OPERATING INSTRUCTIONS MANUAL

(Please retain for future reference)

For

FMA-2300 (208V) GAS CONSTRUCTION HEATER

CERTIFIED FOR USE IN CANADA AND U.S.A.

As per Standard ANSI Z83.7 2011/10/01 Ed: 2
CSA 2.14 2011 Ed: 2 Gas Fired Construction Heaters Unvented/Unattended Type.

C ETL LISTED US
Intertek
2003325

FLAGRO INDUSTRIES LIMITED
ST. CATHARNIES, ONTARIO
CANADA

GENERAL HAZARD WARNING:

FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER, CAN RESULT IN DEATH, SERIOUS BODILY INJURY AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, EXPLOSION, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND/OR ELECTRICAL SHOCK.

ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER.

IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTIONS MANUAL, LABELS, ETC. CONTACT THE MANUFACTURER.

WARNING:

FIRE, BURN, INHALATION, AND EXPLOSION HAZARD. KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER OR CARDBOARD, A SAFE DISTANCE AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES OR UNKNOWN CHEMICALS.

WARNING:

NOT FOR HOME OR RECREATIONAL VEHICLE USE.

WARNING:

INTENDED USE IS PRIMARILY THE TEMPORARY HEATING OF BUILDINGS UNDER CONSTRUCTION, ALTERATION, REPAIR OR EMERGENCIES ONLY.

ALWAYS PROVIDE ADEQUATE VENTILATION. 1 SQ. IN. OF FRESH AIR MUST BE SUPPLIED FOR EVERY 1000 BTUH OF HEAT.

THIS HEATER SHALL BE INSTALLED SUCH THAT IT IS NOT DIRECTLY EXPOSED TO WATER SPRAY, RAIN AND/OR DRIPPING WATER.

This heater is designed and approved for use as a construction heater under ANSI Z83.7 2011 and CSA 2.14 2011 Gas Fired Construction Heaters
We cannot anticipate every use which may be made of our heaters. CHECK WITH YOU LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS
ABOUT APPLICATIONS. Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

MAIN CONTROL FUNCTIONS:

Variable Frequency Drive: This heater is equipped with a VFD "Variable Frequency Drive" to control the primary fan acceleration & de-acceleration to allow a clean burner ignition and proper cfm.

Low Fire Start: This feature ensures the burner is lite at low fire before the heater engages the modulating setting.

FreezeStat: The FreezeStat continuously monitors a pre-set discharge air temperature. When the discharge air temperature is below the freezestat set-point, the pre-set timer of (60 seconds) engages and shuts down the burner and blower. Reasons: A failure in the system has occurred. Burner flame went out, problem with fuel supply, not proving air or high limit switch engaged.

Mild Weather Stat: The Mild Weather Stat continuously monitors a pre-set discharge air temperature. When the ambient air temperature is higher than the Mild Weather Stat temperature, the burner will turn off and the fan will continue to blow air. Once the ambient temperature drops below the pre-set Wild Weather Stat, the burner will lite.

High Pressure Switch: The high pressure switch monitors fuel supply flow. If the system is supplied with too much fuel pressure, the system will shut down.

Room Override Thermostat: The thermostat senses temperature in the space. If the temperature in the space drops below the thermostat set-point, the controller will increase the discharge temperature to a maximum of 50 Degrees.(already programmed) Once the space temperature increases to the thermostat set-point, the controller will go back to the original setting.

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RATING INFORMATION

Model Number	-	FMA-2300		
Input btuh	-	LP	620,000	MIN.
			2,300,000	MAX.
		NG	320,000	MIN.
			2,300,000	MAX.
Fuel	-	Natural Gas or Propane		
Inlet Pressure	-	Natural Gas:.		5psi
	-	Propane:		5psi
Manifold Pressure		Natural Gas:		3.00” W.C.
		Propane:		2.20” W.C.
Ignition	-	Hot Surface Ignition (HSI)		
	-	Thermostat Control		
Air Circulation	-	15,000cfm		
Fuel Consumption	-	106 lbs/hr		
	-	1900 cfh		
Approved	-	cETLus listed		

INSTALLATION:

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The installation of this heater for use with natural gas shall conform with local codes or, in the absence of codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54 and the Natural Gas and Propane Installation Code, CSA B149.1.

