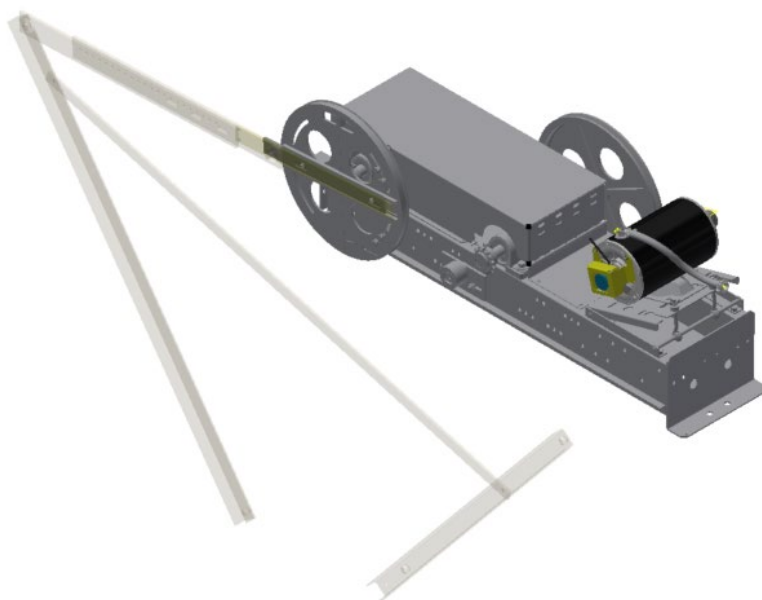


# OTIS OVL to GAL MOVFE-HH Conversion Kit



Retaining existing drive arms, header, tracks, hangers,  
clutch, and interlocks

*Installation Manual*

*Rev A*

(Intentionally left blank)

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## 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 OTIS OVL operator with GAL's MOVFE-HH operator.

The mechanical profile of the MOVFE-HH is like the existing Otis OVL operator. The drive arms, header, tracks, and hangers are retained, clutch allowing the user to easily replace the operator with minimal adjustments required.

MOVFE HH DOL and DCL cams needs to be set to match the existing Otis OVL stroke or adjusted to suit door opening.


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

### IMPORTANT NOTES

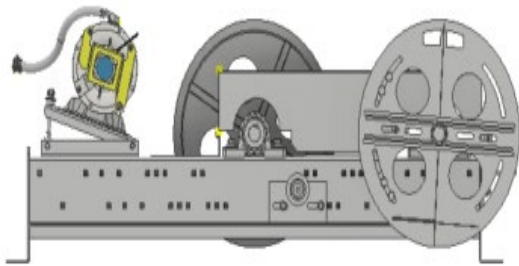
All equipment must be installed, adjusted, tested, and maintained to comply with all Federal, State/Provincial, and Local codes.

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.

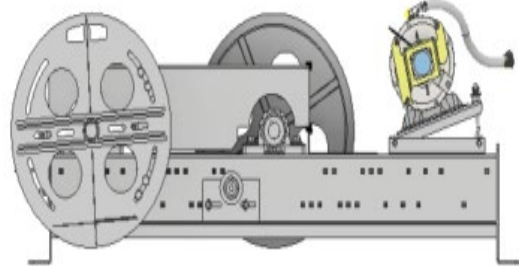
Before mounting the operator, check that the car door is plumb, free and moves easily without binding. Check the attached standard measurement sheets and install the operator according to the measurements supplied. Contact G.A.L. if the following label shown in **Figure 1** is missing from the door operator.

TYPE MOVFE2500 OPERATOR			
CSA B44.1/ASME-A17.5			
<input type="checkbox"/> 115 VAC 50/60 Hz 4A 1/2 HP.	<input type="checkbox"/> HH (HARMONIC)	<input type="checkbox"/> HL (LINEAR)	
<input type="checkbox"/> 115 VAC 50/60 Hz 4A 1/2 HP.	<input type="checkbox"/> OL		
<input type="checkbox"/> 230 VAC 1P 50/60 Hz 2A 1/2 HP.	<input type="checkbox"/> HH (HARMONIC)	<input type="checkbox"/> HL (LINEAR)	
<input type="checkbox"/> 230 VAC 1P 50/60 Hz 2A 1/2 HP.	<input type="checkbox"/> OL		
MINIMUM DOOR CLOSING TIMES			
CAN/CSA B44-00 & ASME A17.1-2000 RULE 2.13.4.2.4			
LIGHT DOORS	SERIAL #	HEAVY DOORS	
SECONDS WITH REOPENING DEVICE ENABLED			
SECONDS REOPENING DEVICE DISABLED (NUDGING)			
<b>WARNING !</b> MORE THAN ONE LIVE CIRCUIT, SEE DIAGRAM Parts of the controller are not de-energized by the Disconnect Switch.		<b>IMPORTANT</b> All GAL equipment must be field installed, adjusted and maintained to comply with all federal, state/provincial and local codes.	
<b>AVERTISSEMENT !</b> CET EQUIPEMENT RENFERME PLUSIEURS CIRCUITS SOUS TENSION, VOIR LE SCHEMA Certains composants dans le panneau de contrôle ne sont pas désactivés par la mise hors tension de l'alimentation.		GAL CANADA MISSISSAUGA, ONTARIO CANADA 	
<input type="checkbox"/> SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5000 RMS SYMMETRICAL AMPERES, 240 VOLTS MAXIMUM, WHEN PROTECTED BY 4 AMPERES, 240V RMS FUSES.			
<input type="checkbox"/> SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5000 RMS SYMMETRICAL AMPERES, 120 VOLTS MAXIMUM, WHEN PROTECTED BY 8 AMPERES, 120V RMS FUSES.			

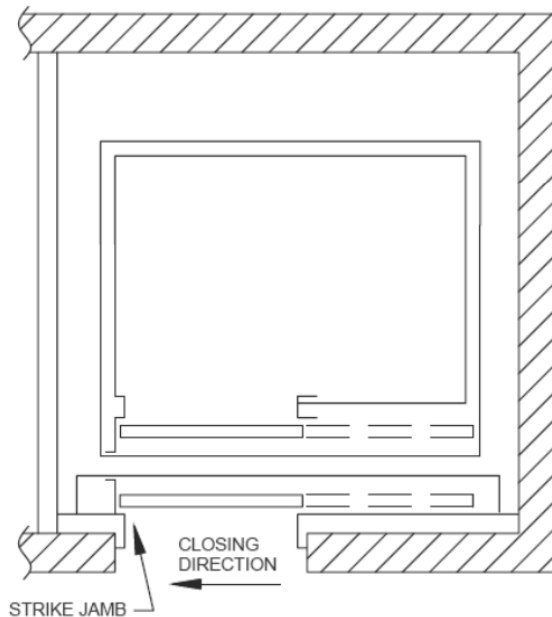
## 1.1. Determining the Hand of the Operator



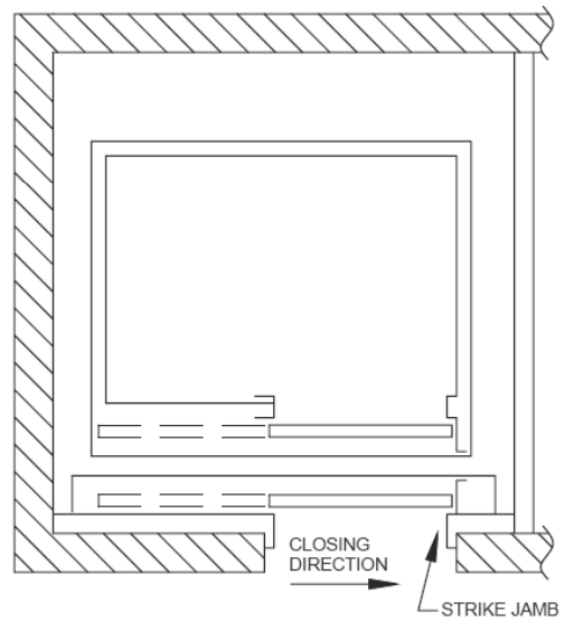
Right Hand Operator



Left Hand Operator



LEFT HAND DOOR



RIGHT HAND DOOR

GAL door operators are available for left and right hand doors (Center opening doors use a left hand operator). To determine the hand of the door, stand in the lobby facing the elevator doors. If the door closes to the left, it is a left hand, and if the door closes to the right, it is a right hand door.

