

# OPERATING, MAINTENANCE & PARTS MANUAL

## ELECTRIC CHAIN HOIST VARIABLE FREQUENCY DRIVE SUPPLEMENT

# CM<sup>®</sup> LODESTAR<sup>®</sup>

Before installing hoist, fill in the information below.

Model Number \_\_\_\_\_

Serial No. \_\_\_\_\_

Purchase Date \_\_\_\_\_

Voltage \_\_\_\_\_

Rated Load \_\_\_\_\_

### **RATED LOADS 1/8 TO 3 TONNES 125 KG TO 3000 KG**

Follow all instructions and warning for inspecting, maintaining and operating this hoist.

The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. **Retain this manual for future reference and use.**

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.



# FOREWORD

This manual contains important information to help you properly install, operate and maintain your hoist for maximum performance, economy and safety.

Please study its contents thoroughly before putting your hoist into operation. By practicing correct operating procedures and by carrying out the recommended preventive maintenance suggestions, you will experience long, dependable and safe service. After you have completely familiarized yourself with the contents of this manual, we recommend that you carefully file it for future reference.

The information herein is directed to the proper use, care and maintenance of the hoist and does not comprise a handbook on the broad subject of rigging.

Rigging can be defined as the process of lifting and moving heavy loads using hoists and other mechanical equipment. Skill acquired through specialized experience and study is essential to safe rigging operations. For rigging information, we recommend consulting a standard textbook on the subject.

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## ELECTROMOTIVE IMPULSE® •G+ MINI ADJUSTABLE FREQUENCY DRIVES

Through a special arrangement with Electromotive Systems, a Magnatek Company, the Impulse •G+ Mini adjustable frequency drives have been mounted inside most Columbus McKinnon (CM®) chain hoists. This manual contains information on the adjustable frequency drives and it should be used in conjunction with the manual supplied with the hoist.

### DISCLAIMER OF WARRANTY

Electromotive Systems hereafter referred to as Company, assumes no responsibility for improper programming of a drive by untrained personnel. A drive should only be programmed by a trained technician who has read and understands the contents of this manual. Improper programming of a drive can lead to unexpected, undesirable, or unsafe operation or performance of the drive. This may result in damage to equipment or personal injury. We shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of such programming. We neither assume nor authorize any other person to assume any other liability in connection with the sale or use of this product.

### WARNING

Improper programming of a drive can lead to unexpected, undesirable, or unsafe operation or performance of the drive.

#### TO AVOID INJURY:

Drive must only be programmed by trained personnel.

### GENERAL

Refer to hoist manual for Safety Precautions, Hoist Safety is up to you, Forward, General Information, Accessories and Installation of the hoist. However, when installing the hoist, be sure it is protected from the following conditions:

- Extreme cold and heat. Use only within the ambient temperature range: 14 to 122°F (-10 to +50°C).
- Rain, moisture.
- Oil sprays, splashes.
- Salt spray.
- Direct sunlight (Avoid using outdoors).
- Corrosive gases (e.g. sulfurous gas) or liquids.
- Dust or metallic particles in the air.
- Physical shock, vibration.
- Magnetic noise. (Example: welding machines, power devices, etc.).
- High humidity.
- Radioactive substances.
- Combustibles: thinner, solvents, etc.

### POWER SUPPLY AND ELECTRICAL CONNECTIONS

Follow the power supply and electrical connections under the Installation Instructions of the hoist manual. Hoists supplied with the Electromotive adjustable frequency drives are to be connected to 220 volt - 3 phase - 50 hertz, 208-240 volt - 3 phase - 60 hertz, 380-415 volt - 3 phase - 50 hertz or 440-480 volt - 3 phase - 60 hertz power supply. Before connecting the hoist to the power supply, check that the power to be used agrees with that shown on the hoist identification plate. Hoists with drives are **not** dual voltage.

The hoist should be connected to a branch circuit which complies with the requirements of the National Electrical Code and applicable local codes.

It is recommended that a line of adequate capacity be run directly from the power supply to the hoist to prevent having problems with low voltage and circuit overloads.

The hoist must be supplied with adequate electrical power in order to operate properly. For proper operation, the voltage, (measured at the end of the standard power cord with the hoist operating in the ↑ (UP) direction with full load) must be as indicated in the following table:

NOMINAL POWER SUPPLY	MINIMUM RUNNING VOLTAGE
230-3-60	200
460-3-60	415
220-3-50	200
380-3-50	365
415-3-50	399

#### Signs of inadequate electrical power (low voltage) are:

- Noisy hoist operations due to brake chattering.
- Dimming of lights or slowing of motors connected to the same circuit.
- Heating of the hoist motor and other internal components as well as heating of the wires and connectors in the circuit feeding the hoists.
- Failure of the hoist to lift the load due to motor stalling.
- Blowing of fuses or tripping of circuit breakers.

To avoid these low voltage problems, the hoist must be connected to an electrical power supply system that complies with the National Electric Code and applicable local codes. This system must be sized based on the full load current of the hoist and it must have a disconnecting means, overcurrent protection (slow blow fuses or inverse-time type circuit breakers) and provisions for grounding the hoist.

For grounding of the hoist, the power cord includes a grounding conductor (green wire). Furthermore, the suspension system on which the hoist is mounted must also be permanently grounded.

### WARNING

Failure to properly ground the hoist presents the danger of electric shock.

#### TO AVOID INJURY:

Permanently ground the hoist as instructed in this manual.

Low voltage can also be caused by using an undersize extension cord to supply power to the hoist. Refer to the hoist manual to determine the size of the wires in the extension cord.

## **WARNING**

Failure to provide a proper power supply system for the hoist may cause damage and offers the potential for a fire.

### **TO AVOID INJURY:**

Provide the hoist with a overcurrent protected power supply system per the National Electrical Code and applicable local codes as instructed in this manual.

Remember, operation with low voltage can void the CM repair/replacement policy. When in doubt about any of the electrical requirements, consult a qualified electrician.

Always disconnect the power from the power supply system and lockout/tagout disconnecting means before servicing the hoist.

## **WARNING**

Working in or near exposed energized electrical equipment presents the danger of electric shock.

### **TO AVOID INJURY:**

Disconnect power and lockout/tagout disconnecting means before removing cover or servicing this equipment.

**NOTE: The brake coil voltage must be the same as the hoist line voltage. This must be a consideration when ordering a repair brake coil.**

## **OPERATING INSTRUCTIONS**

Follow the operating instructions in the hoist manual and use the following:

The hoist is supplied with dynamic braking resistors. During normal hoist operation these resistors get very hot (300°F or more). These resistors must never be touched while the hoist is in operation. They should be allowed to cool to room temperature before inspection or servicing the hoist.

## **WARNING**

Dynamic braking resistors get very hot during normal hoist operation.

### **TO AVOID INJURY:**

Never touch the dynamic braking resistors while the hoist is in operation. Allow resistors to cool before servicing.

1. The adjustable frequency drives are programmed on a per order basis (see Speed Control Methods on page 23) to provide:
  - a. 1 step control. In this method, the hoist can be operated as a normal single speed hoist. Depress the up or down push button and the hoist speed will gradually increase to the rated speed of the hoist.
  - b. 2 step control. In this method, the hoist can be operated as a normal two speed hoist. Partially depress the up or down push button for slow speed operation and fully depress the button for fast speed operation.
  - c. 3 step control. In this method, the hoist can be operated as a normal three speed operation. Partially depress the up or down push button for slow speed operation. Depress the button to the intermediate position for second speed operation and fully depress the button for fast speed operation. The hoist speed gradually increases to the next speed point.

- d. 2 step infinitely variable control. Partially depress the up or down push button and the speed of the hoist will gradually increase to the slow speed point. Fully depress the button and the speed of the hoist will gradually increase to fast speed operation. Slowly release or depress the up or down push button and the hoist will operate at a speed between the preset speed points.
- e. 3 step infinitely variable control. Partially depress the up or down push button and the speed of the hoist will gradually increase to the slow speed point. Depress the button to the intermediate position and the speed of the hoist will gradually increase to the second speed. Fully depressing the button will cause the hoist to gradually increase to fast speed. Slowly release or depress the up or down push button and the hoist will operate at a speed between the preset speed points.

## **SAFETY PROCEDURES**

Refer to the hoist manual and:

1. When preparing to lift a load, be sure that the attachments to the hook are firmly seated in hook saddle. Avoid off center loading of any kind, especially loading on the point of hook.
2. When lifting, raise the load only enough to clear the floor or support and check to be sure that the attachments to the hook and load are firmly seated. Continue lift only after you are assured the load is free of all obstructions.
3. Do not load hoist beyond the rated capacity shown on hoist identification plate. Overload can cause immediate failure of some load-carrying part or create a defect causing subsequent failure at less than rated capacity. When in doubt, use the next larger capacity hoist.
4. Do not use this or any other overhead materials handling equipment for lifting persons.
5. Stand clear of all loads and avoid moving a load over the heads of other personnel. Warn personnel of your intention to move a load in their area.
6. Do not leave the load suspended in the air unattended.
7. Permit only qualified personnel to operate unit.
8. Do not wrap the load chain around the load and hook onto itself as a choker chain. Doing this will result in:
  - a. The loss of the swivel effect of the hook which could mean twisted chain and a jammed liftwheel.
  - b. The upper limit switch, on certain hoists, is by-passed and the load could hit the hoist.
  - c. The chain could be damaged at the hook.

9. On two and three part reeved hoists, check for twists in the load chain. A twist can occur if the lower hook block has been capsized between the strands of chain. Reverse the capsize to remove twist.

## **WARNING**

Allowing the load to bear against the hook latch and/or hook tip can result in loss of load.

### **TO AVOID INJURY:**

Do not allow the load to bear against the hook latch and/or hook tip. Apply load to hook bowl or saddle only.

10. Do not allow the load to bear against the hook latch. The latch is to help maintain the hook in position while the chain is slack before taking up slack chain.
11. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
12. Do not allow the load to swing or twist while hoisting.
13. Never operate the hoist when flammable materials or vapors are present. Electrical devices produce arcs or sparks that can cause a fire or explosion.
14. **STAY ALERT!** Watch what you are doing and use common sense. Do not use the hoist when you are tired, distracted or under the influence of drugs, alcohol or medication causing diminished control.