The installation of this heater for use with propane tank or cylinder shall conform with Local codes or, in the absence of local codes, with the Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58 and the Natural Gas and Propane Installation Code, CSA B149.

This heater must be located at least 10ft (3m) from any propane gas cylinder. This heater shall not be directed toward any propane gas container within 20ft (6m).

CLEARANCE TO COMBUSTIBLES:

TOP: 4 ft FRONT: 16 ft SIDES: 2 ft REAR: 4 ft

CONNECTING THE HEATER TO A PROPANE SOURCE:

The heater must be located at least; 6 ft (1.83m) in the USA; or 10 ft (3m) in Canada from any propane gas container.

If Propane cylinder(s) are used to supply the heater, no cylinder(s) smaller than 500 GAL. capacity shall be used. This cylinder (s) must supply a vapor withdrawal only.

1. All cylinder(s) connections must be made using a wrench to tighten the fitting.

2. Be sure that the cylinder(s) valve(s) are in the closed position when connecting or disconnecting the cylinder(s).

3. A soap and water solution must be applied to all connections in order to leak check the system.

The gas must be turned off at the propane supply cylinder(s) when the heater is not in use. When the heater is to be stored indoors, the connection between the propane supply cylinder(s) and the heater must be disconnected and the cylinders removed from the heater and stored in accordance with Standard for the Storage and Handling or Liquefied Petroleum Gases, ANSI/NFPA 58 and CSA B149.1, Natural Gas and Propane Installation Code.

PIPING:
This heater must be installed by a qualified gas technician following local codes published by the authority having jurisdiction. Sizing of supply piping must be determined using the length of pipe run as well as total btuh rating of the appliance(s). Appropriate piping tables must be used to determine size of supply piping dependant on the length of run from source.

PRESSURES:

HIGH FIRE PRESSURES:	LP:	2.20 IN. WC.
	NG:	3.00 IN. WC.
LOW FIRE PRESSURES:	LP:	- 0.5 IN. WC.
	NG:	0.012 IN. WC.

This heater must be supplied by pressures indicated on the approval label. Over pressure may cause controls to fail.

DO NOT supply this unit with more than **5 PSI**
Note: A first stage regulator must be installed directly on the supply tank(s)

FUEL: This heater will operate on propane or natural gas. The manifold pressures are listed on the approval label. Ensure that the proper pressure settings are achieved depending on the fuel being supplied.

A fuel selector valve is located on the manifold of the heater. Ensure that this valve is in the proper position depending on the fuel being used. DO NOT operate the heater with the valve in the Incorrect position.

HOSES: All hoses used to connect the heater to the fuel supply, must be a Type 1 approved propane / natural gas hose assemblies.

ELECTRICAL:

WARNING
Electrical Grounding Instructions

This appliance is equipped with a grounded receptacle for your protection against shock hazard and should be plugged directly into a properly grounded plug. The electrical grounding of the heater shall be in compliance with the National electrical Code, ANSI/NFPA 70, or CSA C221.1, Canadian Electrical Code Part I.

THIS APPLIANCE IS ABLE TO RECEIVE 3 PHASE POWER.
208V – 230V SUPPLY MUST BE AVAILABLE.

POWER SUPPLY:
THREE PHASE: 208V – 230V, 30 AMP BREAKERS OR 30AMP TIME DELAY FUSE, 10/4 AWG AT 100FT MAX.

This heater is equipped with a VFD “Variable Frequency Drive” to control the primary fan acceleration & de-acceleration. The VFD has been password protected to prevent improper use. If access to the VFD control is required for troubleshooting, please contact Flagro at 905-685-4243.