## 2. Installation and Setup

### 2.1. Components

**KIT04-4001L** – OVL to MOVFE HH SS/2S/CP KIT, 115V

**KIT04-4001R** - OVL to MOVFE HH SS/2S KIT, 115V

Part Number	Description
	MOVFE HH OPERATOR , 115V
MOVFE-0008N	PARAMETER UNIT
OP22-0766N	OTIS OVL CRANK ARM ADAPTOR
SW1-0048N	SWITCH ASSEMBLY “G” GATE
DOC-0158N	INSTALLATION MANUAL

**KIT04-4002L** - OVL to MOVFE HH SS/2S/CP KIT, 230V

**KIT04-4002R** - OVL to MOVFE HH SS/2S KIT, 230V

Part Number	Description
	MOVFE HH OPERATOR , 230V
MOVFE-0008N	PARAMETER UNIT
OP22-0766N	OTIS OVL CRANK ARM ADAPTOR
SW1-0048N	SWITCH ASSEMBLY “G” GATE
DOC-0158N	INSTALLATION MANUAL

### 2.2. Preliminary Steps

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

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



Existing Gate switch



GAL Gate switch

Measure the following:

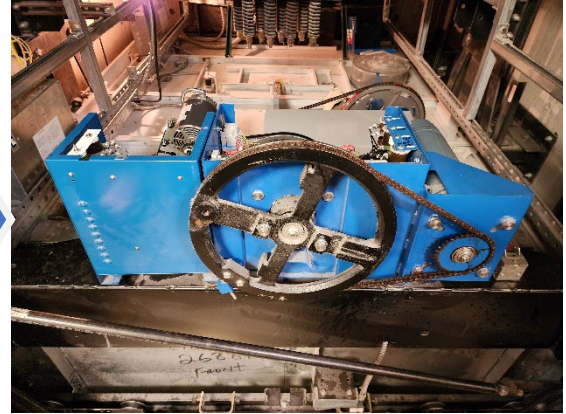
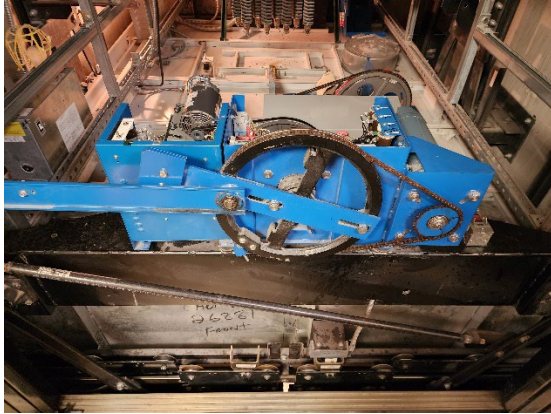
- **For Side Slide Doors (SS/2S):**
  1. Operator base to the center of the operator pulley
  2. Daylite to the center of the operator pulley.
  3. Dimension of the existing connecting arm.
- **For Center Opening doors (CO/2SCP):**
  1. Measure Operator base to the center of the operator pulley
  2. Center of the opening to the center of the operator pulley.
  3. Dimension of the existing connecting arm.

This will allow an easy setup of the MOVFE HH with the existing arms.

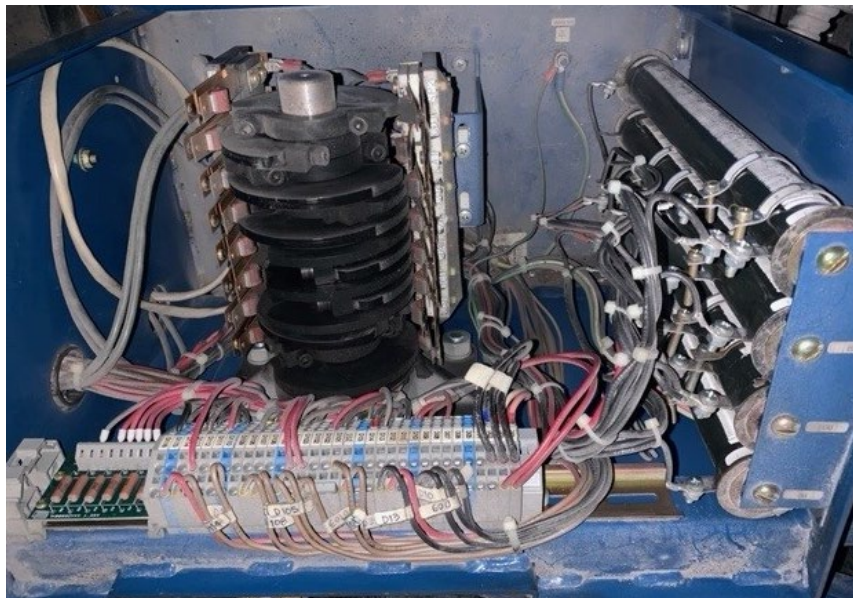
## OTIS OVL TO MOVFE-HH CONVERSION KIT

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- Detach the existing operator arm from the wheel and save all the hardware to attach the GAL Crank arm adaptor to the MOVFEHH.



- Disconnect and label all the operator wiring.



- Remove the mounting nuts holding the operator in place and take out the OVL operator.



### 2.3. *Installing the Operator*

- Align the front of the MOVFE HH base to the existing operator support.
- Once the operator is in line with the plate, mark the edges of the MOVFE HH.



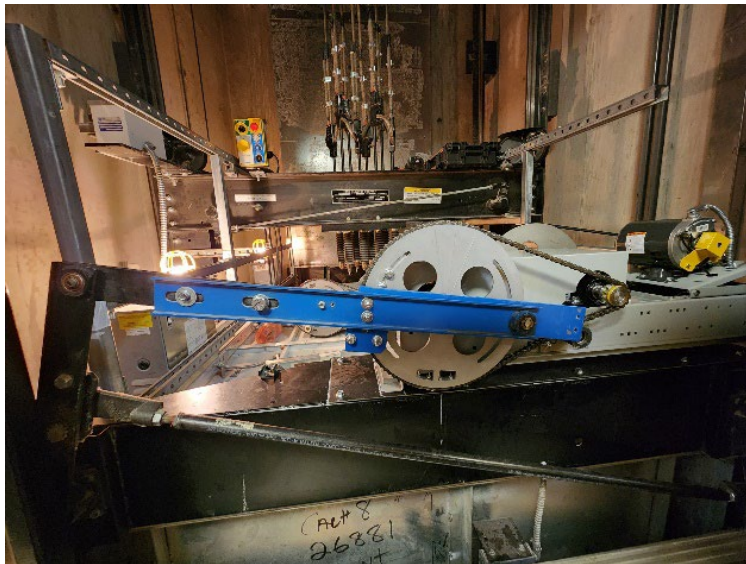
- Drill holes for the operator mounting bolts, then place the operator back on the plate and secure.



## OTIS OVL TO MOVFE-HH CONVERSION KIT

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- Once the operator is secured to the plate, rotate the operator wheel and install the Crank arm adaptor and connect the existing arms.
- Adjust accordingly to rotate open and closed.
- The operator arm should be in line, fully openend and fully closed with the operator wheel.
- In order to fully open and close, existing arm weights should be removed.
- Adjust open and close stops accordingly.
- When fully opened and closed is achieved with the correct position of the operator arm, fully tighten all hardware to secure the operator arm.



- After completing the installation, rotate the operator open and closed by hand to check clearances. Correct operation if needed.

