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GSI

MS

Weight Gain Micro Ingredient Weighing Systems (MS1)

Weight Loss Micro Ingredient Weighing Systems (MS2)

Micro Ingredient Motor Control Systems

Table of Contents

List of Illustrations & Drawings

I. GENERAL SAFETY INFORMATION

SAFETY FIRST! The symbols shown identify examples of the safety labels and signs to be found on Intersystems equipment. They are affixed to the equipment to warn of danger to persons and of possible equipment damage. These signs must never be removed, tampered with,

NOTICE

THIS MACHINE STARTS WITHOUT WARNING

EMC 403 32

STARTS W/OUT WARNING
EMC40332

⚠ WARNING ⚠

MOVING PART CAN CAUSE SEVERE INJURY

LOCK OUT ENERGY SOURCE BEFORE INSPECTION OR SERVICE

EMC 30 32

MOVING PART
EMC3032

painted over or obscured in any way. (See page 4, 5 and 6 for label locations). If labels are damaged or become unreadable, replacement labels are available from Intersystems. The user must institute a continuing program to instruct all personnel in safe operating and maintenance procedures, and to insure that all safety devices, guards and covers are intact, operable and that all safety signs are legible.

Consult Intersystems before making any changes to the microsystem or its operating environment. Careless changes could result in death or serious injury to people and reduce the performance and service life of the equipment.

Never perform any service on this equipment or any other powered equipment until all power has been shut off and locked out so that it cannot be restored without the consent and knowledge of the person who interrupted power. Power includes electrical, fluid, mechanical or pneumatic energy.

Never perform any service on this equipment without utilizing the required PPE (Personal Protective Equipment). Refer to the MSDS(s), material safety data sheet(s), on all the products to which this equipment is in contact with to determine what PPE is required.

⚠ **DANGER** ⚠

THIS EQUIPMENT IS TO BE OPERATED ONLY ON THE VOLTAGE DESIGNATED ON THE CERTIFIED ELECTRICAL DRAWING(S)! FIRE OR EXPLOSION MAY RESULT, WHICH CAN CAUSE DEATH, SERIOUS INJURY AND EXTENSIVE DAMAGE TO EQUIPMENT. DO NOT CONNECT TO VOLTAGES OTHER THAN DESIGNATED.

⚠ **WARNING** ⚠

COMPRESSED AIR CAN CAUSE SEVERE INJURY. SHUT OFF AND LOCK OUT COMPRESSED AIR SOURCE TO THE MICROSYSTEM AND BLEED OFF ANY AND ALL PRESENT COMPRESSED AIR WITHIN THE MICROSYSTEM PNEUMATICS BEFORE ATTEMPTING ANY SERVICE ON THIS MICROSYSTEM.

NOTE: THESE SIGNS MUST NEVER BE REMOVED, TAMPERED WITH, PAINTED OVER OR OBSCURED IN ANY WAY. IF THE LABELS ARE DAMAGED OR BECOME UNREADABLE, REPLACEMENT LABELS ARE AVAILABLE FROM INTERSYSTEMS.
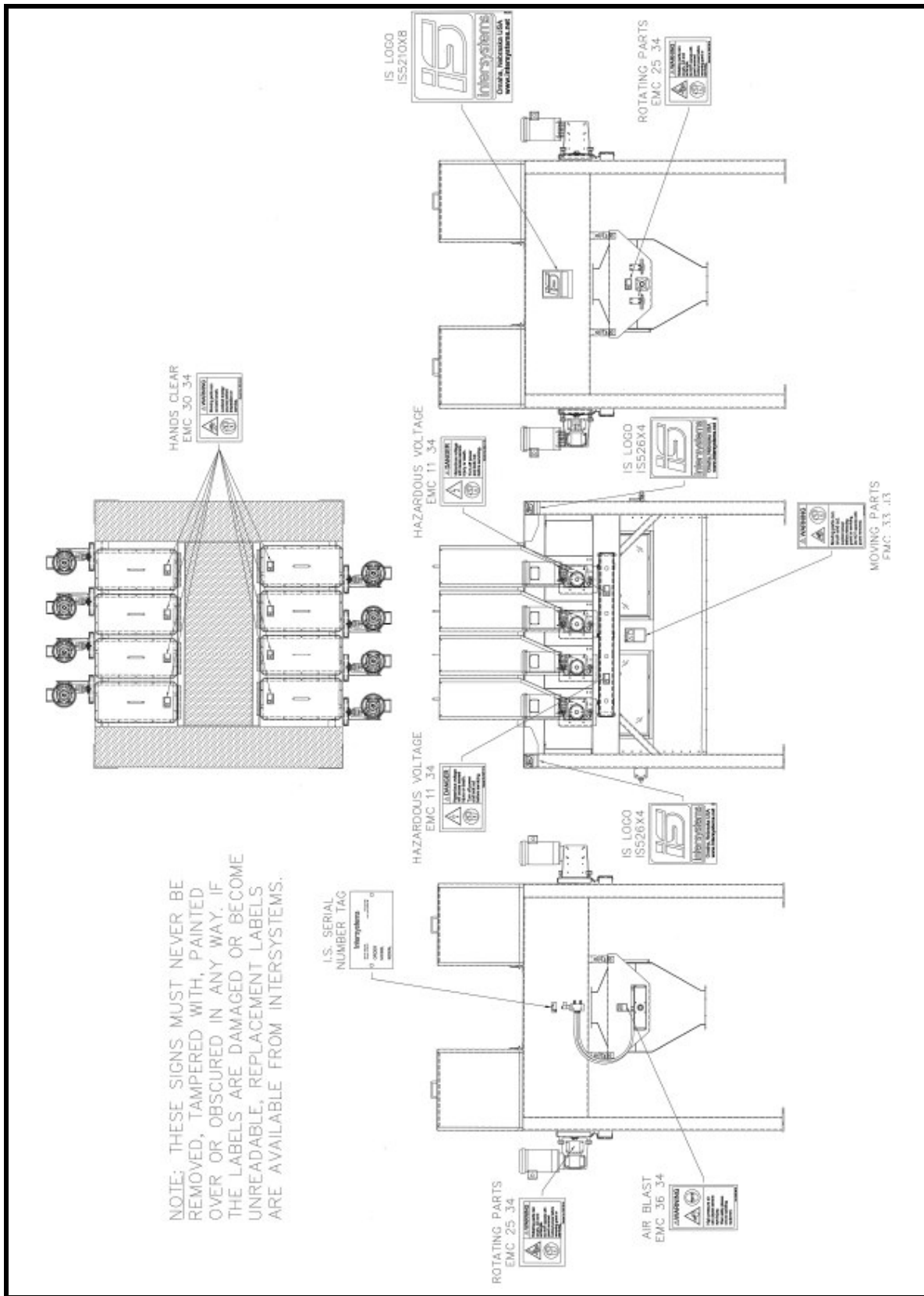
FIGURE 1-1   MS1 MICROSYSTEM WEIGHT GAIN SAFETY LABEL LOCATIONS

NOTE: THESE SIGNS MUST NEVER BE REMOVED, TAMPERED WITH, PAINTED OVER OR OBSCURED IN ANY WAY. IF THE LABELS ARE DAMAGED OR BECOME UNREADABLE, REPLACEMENT LABELS ARE AVAILABLE FROM INTERSYSTEMS.

OPPOSITE SIDE
I.S. SERIAL
NUMBER TAG

IS LOGO
IS5517X4

ROTATING PARTS
EMC 25 34

HANDS CLEAR
EMC 30 34

IS LOGO
IS526X4

HAZARDOUS VOLTAGE
EMC 11 34

IS LOGO
IS526X4

HAZARDOUS VOLTAGE
EMC 11 34

FIGURE 1-2   MS2 MICROSYSTEM WEIGHT LOSS SAFETY LABEL LOCATIONS

FIGURE 1-3   **MICROSYSTEM CONTROL SAFETY LABEL LOCATIONS**

II. GENERAL INFORMATION

2.1 System Description

The weight gain microsystem is designed to accurately add the desired micro ingredients to the system. The microsystem will help to reduce labor costs and material costs due to reduction of bad batches and increase plant capacity.