HEATER SET UP:

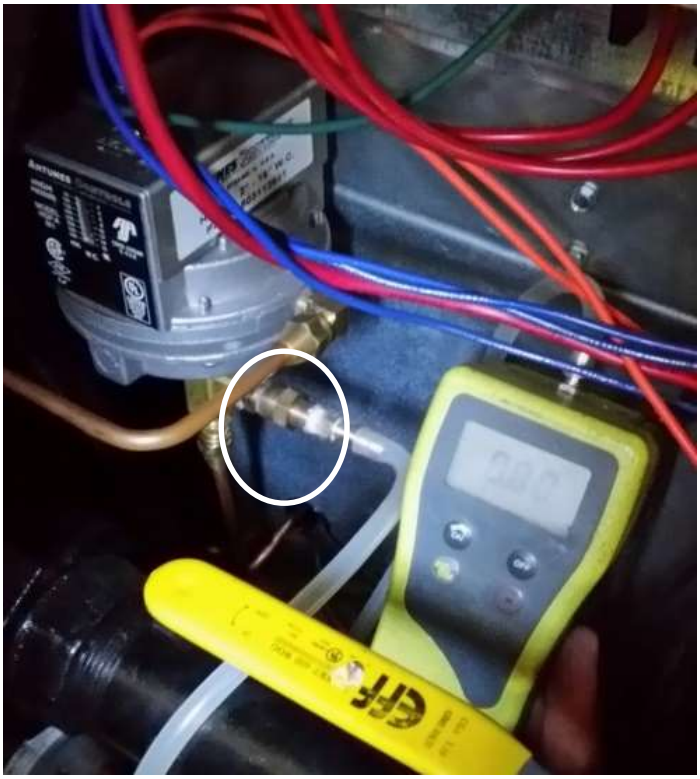
- MAKE SURE HEATER IS ON A LEVEL SURFACE AND MEETS CLEARANCE TO COMBUSTIBLES REQUIREMENTS.
- KEEP FRESH-AIR INTAKE AND HEATED-AIR DISCHARGE CLEAR OF OBSTRUCTION
- PROVIDE PROPER CLEARANCE TO ALLOW ACCESS TO VESTIBULE, BLOWER AND MOTOR COMPARTMENTS
- MAINTAIN A MAXIMUM VOLTAGE DIFFERENTIAL **OF +/- 10% WHILE** HEATER IS RUNNING.
- ENSURE HOSE IS PROTECTED FROM HOT SURFACE AND TRAFFIC AREAS.
- DO NOT HANDLE, MOVE OR SERVICE HEATER WHILE IN OPERATION, CONNECTED TO POWER SUPPLY OR WHILE HOT.
- PERFORM LEAK TEST ON ALL PIPING AND HOSE CONNECTIONS

SETTING MANIFOLD PRESSURE:

- OPEN MAIN CONTROL DOOR, IDENTIFY THE MODULATING VALVE AND REMOVE BLUE COVER.

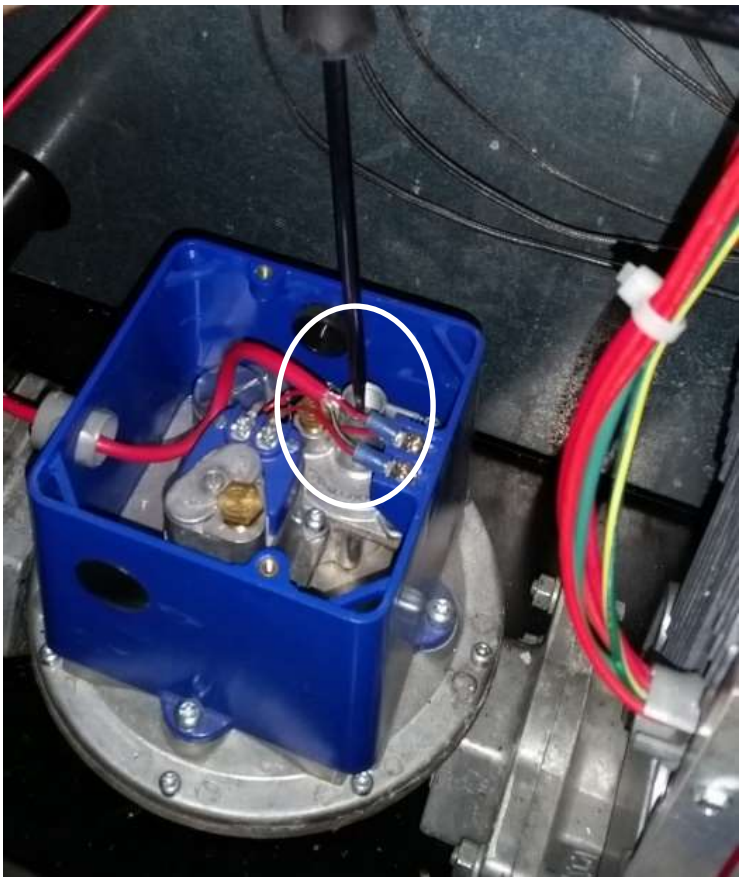
- DISCONNECT WIRES FROM BOTH **RTD PORTS** ON CONTROLLER
  (5^{TH} & 6^{TH} WIRE FROM THE BOTTOM LEFT SIDE)