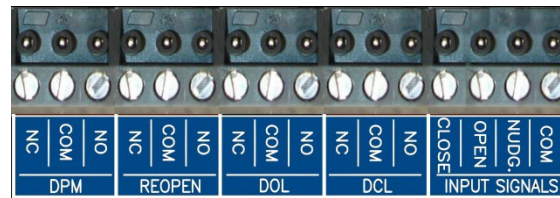
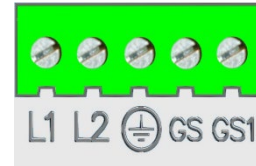
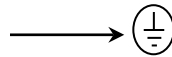
## 2.4. Initial Electrical Setup

### 2.4.1. 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)
- **NUDGL** (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 NUDGL 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.

### 2.4.2. 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

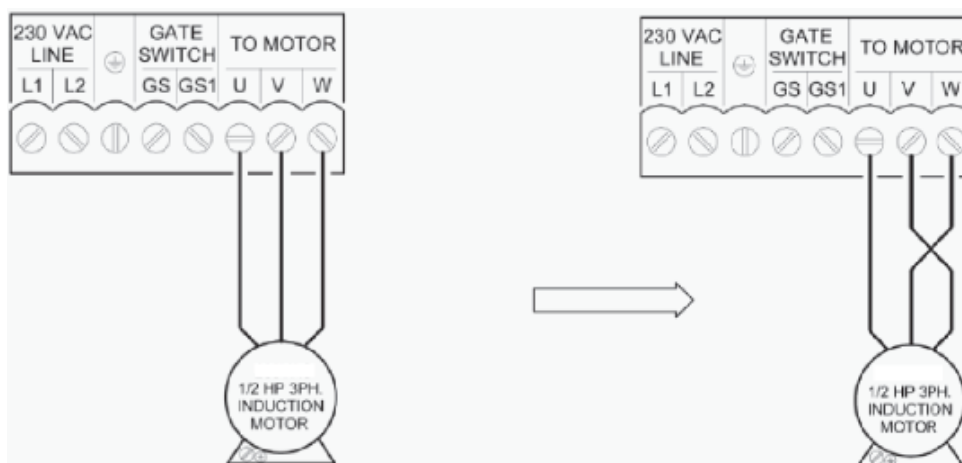
2. Motor direction:

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

- Press **VOLT PULSE**. Run the door in Manual mode using the toggle switches.
- If the door Closes and the counter Decreases, or the door Opens and the counter Increases, then the encoder Direction is Correct.
- Otherwise, change parameter 42 from 1 to 2 or vice versa.

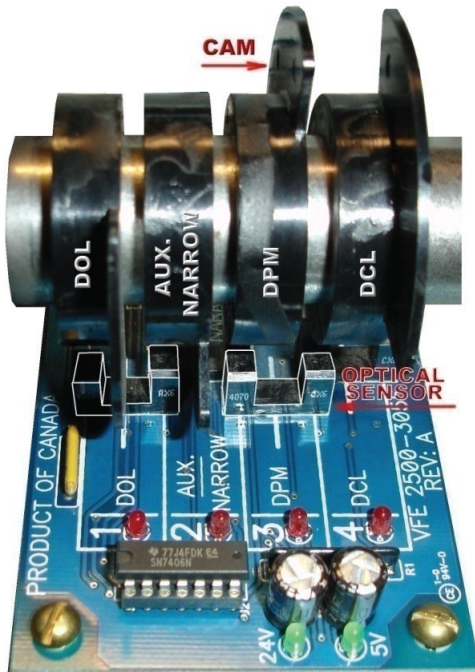
### 4. Learn the door width

- Flip the RUN | SETUP switch to SETUP. Set Par. **63 = 1**.
- Flip the RUN | SETUP switch to RUN.
- Use Manual mode to run the door from DOL to DCL, or vice versa.
- 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.

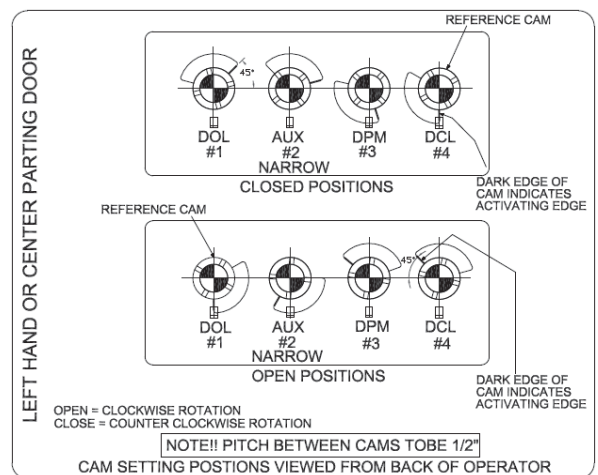
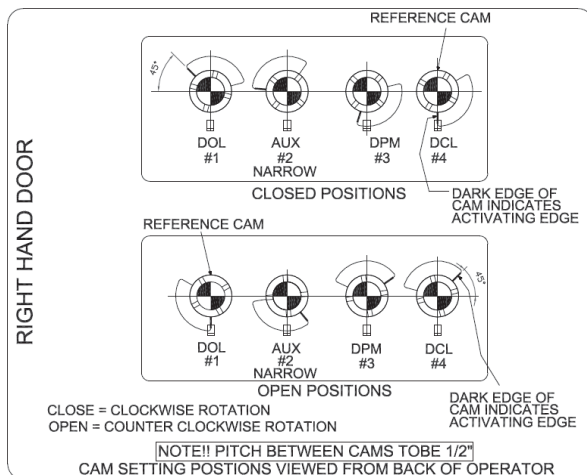


## 2.5. Optical Cams

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.



