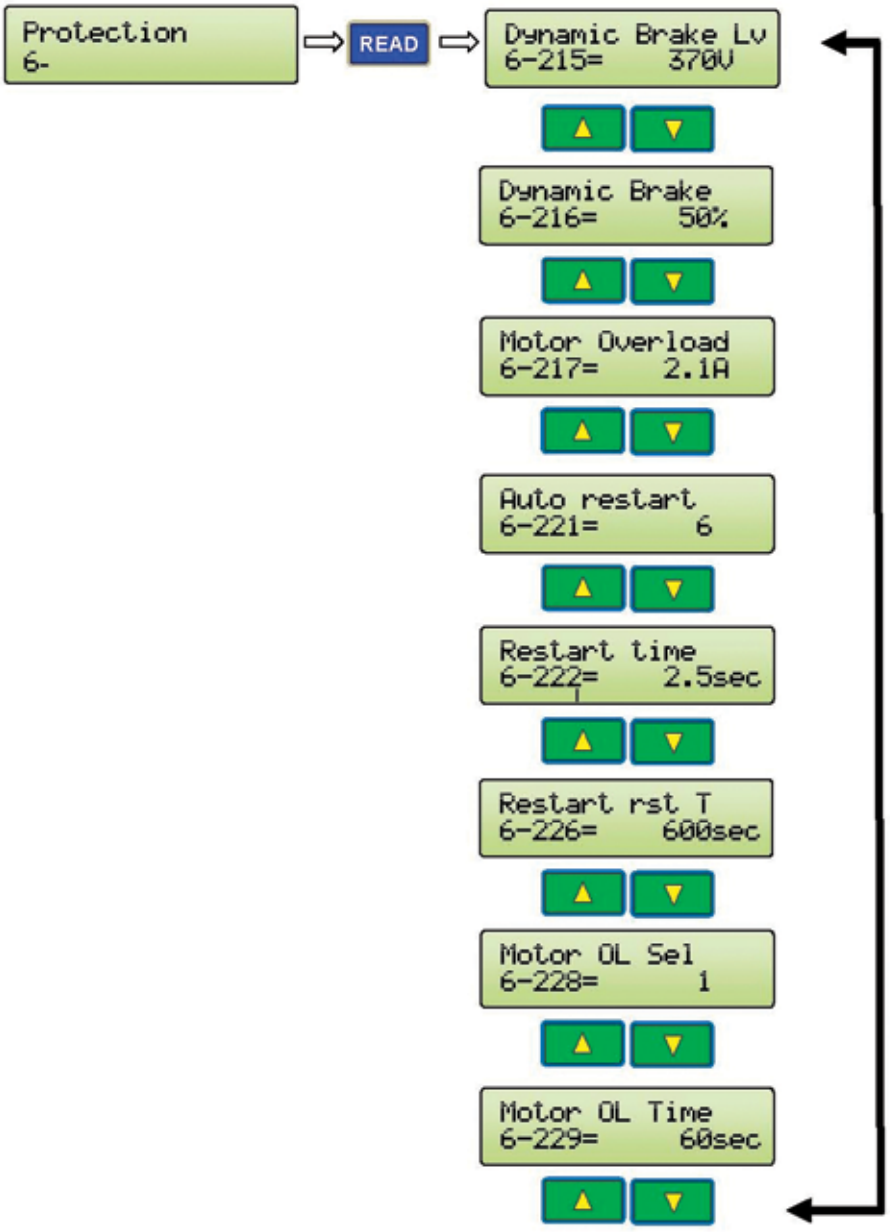

### 2.12.8.4. Counters



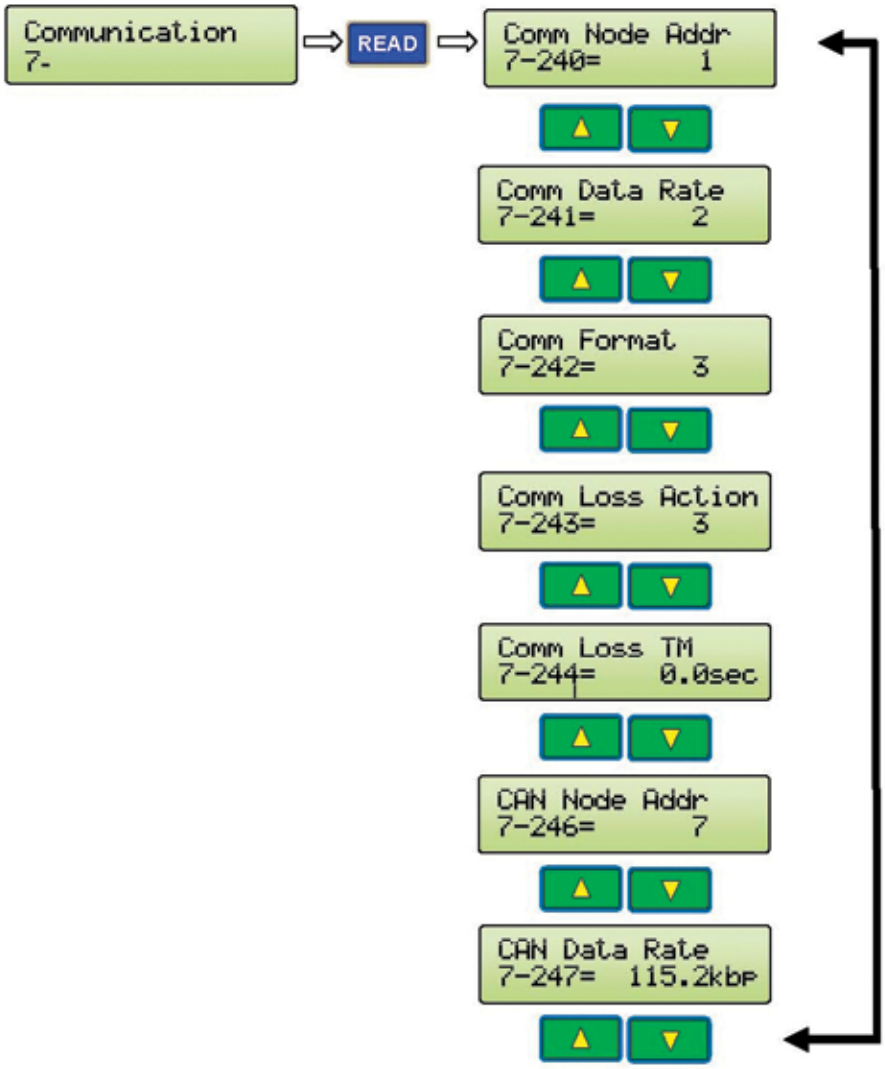
### 2.12.8.5. Digital I/O Parameters



### 2.12.8.6. Direction