## **INSPECTION AND MAINTENANCE**

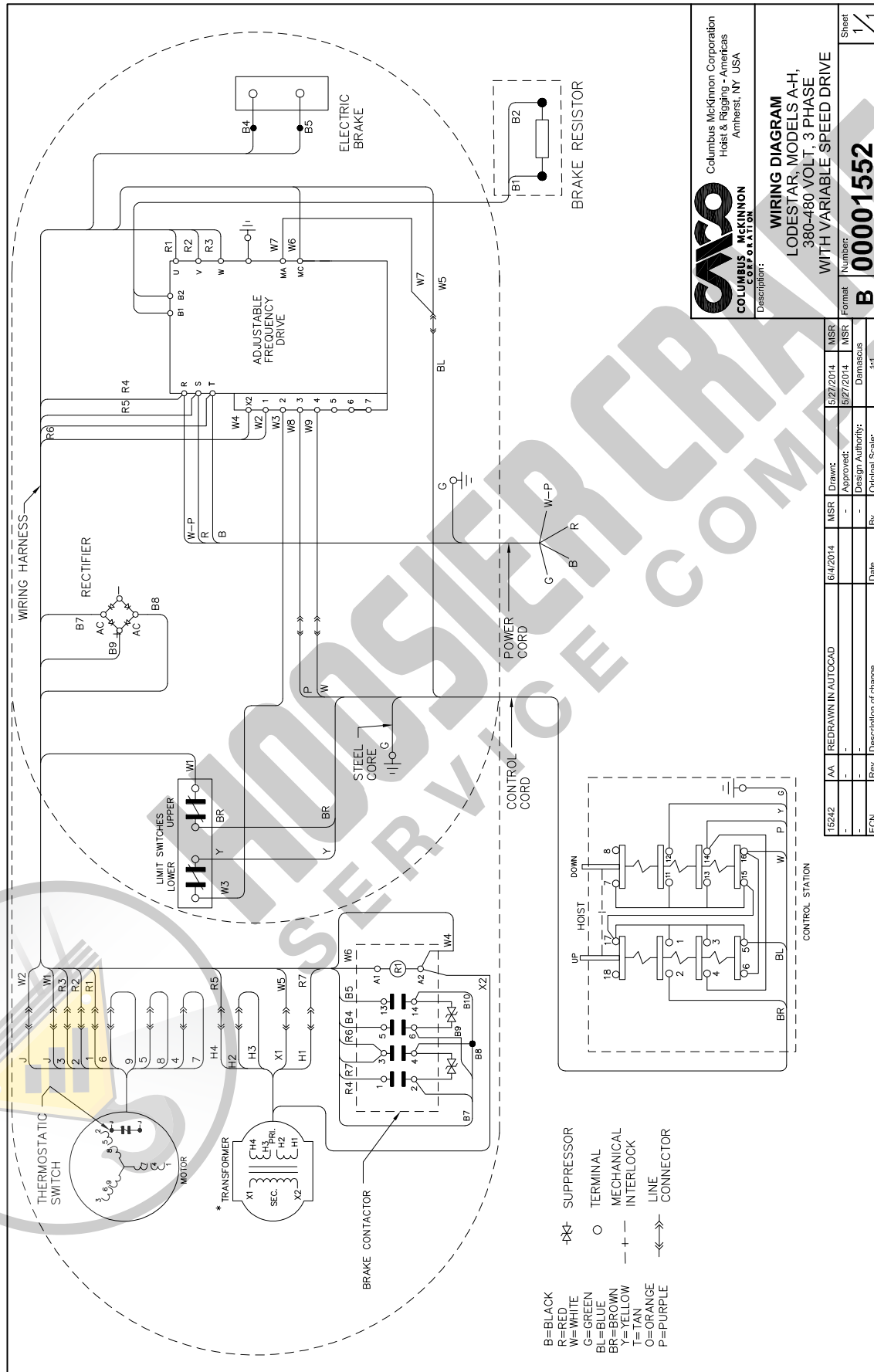
Refer to the hoist manual and in addition, periodically check wiring connections to the drive to make sure they are tight.

TORQUE SPECIFICATIONS	
CHAIN CONTAINER BRACKET SCREWS	20-50 FT*LBF
BRAKING RESISTOR MOUNTING SCREWS	15-18 IN*LBF
#6 SCREWS	6-9 IN*LBF
#8 SCREWS	15-18 IN*LBF
#10 SCREWS	25-30 IN*LBF

\*Refer to Manual 00001996 for all other torque values



# **WIRING DIAGRAM** **LODESTAR MODELS A-H 380-480 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE**



**COLUMBUS MCKINNON CORPORATION**  
 Hoist & Rigging - Americas  
 Amherst, NY USA

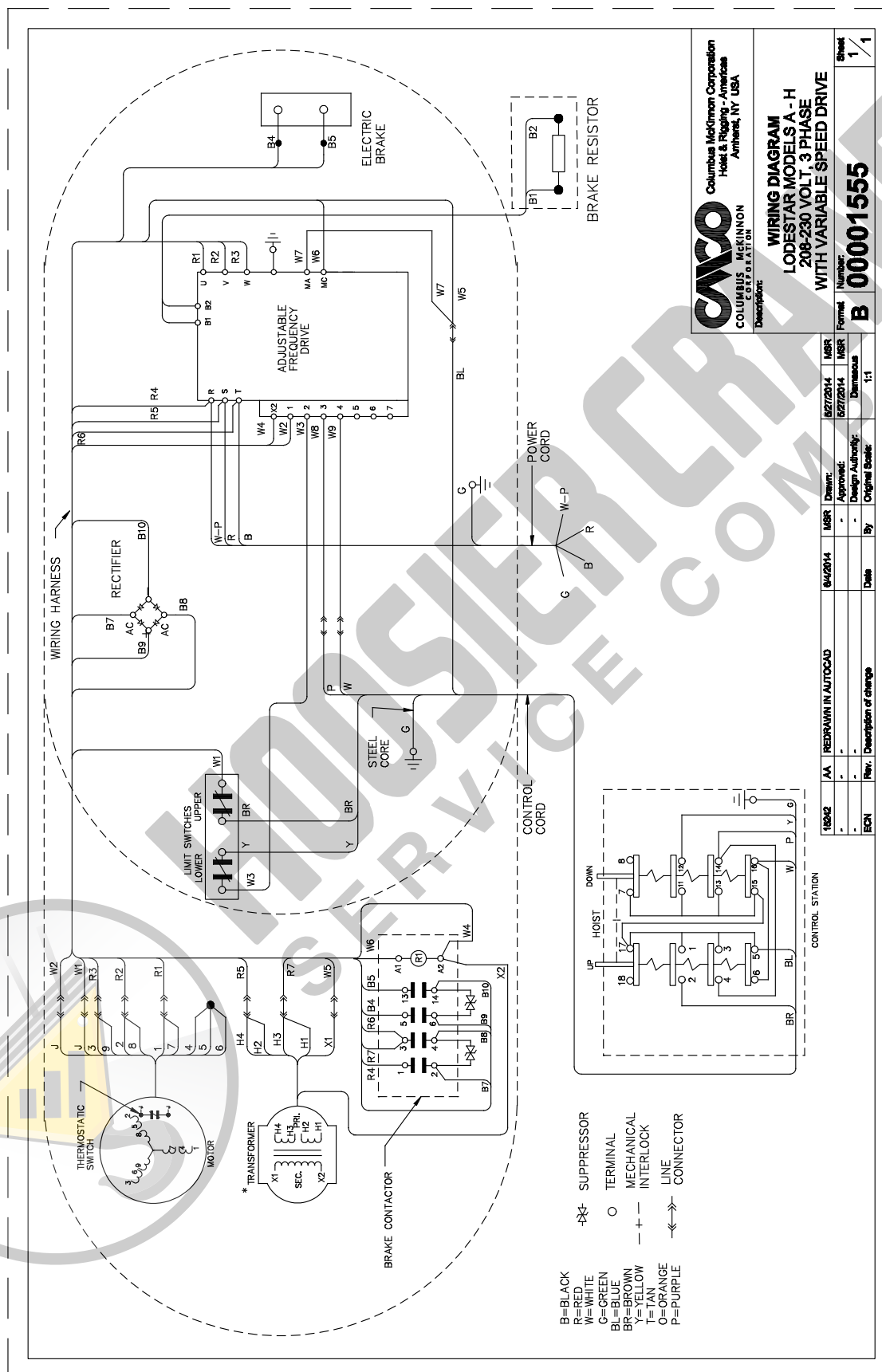
**WIRING DIAGRAM**  
 LODESTAR MODELS A-H,  
 380-480 VOLT, 3 PHASE,  
 WITH VARIABLE SPEED DRIVE

Sheet	1 / 1
Number	B
Format	00001552

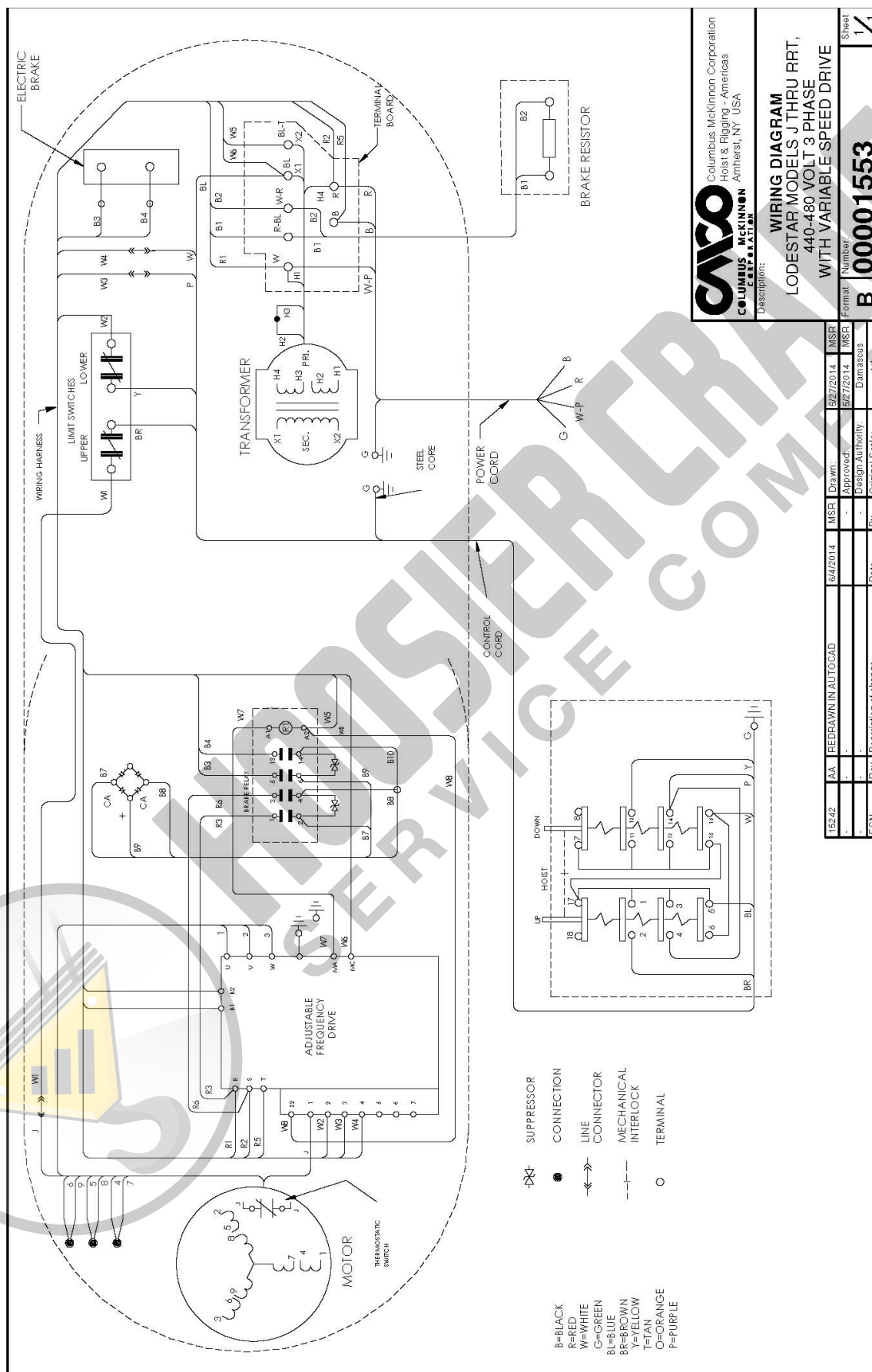
15242	AA	REDRAWN IN AUTOCAD	6/4/2014	MSR	Drawn	5/27/2014	MSR	Number
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
ECN	Rev.	Description of change	Date	By	Design Authority	Damascus	Original Scale	1:1