- CONNECT A MANOMETER TO THE TEST PORT ON THE HIGH PRESSURE SWITCH, USE SMALL WRENCH TO REMOVE BRASS PLUG



- REFER TO START UP INSTRUCTIONS TO START HEATER TO SET PRESSURES. THIS PROCESS NEEDS TO BE CONDUCTED QUICKLY, **OTHER WISE THE HEATER MAY GO OUT ON HIGH LIMIT**.

- ADJUST PRESSURE TO SET POINT BY USING A SCREW DRIVER AND ADJUSTING THE SET SCREW ON THE VALVE
  LP: 2.20 IN. WC.
  NG: 3.00 IN. WC



- TURN BURNER SWITCH TO THE “OFF” POSITION AND LET THE BLOWER RUN FOR A FEW MINUTES TO COOL DOWN HEATER

- TURN BLOWER SWITCH TO THE “OFF” POSITION

- RECONNECT THE 2 RTD WIRES ON THE CONTROLLER

- HEATER IS READY TO OPERATE, CONTINUE TO “**START UP INSTRUCTIONS**”

START UP INSTRUCTIONS:

1. CONNECT POWER SUPPLY- 208V-230V 3 Phase Power (SEE RATING PLATE)
2. CONNECT PROPER FUEL SUPPLY – PROPANE OR NATURAL GAS (SEE RATING PLATE FOR PRESSURES)
3. ENSURE FUEL SELECTOR VALVE IS IN THE PROPER FUEL POSITION
4. THERMOSTAT MUST BE PLUGGED INTO HEATER

   The remote thermostat should be placed in the area you are trying to heat and set to a desired temperature. The function of the remote thermostat is to sense the temperature in the area you are trying to heat. When the temperature in the area drops below the remote thermostat set-point, the heater will modulate maintain a discharge temperature to a maximum of 170degF at full CFM. The heater will continue to run on modulating mode until the remote thermostat set point is achieved.
   Once the remote thermostat temperature is achieved, the heater will modulate to low fire mode and maintain 120 degF..

5. OPEN FUEL SUPPLY VALVE AT FUEL SOURCE AND TURN FUEL VALVE ON HEATER TO THE “ON” POSITION.
6. TURN THE BLOWER SWITCH TO THE “ON” POSITION. GREEN LIGHT WILL TURN ON, MEANS HEATER IS PROVEN AIR.
7. TURN THE BURNER SWITCH TO THE “ON” POSITION. THIS WILL ENGAGE THE CONTROLLER START-UP SEQUENCE OF “60 SECONDS”. AFTER 17 SECONDS THE GLOW PLUG WILL ENGAGE AND AT 31 SECONDS IGNITION WILL OCCUR, AT A LOW AIR FLOW.
8. THE HEATER WILL RUN IN A LOW FIRE START UP UNTIL THE 60 SECOND MARK. ONCE AT 60 SECONDS, THE HEATER WILL MODULATE TO MAINTAIN THE SET POINT, WITH FULL AIR FLOW.

CAUTION

DO NOT ATTEMPT TO LIGHT THE HEATER MANUALLY

MAINTENANCE:

1. Every construction heater should be inspected before each use, and annually by a qualified service person.

2. The hose assembly shall be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear, or the hose is cut, it must be replaced prior to the heater being put into operation. The replacement hose assembly shall be that specified by the manufacturer.