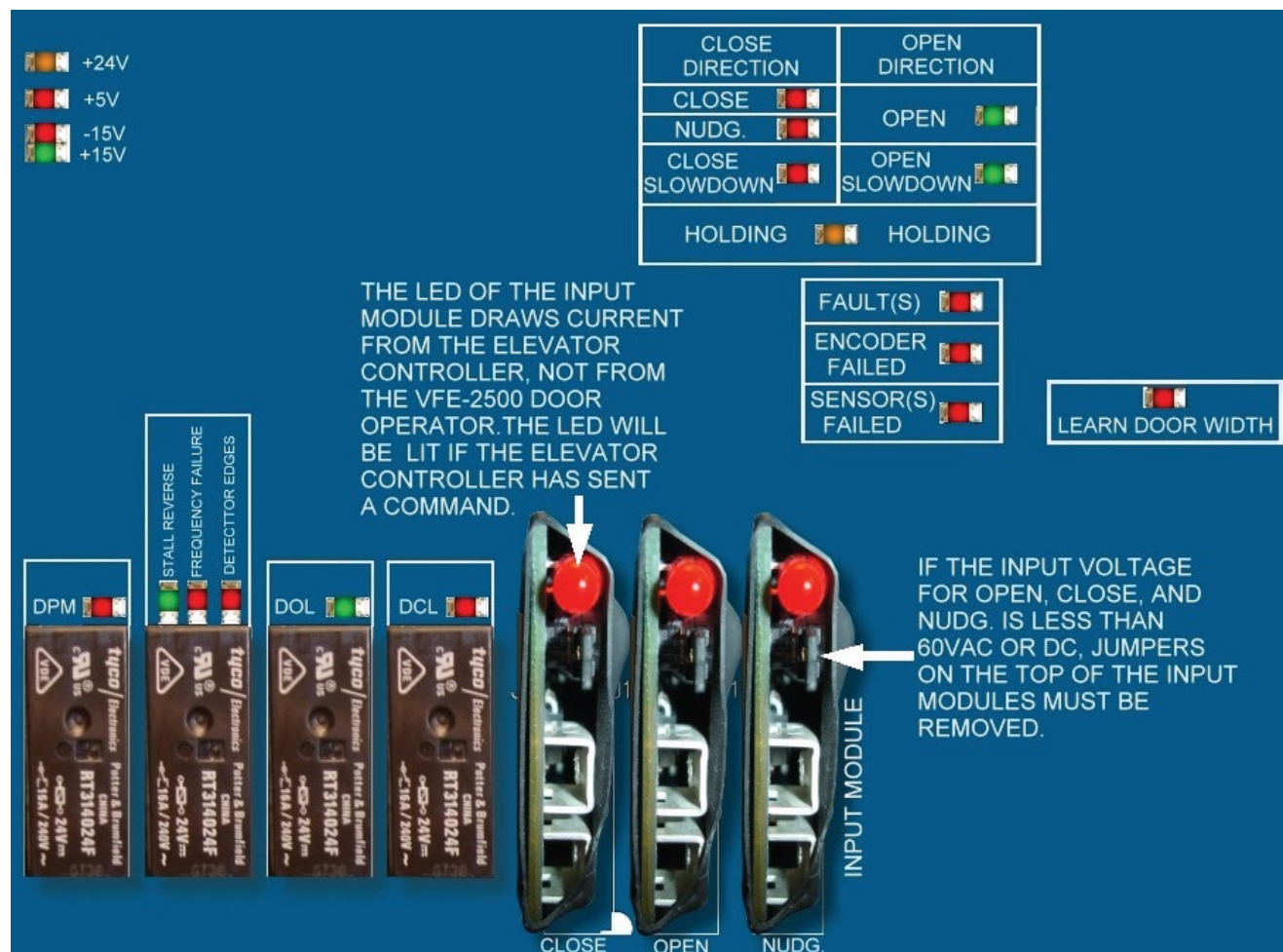


## 2.6. LED Indicators

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.



### 2.7. 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.

## 2.8. 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:

### 2.8.1. How to Change Parameters

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

### 2.8.2. How to Read (Copy) From A Drive

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

### 2.8.3. How to Write (Download) To A Drive

- Press **SET** . Press 
- Press **WRITE** . Wait for the Completed signal from the LCD display.



### 2.8.4. Default Parameters

CLOSING	Pr.#	RANGE	DEFAULT VALUE					
			HARMONIC		LINEAR			
			C / P	S / O	STRAIGHT		GEARED	
			C / P	S / O	C / P	S / O	C / P	S / O
MAX. CLOSE SPEED	136	0-60	30	30	30	30	30	30
HOLDING TORQUE	137	0-3	0.6	0.6	0.6	0.6	0.2	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	25	20	25	20
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

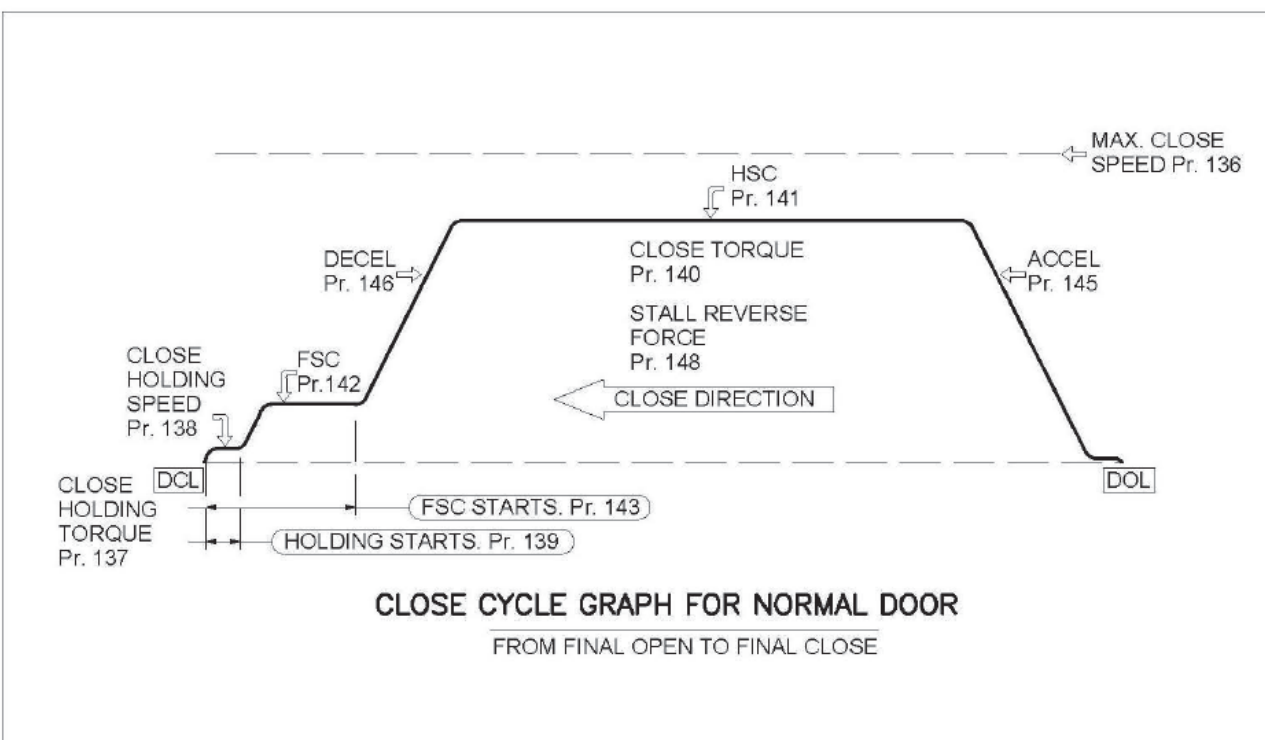
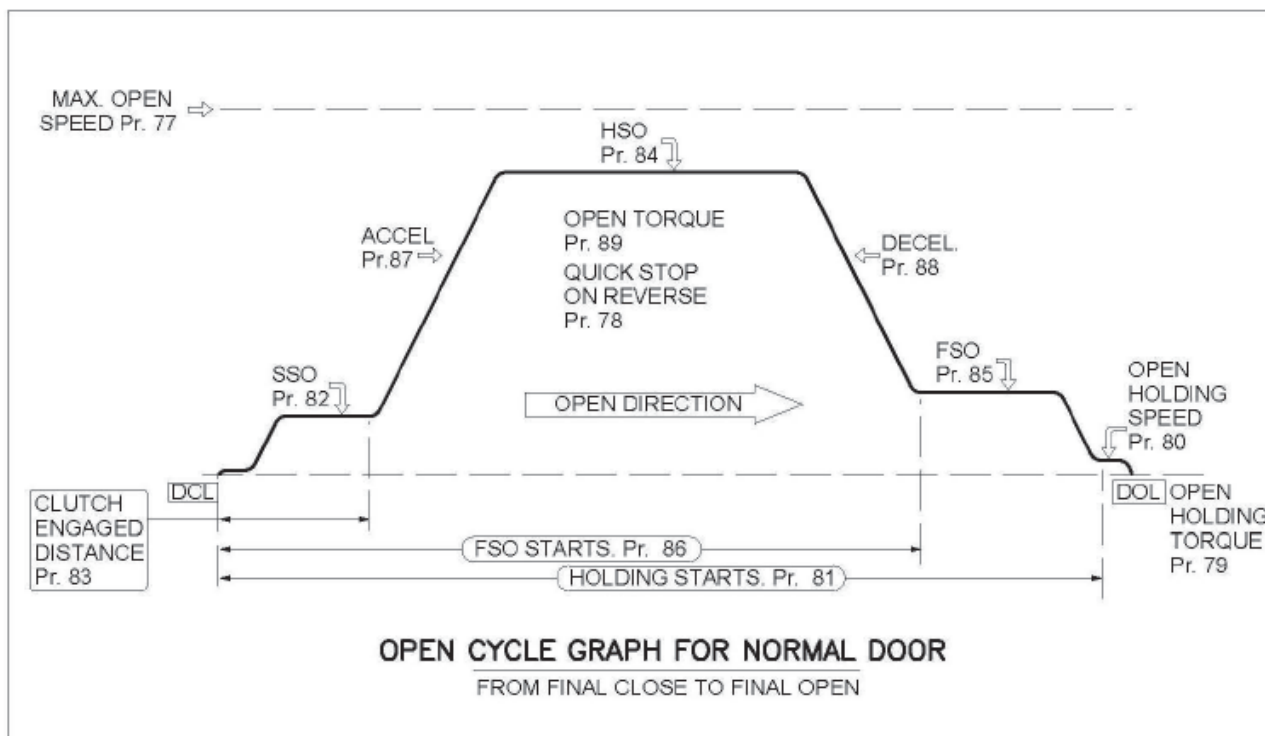
OPENING	Pr.#	RANGE	DEFAULT VALUE					
			HARMONIC		LINEAR			
			C / P	S / O	STRAIGHT		GEARED	
			C / P	S / O	C / P	S / O	C / P	S / O
QUICK STOP ON REV.	78	0-4.5	1.2	1.4	2.0	2.0	1.2	1.2
HOLDING TORQUE	79	0-3	0.6	0.6	0.6	0.6	0.2	0.2
HOLDING SPEED	80	0-400	2	2	2	2	2	2
HOLDING BEGINS	81	0-100	99	99	99	99	99	99
SLOW SPD (SSO)	82	0-400	5	5	3	5	3	5
CLUTCH ENG. DIST.	83	0-100	12	12	12	12	12	12
HIGH SPD (HSO)	84	0-400	31	45	45	45	45	50
FINAL SPD (FSO)	85	0-400	7	7	3	5	3	5
FSO BEGINS	86	0-100	95	95	98	98	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