2.1.1 Weight Gain (MS1) (FIGURE 2-1)

The microsystem bins are each filled with a micro ingredient. These ingredients can be added by hand, bulk bag, feeder screw, etc. The microsystem control is connected to the control room's batch control. The desired ingredient bin is initiated in response to either an operator's manual command or a signal automatically generated by the batch controller logic. When triggered, the motor will turn on, turning the auger of the bin. The auger discharges the ingredient into the weigh hopper. The weigh hopper is on (4) load cells which send a signal back to the control logic to tell how much of the product has been added. When the product gets within a percentage of the projected amount, the microsystem control's variable frequency drive (VFD) will slow down the motor to add the ingredient slower, making the system more accurate. When the weight gets close to the projected weight, the system will turn off the motor to account for the run off and the distance the ingredient falls. Once this is finished, the next ingredient bin 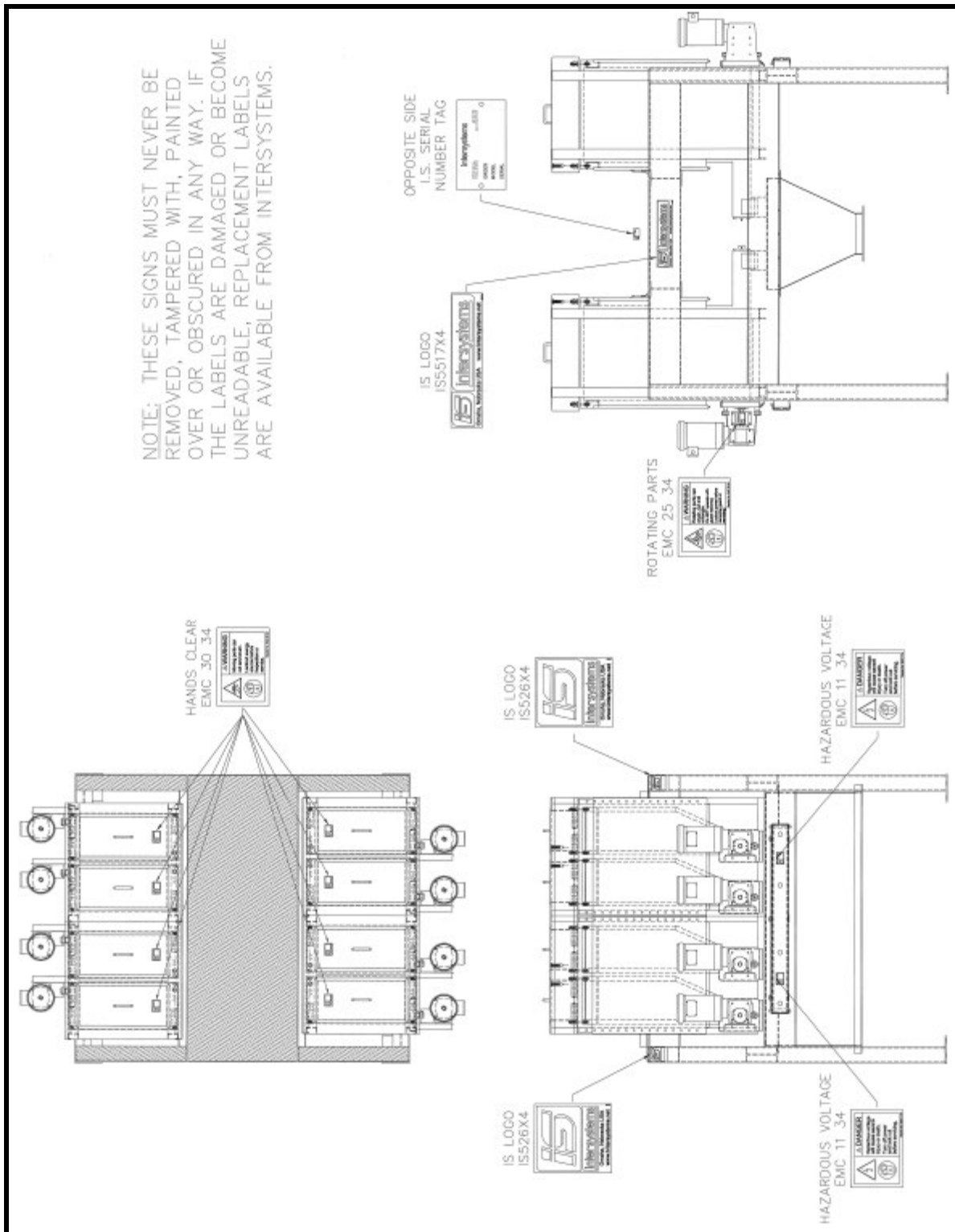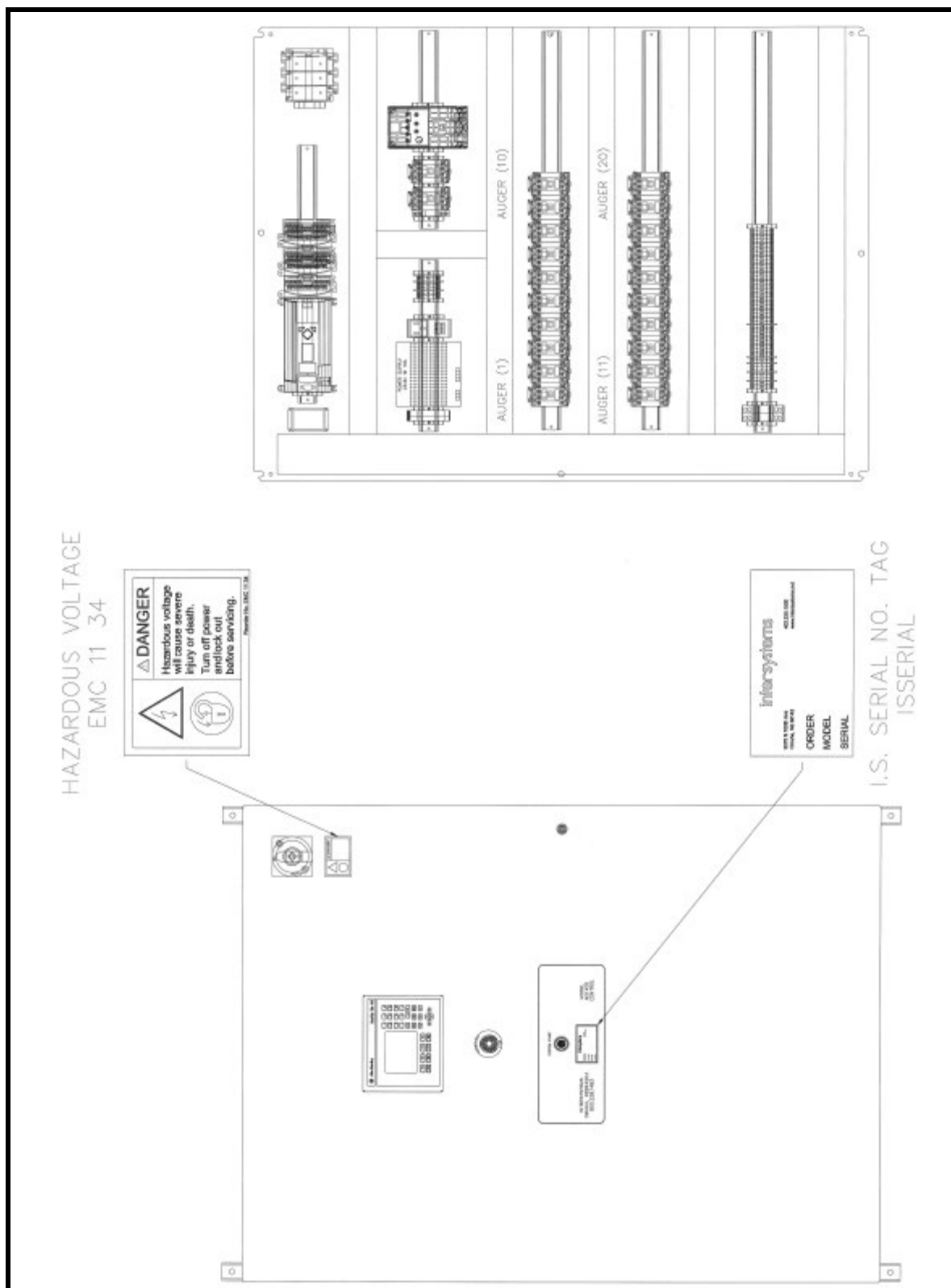is initiated and the process repeats. When all of the desired ingredients are added to the weigh hopper, the air valve, located on one end of the frame, energizes. When energized, the rotary actuator turns the weigh hopper 180 degrees, dumping the ingredients out of the weigh hopper and shroud. These ingredients could be dumped directly into the mixer or could be taken to the mixer via an Intersystems Kleen-Drag Conveyor. Once the ingredients are out, the weigh hopper is rotated back in the upright position and the entire process repeats.