3. The appliance must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids.

4. The flow of combustion and ventilation air must not be obstructed. Be sure to check the fan assembly and ensure that the motor and blade are operating properly.

5. Compressed air should be used to keep components free of dust and dirt build up. Note: Do not use the compressed air inside any piping or regulator components.

6. **Please note:** Bearings have a life expectancy of 2 to 3 seasons. The HTB 550 grease used in these high temp bearings is designed to extend the life of the bearings. Adding grease to the bearings may cause excess wear. Do not remove the grease plug as breaking the seal on the bearing will cause it to fail prematurely.
   The manufacturer recommends that the bearings be replaced every 2 years.

PRE-SEASON INSPECTION

1. Inspect the burner, use compressed air to remove any dirt or debris. If necessary, remove the burner and use a #50 DMS drill bit to clean the burner ports by hand – DO NOT use a drill.
2. Inspect the Flame Rod & HSI on the burner, look for any cracks in the ceramic, if the ceramic is cracked it must be replaced. Use an abrasive scrub pad to clean the flame rod if necessary. Note: DO NOT touch the HSI with bare hands. Grease from fingertips will prevent the HSI from functioning properly.
3. Remove & inspect the copper air pressure tubes. Use compressed air to clear any blockages in these tubes. Note: DO NOT clean while attached to the air pressure switch.
4. Inspect the Motor, Belt & Pulleys. Confirm the belt does not have excess wear and proper tension. Confirm the pulley set screws are tight on the motor shaft.
5. The heater is equipped with pillow blocks that do not have zerk fittings they are a sealed bearing and a visual inspection of bearings for wear is adequate.
6. Inspect the blower wheel, confirm the wheel is in the center of the housing & free of dirt build up & debris. Ensure the blower is moving freely on the shaft. Note any build up of debris on the fan blade will reduce airflow and cause over heating.
7. Inspect all wire connections confirming none are loose and all connections are free of corrosion.

Connect the heater using the gas pressure and electrical supply as per the approval label. Follow start up instructions.

Confirm Start-up sequence and Amplifier settings:

Hot surface ignitor is powered at 17-18 seconds on the Amplifier timer.

Solenoid valves will open at 31 seconds, within a couple seconds ignition occurs.

Low fire timer is complete at 60 seconds & heater then goes to modulating mode.

Leak test valve train while operating.