## LODESTAR MODELS A-H 208-230 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE

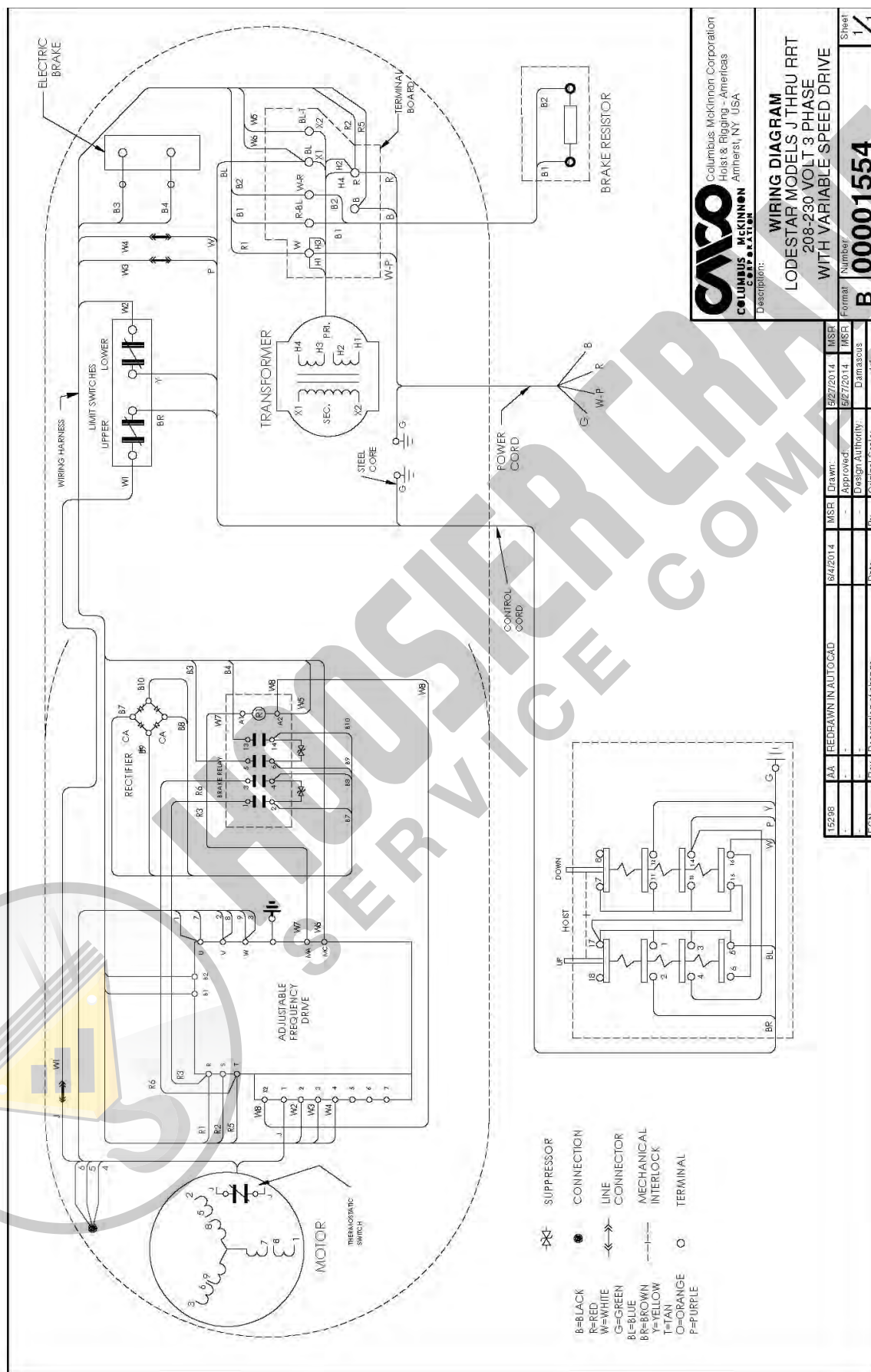


## LODESTAR MODELS J THRU RRT, 440-480 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE

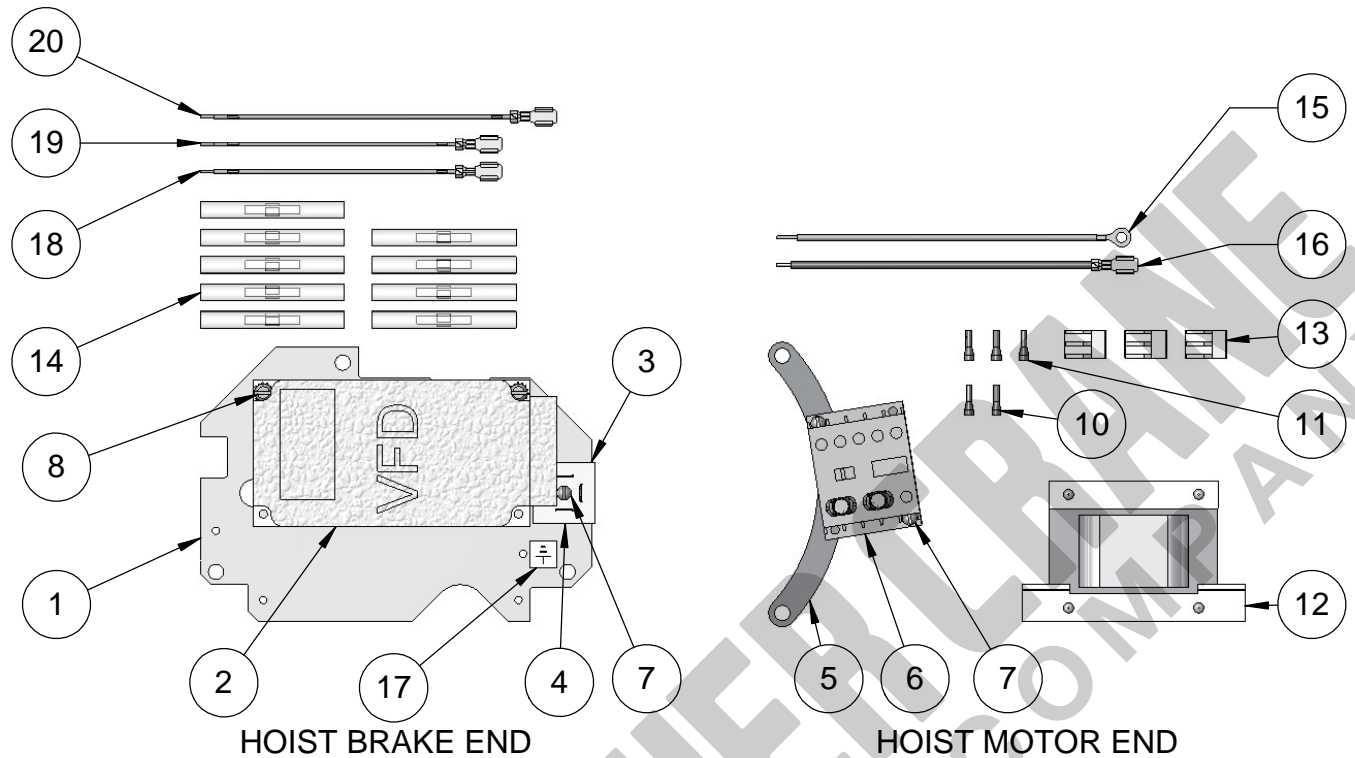




## LODESTAR MODELS J THRU RRT, 208-230 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE

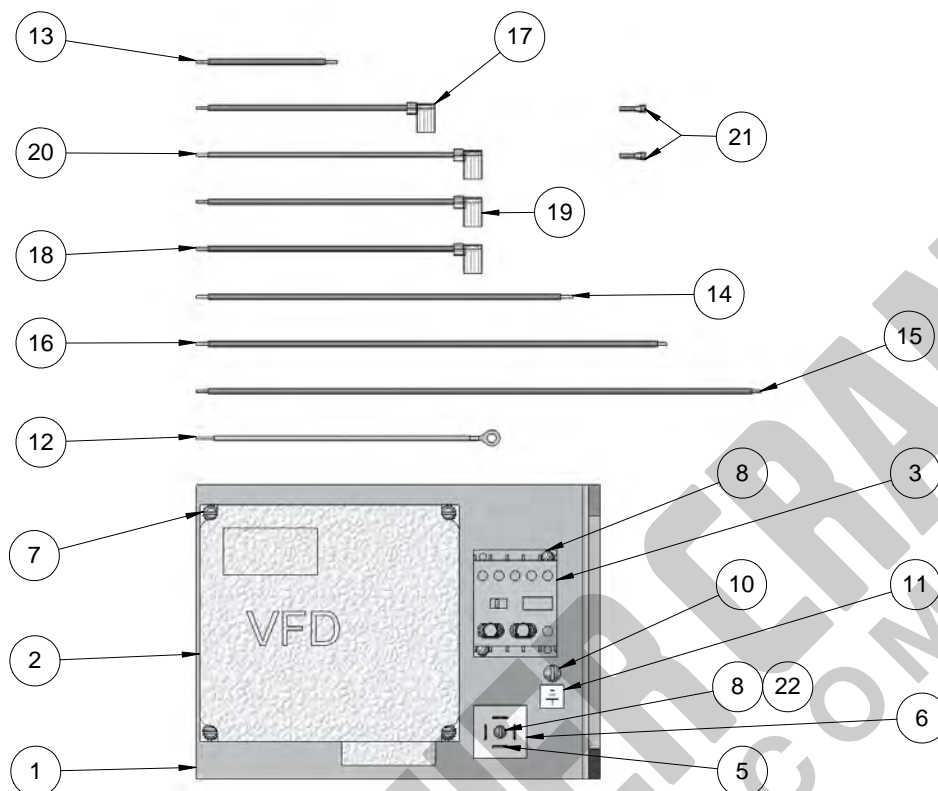


## V1 CONTACTOR PLATE ASSEMBLIES



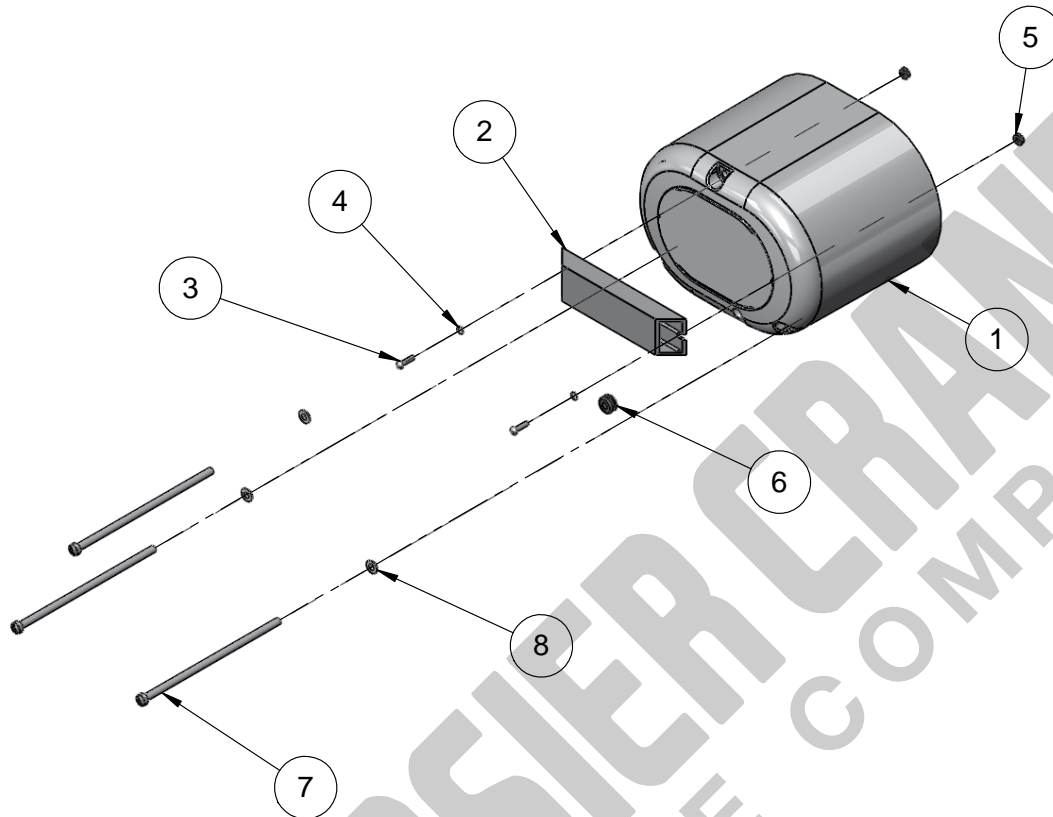
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	28968	AFD BRACKET	1
2	38953	VFD G+MINI, 1/2 HP	1
	38954	VFD 3/4HP 460V	1
3	70246	RECTIFIER	1
4	70274	INSULATOR, RECTIFIER	1
5	28969	BRAKE RELAY BRACKET	1
6	35928	MAINLINE CONTACTOR	1
7	957854	SCREW #6-32 NC-2 X 5/8" ROUND	3
8	987378	SCREW #8-32 UNC-2A X 1/2"	2
9	00000535	SURGE SUPPRESSOR	2
10	982233	ALTECH DIN SERIES SINGLE WIRE	2
11	982234	ALTECH DIN SERIES SINGLE WIRE	3
12	27771	TRANSFORMER	1
13	11782704	CONNECTOR PUSHWIRE ORANGE	3
14	982158	LINE CONNECTOR	9
15	27686	JUMPER (G-Y)	1
16	00001729	JUMPER (R7)	1
17	20940	GROUND LABEL	1
18	28086	JUMPER (T)	1
19	28087	JUMPER (T)	1
20	28090	JUMPER (T)	1
NOT SHOWN	00001558	V1 230V VFD WIRING HARNESS	1
	00001557	V1 460V VFD WIRING HARNESS	1
NOT SHOWN	10001109	THERMAL CONDUCTIVE PASTE	AS REQ'D

## V2 AND RRS CONTACTOR PLATE ASSEMBLIES



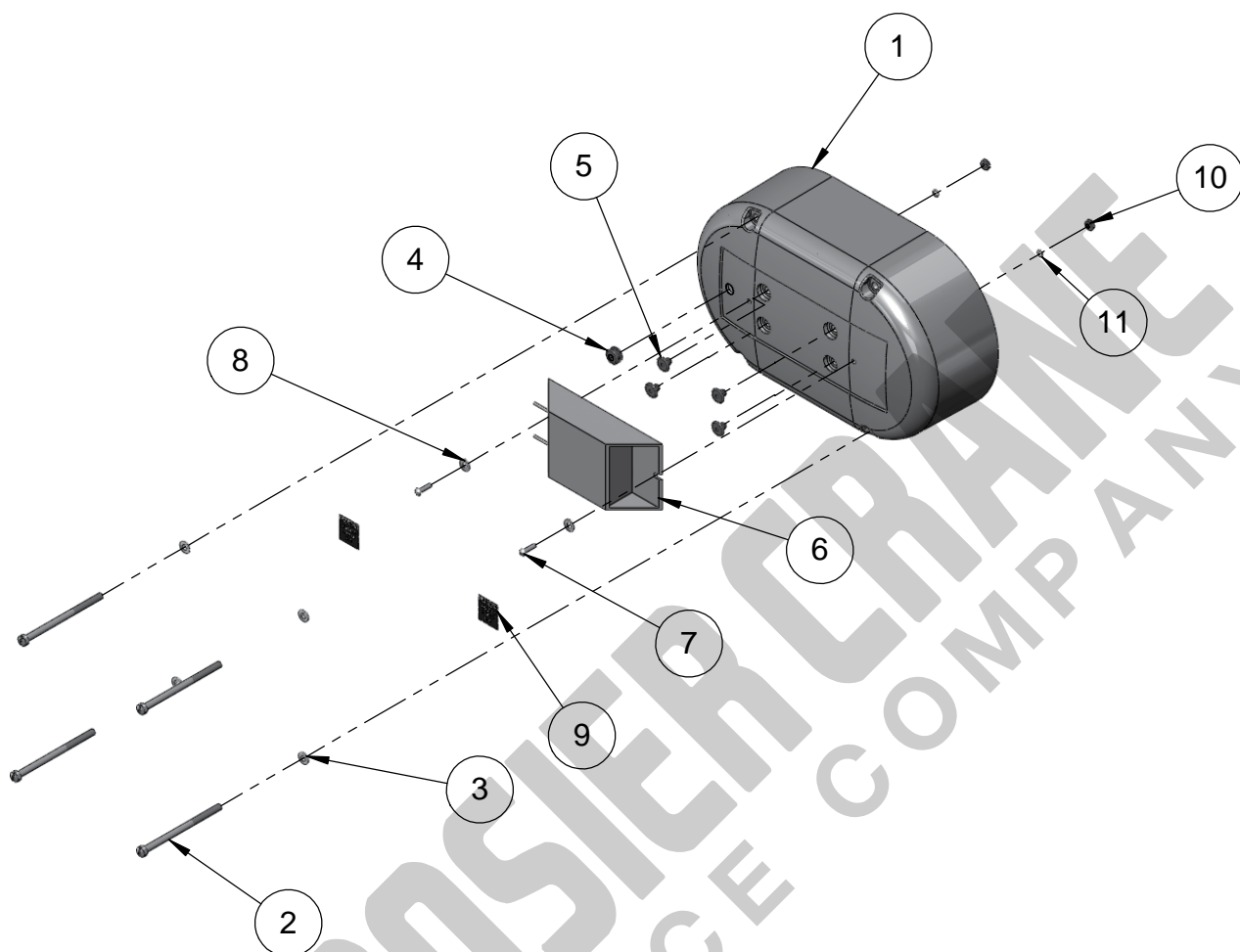