2.1.2 Weight Loss (MS2) (FIGURE 2-2)

The microsystem bins are each filled with a micro ingredient. These ingredients can be added by hand, bulk bag, feeder screw, etc. The microsystem control is connected to the control room's batch control. When adding ingredients, a proximity switch on the lid allows for the weight of the ingredients to be recorded before adding material to the system. This system will help to reduce errors and is able to provide traceability. The desired ingredient bin is initiated in response to either an operator's manual command or a signal automatically generated by the batch controller logic. When triggered, the motor will turn on, turning the auger of the bin. In the weight loss system, each bin is weighed individually on (3) load cells. As the auger discharges the ingredient, the load cells weigh the loss in product. With each bin weighing itself, multiple variable frequency drives (VFD) can be provided to run more than one bin simultaneously. This will cut the batch time down significantly. When the product gets within a percentage of the projected amount, the microsystem control's VFD will slow down the motor to add the ingredient slower, making the system more accurate. When the weight gets close to the projected weight, the system will turn off the motor to account for the run off of product. Once this is finished, the next ingredient bin is initiated and the process repeats. The weight loss ingredient bins can discharge directly into the mixer or could be discharged into a hopper which is connected to an Intersystems Kleen-Drag Conveyor which transports the ingredients to the mixer. After the batch is complete, the process repeats.
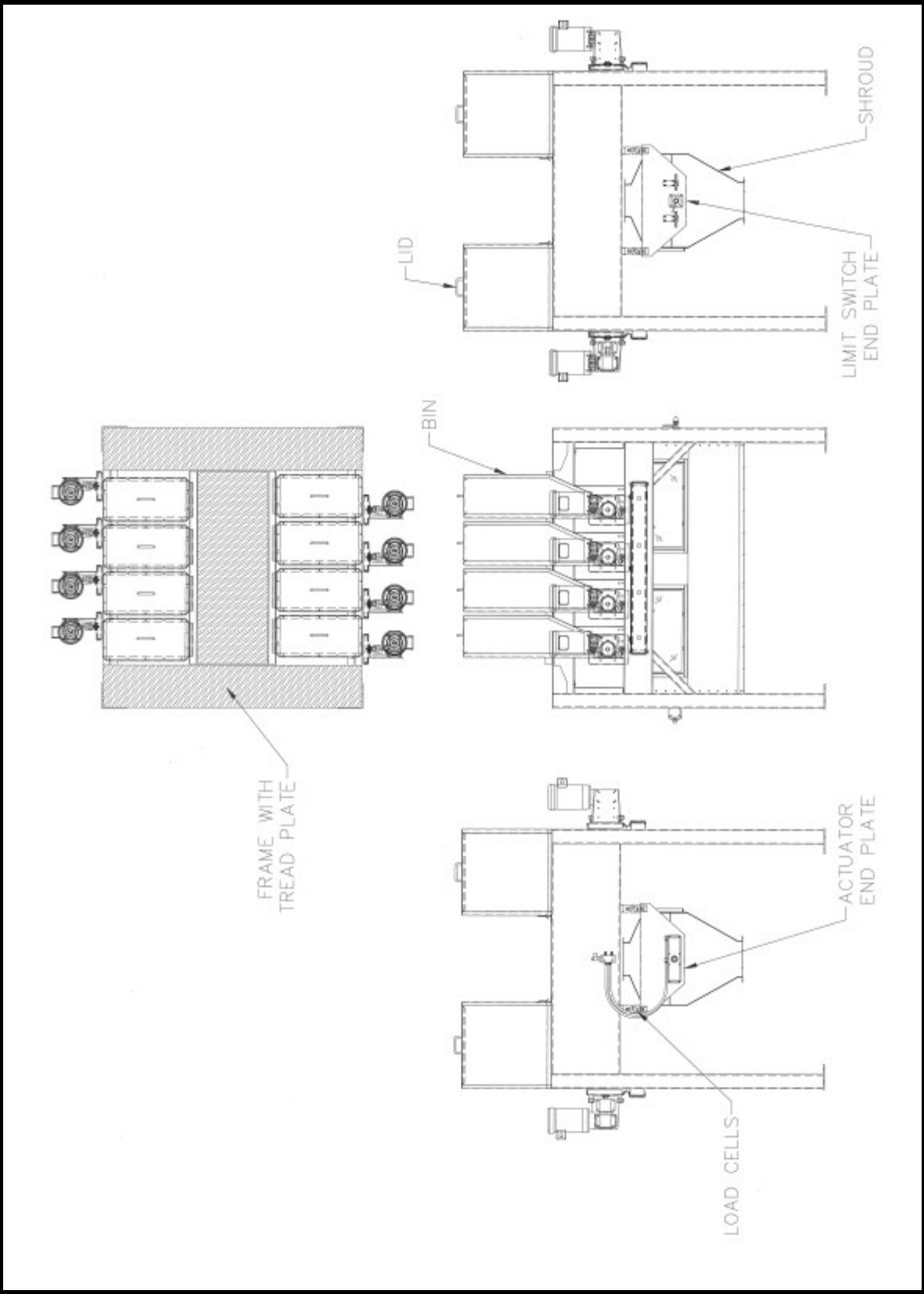
FIGURE 2-1   TYPICAL WEIGHT GAIN (MS1) MICROSYSTEM
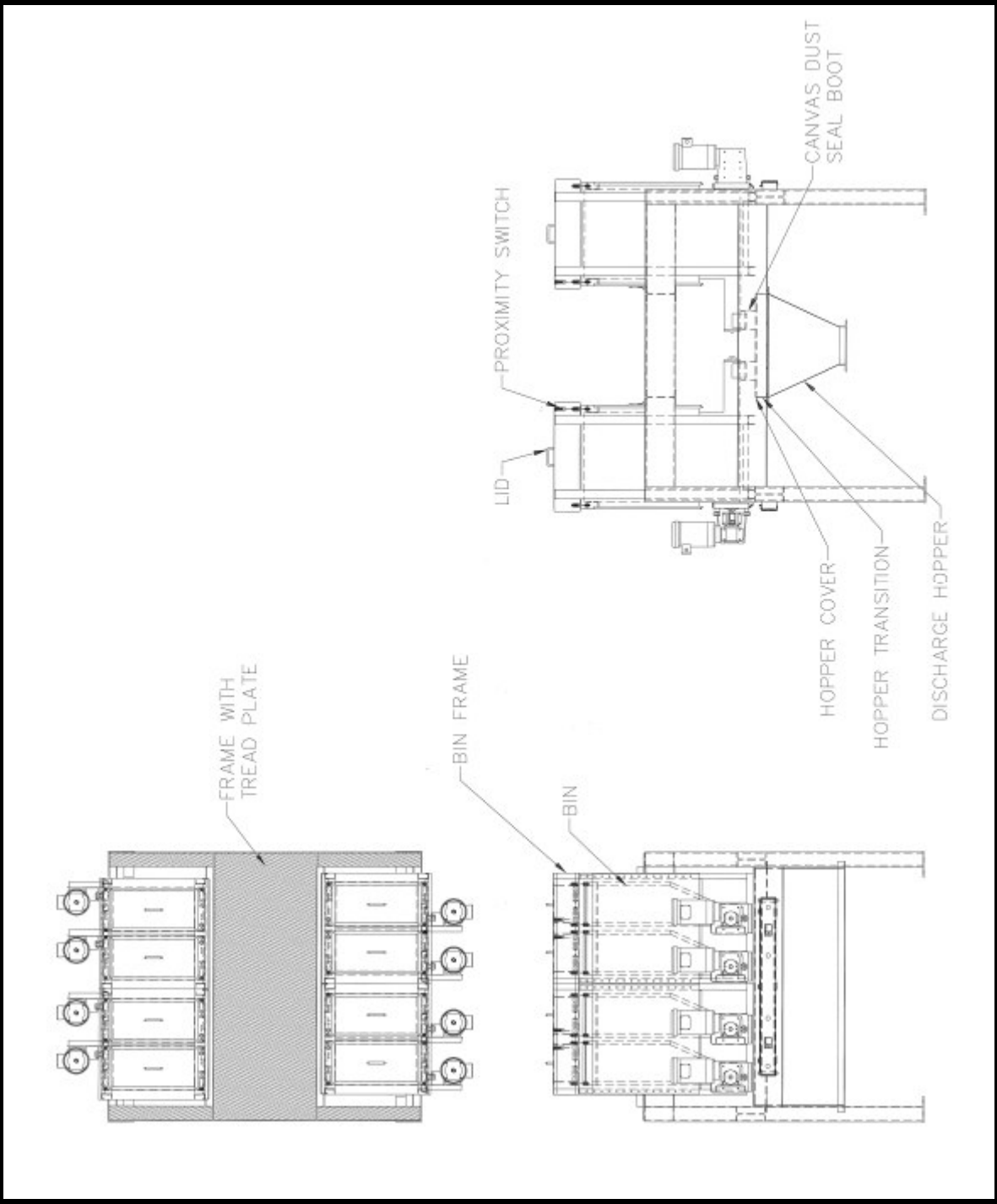
FIGURE 2-2   TYPICAL WEIGHT LOSS (MS2) MICROSYSTEM