FMA-2300 – PARTS LIST

120V IGNITION BOARD

FMA-502

24” WIRING HARNESS

FMA-503

LED LIGHT MODULE
C/W MOUNT
FMA-511 – RED
FMA-512 - GREEN

LED LENS ONLY
FMA-511A – RED
FMA-512A - GREEN

PILOT BRACKET KIT
C/W FLAME ROD
FMA-516

FLAME ROD ONLY

FMA-516A

DISCHARGE AIR TEMP
CONTROLLER

FMA-520

12” MIXING TUBE

FMA-521

DISCHARGE AIR TEMP
CONTROLLER
FMA-523

HOT SURFACE IGNITOR

FMA-525

HIGH PRESSURE SWITCH

FMA-2301

240V/24V 75VA
TRANSFORMER

FMA-2302

3PH 600V 30AMP
BREAKER

FMA-2303

PANEL MOUNT HANDLE
OPERATOR

FMA-2303A

2 POSITION SWITCH
FMA-2304
MOUNTING COLLAR
FMA-2304A

FMA-2300 – PARTS LIST

ON/OFF ACTUATOR

FMA-2505

1 ½" SOLENOID VALVE

FMA-2308

BLOWER ASEMBLY

FMA-2309

BURNER

FMA-2310

1 1/2" MODULATING
REGULATOR VALVE
FMA-2311

7.5 HP MOTOR 208V

FMA-2313

7.5 HP 208V VFD

FMA-2315

5.7" PULLEY

FMA-2316

SPLIT TAPER BUSHING

FMA-2317

10.5" PULLEY

FMA-2318

68" V- DRIVE BELT

FMA-2319

RELAY

FMA-2321

RELAY BASE

FMA-2321A

DISTRIBUTION BLOCK

FMA-2322

TRANSFORMER
230V/120V 500 VA

FMA-2323

FMA-2300 PARTS LIST

1 1/2” SHUT OFF VALVE
2103-H-CGA
1 1/2” FUEL SELECTOR VALVE
FMA-2324

GROUNDING BLOCK

FMA-2327

HIGH TEMP (HTB GREASE) 1 1/875” PILLOW BLOCK

FMA-1520LFL

3PH 30AMP RECEPTACLE

FV-729

3PH 30AMP PLUG END

FV-727

AIR SWITCH

S-414

N/C CONTACT BLOCK

FLE-639A

N/O CONTACT BLOCK

FLE-640A

THERMOSTAT PORT

FV-414B

HIGH LIMIT

S-410 (250F)

BOLT ON HINGE

FV-450TR

DOOR LATCH ASSEMBLY

FMA-2312

PARTS LIST FOR FMA-2300

208V

Part Number	Part Description
FMA-502	120V .HSI IGNITION BOARD
FMA-503	24" WIRING HARNESS
FMA-509	TERMINAL STRIP (19 REQUIRED)
FMA-509A	END CAPS FOR TERMINAL STRIP (2 REQUIRED)
FMA-511	RED LED LIGHT MODULE C/W MOUNT
FMA-511A	RED LED LENS (COVER ONLY)
FMA-512	GREEN LED LIGHT MODULE C/W MOUNT
FMA-512A	GREEN LED LENS (COVER ONLY)
FMA-516	PILOT BRACKET KIT ASSEMBLY
FMA-516A	FLAME ROD ONLY
FMA-520	DISCHARGE AIR TEMP SENSOR
FMA-521	12" MIXING TUBE
FMA-523	DISCHARGE AIR TEMP CONTROLLER
FMA-525	HOT SURFACE IGNITOR (.HSI)
S-410	HIGH LIMIT 250F
S-414	AIR PRESSURE SWITCH
FV-414B	THERMOSTAT CONNECTOR
FLE-639A	NC-CONTACT BLOCK (DUST RESISTANT) (2 REQUIRED)
FLE-640A	NO-CONTACT BLOCK (DUST RESISTANT) (3 REQUIRED)
FV-727	3PH 30AMP PLUG END
FV-729	3PH 30AMP RECEPTACLE
FMA-2301	HIGH PRESSURE SWITCH 2-16"WC
FMA-2302	240V/24V 75VA TRANSFORMER
FMA-2303	3PH 600V 30AMP BREAKER
FMA-2303A	PANEL MOUNT HANDLE OPERATOR
FMA-2304	2 POSITION SWITCH (2 REQUIRED)
FMA-2304A	MOUNTING COLLAR (2 REQUIRED)
FMA-2305	ON/OFF ACTUATOR
FMA-2305A	ACTUATOR VALVE BODY
FMA-2306	INTERMEDIATE HARDWARE KIT
FMA-2307	INLET/OUTLET FLANGE KIT
FMA-2308	1-1/2" SOLENOID VALVE

FMA-2309	BLOWER ASSEMBLY
FMA-2310	3.5-FT HMA-2A BURNER
FMA-2311	MODULATING REGULATOR VALVE
FMA-2312	DOOR LATCH ASSEMBLY (4 REQUIRED)
FMA-2313	7.5 HP 213T 208V MOTOR
FMA-2314	213T MOTOR SLIDE PLATE
FMA-2315	7.5 HP 208V VFD
FMA-2316	5.7" DIA PULLEY
FMA-2317	SPLIT TAPER BUSHING
FMA-2318	10.5" DIA PULLEY
FMA-2319	68" V-BELT
FMA-2321	RELAY FOR FMA-2300
FMA-2321A	RELAY BASE FOR FMA-2300
FMA-2322	DISTRIBUTION BLOCK
FMA-2323	230V/120V 500VA TRANSFORMER
FMA-2324	FUEL SELECTOR VALVE C/W LOCKING HANDLE
FMA-2327	GROUNDING BLOCK
FMA-1520LFL	HIGH TEMP (HTB GREASE) 1-1875" BORE PILLOW BLOCK FOR FMA-1500/FMA-2300

September 23, 2019	FLAGRO INDUSTRIES FMA-2300-230