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	10001056	RRS VFD CONTROLS BRACKET	1
	00000339	V2 VFD CONTROLS BRACKET	1
2	38955	VFD 1HP 230V	1
	38956	VFD 1HP 406V	1
	38957	VFD 2HP230V	1
	38992	VFD 5HP 460V	1
3	35928	BRAKE CONTACTOR	1
4	00000535	SURGE SUPPRESSOR - 230V	2
	00001505	SURGE SUPPRESSOR - 460V	2
5	70246	RECTIFIER	1
6	70274	INSULATOR, RECTIFIER	1
7	987378	SCREW #8-32 UNC-2A X 1/2"	4
8	957854	SCREW #6-32 NC-2 X 5/8" ROUND	3
9	957855	LOCKWASHER	2
10	982686	SCREW #10-32 UNF-2A X 3/8" SL	1
11	20940	GROUND LABEL	1
12	27686	JUMPER (G-Y)	1
13	28091	JUMPER (R3)	1
14	28096	JUMPER (W7)	1
15	00001741	JUMPER (W8)	1
16	00001742	JUMPER (R6)	1
17	00000375	B7 JUMPER	1
18	00001743	JUMPER (B8)	1
19	00001744	JUMPER (B9)	1
20	00001745	JUMPER (B10)	1
21	982233	ALTECH DIN SERIES SINGLE WIRE	2
22	982470	HEX HEAD MACHINE NUT	1
NOT SHOWN	00001556	WIRING HARNESS V2 CE	1
NOT SHOWN	10001109	THERMAL CONDUCTIVE PASTE	AS REQ'D

## V1 BRAKE END COVER DETAIL



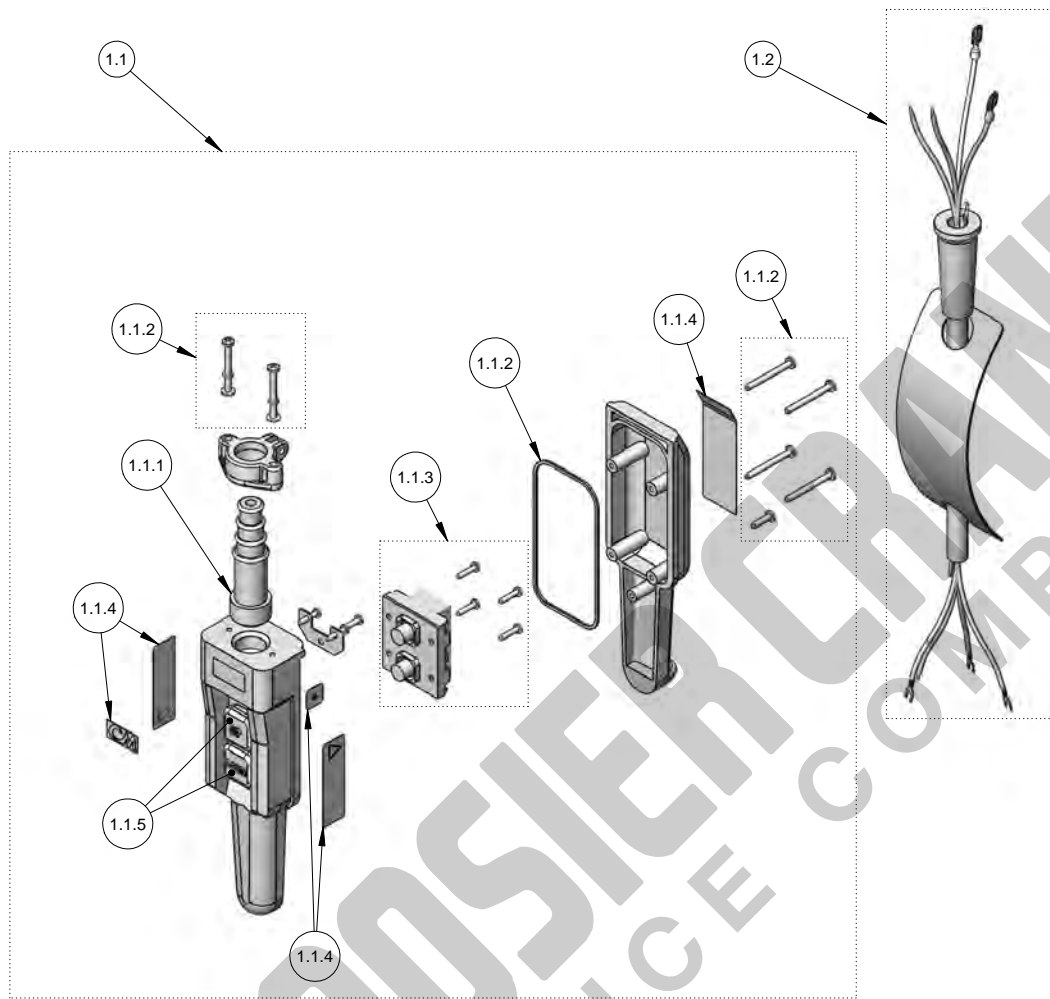
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	27025	COVER	1
2	28958	DYNAMIC BRAKING RESISTOR - 250 OHM	1
	28959	DYNAMIC BRAKING RESISTOR - 500 OHM	1
3	982537	SLOTTED ROUND HEAD SCREW-#8-32	2
4	957844	LOCKWASHER	2
5	982472	NUT #8-32 UNC-2B 11/32 X 1/8	2
6	28731	GROMMET, BUNA-N #9307K38	1
7	87325	SCREW 1/4-20 X 6.5" SL FIL HD	3
8	982251	WASHER - .252 ID X .19 WALL	3