2.2 Optional Features

Some of the more frequently specified optional features are briefly described in the following list:

A. Dust-hood lid. This lid allows for dust removal when adding ingredients to the bin.

B. Hinged lid. This lid allows the lid to stay with the bin.

C. Inlet grate. This grate helps prevents utility knives, parts of bags and other things from falling into the bin and getting into the auger, which could cause damage to the equipment and possibly lose the integrity of the mix.

D. High Volume Auger. This auger moves the ingredients through the bin quicker but sacrifices some accuracy.

E. High Accuracy Auger. This auger is more accurate, but sacrifices some speed.

2.3 Microsystem Construction

Standard microsystem construction: bin, shroud and end plates are of polished 304 stainless steel; weigh hopper is of 304 stainless steel; frame is of painted carbon steel. The construction of 304 stainless steel provides more protection against pitting and corrosion.

III. GENERAL INSTALLATION REQUIREMENTS

3.1   Receiving Inspection

Carefully inspect the microsystem for damage as soon as it is received. Also, verify that the quantity of parts or packages actually received corresponds to the quantity shown on the packing slip. Report any damage or shortage to the delivering carrier as soon as possible. Intersystems' responsibility for the equipment ended with acceptance by the delivering carrier.

3.2   Pre-Installation Preparation

Before starting microsystem installation, study this manual, the certified drawing(s) furnished with the system and other applicable documents (including, but not limited to OSHA Regulations, the National Electrical Code and all other applicable federal, state and local codes and regulations).

3.3   Assembly

Where the microsystem is installed (above the floor or in the floor) determines how much assembly will take place.

3.3.1   Weight Gain (MS1)

3.3.1.1   Above Floor Assembly

If the microsystem is above the floor, the frame, shroud with weigh hopper and end plates will come pre-assembled. The end plates are connected to the frame with load cell dummy plates during shipping.

A. The seal rings will go around the auger tube and the bins will be placed on the frame. Once the bins are in place, with the auger tube inside the shroud, the seal rings are to be pushed tightly against the shroud sealing the hole in the shroud around the auger tube.

B. Verify that the speed control valves on the exhaust ports of the air solenoid valve are completely closed by turning the adjustment knob fully clock-wise.

C. Verify that all airline connections between the air solenoid valve and the rotary actuator are connected properly and the fittings are tightened securely. Manually rotate the weigh hopper into the upright or "fill" position.

D. Slowly open the air supply valve feeding the air solenoid valve of the weigh hopper's rotary actuator until the airlines are fully charged. Adjust the input air supply between 80 and 100 PSI.

E. Slowly adjust the speed control valve on the exhaust port of the air solenoid valve, a quarter turn at a time, counterclockwise, until the weigh hopper begins to rotate from the closed/fill position to the open/dump position. When properly adjusted, the weigh hopper movement should take approximately 3-5 seconds.

F. Slowly adjust the speed control valve on the other exhaust port of the air solenoid valve, a quarter turn at a time, counterclockwise, until the weigh hopper begins to rotate from the open/dump position to the closed/fill position. When properly adjusted, the weigh hopper movement should take approximately 3-5 seconds.

G. Replace the dummy plates with the (4) load cells and (8) eye bolts.

H. Place or bolt the lids on top of the bins to complete assembly.

3.3.1.2   In-Floor Assembly

If the microsystem is in the floor, it is recommended to put down isolation pads between the frame and the angle to reduce the vibrations onto the frame which could affect the accuracy of the weighing process. All other assembly is the same as the above floor microsystem. The in-floor assembly will be sent with extended bolt on legs for shipping purposes. Once the microsystem is installed, these can be removed if desired.

Typically an Intersystems Kleen-Drag conveyor is placed under the microsystem to transport the ingredients to a mixer. The Kleen-Drag will bolt directly to the microsystem shroud. The shroud will not support the Kleen-Drag so there must be additional support off of the floor.

3.3.2   Weight Loss (MS2)

3.3.2.1   Above Floor Assembly

If the microsystem is above the floor, the frame, hopper cover, hopper transition and discharge hopper will come pre-assembled.

A. The canvas dust seal discharge boot will need (4) holes in its base to fit around the weld bolts on the hopper cover.

B. The dust seal boot flange fits over the canvas and weld bolts and needs to be fastened down with nuts.

C. Place all of the bins on top of the frame with the hanger bracket on the front of the bin frame hanging from the angle on top of the frame and the bottom of the bin frame resting on the I-beam.

D. Zip-tie the top of the canvas dust seal boot to the discharge of the auger tube.

E. Place or bolt the lids on top of the bins to complete assembly.

3.3.1.2   In-Floor Assembly

If the microsystem is in the floor, it is recommended to put down isolation pads between the frame and the angle to reduce the vibrations onto the frame which could affect the accuracy of the weighing process. All other assembly is the same as the above floor microsystem. The in-floor assembly will be sent with extended bolt on legs for shipping purposes. Once the microsystem is installed, these can be removed if desired.