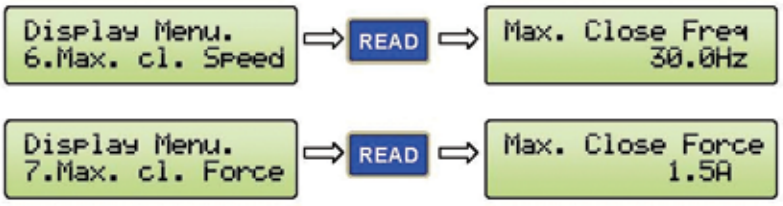


### 2.12.8.7. Communication




### 2.12.8.8. Maximum Close Speed

### 2.12.8.9. Maximum Close Force

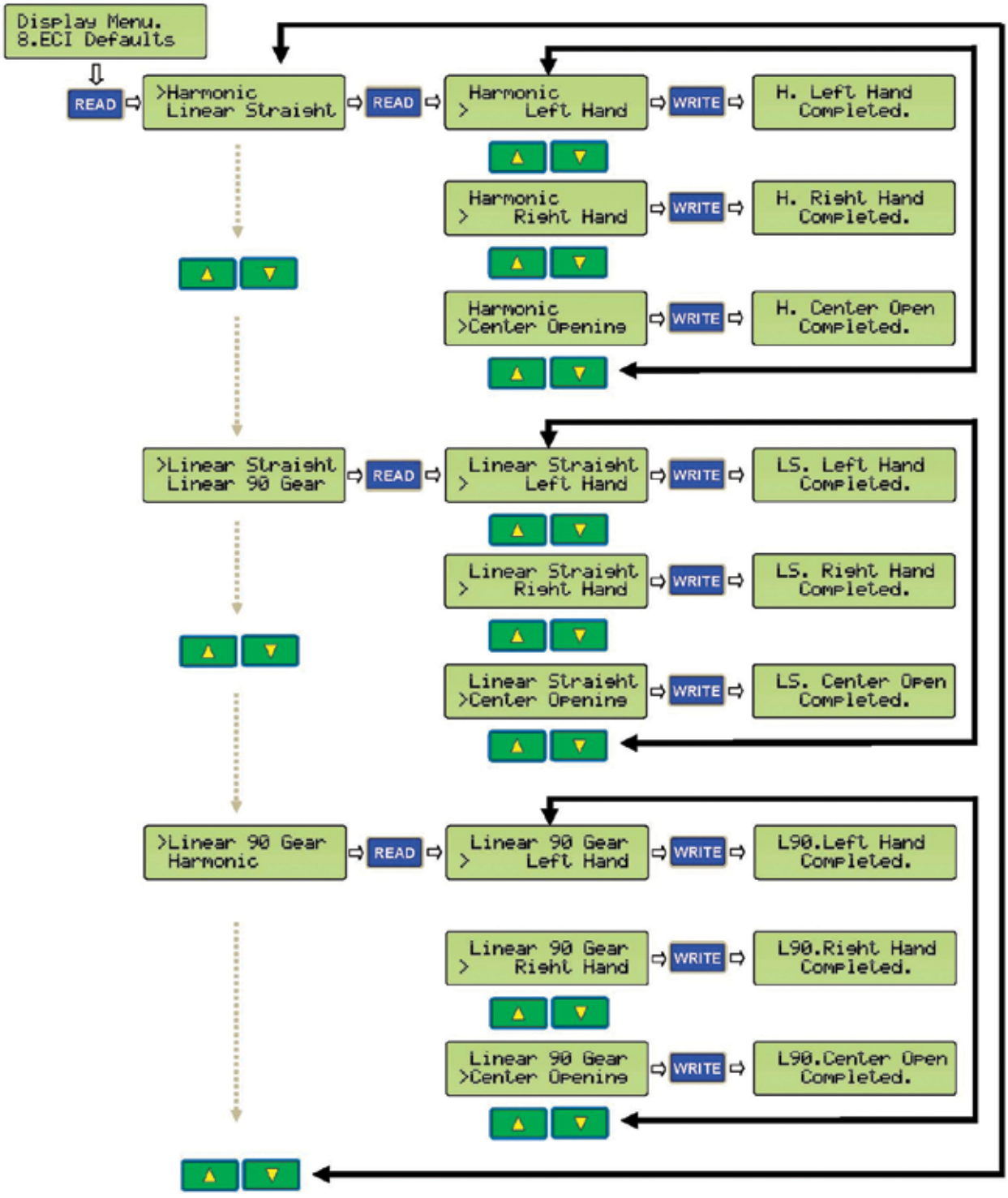


**2.12.8.10. G.A.L. Default Parameter Sets**

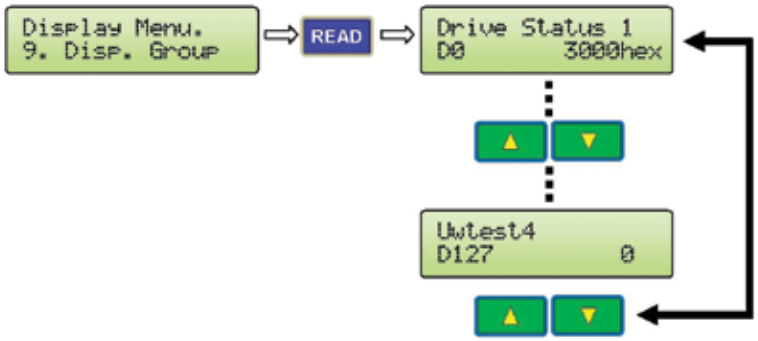
**2.12.8.11. Harmonic (Reference Only)**