## V2 AND RRS BRAKE END COVER DETAIL



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	35262	CVR BACK FRAME MOD. J THRU RRT	1
2	968752	SCREW BRAKE COVER	4
3	982251	WASHER - .252 ID X .19 WALL	4
4	28731	GROMMET 1/4ID X 3/16 PANEL THK	1
5	00000574	HOLE PLUG	4
6	28960	DYNAMIC BRAKING RESISTOR - 150 OHMS	1
	28961	DYNAMIC BRAKING RESISTOR - 250 OHMS	1
7	982537	SLOTTED ROUND HEAD SCREW-#8-32	2
8	982210	WASHER - #10	2
9	27024NH	WARNING LABEL	2
10	982472	NUT #8-32 UNC-2B 11/32 X 1/8	2
11	957844	LOCKWASHER	2

## COMPLETE CONTROL CORD AND STATION ASSEMBLY VFD, 3-SPEED HOIST CONTROL STATION



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	28079	STATION ASSEMBLY AND CONTROL CORD FOR 10 FOOT LIFT	1
	28080	STATION ASSEMBLY AND CONTROL CORD FOR 15 FOOT LIFT	
	28081	STATION ASSEMBLY AND CONTROL CORD FOR 20 FOOT LIFT	
1.1	58296	2 BUTTON CONTROL STATION	1
1.1.1	58278	GROMMET	1
1.1.2	58275	HARDWARE KIT	1
1.1.3	57803	1-SPEED INSERT	1
1.1.4	58276	WARNING LABEL KIT	1
1.1.5	58277	BUTTON LABEL KIT	1
1.2	28076	CONTROL CORD - 10 FOOT LIFT	1
	28077	CONTROL CORD - 15 FOOT LIFT	
	28078	CONTROL CORD - 20 FOOT LIFT	



# PROGRAMMING THE ADJUSTABLE FREQUENCY DRIVE

## USING THE KEYPAD

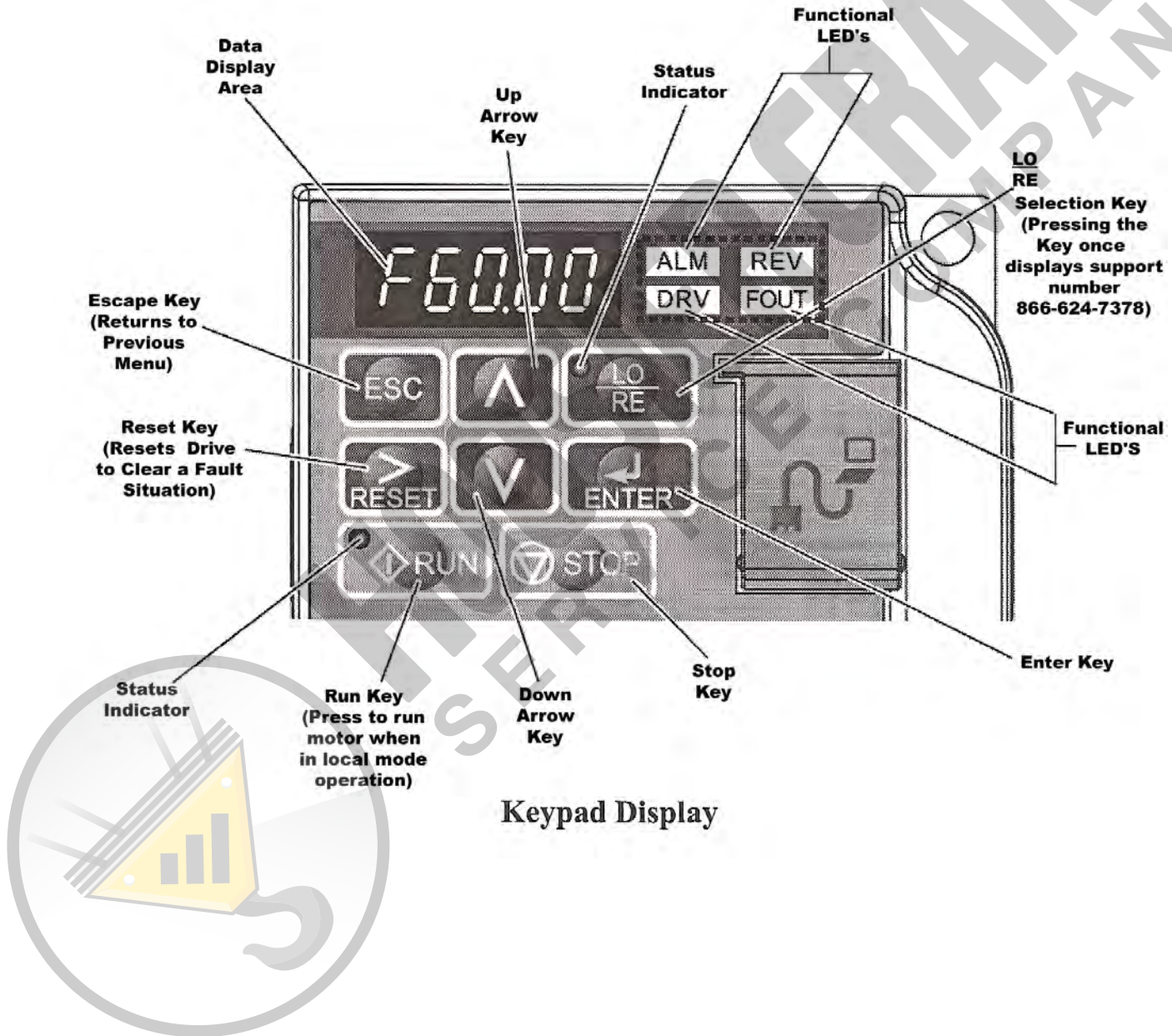
All functions of the drive are accessed using the keypad. The information needed to configure the drive's application is entered into the drive by using the functional LEDs. This information is stored into the drive's memory.

## KEYPAD FUNCTIONS

The keypad has a 5-digit LED display. Both numeric and alpha-numeric data can appear on the display.

Indicators and keys on the keypad are described below.

**Note: The STOP key is always active and will cause any run command to come to an immediate stop.**



Keypad Display

## KEYPAD LED AND BUTTON FUNCTIONS

Some of the keypad buttons, whose functions are described below, are dual-purpose. The dual-purpose keys have one function when used in a view-only mode and another function when used in a programming mode.:





### KEYS AND DISPLAYS ON THE LED OPERATOR

NO.	DISPLAY	NAME	FUNCTION
1		Data Display Area	Displays the frequency reference, parameter number, etc.
2		ESC Key	Return to the previous menu (before ENTER Key is pressed), or cursor position
3		RESET Key	Moves the cursor to the right. Resets the drive to clear a fault situation
4		RUN Key	Pressing the key initiates the RUN command when LOCAL mode operation is selected. Starts the auto-tuning process.
5		Up Arrow Key	Scrolls up to select next parameter group or parameter settings. It also increases the value of the blinking digit of a parameter setting.
6		Down Arrow Key	Scrolls down to select next parameter group or parameter settings. It also decreases the value of the blinking digit of a parameter setting.
7		STOP Key	Stops the drive by initiating a base block STOP command. <b>Note: Stop priority circuit.</b>
8		ENTER Key	Selects modes or parameters. Displays each parameter's set value. By pressing this key again, the set value is stored.
9		LO/RE Key	Pressing the key once displays support phone number 866-624-7378. Pressing the key again shows control method, motion and reference speed. Pressing the key again will show RESET. Pressing the ENTER Key afterwards will reset the maintenance timers.

### LO/RE LED AND RUN LED INDICATIONS

NO.	LED	Lit	Flashing	Flashing Quickly	OFF
10		During run.	During deceleration to stop. When a run command is input and frequency is 0.	During deceleration at a fast stop. During stop by interlock operation	During stop.
11		When run command is selected from LED operator (LOCAL)	—	—	Run command is selected from device other than LED operator (REMOTE)

## FUNCTION LEDS

NO.	Display	Lit	Flashing	OFF
12		When the drive detects an alarm or error	When an alarm occurs OPE detected When a fault or error occurs during Auto-Tuning	Normal state (no fault or alarm)
13		When the REVERSE command is given	—	When the FORWARD command is given
14		Drive Ready Auto-Tuning	—	Programming Mode
15		Displays output frequency (Hz)	—	—

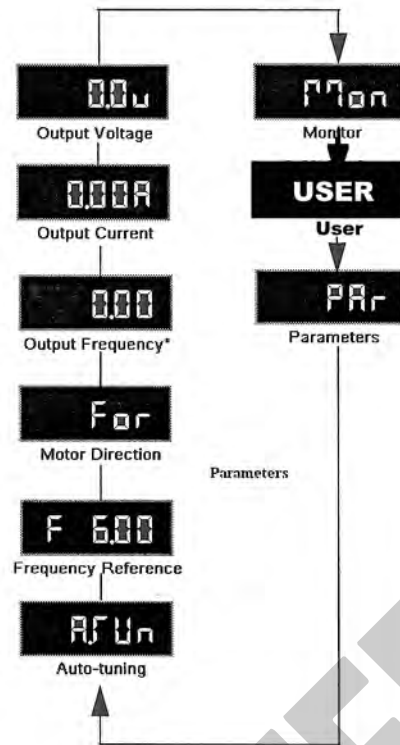
## PARAMETERS

There are hundreds of parameters, organized by function group, that determine how the drive functions. These parameters are programmed in the drive's software as measurable values or options-both of which will be referred to in this manual as settings. While some of these parameters are associated with one setting, others are tied to a number of possible settings.

The IMPULSE•G+ Mini is configured for a specific hoist or trolley. If you find it necessary to change the initial settings, it is recommended that you only allow qualified system technicians to program the drive. This can be accomplished by using the Password and Access Level features. The factory must be contacted.



## IMPULSE•G+ MINI STRUCTURE OF PARAMETERS



### Frequency Reference Setting

Sets/Displays the drive operation speed (Hz).

### Output Frequency Monitor

Displays the output frequency (Hz.) at which the drive is currently operating. This is a monitor only function; the operator cannot change the displayed value by use of the keypad.

### Output Current Monitor

Displays the level of output current (Amps) that the drive is currently producing. This is a monitor only function; the operator cannot change the displayed value by use of the keypad.

### Monitor Selection

Pressing ENTER allows access to the various Monitor parameters. These are monitor-only functions; the operator cannot change the displayed value. Accessible during run command. See pages 18 thru 21 for complete listing of all monitor parameters.

### \*Parameter Programming

Selects or reads data using parameter settings. Data is displayed by pressing the ENTER key, and can be changed by pressing the “up arrow” or “down arrow” keys. Any changes can be saved by again pressing the ENTER key. Pressing the ESC key exits the programming mode.

### Output Voltage Monitor

Displays the level of output voltage to the motor. This is a monitor only function: The operator cannot change the displayed value by use of the keypad.

### User

Allows for quick access to parameters that can be programmed by operator.