Typically an Intersystems Kleen-Drag conveyor is placed under the microsystem to transport the ingredients to a mixer. The Kleen-Drag will bolt directly to the discharge hopper. The discharge hopper will not support the Kleen-Drag so there must be additional support off of the floor.

3.4   Controller Location

A.   Use vibration isolation pads when mounting the control enclosure or mount the controller in a vibration-free location.

B.   Unless ordered for severe duty, locate controller so it is protected from water and dust.

C.   Unless an explosion-proof rated controller was specifically ordered, DO NOT locate the controller in a hazardous area.

3.5   System Wiring

Refer to the certified electrical drawing(s) for specific wiring requirements.

The controller was completely assembled and tested with the microsystem before it left the factory. The electrical installation must comply with OSHA Regulations, the National Electrical Code and all other applicable federal, state and local codes and regulations.

If wiring between the controller and the microsystem unit is run through rigid conduit, use a short length of flexible conduit to connect wiring to the microsystem. This will isolate the rigid conduit from any vibration originating from the microsystem or conveyor beneath.

3.5.1   Electrical Power Requirements

380/460 VAC, 50/60 Hz, Three Phase, 30 Amp (includes motor and solenoid power requirements)

Refer to the certified electrical drawings for specific wiring requirements. Intersystems strongly recommends that electrical service to the microsystem be an isolated line. Voltage fluctuations and line noise can affect the controller's PLC and VFD, thus causing the microsystem to malfunction.

No power will need to be supplied to the systems motor or solenoid if the controller is purchased. All power goes to controller and the controller powers the microsystem.

IV. OPERATIONS AND ADJUSTMENTS

⚠ DANGER ⚠

FAILURE TO OBSERVE ALL SAFETY RULES, WRITTEN AND IMPLIED, AND THOSE SUGGESTED BY COMMON SENSE, CAN RESULT IN DEATH, SERIOUS INJURY AND/OR EQUIPMENT DAMAGE. LOCKOUT POWER BEFORE PERFORMING ANY MAINTENANCE.

4.1 Control Components and Their Functions

Refer to the certified electrical drawings(s) for dimensions on control panels with optional features. The microsystem controller is an Allen Bradley Micrologix-1400 PLC based control system. It is interfaced through Ethernet IP to Allen Bradley PanelView plus 400 HMI and through Modbus RTU to Allen Bradley PowerFlex 40 variable frequency drive (VFD). The microsystem controller controls all motors and gates of the batching system. Signals to control all motors and gates can be received as hard wired or Ethernet inputs from customer based controls.

The weight gain controller will only energize one motor at a time. If the system receives more than one signal to start a motor, the first signal received will be processed to start a motor and all other signals will be ignored until the first signal is turned off.

The weight loss controller can energize multiple motors by having multiple VFDs. The system will monitor the lid for every bin and the corresponding motor will be de-energized any time the lid is opened.

4.1.1 ON/OFF Switch

This switch controls all electrical power to the controller and the microsystem unit.

4.1.2 SYSTEM START – Push Button/Pilot Light

This push button will send the electrical power from the controller to the microsystem. If the push button has been pushed, a green pilot light will be illuminated indicating power to the microsystem.

⚠ WARNING ⚠

THIS MACHINE STARTS WITHOUT WARNING. MOVING PARTS CAN CAUSE SEVERE INJURY. CLEAR AREA PRIOR TO CONTROLLER START-UP.

4.1.3   EMERGENCY STOP

This twist and pull E-STOP will cut power to the microsystem. All motors and output devices will stop and all gates will close. When this occurs, there will still be power to the control panel and the PanelView will still be illuminated. If service is needed, the ON/OFF switch should also be turned to the OFF position.
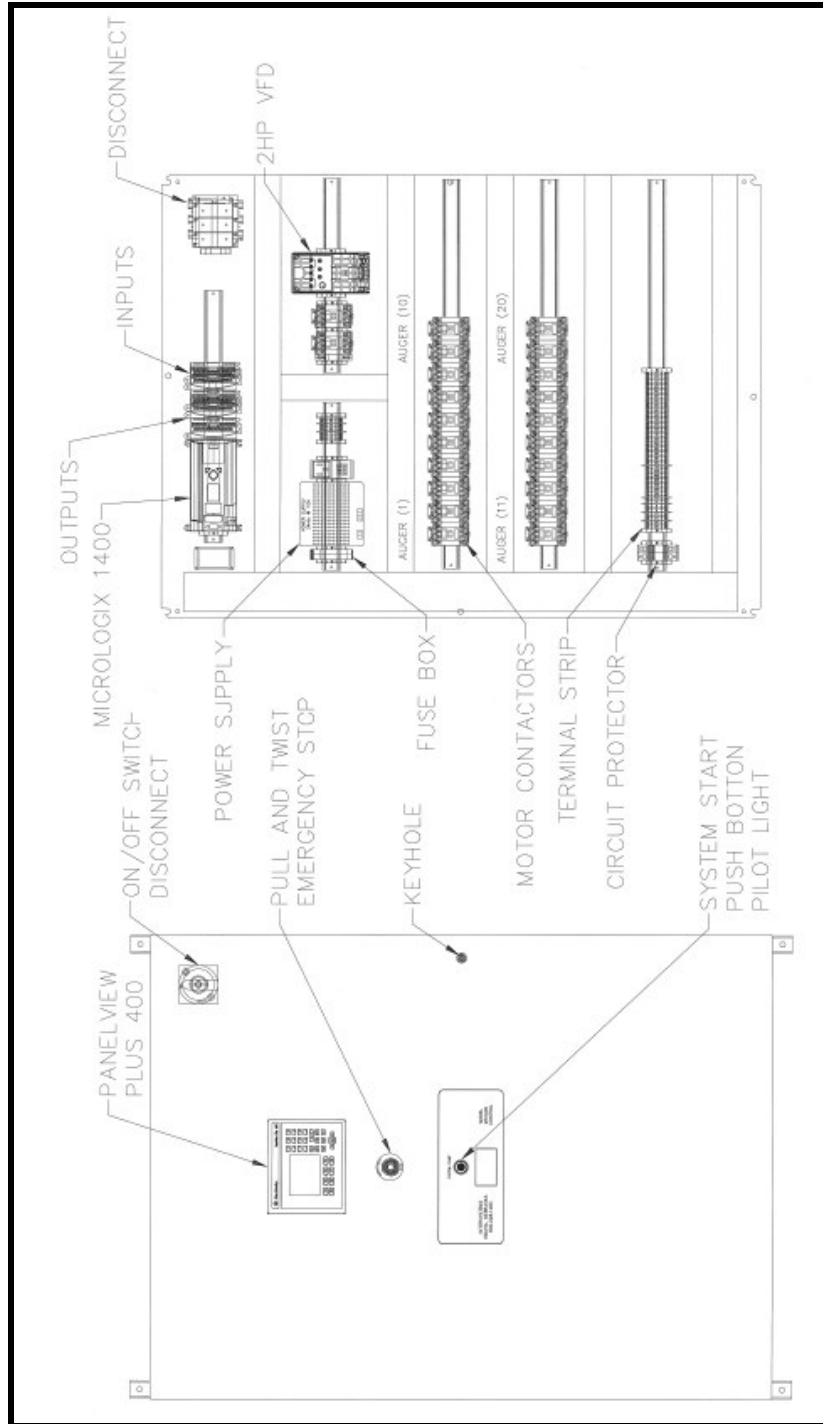
FIGURE 4-1   TYPICAL MICROSYSTEM CONTROL