**2.12.8.12. Linear Straight**

**2.12.8.13. Linear Geared**



### 2.12.8.14. Display Groups for Monitoring and Troubleshooting



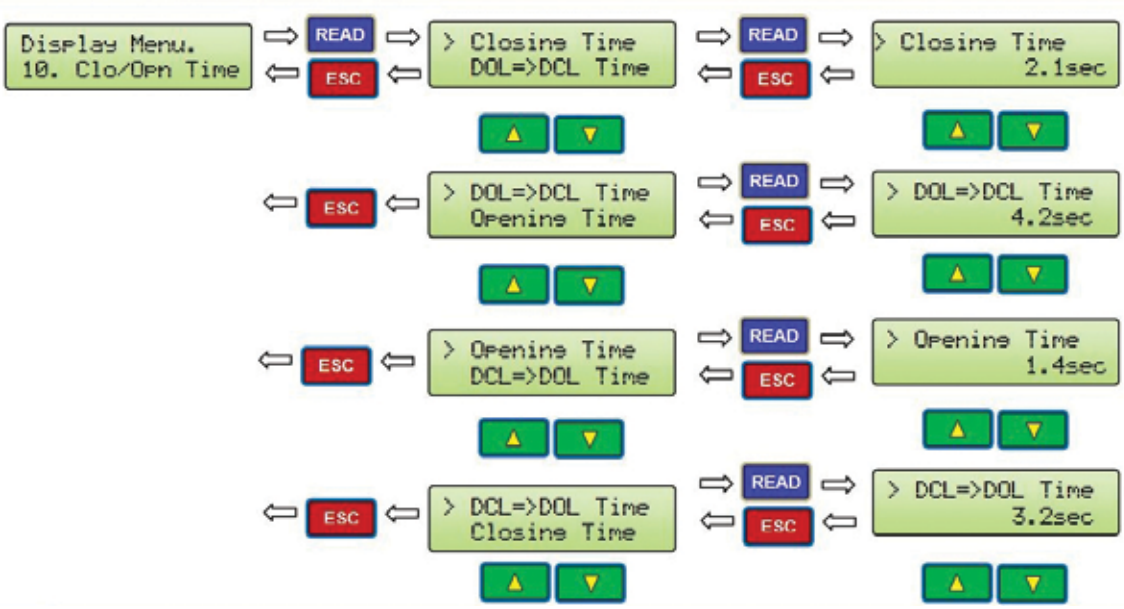

### 2.12.8.15. Code Distance Closing Time Display

### 2.12.8.16. CD Closing Time

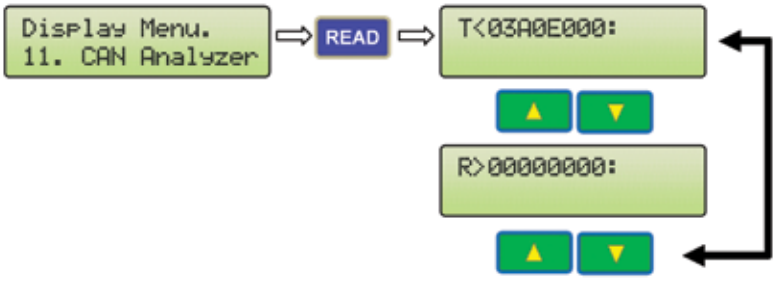
### 2.12.8.17. DOL - DCL Time

### 2.12.8.18. CD Opening Time

### 2.12.8.19. DCL – DOL Time




### 2.12.8.20. CAN Analyzer



# 3. FAULTS

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Over-Current | Over-Current | Yes | Yes | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | 1. Check the wiring connections to U, V, W for possible short circuits.<br>2. Check the wiring connections between the AC motor drive and motor for possible short circuits, also to ground.<br>3. Check for loose contacts between AC motor drive and motor.<br>4. Increase the acceleration time.<br>5. Check for possible excessive loading conditions at the motor.<br>6. If there are still any abnormal conditions when operating the AC motor drive after a short-circuit is removed and the other points above are checked, it should be sent back to manufacturer. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Over-Voltage | Over-Voltage | Yes | Yes | Yes | Coast to Stop | DC-bus must be less than 385V for 230V Drive |
| Remedy | 1. Check if the input voltage is over the rated voltage of the 2500-3050 drive input voltage range.<br>2. Check for possible voltage transients.<br>3. DC-bus over-voltage may also be caused by motor regeneration.<br>4. Increase the deceleration time.<br>5. Check whether the required braking power is within the specified limits.<br>6. Check to proper earth ground wire. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Over Heat | Over Heat | Yes | Yes | Yes | Coast to Stop | Heatsink temperature must be less than 161˚F (71.6˚C) |
| Remedy | 1. Ensure that the ambient temperature fall within the specified temperature range.<br>2. Remove any foreign objects from the heatsink and check for possible dirty heat sink fins. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Drive Overload | Drive Overload | Yes | Yes | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | 1. Check whether the motor is overloaded.<br>2. Reduce torque. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Motor Overload | Motor Overload | Yes | Yes | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | 1. Reduce the motor load.<br>2. Check, remove any foreign objects preventing the motor from moving.<br>3. Repair defective mechanical system. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Hardware Failure | Hardware Protection Failures | No | No | Yes | Coast to Stop | |
| Remedy | Return to GAL | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| OC at Accel | Over Current During Acceleration | Yes | Yes | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | 1. Short-circuit at motor output: Check for possible poor insulation at the output line.<br>2. Torque boost too high: Decrease the torque compensation setting in Pr.33.<br>3. Acceleration time too short: Increase the acceleration time. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| OC at Decel | Over Current During Deceleration | Yes | Yes | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | 1. Short-circuit at motor output: Check for possible poor insulation at the output line.<br>2. Deceleration time too short: Increase the deceleration time. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| OC at Steady | Over Current During Steady State Operation | Yes | Yes | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | 1. Short-circuit at motor output: Check for possible poor insulation at the output line.<br>2. Sudden increase in motor loading: Check for possible motor stall. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Ground Fault | Short To Ground | No | No | Yes | Coast to Stop | Continuous current must be less than 50% of rated current for 5 seconds |
| Remedy | When one of the output terminals is grounded, short circuit current is more than 15A, the AC motor drive power module may be damaged.<br>1. Check whether the IGBT power module is damaged.<br>2. Check for possible poor insulation at the output line.<br>Note! The short circuit protection is provided for AC motor drive protection, not for protection of the user. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| EEPROM Read Fail | CPU Read Failure | Yes | No | Yes | Coast to Stop | Immediately |
| Remedy | Return to factory | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Parameter Chksum | CPU Write Failure | Yes | No | Yes | Coast to Stop | Immediately |
| Remedy | Return to factory | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Comm. Loss | Comm. Time Out | Yes | No | Yes | Disable Coast to Stop Ramp to Stop Warning | Immediately |
| Remedy | 1. Check the RS485 connection between the AC motor drive and RS485 master for loose wires and wiring to correct pins.<br>2. Check if the communication protocol, address, transmission speed, etc. are properly set.<br>3. Use the correct checksum calculation | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Autotune Failure | Auto-learning Error | Yes | No | Yes | Coast to Stop | Immediately |
| Remedy | 1. Check the cable between drive and motor.<br>2. Retry again. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Encoder Loss | Encoder Loss Error | Yes | Yes | Yes | Coast to Stop Ramp to Stop Warning & Scan Speed | Detect the correct signals of the encoder |
| Remedy | Check the wiring of the encoder. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| Encoder Fbk Error | Encoder Direction Error | Yes | Yes | Yes | Coast to Stop Ramp to Stop Warning & Scan Speed | Movement direction is in agreement with the encoder direction defined by the drive |
| Remedy | 1. Check value of Par. 41.<br>2. Check if the wiring of the encoder is correct. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| AUX Sensor Fail | AUX Error | Yes | Yes | Yes | Warning & Scan Speed | Recover if the signal is detected appropriately |
| Remedy | 1. Check the AUX sensor.<br>2. Check the wirings of the AUX sensor.<br>3. Check the magnet for the linear model. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| DPM Sensor Fail | DPM Error | Yes | Yes | Yes | Warning & Scan Speed | Recover if the signal is detected appropriately |
| Remedy | 1. Check the DPM sensor.<br>2. Check the wirings of the DPM sensor.<br>3. Check the magnet for the linear model.<br>4. Check the Cam for the harmonic model. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| DOL Sensor Fail | DOL Error | Yes | Yes | Yes | Warning & Scan Speed | Recover if the signal is detected appropriately |
| Remedy | 1. Check the DOL sensor.<br>2. Check the wirings of the DOL sensor.<br>3. Check the magnet for the linear model. | | | | | |