**\*Note: All programming parameters are password protected, except those stored in user function..**

## MONITOR PARAMETERS

PARAMETER CODE	NAME	FUNCTION	UNITS
<b>MONITOR</b>			
U01.01	Frequency Reference	Frequency Reference	Hz
U01.02	Output Frequency	Inverter Output Frequency	Hz
U01.03	Output Current	Inverter Output current	A
U01.04	Control method	Displays the value of A01.02	—
U01.05	Motor Speed	Motor Speed (OLV only)	—
U01.06	Output Voltage	Inverter Output Voltage (Reference)	V
U01.07	DC Bus Voltage	DC Bus Voltage (Measured)	V
U01.08	Output Power	Inverter Output Power (Calculated)	HP
U01.09	Motor Torque	Motor Torque (OLV only)	%
U01.10	Input Terminal	Status Input Terminal Status	—

### U01.10



- ☐ Digital Input Terminal S1 Enabled
- ☐ Digital Input Terminal S2 Enabled
- ☐ Digital Input Terminal S3 Enabled
- ☐ Digital Input Terminal S4 Enabled
- ☐ Digital Input Terminal S5 Enabled
- ☐ Digital Input Terminal S6 Enabled
- ☐ Digital Input Terminal S7 Enabled

U01.11	Output Terminal Status	Output Terminal Status	—
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### U01.11



- ☐ Multi-Function Digital Output Terminal MA, MB, MC Enabled
- ☐ Multi-Function Digital Output Terminal P1 Enabled
- ☐ Multi-Function Digital Output Terminal P2 Enabled

U01.12	Inverter Control Status	Operation Status	—
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### U01.12



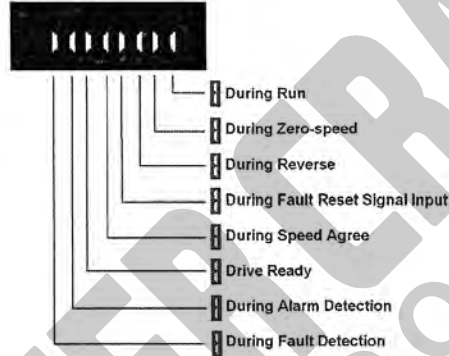
- ☐ During Run
- ☐ During Zero-speed
- ☐ During Reverse
- ☐ During Fault Reset Signal Input
- ☐ During Speed Agree
- ☐ Drive Ready
- ☐ During Alarm Detection
- ☐ During Fault Detection



## MONITOR PARAMETERS

PARAMETER CODE	NAME	FUNCTION	UNITS
<b>MONITOR</b>			
U01.13	Elapsed Time	Elapsed Time	hours
U01.14	Flash ID	Flash ROM software ID number	--
U01.15	Terminal A1 Level	External Terminal input level	V
U01.16	Terminal A2 Level	External Terminal input level	V/mA
U01.20	Output Frequency after Soft Start	---	Hz
U01.28	Software CPU	---	--
U01.34	OPE Detection Parameter	Parameter OPE detected	const #
U01.39	Memobus Communications Error	Displays content of MEMOBUS error	--

### U01.39



PARAMETER CODE	NAME	FUNCTION	UNITS
U01.52	Maintenance Timer		hr
U01.54	Pulse Monitor	Displays the pulse train input RP Frequency	--
<b>FAULT TRACE</b>			
U02.01	Current Fault Displays Current fault --		
U02.02	Last Fault Displays last fault detected --		
U02.03	Frequency Reference @ Fault	Frequency reference when fault was detected	Hz
U02.04	Output Frequency @ Fault	Output frequency when fault was detected	Hz
U02.05	Output Current @ Fault	Output current when fault was detected	A
U02.06	Motor Speed @ Fault (OLV Only)	Motor speed when fault was detected	Hz
U02.07	Output Voltage @ Fault	Output voltage when fault was detected	V
U02.08	DC Bus Voltage @ Fault	DC Bus voltage when fault was detected	V
U02.09	Output Power @ Fault	Output power when fault was detected	kW
U02.11	Input Terminal Status @ Fault	Input terminal status when fault was detected	--
U02.12	Output Terminal Status @ Fault	Output terminal status when fault was detected	--



## MONITOR PARAMETERS

PARAMETER CODE	NAME	FUNCTION	UNITS
<b>FAULT TRACE</b>			
U02.13	Operation Status @ Fault	Inverter status before fault was detected	--
U02.14	Elapsed Time @ Fault	Elapsed time when fault was detected	hr
U02.15	Speed Reference During Soft Start @ Fault	Speed reference during soft start at previous fault	%
U02.16	Motor q-Axis Current During Fault	---	--
U02.17	Motor d-Axis Current During Fault	---	--
<b>FAULT HISTORY</b>			
U03.01	Last Fault	Displays most recent fault --	
U03.02	Fault Message 2	Displays second most recent fault	--
U03.03	Fault Message 3	Displays third most recent fault	--
U03.04	Fault Message 4	Displays fourth most recent fault	--
U03.05	Fault Message 5	Displays fifth most recent fault	--
U03.06	Fault Message 6	Displays sixth most recent fault	--
U03.07	Fault Message 7	Displays seventh most recent fault	--
U03.08	Fault Message 8	Displays eight most recent fault	--
U03.09	Fault Message 9	Displays ninth most recent fault	--
U03.10	Fault Message 10	Displays tenth most recent fault	--
U03.11	Elapsed Time 1	Elapsed time of most recent fault	--
U03.12	Elapsed Time 2	Elapsed time of second most recent fault	--
U03.13	Elapsed Time 3	Elapsed time of third most recent fault	--
U03.14	Elapsed Time 4	Elapsed time of fourth most recent fault	--
U03.15	Elapsed Time 5	Elapsed time of fifth most recent fault	--
U03.16	Elapsed Time 6	Elapsed time of sixth most recent fault	--
U03.17	Elapsed Time 7	Elapsed time of seventh most recent fault	--
U03.18	Elapsed Time 8	Elapsed time of eight most recent fault	--
U03.19	Elapsed Time 9	Elapsed time of ninth most recent fault	--
U03.20	Elapsed Time 10	Elapsed time of tenth most recent fault	--
U03.21	Accumulated Operations	Displays the number of FWD and REV Commands	--
U03.22	U03.21 Rollovers	Increments when U03.21 reaches 65535. U03.21 is set to zero.	--
U03.23	Overload/Load Check Count	Displays the number of OL1, OL2 and LC faults	--
<b>MAINTENANCE</b>			
U04.01	Cumulative Operation Time		hr
U04.03	Cooling Fan Operation Time		hr
U04.04	Cooling Fan Maintenance		%
U04.05	Capacitor Maintenance		%
U04.06	Soft Charge Bypass Relay Maintenance		%
U04.07	IGTB Maintenance		%
U04.08	Heatsink Temperature		--

## MONITOR PARAMETERS

PARAMETER CODE	NAME	FUNCTION	UNITS
<b>MAINTENANCE</b>			
U04.09	LED Check	Lights all segments of the LED to verify that the display is working properly	
U04.10	kWh: Lower 4 Digits		--
U04.11	kWh: Upper 5 Digits		--
U04.12	CPU Resources Used		--
U04.13	Peak Hold Current		--
U04.14	Peak Hold Output Frequency		--
U04.16	Motor Overload (oL1) Detection Level		--
U04.17	Motor Overload (oL2) Detection Level		--
U04.18	Frequency Reference Source Selection		--
U04.19	Frequency Reference Memobus		--
U04.20	Output Frequency Reference (decimal)		--
U04.21	Run Command Selection Results		--
U04.22	Memobus Communication Reference		--
U04.23	Not Used		--
<b>MOTOR CONTROL MONITOR</b>			
U06.01	Motor Secondary Current (Iq)		%
U06.02	Motor Excitation Current (Id)		%
U06.03	ASR Input		%
U06.04	ASR Output		%
U06.05	Output Voltage Reference (Vq)		%
U06.06	Output Voltage Reference (Vd)		%
U06.07	ACR (q) Output		%
U06.08	ACR (d) Output		%
U06.20	Frequency Reference Bias (Up/Down2)		%
U06.21	Offset Frequency		%
U06.36	GAIA Communication Error		--
U06.37	LUNA Communication Error		--
U06.38	Option Card Error		--



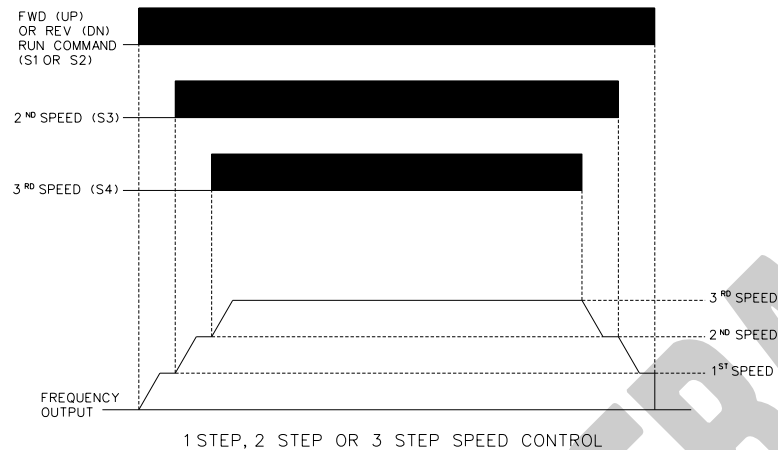
## IMPULSE G+MINI ADJUSTABLE FREQUENCY DRIVE SPECIFICATIONS

Specification	Specification Value and Information for all Models
Certification	UL, cUL, CE, TÜV, RoHS
Rated input power supply volts & frequency	3-phase 200~240V or 380~480V: 50/60 Hz
Allowable input voltage fluctuation	+10% or -15% of nominal
Allowable input frequency fluctuation	±5% of nominal
Control method	Fully digital; sine-wave, pulse-width-modulated
Maximum output voltage (VAC)	Max output voltage 3-phase, 200~240V; 380~480V (proportional to input voltage).
Rated frequency (Hz)	Up to twice motor nameplate RPM (Swift-Lift) 60 Hz standard (150 Hz, consult factory)
Output speed control range	40:1 -V/f, 100:1 - Open Loop Vector (OLV)
Output frequency accuracy	0.01%-with digital reference command 0.1%-with analog reference command; 10 bits/10V
Frequency reference resolution	Digital: 0.01 Hz; analog: 0.03 Hz (at 60 Hz)
Output frequency resolution	0.01 Hz
Overload capacity	150% of rated output current of the drive for 1 minute
Remote frequency reference sources	0-10VDC (2K $\Omega$ ); $\pm$ 10VDC serial (RS-485)
Accel/decel times	0.0 to 25.5 seconds - 1 set; 0.0 to 6000.0 - 3 sets; 8 parameters are independently adjustable
Braking torque	150% or more with dynamic braking
Motor overload protection	UL recognized electronic thermal overload relay: field-programmable
Overcurrent protection level	200% of drive rated current
Circuit protection	Ground fault and blown-fuse protection
Overvoltage protection level	Approximately 410VDC (230V Class), 820VDC (460V Class)
Undervoltage protection level	Approximately 190VDC (230V Class), 380VDC (460V Class)
Heatsink overtemperature	Thermostat trips at 184 - 249°F (90 -121°C) dependent on drive capacity
Torque limit selection	Separate functions for FORWARD, REVERSE, REGEN.; all selectable from 0-300%
Stall prevention	Separate functions for accel, decel, at-speed and constant horsepower region
Other protection features	Lost output phase, failed-oscillator, mechanical overload and internal braking transistor
DC bus voltage indication	Charge LED is on until DC bus voltage drops below 50VDC
Location	Indoors; requires protection from moisture, corrosive gases and liquids
Ambient operating temperature	14° to 122°F (-10° to 50°C) for open chassis
Storage temperature	-4° to 140°F (-20° to 60°C)
Humidity	95% relative; noncondensing
Vibration	1G less than 20 Hz; 0.2 G for 20-55 Hz
Elevation	3300 Ft. (1000M) or less
Memobus	RS485/422 Max 115.2 Kbps