4.1.4   PanelView Plus 400 Operator Interface

The "System Main" menu will be displayed on power up. The system can be operated in auto mode where all control signals are received as hard wired inputs from end user or in manual mode using PanelView plus 400 HMI. When manual mode is selected, all hard wired controls from the end user are ignored.
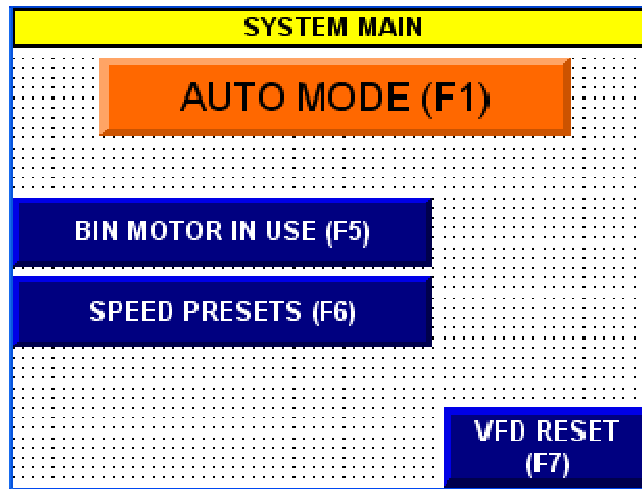
FIGURE 4-2   SYSTEM MAIN SCREEN IN AUTO MODE

Auto mode is the default mode of operation. To operate the system in manual mode, press "Auto Mode" (F1) and the manual mode screen in Figure 4-3 will be displayed.
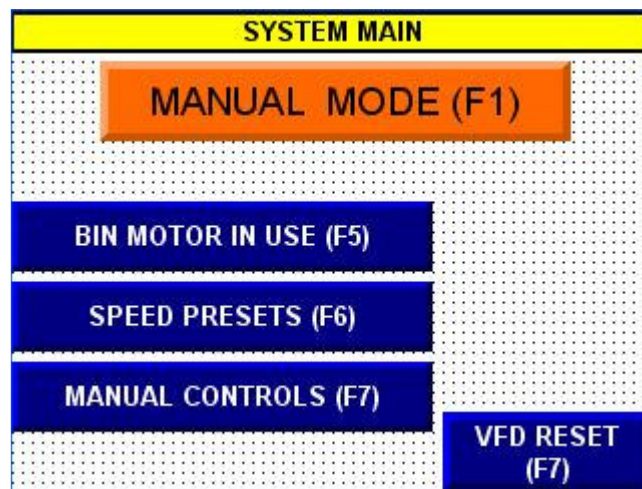
FIGURE 4-3   SYSTEM MAIN SCREEN IN MANUAL MODE

To switch back to auto mode, press "Manual Mode" (F1).

 - Press "Bin Motor in Use" (F5) to navigate to the screen that displays current active motor along with current speed. This screen is also used to adjust current motor speed.
 - Press "Speed Presets" (F6) to navigate to motors speed programming menu.
 - Press "Manual Controls" (F7) to navigate to manual controls screen.

4.1.4.1 Bin Motor in Use (F5)

When no motor is active or running, the screen in Figure 4-4 will be displayed.
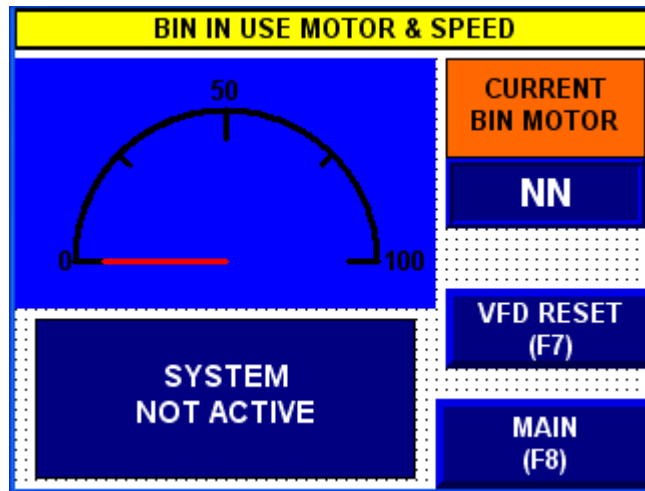
FIGURE 4-4   BIN IN USE SCREEN WITH NO MOTOR ACTIVE

When a motor is running or active, the screen in Figure 4-5 will be displayed.
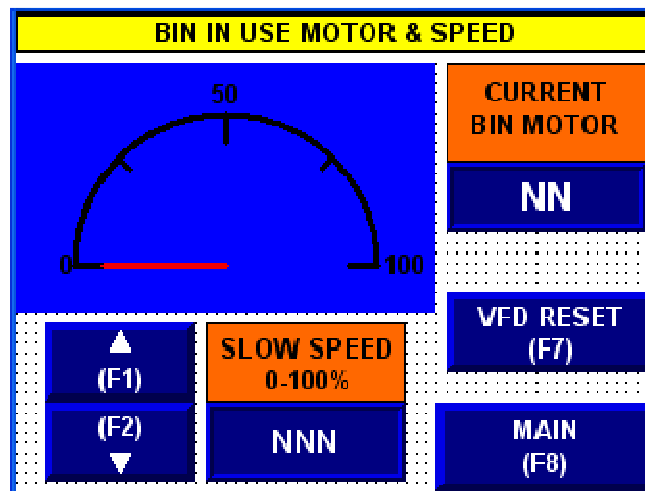
FIGURE 4-5   BIN IN USE SCREEN WITH A MOTOR ACTIVE

- The 0-100 dial will show motor speed as a percentage of its full speed frequency.
- "Current Bin Motor" will show which motor is currently active or energized.
- "VFD Reset" will be visible only when a VFD fault is present. Pressing (F7) will reset all VFD faults. This will be invisible when no VFD faults are present.
- The bottom left section of the screen shows current motor speed preset. The display above the speed will display whether the motor is running in "Fast Speed" or "Slow Speed." Displayed fast or slow speed motor can be increased or decreased using the "Up" (F1) and "Down" (F2) arrows. When current motor speed is changed, it is automatically saved as the new programmed fast or slow speed preset.

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4.1.4.2   Speed Preset (F6)

To program the fast and slow speed presets for each motor, the screen showed in Figure 4-6 will be used.

FIGURE 4-6   AUGER MOTOR SPEED PRESET PROGRAMMING SCREEN

-   Press "Motor #" (F3) to enter motor number or use "Up" (F1) and "Down" (F2) to increase or decrease the motor number to be programmed.
-   Press "Fast Speed" (F5) to enter the fast speed preset for the selected motor. As the button shows, preset number entered is a percentage of the full speed frequency of the motor.
-   Press "Slow Speed" (F6) to enter the slow speed preset for the selected motor.
-   Once all information is entered, press "Save" (F4) to save the speed presets for the selected motor.

Program all motors by entering the motor number or by increasing or decreasing the motor number.