| FAULT DISPLAY | MEANING | RESET | AUTO RESET | RECORD | DRIVE RESPONSE | RESET CONDITION |
|---|---|---|---|---|---|---|
| DCL Sensor Fail | DOL Error | Yes | Yes | Yes | Warning & Scan Speed | Recover if the signal is detected appropriately |
| Remedy | 1. Check the DCL sensor.<br>2. Check the wirings of the DCL sensor.<br>3. Check the magnet for the linear model. | | | | | |

# 4. KINETIC ENERGY AND ASME A17.1 2000

Requirement 2.13.4.2.4 of ASME A17.1 2000 stipulates that a data tag must be attached to the door operator or car crosshead. If you are in a jurisdiction that has adopted the 2000 code, you need to read and understand this requirement, and all the related requirements.

The data tag is required to show:

- The minimum closing code time for the door system that will result in average kinetic energy of less than 7.37 foot-pounds.
- The minimum code closing time for the door system, when in nudging, that will result in average kinetic energy of less than 2.5 foot-pounds.

The attached data tables are designed to give GAL customers the information necessary to comply with these requirements. If you use all GAL equipment, and follow GAL instructions, these sheets will give you the minimum closing code time for the normal door configurations and sizes originally available for the QKS-16 operator.

### 4.1.1. CODE CLOSING DISTANCE / TIME

On side opening, the code distance starts 2" from the jamb and goes to 2" from full close. (opening size – 4") On center opening, code distance starts 1" from the jamb and goes to 1" from full close. (still opening size – 4") Times shown are minimums for the code closing distance.

### 4.1.2. AVERAGE KINETIC ENERGY (7.37 ft lbs)

This is the requirement for which the times shown on the data tables were calculated. The rotational inertia of the motor and operator is included in these calculations. GAL's calculations include equipment rigidly connected thereto and accommodate all hangers, rollers, clutches, closers, releases, and any normal reopening devices .

### 4.1.3. ACTUAL (PEAK) KINETIC ENERGY (17 ft lbs)

Using GAL equipment and following GAL instructions, you will not exceed the requirement for actual (peak) KE.

### 4.1.4. NUDGING KINETIC ENERGY (2.5 ft lbs)

If taking the minimum closing code time for your application and doubling it, you will have a safe time to use for the requirement under nudging. (Note – this is a very conservative time, if you want to close your door more quickly while in nudging, call GAL for an absolute minimum)

### 4.1.5. NON-STANDARD SYSTEMS

For a non-standard application, like panels that are so heavy or light that they fall outside the range shown on the data tables, you can call GAL and we will calculate closing code time for your job. The following paragraphs are excerpted from ASME 17.1 2000. They are provided here for your convenience only.

**2.13.4.2.4 Data Plate**

A data plate conforming to 2.16.3.3 shall be attached to the power door operator or to the car crosshead and shall contain the following information:

**a)** minimum door closing time in seconds for the doors to travel the code zone distance as specified in 2.13.4.2.2 corresponding to the kinetic energy limits specified in 2.13.4.2.1(b)(2);

**b)** minimum door closing time in seconds for the doors to travel the Code zone distance as specified in 2.13.4.2.2 corresponding to the kinetic energy limits specified in 2.13.4.2.1(c)(2), if applicable [see 2.27.3.1.6(e)];

**c)** where heavier hoistway doors are used at certain floors, the minimum door closing time in seconds corresponding to the kinetic energy limits specified in 2.13.4.2.1(b)(2) and 2.13.4.2.1(c)(2), if applicable, for the corresponding floors shall be included on the data plate.

**2.13.4.2.1 Kinetic Energy**

**a)** Where the hoistway door and the car door/gate are closed in such a manner that stopping either one manually will stop both, the kinetic energy of the closing door system shall be based upon the sum of the hoistway and the car door weights, as well as all parts rigidly connected thereto, including the rotational inertia effects of the door operator and the connecting transmission to the door panels.