▲ : TO LOWER TORQUE, INCREASE THE VALUE.








COMMON	Pr.#	RANGE	DEFAULT VALUE								
			HARMONIC			LINEAR					
						STRAIGHT			GEARED		
			L	R	C / P	L	R	C / P	L	R	C / P
SELECTION OF THE HAND OF THE DOOR L ■ LEFT R ■ RIGHT C / P ■ CENTER PARTING	42	1-2	2	1	2	1	2	1	2	1	2
CARRIER FREQ.	1	0-15	12								
SCAN FREQ.	61	0-400	9								
LEARNING FREQ.	62	0-400	9								
EDGES DELAY TIME	197	0-180	15								
EDGES HOLD TIME	206	0-180	5								
BUZZER DELAY TIME	198	0-180	10								
OVERLOAD	217	0-6	2.5								
BUZZER MODE	205	0-2	0: DISABLE 1: CONTINUOUS 2: PULSE								
DET. EDGES MODE	202	0-2	0: DISABLE 1: NPN 2: PNP								
NARROWER DOOR	199	0-1	0: ENABLE 1: DISABLE								
NARROWER DOOR DOL	204	0-1	0: USE BOTH DOL AND AUX 1: USE DOL								
RE-OPEN RELAY MODE	207	0-1	0: MAINTAIN 1: DISABLE WHEN EDGES RELAY ON								
CLUTCH DISTANCE UNIT	76	0-1	0: PERCENT 1: PULSES								
CODE DIST. REG / HVY	69	0-65535	1" FOR S/O, OR 2" FOR C/P FROM DCL								
CODE DIST. NARROW	70	0-65535	1" FOR S/O, OR 2" FOR C/P FROM DCL								
CAN NODE ID	246	7-8	FRONT DOOR = 7 REAR DOOR = 8								
DOORWIDTH LEARNING	63	0-1	0: DISABLE 1: ENABLE								

## 2.8.5. 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.



## 2.8.6. Convenience Keys

- Press  to display speeds in Hz.
- Press  to display input and output signals.
- Press  to display recent faults.
- Press  or  to view all recent faults.
- Press  to display currents.
- Press  to reset the drive.

## 2.8.7. 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.
- NUDG. = Nudging
- HLD= Holding.
- PRG= Programming Mode
- FLT= Fault
- OVT= Over Torque.



## 2.8.8. 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.

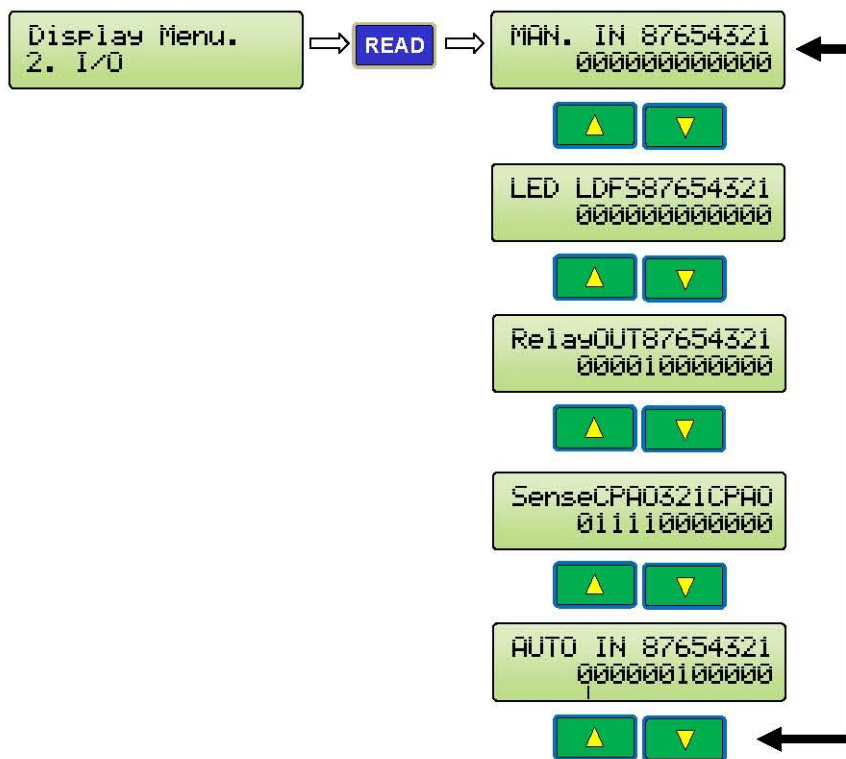
Press **ESC** at any time to get back to the previous display.

The following items are under the **VIEW** key:

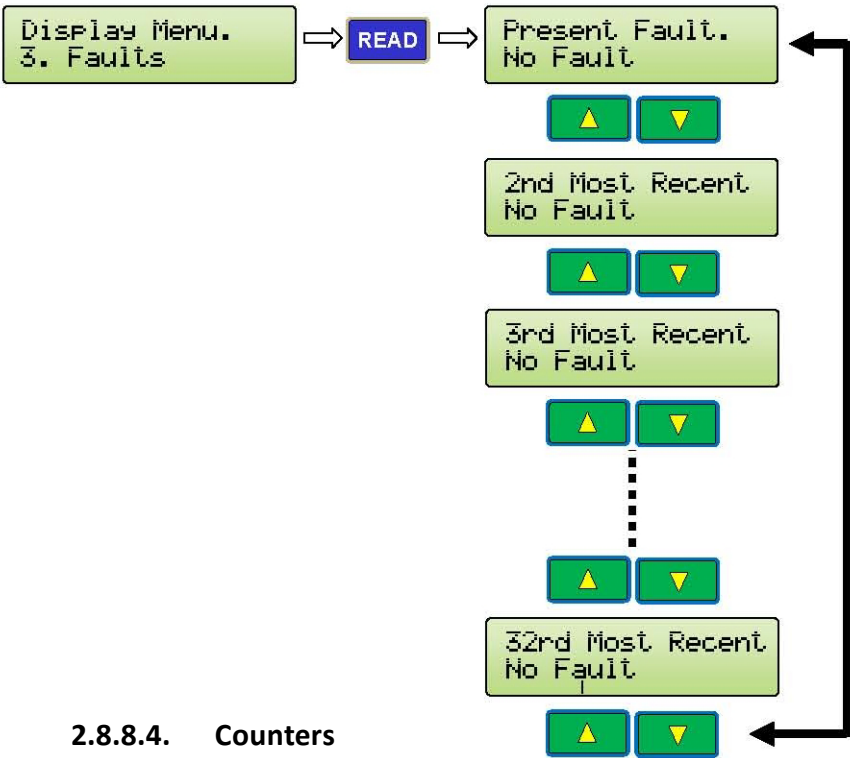
### 2.8.8.1. Voltage, Current, Command Frequency and Actual Frequency (Hz)