4.1.4.3 Manual Controls (F7)

The "Manual Controls" screen shown in Figure 4-7 is used to operate the VFD and to operate each motor individually. When "Manual Mode" is selected from the "System Main" menu all hard wired controls from the end user are ignored.
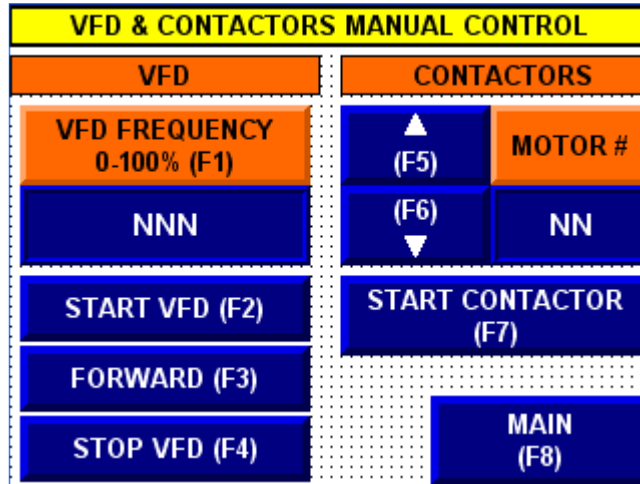
FIGURE 4-7   VFD & CONTACTORS MANUAL CONTROL SCREEN

- Press "VFD Frequency" (F1) to enter VFD frequency.
- Press "Start VFD" (F2) to start the VFD.
- Press "Stop VFD" (F4) to stop the VFD.
- Press "Forward" (F3) to change direction. This is a toggle switch and will switch between "Forward" and "Reverse."
- Press "Up" (F5) and "Down" (F6) to select the desired motor to operate.
- Press "Start Contactor" (F7) to energize the selected motor contactor. This is a momentary push button, press and hold to keep the contactor energized.

V. MAINTENANCE AND REPAIR

5.1 General Maintenance

A good maintenance program involves thorough general housekeeping, periodic inspection, adequate periodic re-lubrication and replacement of worn or damaged components.

5.2 Periodic Inspection

At regularly scheduled intervals, while observing all safety precautions, observe the microsystem as it operates. Inspect for:
A. Loose or missing hardware
B. Noisy motor or motor/reducer bearings
C. Overheated motor or reducer
D. Adequate lubricant in gear reducer
E. Structural damage
F. Rust or corrosion
G. Damaged wiring, including exposed conductors and connections
H. All guards in place and all warning labels in place and legible. Section I, GENERAL SAFETY INFORMATION, explains the purpose and intended location of the warning signs. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY!

5.3 Lubrication

In all cases, the manufacturers of the individual components have precise recommendations for periodic lubrication of their products. Strict adherence to these procedures will result in minimum down time and maximum component life.

5.3.1 Gear Reducer

This gear reducer is lubricated for life at the manufacturer factory and periodic lubrication should not be required under normal conditions. If leakage is detected, repair as needed, clean gear case completely and refill with DODGE 334863 (in quarts). The gear case will require approximately 12 ounces to fill.

5.3.2 Flange Bearings

Mounted bearings require periodic lubrication at appropriate intervals. The amount and frequency depends in large extent upon the severity of the operating environment and the duty cycle.

Inject each mounted bearing with an NLGI #2 grease, Lubri-Plate "Multi-Lube A" for example. Inject only enough lubricant so that a slight bead can be seen to form around the seal. The appearance of the bead indicates that the bearing has been filled adequately and helps purge and exclude contaminants from the bearing cavity.

5.4 Mechanical Repair Procedures

5.4.1 Limit Switch Adjustment

Loosen and adjust the limit switch arms if required. The limit switches trip on the cam attached to the shaft of the weigh hopper and signal the control that the weigh hopper is closed and has dumped the material. After dumping, the rotary actuator will reverse. The limit switches trip on the cam going back and will signal the control that the weigh hopper is open and ready to receive product again.

5.4.2 Auger Replacement

When following the instruction below, refer to the applicable certified drawing(s) of the microsystem.

A. Shutoff and lockout all power (electrical and pneumatic).

B. Unplug cord from receptacle.

C. Unscrew both star knobs from motor mounts.

D. Remove entire motor, reducer and auger assembly.

E. Remove the set screws on the bearing and coupling.

F. Insert new auger and tighten set screws on bearing and coupling.

G. Insert into bin auger tube, screw in star knobs and plug cord into receptacle.

H. Restore power and run to make sure that the auger does not rub on bin sidewalls.

VI. TROUBLESHOOTING

6.1   General Microsystem Troubleshooting

⚠ **DANGER** ⚠

CARELESS OR ACCIDENTAL RESTORATION OF POWER CAN RESULT IN DEATH OR SERIOUS INJURY. MAKE CERTAIN AREA IS CLEAR BEFORE REMOVING LOCKOUTS.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Weigh hopper does turn or seems sluggish	No or low air pressure.	Turn air supply on and set regulator to 80-100 PSI
	Speed control is closed	Refer to Section 3.3.1 E & F to reset.
Weigh hopper turns rapidly and slams	Speed control is too open.	Turn clockwise to turn off. Refer to Section 3.3.1 E & F to reset.
Motor will not run.	Motor wired improperly.	Correct. Refer to the certified electrical schematic.
	Weigh hopper position is Open/Dump.	Cycle the rotary actuator so the weigh hopper is in the Closed/Fill position.
Motor Thermal Overload	Auger seized up in tube.	Inspect and remove anything that fell into screw. Push reset on control.
	Motor wired improperly.	Correct. Refer to the certified electrical schematic.
Motor fuse blows continuously.	Motor wired improperly.	Correct. Refer to the certified electrical schematic.
	Motor jammed.	Inspect & replace.
	Auger seized up in tube.	Inspect & replace. Refer to Section 5.4.2.
Variable Speed Drive Fault	See Troubleshooting section (Chapter 4) of the PowerFlex40 user's manual or the quick guide in Appendix A.	See Troubleshooting section (Chapter 4) of the PowerFlex40 user's manual or the quick guide in Appendix A.

TABLE 6-1   GENERAL MICROSYSTEM TROUBLESHOOTING

VII. REPLACEMENT PARTS

7.1 Scope

The certified drawings list the non-standard components that have been incorporated into the equipment. Intersystems normally stocks non-fabricated parts and non-custom OEM parts. Replacement parts for any other components, including fabricated parts and custom OEM components, can be supplied upon request.

7.2 Ordering Parts

Direct parts orders or requests for technical assistance to your sales representative or to:

Intersystems, Inc.
9575 N. 109th Ave
Omaha, NE 68142
Phone: (402) 330-1500
Fax: (402) 330-3350

Please have available the MODEL NUMBER, SERIAL NUMBER and CUSTOMER ORDER NUMBER of the equipment in question as well as the location where the microsystem is INSTALLED.

7.3 Replacement Parts

The Intersystems microsystem is a quality built piece of machinery. As with any machine, parts do wear out and fail. It is Intersystems' recommendation that a small supply of spare parts be kept on hand to cover any minor breakdowns. It is also necessary to check the certified drawings, which will list any special or custom components utilized on this equipment.

7.3.1 Spare Parts List

The following tables contain common spare parts for each microsystem and the control.

Part Number	Description
650036	AUGER MS 304SS STD HIGH ACCY ASSY
650421	AUGER MS 304SS ULTRA HIGH ACCY ASSY
650422	AUGER MS 304SS STD HIGH VOLUME ASSY
650006	MS DISCHARGE END BEARING UHMW
650014	MS MOTOR MOUNT UP WELDMENT SS
650395	MS MOTOR MOUNT DN WELDMENT SS
650021	MS MOTOR MOUNT GASKET NEOPR
650026	BRG FLG 2 BOLT 1 BORE
35020	SPIDER L090 RUBBER
302245	CPLG LOVEJOY L090 1 B BODY HALF
523189	CPLG LOVEJOY L090 7/8 B BODY HALF
650440	MS MOTOR/CORDSET ASSY 1HP 230/460V
650025	RDCR GEAR 40:1 RATIO DODGE 17