**b)** Where a reopening device conforming to 2.13.5 is used, the closing door system shall conform to the following requirements:

**1)** The kinetic energy computed for the actual closing speed at any point in the Code zone distance defined by 2.13.4.2.2 shall not exceed 23 J (17 ft-lbf); and

**2)** The kinetic energy computed for the average closing speed as determined in accordance with 2.13.4.2.2 shall not exceed 10 J (7.37 ft-lbf).

**b)** Where a reopening device is not used, or has been rendered inoperative (see 2.13.5), the closing door system shall conform to the following requirements:

**1)** The kinetic energy computed for the actual closing speed at any point in the code zone distance defined by 2.13.4.2.2 shall not exceed 8 J (6 ft-lbf).

**2)** The kinetic energy computed for the average closing speed within the code zone distance (see 2.13.4.2.2), or in any exposed opening width, including the last increment of door travel, shall not exceed 3.5 J (2.5 ft-lbf).

**NOTE:** The term "Door Weight" in the tables refers to the combined weight of all doors, including all car door (s) and all hoistway door(s) (of one floor only).

Also, note that if the weight of the hoistway door(s) varies by floor, different settings of the code distance closing time must be used from the table.

The following tables show the minimum closing code time for MOVFE-HH doors:

| SINGLE SPEED SIDE SLIDING DOOR | | | | | | |
|---|---|---|---|---|---|---|
| Door Width (in) | Door Weight (lbs) | Approx. Equipment Weight (lbs) | Code Distance (in) | Average Kinetic Energy (ft-lbs) | Minimum Code Time (seconds) | Minimum Code Time When Door Protection Disabled (Nudging) (seconds) |
| **36** | 275 | 39 | 32 | 7.37 | 2.39 | 4.09 |
| | 300 | 39 | 32 | 7.37 | 2.47 | 4.22 |
| | 325 | 39 | 32 | 7.37 | 2.54 | 4.34 |
| | 350 | 39 | 32 | 7.37 | 2.62 | 4.48 |
| | 375 | 39 | 32 | 7.37 | 2.69 | 4.60 |
| | 400 | 39 | 32 | 7.37 | 2.76 | 4.72 |
| | 425 | 39 | 32 | 7.37 | 2.82 | 4.82 |
| | 450 | 39 | 32 | 7.37 | 2.89 | 4.94 |
| **42** | 325 | 39 | 38 | 7.37 | 2.99 | 5.11 |
| | 350 | 39 | 38 | 7.37 | 3.08 | 5.27 |
| | 375 | 39 | 38 | 7.37 | 3.16 | 5.40 |
| | 400 | 39 | 38 | 7.37 | 3.24 | 5.54 |
| | 425 | 39 | 38 | 7.37 | 3.32 | 5.68 |
| | 450 | 39 | 38 | 7.37 | 3.40 | 5.81 |
| | 475 | 39 | 38 | 7.37 | 3.48 | 5.95 |
| | 500 | 39 | 38 | 7.37 | 3.55 | 6.07 |
| **48** | 375 | 39 | 44 | 7.37 | 3.62 | 6.19 |
| | 400 | 39 | 44 | 7.37 | 3.72 | 6.36 |
| | 425 | 39 | 44 | 7.37 | 3.81 | 6.52 |
| | 450 | 39 | 44 | 7.37 | 3.90 | 6.67 |
| | 475 | 39 | 44 | 7.37 | 3.99 | 6.82 |
| | 500 | 39 | 44 | 7.37 | 4.08 | 6.98 |
| | 525 | 39 | 44 | 7.37 | 4.17 | 7.13 |
| | 550 | 39 | 44 | 7.37 | 4.25 | 7.27 |