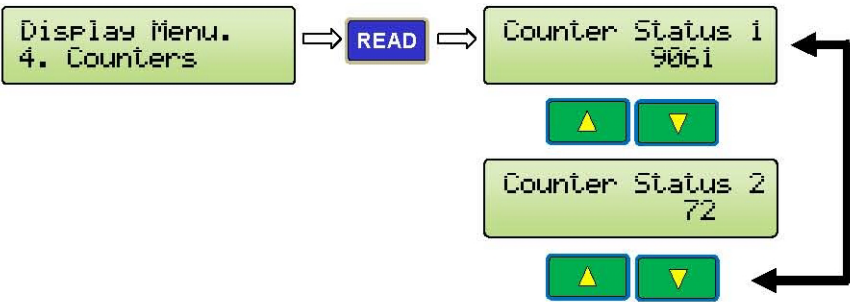
### 2.8.8.2. Inputs & Outputs Monitoring



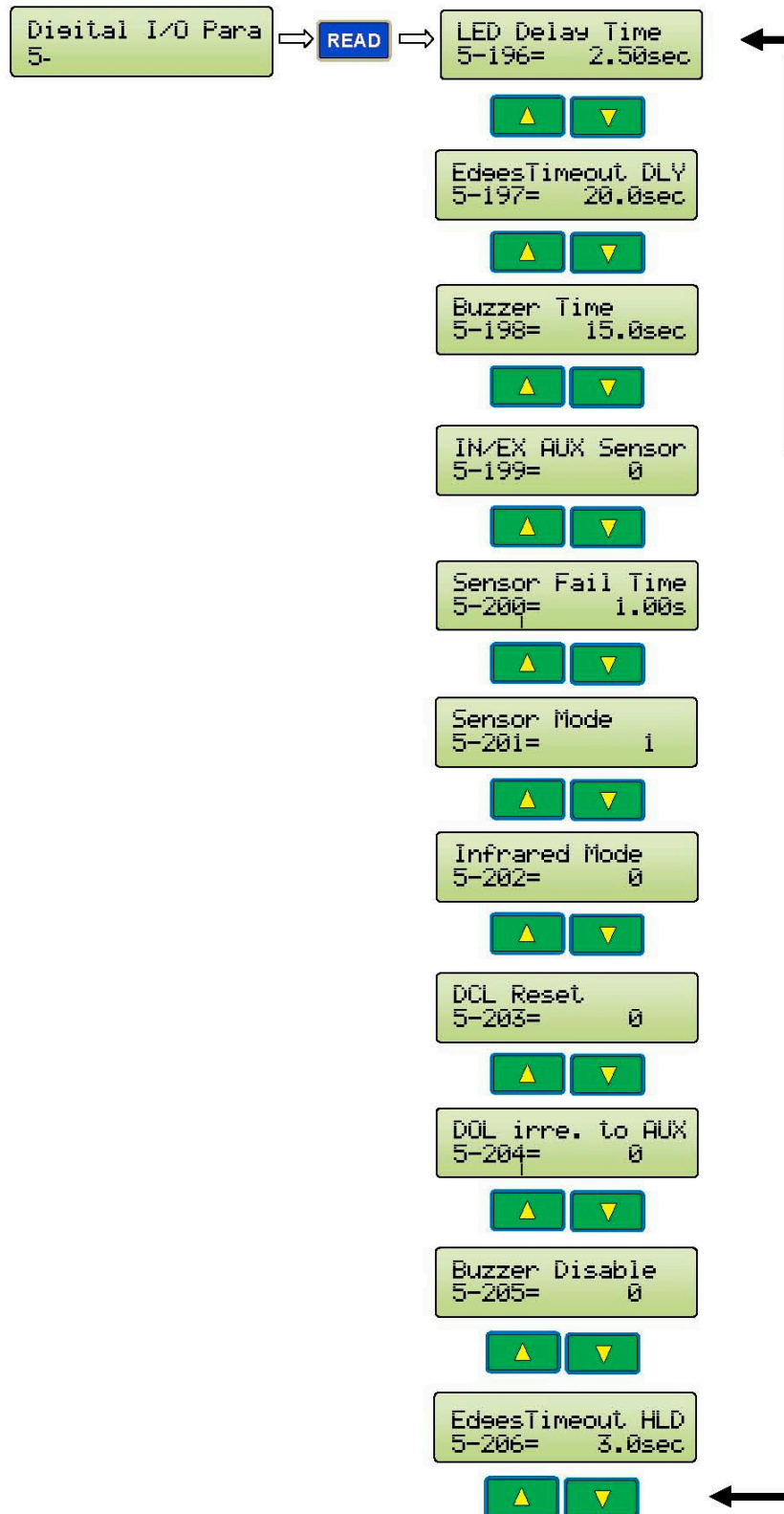
2.8.8.3. Faults



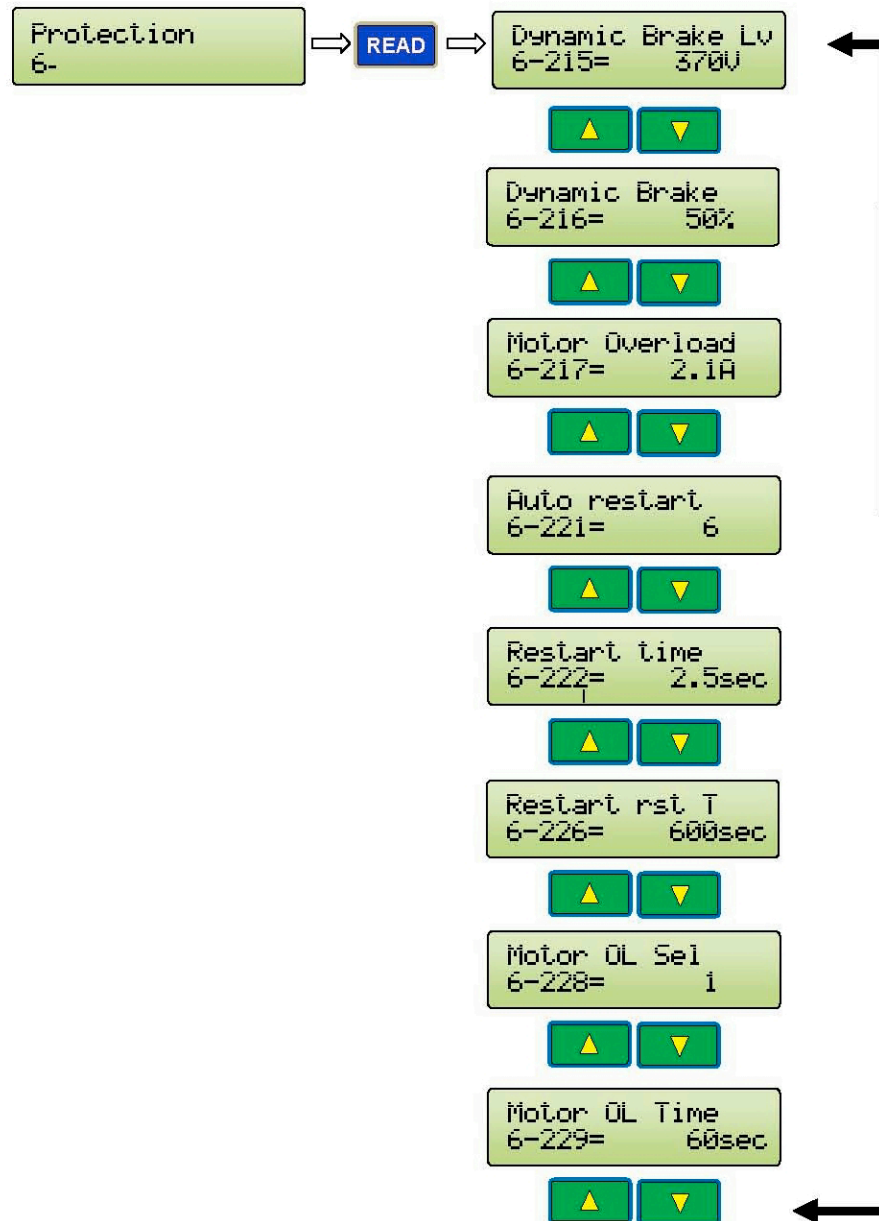
2.8.8.4. Counters



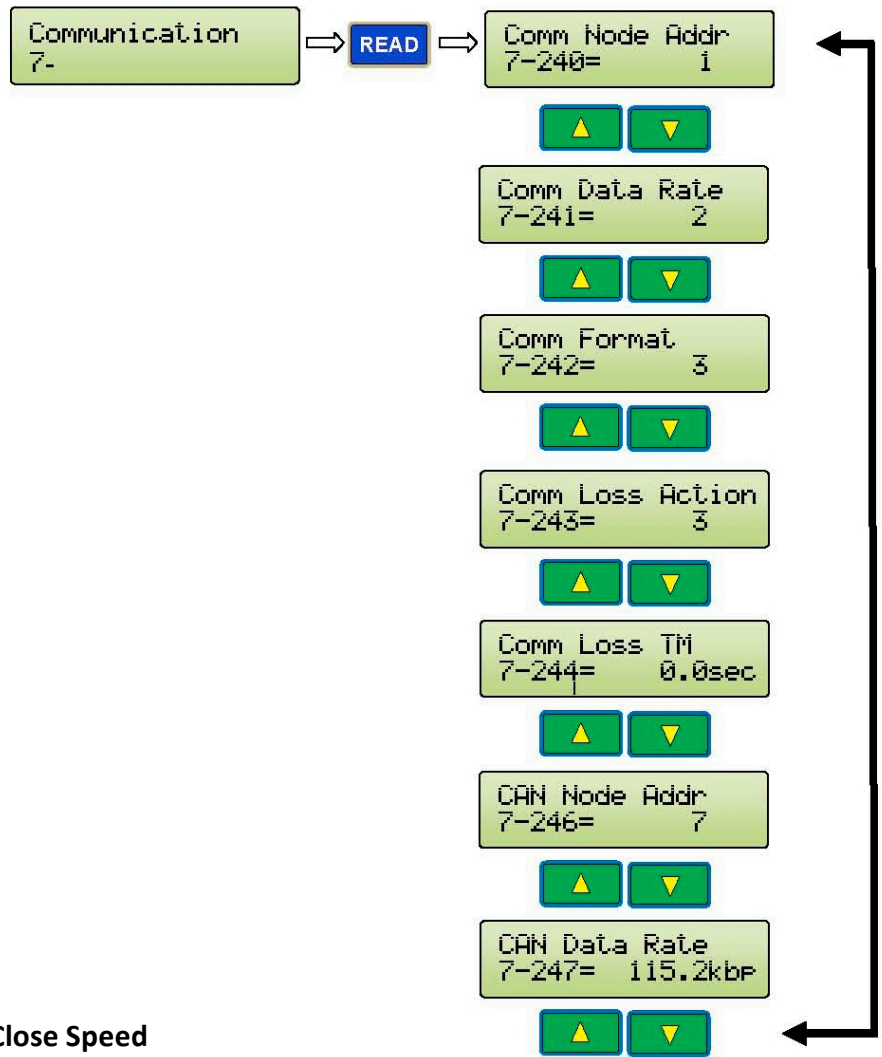
## 2.8.8.5. Digital I/O Parameters



## 2.8.8.6. Direction

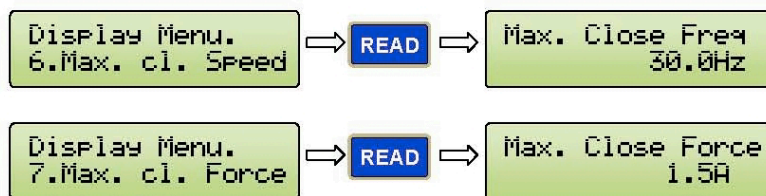


## 2.8.8.7. Communication



## 2.8.8.8. Maximum Close Speed

## 2.8.8.9. Maximum Close Force



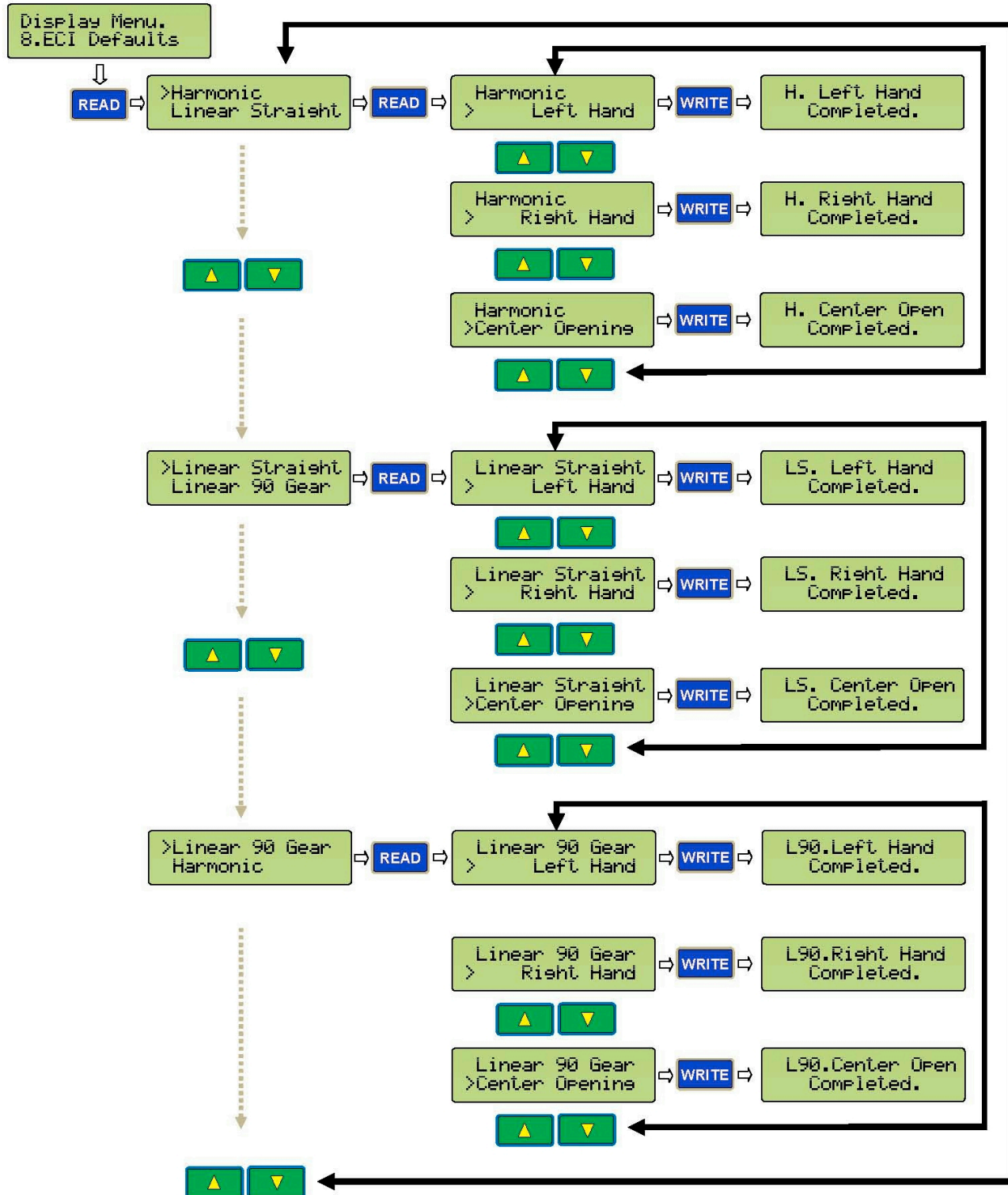


## 2.8.8.10. G.A.L. Default Parameter Sets

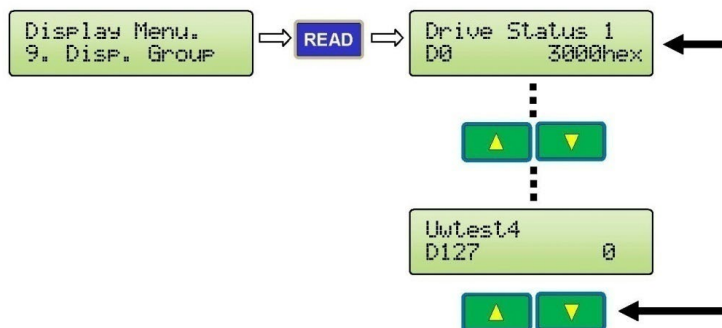
## 2.8.8.11. Harmonic (Reference Only)

## 2.8.8.12. Linear Straight

## 2.8.8.13. Linear Geared



## 2.8.8.14. Display Groups for Monitoring and Troubleshooting



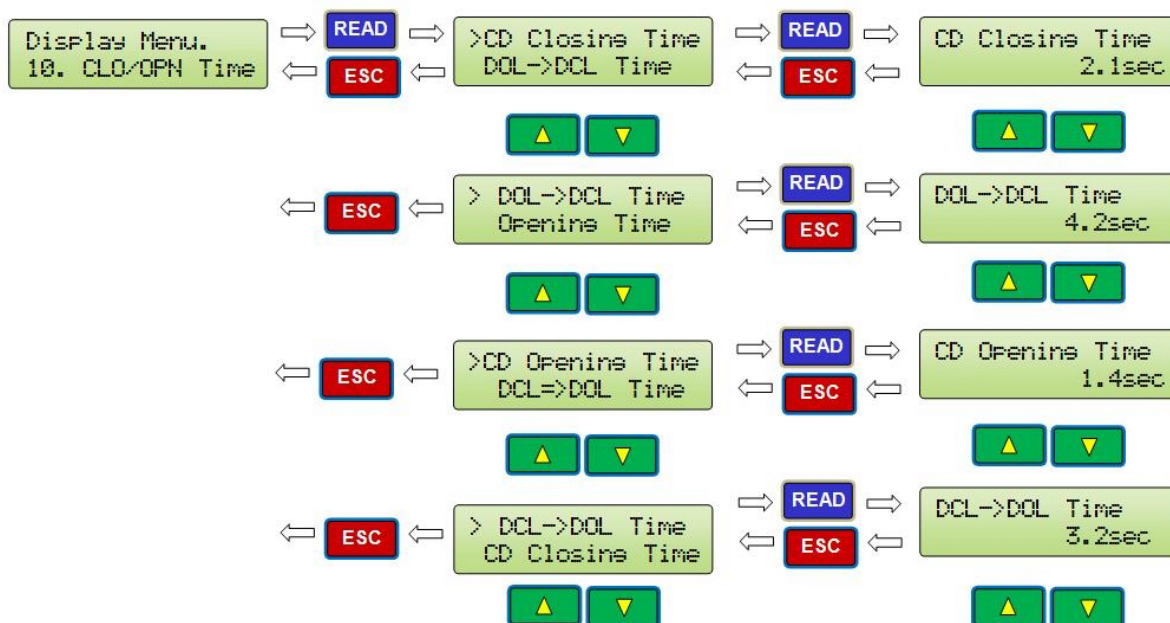
## 2.8.8.15. Code Distance Closing Time Display

### 2.8.8.16. Cd Closing Time

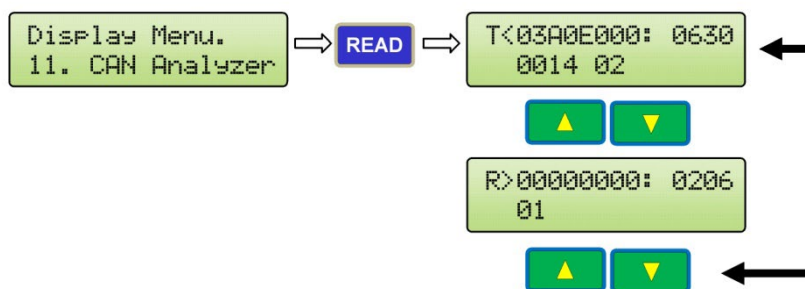
### 2.8.8.17. DOL - DCL Time

### 2.8.8.18. Cd Opening Time

### 2.8.8.19. DCL – DOL Time



## 2.8.8.20. CAN Analyzer



### 3. Faults List

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. 2. Check the wiring connections between the AC motor drive and motor for possible short circuits, also to ground. 3. Check for loose contacts between AC motor drive and motor. 4. Increase the acceleration time. 5. Check for possible excessive loading conditions at the motor. 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. 2. Check for possible voltage transients. 3. DC-bus over-voltage may also be caused by motor regeneration. 4. Increase the deceleration time . 5. Check whether the required braking power is within the specified limits. 