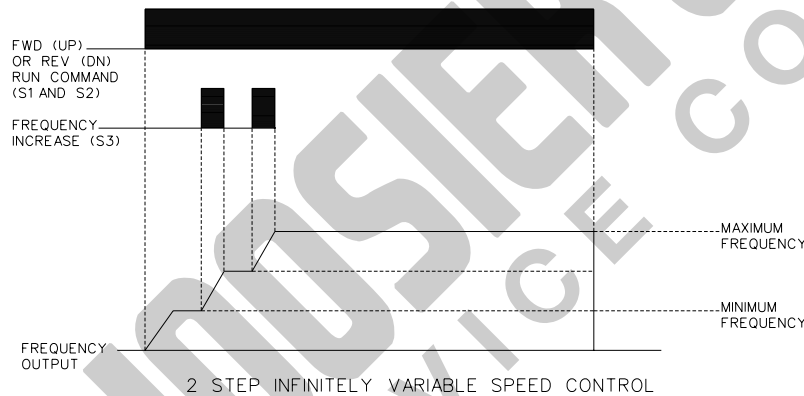


## SPEED CONTROL METHODS

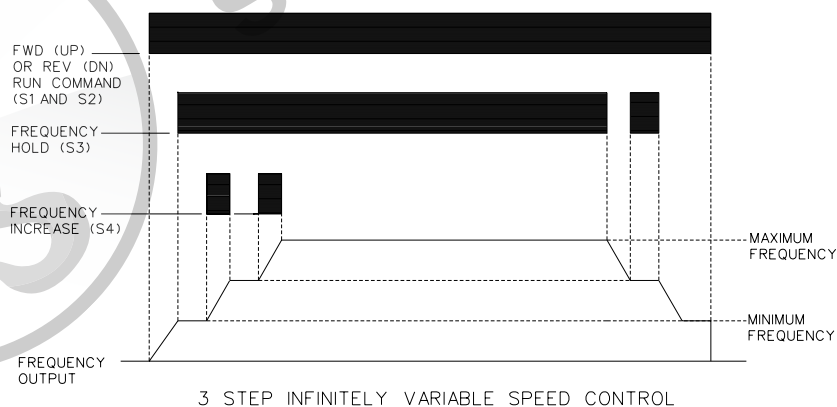
The IMPULSE.G+Mini provides 1-step, 2-step or 3-step Multi-Step control methods. For each input that is energized, the drive begins to operate at the corresponding frequency. If 1, 2 or 3-step is desired, then the frequency reference for the 1st, 2nd or 3rd step will be set at the maximum desired speed of operation.



In addition to discrete speed control, true infinitely variable speed control can be configured. The IMPULSE.G+ Mini has two ways in which infinitely variable control can be configured, 2-Step Infinitely Variable and 3-Step Infinitely Variable control. Sample timing diagrams for both methods are given.



Note: Above figures shown with stopping method set for immediate stop (as in hoist applications), the frequency output is immediately set to zero and the hoist brake will immediately close when the run command is removed. With the stopping method set for ramp to stop (as in trolley applications), the trolley speed will ramp down to minimum frequency before the trolley brake (if provided) closes.



NOTE:

ABOVE FIGURES SHOWN WITH STOPPING METHOD SET FOR IMMEDIATE STOP (AS IN HOIST APPLICATIONS). THE FREQUENCY OUTPUT IS IMMEDIATELY SET TO ZERO AND THE HOIST BRAKE WILL IMMEDIATELY CLOSE WHEN THE RUN COMMAND IS REMOVED. WITH THE STOPPING METHOD SET FOR RAMP TO STOP (AS IN TROLLEY APPLICATIONS), THE TROLLEY SPEED WILL RAMP DOWN TO MINIMUM FREQUENCY BEFORE THE TROLLEY BRAKE (IF PROVIDED) CLOSES.

## FACTORY SETTINGS OF PARAMETERS

CONTROL	PARAMETER	SETTING
1 step, 2 step and 3 step	B05.01 (Acceleration Time)	3.0 Sec.
	B05.02 (Deceleration Time)	3.0 Sec.
	B01.01 (First Speed)	10 Hz.
	B01.02 (Second Speed)	over 10 Hz. thru 60 Hz.
	B01.03 (Third Speed)	over 10 Hz. thru 60 Hz.
	A01.04	01
2 step infinitely variable	B05.01 (Acceleration Time)	3.0 Sec.
	B05.02 (Deceleration Time)	3.0 Sec.
	B01.01 (First Speed)	10 Hz.
	B01.03 (Maximum Speed)	60 Hz.
	A01.04	03
3 step infinitely variable	B05.01 (Acceleration Time)	3.0 Sec.
	B05.02 (Deceleration Time)	3.0 Sec.
	B01.01 (First Speed)	10 Hz.
	B01.03 (Maximum Speed)	60 Hz.
	A01.04	04

### NOTE:

1. Standard factory setting for control is 3 Step Infinitely Variable.
2. B01.01, B05.01 and B05.02 can be accessed and changed using the user functions A02.01, A02.02 and A02.03. The other parameters have been factory set and pass word protected and should not be reset without authorization by EMS and/or CM.



## FACTORY SETTINGS OF PARAMETERS

FAULT CODE	FAULT OR INDICATOR NAME/DESCRIPTION	CORRECTIVE ACTION
<b>BB</b> (flashing) Base Block	<b>External Base Block Indicator.</b> The flashing base block signal is the result of a multi function input in the terminal strip. The base block indicates that the drive's IGBTs have been disabled. The motor will begin coasting when the base block input is received. If a <b>RUN</b> command is still present when the <b>BB</b> signal is removed, the output voltage will be restored to the previous operating level and operation will continue at the previously commanded frequency.	1. Check constants H01.01 through H01.07 for proper programming. 2. Check terminal status. (U01.10)
<b>BE0</b> (flashing) Brake Ans Lost	<b>Brake Answer back signal is lost during run.</b> While running, the multi-function input brake answer back is lost.	1. Check brake answer back circuit. 2. Check terminal status. (U01.10).
<b>BE4</b> (flashing) Brake Answer 1	<b>Brake Answer-Back, Brake Not Released.</b> At Start, Brake Answer-back is not input within predetermined time (C08.04) after electric brake release command is output-Electric brake not released.	1. Check brake answer back circuit. 2. Increase the value of C08.04. 3. Check terminal status. (U01.10).
<b>BE5</b> (flashing) Brake Answer 2	<b>Brake Answer-Back, At Stop.</b> At Stop, Brake Answer-back signal is not removed within predetermined time (C08.11) after electric brake release command is removed-Electric brake not closed.	1. Check brake answer back circuitries 2. increase the value of C08.11 time.
<b>CALL</b> (flashing)	<b>Serial Communication Transmission Error.</b> Control data is not received correctly after power supply is turned ON for 2 sec.	1. Check serial device connections. 2. Ensure drive is properly programmed for serial communication.
<b>CE</b> Memobus Com Err	<b>MEMOBUS/Modbus Communication Error.</b> Serial communications data corrupted.	1. Check serial connections. (R+, R-, S+ & S-). 2. Check H05.01 through H05.03 for proper programming.
<b>CF</b> Control Fault	<b>Control Fault.</b> A torque limit was reached for 3 seconds or longer while in open Loop Vector	1. Perform auto tune. 2. Check motor parameters
<b>C0F</b>	<b>Current Offset Fault.</b> The drive automatically adjusts the current offset, the calculated value exceeded the allowable setting range.	1. Press reset. 2. Check brake. 3. Check brake contact.
<b>CPF02</b>	<b>A/D Conversion Error.</b> An A/D conversion error occurred.	1. Cycle power to drive. 2. Ensure that the control board terminals and wiring are shielded from electrical noise. 3. Check resistance of potentiometer. 4. Replace the drive.
<b>CPF03</b>	<b>PWM Data Error.</b> There is a problem with the PWM data.	1. Cycle power to the drive. 2. Replace the control board.
<b>CPF06</b>	<b>EEPROM Data Error.</b> There is an error in the data saved to EEPROM.	1. Cycle power to the drive. 2. If the problem continues, replace the drive.
<b>CPF07</b>	<b>Terminal Board Communications Error.</b> A communication error occurred at the terminal board.	1. Cycle power to the drive. 2. Check connections on the control board.
<b>CPF08</b>	<b>EEPROM Serial Communications Fault.</b> EEPROM communications are not functioning properly.	1. Cycle power to the drive. 2. If the problem continues, replace the drive.
<b>CPF11</b>	<b>RAM Fault.</b>	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF12</b>	<b>FLASH Memory Fault.</b> Problem with the ROM (FLASH memory)	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF13</b>	<b>Watchdog Circuit Exception.</b> Control circuit damage.	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF14</b>	<b>Control Circuit Fault.</b> CPU Error (CPU operates incorrectly due to noise, etc)	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF16</b>	<b>Clock Fault.</b> Standard clock error.	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF17</b>	<b>Timing Fault.</b> A timing error occurred during an internal process.	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF18 and CPF19</b>	<b>Control Circuit Fault.</b> CPU error (CPU operates incorrectly due to noise, etc.)	1. Cycle power to the drive. 2. Ensure that the control board terminals and wiring are shielded from electrical noise. 3. Replace the drive.
<b>CPF20 and CPF21</b>	<b>RAM fault, FLASH memory error, watchdog circuit exception.</b>	1. Cycle power to the drive. 2. Replace the drive.
<b>CPF22</b>	<b>A/D Conversion Fault.</b> A/D conversion error.	1. Cycle power to the drive. 2. Ensure that the control board terminals and wiring are shielded from electrical noise. 3. Replace the drive.
<b>CPF23</b>	<b>PWM Feedback Fault.</b> PWM feedback error.	1. Cycle power to the drive. 2. Replace the drive.



<b>CPF24</b>	<b>Drive Capacity Signal Fault.</b> Entered a capacity that does not exist (checked when the drive is powered up.)	1. Cycle power to the drive. 2. Replace the drive.
<b>CRST</b>	<b>Cannot reset.</b> External fault occurred and reset button was pressed before motor was completely stopped. Fault reset was being executed when a RUN command is executed during a fault.	1. Wait for motor to come to complete stop. 2. Reset fault before issuing a RUN command.
<b>DNE</b> Drive not ready	<b>User is trying to give a run command while a FWD or REV is present at Power Up.</b>	1. Check input terminals. 2. Check H01.01 to H01.07 programming.
<b>EF</b> (flashing) External Fault	Both FORWARD/UP and REVERSE/DOWN commands are input at same time for 500 msec or longer.	1. Check control input wiring. 2. Check the sequence of operation.
<b>EF0</b> Optional External Fault	External fault input from communication option card.	1. Check communication option card connection and signals. 2. Check external device for any fault(s).
<b>EF1</b> External Fault 1	External fault occurs on Terminal S1.	1. Check constant H01.01 for proper programming. 2. Check the conditions for input terminal S1 (U01.10).
<b>EF2</b> External Fault 2	External fault occurs on Terminal S2.	1. Check constant H01.02 for proper programming. 2. Check the conditions for input terminal S2 (U01.10).
<b>EF3</b> External Fault 3	External fault occurs on Terminal S3.	1. Check constant H01.03 for proper programming. 2. Check the conditions for input terminal S3 (U01.10).
<b>EF4</b> External Fault 4	External fault occurs on Terminal S4.	1. Check constant H01.04 for proper programming. 2. Check the conditions for input terminal S4 (U01.10).
<b>EF5</b> External Fault 5	External fault occurs on Terminal S5.	1. Check constant H01.05 for proper programming. 2. Check the conditions for input terminal S5 (U01.10).
<b>EF6</b> External Fault 6	External fault occurs on Terminal S6.	1. Check constant H01.06 for proper programming. 2. Check the conditions for input terminal S6 (U01.10).
<b>EF7</b> External Fault 7	External fault occurs on Terminal S7.	1. Check constant H01.07 for proper programming. 2. Check the conditions for input terminal S7 (U01.10).
<b>GF</b> Ground Fault	<b>Ground Fault.</b> Current shorted to ground exceeded 50% of rated current in output side of the drive. Setting L08.09 to 1 enable ground fault detection in models 2025 and 4014 or larger.	1. Disconnect motor from drive and check it for shorts using a megger. 2. Ensure that R/C Surge Suppressors are used across all brake contactor coils to prevent disturbance by electrical transients.
<b>HBB</b>	<b>Hardware Base Block.</b> The Safe Disable Input channel is open.	1. Check if external safety circuit tripped and disabled the drive. 2. If the Safe Disable function is not utilized, check if the terminals HC and H1 are linked
<b>LC</b> Load Check Err	<b>Load Check Fault.</b> Load is greater than specified amount.	1. Reduce Load. 2. Check Load Check sequence set-up. (C05.XX)
<b>LF</b> Output Phase Loss	<b>An open phase occurred at the inverter output.</b>	1. Check for broken wires in output cable. 2. Check for open winding in the motor. 3. Check for loose terminals.
<b>LL1</b> (flashing) Lower Limit 1 Err	<b>Lower Limit 1-SLOW Down Indicator.</b> Lower Limit 1-Slow Down is input (switch status is changed).	1. May not require corrective action. 2. Check the position of the Limit Switch. 3. Check the condition of the Limit Switch. 4. Check the conditions of/for input terminal H01.XX(U01.10)
<b>LL2</b> (flashing) Lower Limit 2 Err	<b>Lower Limit 2-STOP Indicator.</b> Lower Limit 2-Stop is input (switch status is changed).	1. May not require corrective action. 2. Check the position of the Limit Switch. 3. Check the condition of the Limit Switch. 4. Check the conditions of/for input terminal H01.XX(U01.10)
<b>MNT</b> Maintenance Required	<b>Maintenance Required Alert.</b> Running time has exceeded C12.05	1. Reset timer by MFI=5A or depress Mode/Service key three times and enter within 2 seconds.
<b>OC</b> Over Current	<b>Output current exceeds 200% of inverter rated output current.</b>	1. Check for a phase-to-phase short in the motor or wiring using a megger. 2. Extend the acceleration/deceleration time. 3. Check torque limit setting.