| TWO SPEED SIDE SLIDING DOORS | | | | | | |
|---|---|---|---|---|---|---|
| Door Width (in) | Door Weight (lbs) | Approx. Equipment Weight (lbs) | Code Distance (in) | Average Kinetic Energy (ft-lbs) | Minimum Code Time (seconds) | Minimum Code Time When Door Protection Disabled (Nudging) (seconds) |
| **36** | 275 | 50 | 32 | 7.37 | 2.03 | 3.47 |
| | 300 | 50 | 32 | 7.37 | 2.09 | 3.57 |
| | 325 | 50 | 32 | 7.37 | 2.15 | 3.68 |
| | 350 | 50 | 32 | 7.37 | 2.20 | 3.76 |
| | 375 | 50 | 32 | 7.37 | 2.25 | 3.85 |
| | 400 | 50 | 32 | 7.37 | 2.30 | 3.93 |
| | 425 | 50 | 32 | 7.37 | 2.35 | 4.02 |
| | 450 | 50 | 32 | 7.37 | 2.40 | 4.10 |
| **42** | 325 | 50 | 38 | 7.37 | 2.50 | 4.28 |
| | 350 | 50 | 38 | 7.37 | 2.57 | 4.39 |
| | 375 | 50 | 38 | 7.37 | 2.63 | 4.50 |
| | 400 | 50 | 38 | 7.37 | 2.69 | 4.60 |
| | 425 | 50 | 38 | 7.37 | 2.75 | 4.70 |
| | 450 | 50 | 38 | 7.37 | 2.81 | 4.81 |
| | 475 | 50 | 38 | 7.37 | 2.87 | 4.91 |
| | 500 | 50 | 38 | 7.37 | 2.93 | 5.01 |
| **48** | 375 | 50 | 44 | 7.37 | 3.02 | 5.16 |
| | 400 | 50 | 44 | 7.37 | 3.09 | 5.28 |
| | 425 | 50 | 44 | 7.37 | 3.17 | 5.42 |
| | 450 | 50 | 44 | 7.37 | 3.23 | 5.52 |
| | 475 | 50 | 44 | 7.37 | 3.30 | 5.64 |
| | 500 | 50 | 44 | 7.37 | 3.37 | 5.76 |
| | 525 | 50 | 44 | 7.37 | 3.43 | 5.87 |
| | 550 | 50 | 44 | 7.37 | 3.50 | 5.99 |

| SINGLE SPEED CENTER PARTING DOOR | | | | | | |
|---|---|---|---|---|---|---|
| Door Width (in) | Door Weight (lbs) | Approx. Equipment Weight (lbs) | Code Distance Per Side (in) | Average Kinetic Energy (ft-lbs) | Minimum Code Time (seconds) | Minimum Code Time When Door Protection Disabled (Nudging) (seconds) |
| 36 | 275 | 50 | 16 | 7.37 | 1.28 | 2.19 |
| | 300 | 50 | 16 | 7.37 | 1.31 | 2.24 |
| | 325 | 50 | 16 | 7.37 | 1.35 | 2.31 |
| | 350 | 50 | 16 | 7.37 | 1.38 | 2.36 |
| | 375 | 50 | 16 | 7.37 | 1.42 | 2.43 |
| | 400 | 50 | 16 | 7.37 | 1.45 | 2.48 |
| | 425 | 50 | 16 | 7.37 | 1.48 | 2.53 |
| | 450 | 50 | 16 | 7.37 | 1.51 | 2.58 |
| 42 | 325 | 50 | 19 | 7.37 | 1.57 | 2.68 |
| | 350 | 50 | 19 | 7.37 | 1.61 | 2.75 |
| | 375 | 50 | 19 | 7.37 | 1.65 | 2.82 |
| | 400 | 50 | 19 | 7.37 | 1.69 | 2.89 |
| | 425 | 50 | 19 | 7.37 | 1.73 | 2.96 |
| | 450 | 50 | 19 | 7.37 | 1.77 | 3.03 |
| | 475 | 50 | 19 | 7.37 | 1.80 | 3.08 |
| | 500 | 50 | 19 | 7.37 | 1.84 | 3.15 |
| 48 | 375 | 50 | 22 | 7.37 | 1.88 | 3.21 |
| | 400 | 50 | 22 | 7.37 | 1.93 | 3.30 |
| | 425 | 50 | 22 | 7.37 | 1.97 | 3.37 |
| | 450 | 50 | 22 | 7.37 | 2.02 | 3.45 |
| | 475 | 50 | 22 | 7.37 | 2.06 | 3.52 |
| | 500 | 50 | 22 | 7.37 | 2.11 | 3.61 |
| | 525 | 50 | 22 | 7.37 | 2.15 | 3.68 |
| | 550 | 50 | 22 | 7.37 | 2.19 | 3.74 |