6. Check for 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 falls within the specified temperature range. 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. 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 2. Check, remove any foreign objects preventing the motor from moving. 3. Repair defective mechanical system.					

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Fault Display	Meaning	Reset	Auto Reset	Record	Drive Response	Reset Condition
Hardware Failure	Hardware protection failure	No	No	Yes	Coast to Stop	
<b>Remedy</b>	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
<b>Remedy</b>	1. Short-circuit at motor output: Check for possible poor insulation at the output lines. 2. Torque boost too high: Decrease the torque compensation setting in Pr.33. 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
<b>Remedy</b>	1. Short-circuit at motor output: Check for possible poor insulation at the output line. 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
<b>Remedy</b>	1. Short-circuit at motor output: Check for possible poor insulation at the output line. 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
<b>Remedy</b>	When one of the output terminals is grounded, short circuit current is more than 1.5A, the AC motor drive power module may be damaged. 1. Check whether the IGBT power module is damaged. 2. Check for possible poor insulation at the output line. 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
<b>Remedy</b>	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
<b>Remedy</b>	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 Ram to Stop Warning	Immediately
<b>Remedy</b>	1. Check the RS485 connection between the AC motor drive and RS485 master for loose wires and wiring to correct pins. 2. Check if the communication protocol, address, transmission speed, etc. are properly set. 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
<b>Remedy</b>	1. Check the cable between drive and motor 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
<b>Remedy</b>	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.
<b>Remedy</b>	1. Check value of Par. 41. 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
<b>Remedy</b>	1. Check the AUX sensor 2. Check the wirings of the AUX sensor. 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
<b>Remedy</b>	1. Check the DPM sensor 2. Check the wirings of DPM sensor. 3. Check the Magnet for the Linear model. 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
<b>Remedy</b>	1. Check the DOL sensor 2. Check the wirings of the DOL sensor. 3. Check the Magnet for the Linear model.					

Fault Display	Meaning	Reset	Auto Reset	Record	Drive Response	Reset Condition
DCL Sensor Fail	DCL Error	Yes	Yes	Yes	Warning & Scan Speed	Recover if the signal is detected appropriately
<b>Remedy</b>	1. Check the DCL sensor 2. Check the wirings of the DCL sensor. 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

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

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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

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

SINGLE SPEED CENTER PARTING DOOR						
Door Width (in)	Door Weight (lbs)	Approx. Equipment Weight (lbs)	Code Distance <b>Per Side</b> (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