<b>OH</b> (flashing) Heatsnk Over temp	<b>Overheat Pre-Alarm.</b> Heatsink is overheating. The temperature of the inverters heatsink exceeded the setting in L08.02.	1. The inverter cooling fan has stopped. 2. Reduce the ambient temperature.
<b>OH1</b> Heatsink MaxTemp	<b>Overheat Fault.</b> There are two situations that result in an overheat fault. The first occurs when the measured heat sink exceeded 105°C. The second is a result of a fault in the internal 24VDC cooling fan.	1. Ensure that the heat sink cooling fans are functioning. 2. Ensure that the heat sink is free from dirt and debris. 3. Ensure that the inverter's ambient temperature is within specifications. 4. Replace the 24VDC fan. 5. Replace the heat sink thermistor(s).
<b>OH2</b> (Flashing) Overheat 2	<b>Overheat Alarm.</b> Signal is input by external terminal. H01.XX=39	
<b>OH3</b> Motor Overheat 1	<b>Motor Overheating 1.</b> Thermistor analog input detected motor overheating. See L01.03.	1. Check the motor rated current value, E02.01.
<b>OH4</b> Motor Overheat 2	<b>Motor Overheating 2.</b> Thermistor analog input detected motor overheating. See L01.04.	2. Increase cycle time OH4 Motor or reduce the load.
<b>OL1</b> Motor Overloaded	<b>Motor Overload Fault.</b> Inverter output exceeded the inverter overload level.	1. Ensure drive is programmed with proper motor full load Amps (E02.01). 2. Reduce the load.
<b>OL2</b> INV Overload	<b>Inverter Overload Fault.</b> Inverter output exceeded the inverter overload level.	1. Reduce the load. 2. Extend the acceleration time.
<b>OPE01</b> kVA Selection	<b>kVA Settings Fault.</b> Inverter kVA setting range is incorrect.	1. Check 002.04 constant for proper kVA.
<b>OPE02</b>	<b>Parameter Range Setting Error.</b> Parameter settings are set outside the parameter range.	1. Press enter to view parameter. 2. Change parameter to appropriate setting.
<b>OPE03</b> Terminal	<b>Multi-Function Input Settings Fault.</b> Set values other than "F" and "FF" are duplicated.	1. Check the settings for H01.01 to H01.07, verify that the same input is not used twice.
<b>OPE04</b> Terminal	<b>Parameters do not match.</b> The drive, control board, or terminal board has been replaced, and the parameter settings between the controller board or terminal board do not match.	1. Press ENTER to view the parameter. 2. Change parameter(s) to appropriate settings. 3. Set A01.05 = 5550.
<b>OPE07</b> Analog Selection	<b>Multi-Function Analog Input Setting Fault.</b> Set values other than 00 and 0F are duplicated.	1. Check setting for H03.02 and H03.10. Verify that the same value is not used twice.
<b>OPE08</b> Terminal	<b>Selection Parameter error.</b> A parameter has been changed that is not available in the present control method.	1. Undo the last parameter change (if known). 2. Scroll through modified constants for obvious setting error. 3. Perform a user initialize (A01.05=1110) <b>CAUTION: All settings will be restored to the factory defaults.</b>
<b>OPE10</b> V/fPtm Setting	<b>V/f Parameter Setting Error.</b>	1. Check Parameters E01.04 to E01.11.
<b>OPE23</b> Load Check	<b>Check C05.04≤C05.07≤C05.09.</b>	1. Load Check setting error.
<b>OT1</b> Overtorque Det 1	<b>Overtorque Detection Level 1 Fault.</b> Current is higher than set value (L06.02) for more than set time (L06.03).	1. Check for proper programming of L06.02 and L06.03.
<b>OT2</b> Overtorque Det 2	<b>Overtorque Detection Level 2 Fault.</b> Defined by L06.05. Alarm defined by L06.04.	1. Check for proper programming for L06.XX constant.
<b>OV</b> DC Bus Overvolt	<b>Overvoltage Fault.</b> The DC bus voltage exceeded for overvoltage level. Detection level: 230V class-approximate 410V 460V class-approximate 820V	1. Extend the deceleration time. 2. Check for proper DBU operation. 3. Check the resistor. 4. Check the line voltage. 5. If on a load break hoist, check the gear box.
<b>OV</b> (flashing) DC Bus Overvolt	<b>Overvoltage Fault.</b> Overvoltage occurs during stop. Main circuit DC voltage rises above the detection level while the drive output is off. Detection level: 410V or more for 230V, 820V or more for 460V.	1. Check the line voltage.
<b>PF</b> Input Pha Loss	<b>Input Phase Loss Fault.</b> Inverter input power supply has open phase.	1. Check the line voltage. 2. Remove power. 3. Retighten the input terminal screws. 4. Check the fuses.
<b>RR</b> DynBrk Transistr	<b>Braking Transistor Fault.</b> Internal Braking transistor failed.	1. Verify that the external braking resistor is connected to the proper terminals. 2. Confirm that the proper resistor is installed. 3. Check for a short circuit across the braking resistor.
<b>UL1</b> Upper Limt 1 Err	<b>Upper Limit 1-SLOW DOWN Indicator.</b> Upper Limit 1-SLOW DOWN switch status is changed.	1. May not require corrective action. 2. Check the position of the Limit Switch. 3. Check the condition of the Limit Switch. 4. Check the conditions of/for input terminal H01.XX (U01.10)

<b>UL2</b> Upper Limit 2 Err	<b>Upper Limit 2-Stop Indicator.</b> Upper Limit 2-STOP switch status is changed.	1. May not require corrective action. 2. Check the position of the Limit Switch. 3. Check the condition of the Limit Switch. 4. Check the conditions of/for input terminal H01.XX (U01.10)
<b>UL3</b> Upper Limit 3 Err	<b>Upper Limit 3-Weighted Stop.</b> Upper Limit weighted limit switch tripped	1. May not require corrective action. 2. Check the position of the Limit Switch. 3. Check the condition of the Limit Switch. 4. Check the conditions of/for input terminal H01.XX (U01.10)
<b>UT1</b> Undertorque Det1	<b>Undertorque Detection 1.</b> The current is less than L06.02 for more that L06.03.	1. Check settings. 2. Check motor coupling.
<b>UT2</b> Undertorque Det2	<b>Undertorque Detection 2.</b> The current is less than L06.05 for more that L06.06.	1. Check settings. 2. Check motor coupling.
<b>UV</b> (Flashing) DC Bus Undervolt	<b>Undervoltage Fault.</b> Undervoltage status occurs for more than 2 sec during STOP. Input voltage drops below 190V DC or less for 230V AC class, 380V DC or less for 460V AC class.	1. Check the power source wiring. 2. Replace and bad branch fuses. 3. Check collector system.
<b>UV1</b> DC Bus Undervolt	<b>Undervoltage 1 Fault.</b> Undervoltage status occurs for more than 2 sec during RUN command. Input voltage drops below 190V DC or less for 230V AC class, 380V DC or less for 460V AC class.	1. Check the power source wiring. 2. Correct the line voltage. 3. Check collector system.
<b>UV2</b> CTL PS Undervolt	<b>Undervoltage 2 Fault.</b> The inverter detected a loss of 24V logic power supply voltage.	1. Check the power source wiring. 2. Correct the line voltage. 3. Check collector system.
<b>UV3</b> MC Answerback	<b>MC Fault.</b> The pre-charge contactor opened during operation	1. Check the power supply wiring. 2. Correct the line voltage. 3. Check collector system. 4. Wait 30-45 seconds before restarting drive after auto shut down.



## ELECTROMOTIVE SYSTEMS LIMITED WARRANTY

Electromotive Systems, hereafter referred to as Company, guarantees that the drive has been manufactured by it against any defects of material and/or workmanship for a period of two years from the date of shipment. Company makes NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AS TO THE MERCHANTABILITY OR FITNESS OF THE ITEMS FOR THEIR INTENDED USE OR AS TO THEIR PERFORMANCE. Any statement, description or specification in Company's literature is for the sole purpose of identification of items sold by the Company and imparts no guarantee, warranty or undertaking by company of any kind. Components and accessories not manufactured by Electromotive Systems are not included in this warranty and are warranted separately by their respective manufacturers.

Company's sole liability shall be to repair at its factory, or replace any item returned to it within two years from date of shipment, which Company finds to contain defective material or workmanship. All items to be repaired or replaced shall be shipped to Company (Note: return authorization by Company is required) within said two year period, freight prepaid, as a condition to repair or replace defective material or workmanship. Company's herein assumed responsibility does not cover defects resulting from improper installation, maintenance, or improper use. Any corrective maintenance performed by anyone other than the Company during the warranty period shall void the warranty. Company shall not be liable for damages of any kind from any cause whatsoever beyond the price of the defective Company supplied items involved. Company shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of the use of any Company supplied items or material.

Company neither assumes nor authorizes any other person to assume for Company any other liability in connection with the sale or use of items sold by Company.

Materials or items may not be returned for credit, without the prior written consent of the Company. Any authorized return of materials or items shall be subject to a restocking charge equal to 25% of the net invoiced amount (\$100 minimum charge for all control products) after Company determines that the material or item is in resalable condition. If upon receipt of the material or items returned, the Company determines that said material or items cannot be resold without alteration or service, the Company reserves the right to reject the returned materials or items and to send the same back to said purchaser at purchaser's expense.

Any claim for errors in shipment or for material or time shortages must be received by Company within 30 days of shipment and must be accompanied by copies of the bill of lading and packing slip.

Refer to hoist manual for CM's Repair/Replacement policy that applies to the hoist.



## NOTES



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