TABLE 7-1   COMMON SPARE PARTS FOR BOTH MS1 & MS2 MICROSYSTEMS

7.3.1.1 Weight Gain (MS1) Spare Parts List

Part Number	Description
650037	MS BIN ASSY 5.7 MM UP SS
650444	MS BIN ASSY 5.7 MM DN SS NO MTR
650008	MS BIN WELDMENT 5.7CUFT SS
650018	MS BIN LID WELDMENT SS
34792	BRG FLG 4 BOLT 1 SC
650033	ROTARY ACTUATOR 180DEG CCW P1000
650030	LOAD CELL 200LB TENSION S-BEAM RL
650031	EYE BOLT ¼-28 FORGED 500LB
650107	CLEVIS PIN 1-1/2" X 5/8" DIA ZINC
650108	COTTER PIN HAIR 2-1/2" X 1/8" DIA ZINC
650135	MS SHROUD WINDOW 3/16 PLEXIGLASS
650150	LATCH CAM TURN ARROWHEAD
650152	MS SEAL RING AUG TUBE-SHROUD NEOPR

TABLE 7-2 WEIGHT GAIN (MS1) SPARE PARTS LIST

7.3.1.2 Weight Loss (MS2) Spare Parts List

Part Number	Description
650158	MS2 BIN/FRAME ASSY 5.7 MM UP
650441	MS2 BIN/FRAME ASSY 5.7 MM DN NO MTR
650157	MS2 BIN ASSY 5.7 MM UP
650399	MS2 BIN ASSY 5.7 MM DN NO MOTOR
650155	MS2 BIN FRAME WELDMENT 5.7CUFT
650386	MS2 BIN LID WELDMENT SS
650186	SW PROX INDUCTIVE 18mm DIA 5mm RNG
650184	LOAD CELL 500LB SINGLE END BEAM RL
650185	LOAD CELL WIRE ROPE ½" 1400LB
650159	MS2 CANVAS DUST SEAL DISCHARGE BOOT
650445	MS2 DUST SEAL BOOT FLANGE

TABLE 7-3 WEIGHT LOSS (MS2) SPARE PARTS LIST

7.3.1.3 Microsystem Control Spare Parts List

Part Number	Description
650291	MTR VFD PF-40 2HP 480V

TABLE 7-4 MICROSYSTEM CONTROL SPARE PARTS LIST

VIII. MAINTENANCE AND REPAIR

Intersystems reserves the right to make changes in design or in construction of equipment and components without obligation to incorporate such changes in equipment and components previously ordered.

WARRANTY, LIMITATION OF LIABILITY, DISCLAIMER OF IMPLIED WARRANTIES: Intersystems manufactured equipment and components are guaranteed against defects in workmanship or materials for one year from date of shipment. The obligation of Intersystems with respect to any goods is limited to replacement or repair of defective parts and equipment provided those parts are returned, shipping costs prepaid, to Intersystems' factory and provided the product has not been subject to misuse, negligence, accident, repaired or altered outside of our factory, or other than by an Authorized Service Representative. This warranty does not cover the replacement of parts inoperative because of wear occasioned by use, the cost of replacing parts by a person other than an Intersystems employee or an Authorized Service Representative, or the adjustment of a product where the product was improperly adjusted by the purchaser. In addition, this warranty does not cover components manufactured by others such as motors, drives, clutches, cylinders, valves, blowers, and the like. On those components the standard Manufactures' warranty applies. In any event, liability is limited to the purchase price paid, and Intersystems will, under no circumstances, be responsible for special or consequential damages, or for incidental damages.

INTERSYSTEMS NEITHER MAKES NOR AUTHORIZES ANY WARRANTY OTHER THAN AS HEREIN CONTAINED. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

NOTE: Accessories for hazardous areas are designed with guidelines set forth by the National Fire Protections Association (NFPA). Approval for use in a specific environment can be given by the user's own insurance company. Intersystems assumes no responsibility or liability either expressed or implied that this equipment is suitable or acceptable for any specific environment. The owner assumes total responsibility and liability for submission and approval by their insurance company.

COMPLIANCE WITH FCC RULES: This equipment generates, uses and can radiate radio frequency energy. If this equipment is not installed and used in accordance with the instruction manual you are warned that it may cause interference to radio communications. This unit has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a commercial environment. However, if this unit is operated in a residential area, it is likely to cause interference, and under these circumstances the user will be required to take whatever measures are necessary to eliminate the interference, at their own cost.

IX. APPENDIX A

A Powerflex40 VFD User's Manual was sent with the control. Table A-1 contains the Fault Code section of the PowerFlex40 Quick Start guide. This does not replace the PowerFlex40 User's Manual. For complete troubleshooting descriptions refer to the User's Manual Troubleshooting Section which starts on 4-1.

9.1   Fault Codes

NO.	FAULT	DESCRIPTION
F2	Auxiliary Input [1]	Check remote wiring. Verify communications programming for intentional fault.
F3	Power Loss	Monitor the incoming AC line for low voltage or line power interruption. Check input fuses.
F4	Under Voltage [1]	Monitor the incoming AC line for low voltage or line power interruption.
F5	Over Voltage [1]	Monitor the AC line for high line voltage or transient conditions. Bus overvoltage can also be caused by motor regeneration. Extend the decal time or install dynamic brake option.
F6	Motor Stalled [1]	Increase [Accel Time x] or reduce load so drive output current does not exceed the current set by parameter A089 [Current Limit].
F7	Motor Overload [1]	An excessive motor load exists. Reduce load so drive output current does not exceed the current set by parameter P033 [Motor OL Current]. Verify A084 [Boost Select] setting.
F8	Heatsink OvrTmp [1]	Check for blocked or dirty heat sink fins. Verify that ambient temperature has not exceeded 40°C (104°F) for IP 30/NEMA 1/UL Type 1 installations or 50°C (122°F) for Open type installations. Check fan.
F12	HW OverCurrent	Check programming. Check for excess load, improper DC boost setting, DC brake volts set too high or other causes of excess current.
F13	Ground Fault	Check the motor and external wiring to the drive output terminals for a grounded condition.
F29	Analog Input Loss [1]	An analog input is configured to fault on signal loss. A signal loss has occurred. Check parameters. Check for broken/loose connections at inputs.
F33	Auto Rstrt Tries	Correct the cause of the fault and manually clear.
F38	Phase U to Gnd	Check the wiring between the drive and motor.
F39	Phase V to Gnd	Check motor for grounded phase.
F40	Pahse W to Gnd	Replace drive if fault cannot be cleared.
F41	Phase UV Short	Check the motor and drive output terminal wiring for a shorted
F42	Phase UW Short	condition.
F43	Phase VW Short	Replace drive if fault cannot be cleared.
F48	Params Defaulted	The drive was commanded to write default values to EEPROM. Clear the fault or cycle power to the drive. Program the drive parameters as needed.
F63	SW OverCurrent [1]	Check load requirements and A098 [SW Current Trip] setting.
F64	Drive Overload	Reduce load or extend Accel Time.
F70	Power Unit	Cycle power. Replace drive if fault cannot be cleared.
F71	Net Loss	The communication network has faulted. Cycle power. Check communications cabling. Check network adapter setting. Check external network status.
F80	SVC Autotune	The autotune function was either cancelled by the user of failed. Restart procedure.

F81	Comm Loss	If adapter was not intentionally disconnected, check wiring to the port. Replace wiring, port expander, adapters or complete drive as required. Check connection. An adapter was intentionally disconnected. Turn off using A105 [Comm Loss Action]. Connecting I/O Terminal 04 to ground may improve noise immunity.
F91	Encoder Loss	Requires differential encoder. One of the 2 encoder channel signals is missing. Check Wiring. If P038 [Speed Reference] = 9 "Positioning" and E216 [Motor Fdbk Type] = 5 "Quad Check" swap the Encoder channel inputs (see page 13) or swap any two motor leads. Replace encoder.
F100	Parameter Checksum	Restore factory defaults.
F111	Enable Hardware	DriveGuard Safe-Off Option (Series B) board is installed and the ENBL enable jumper has not been removed. Remove the ENBL enable jumper. Cycle power.
		DriveGuard Safe-Off Option (Series B) board has failed. Remove power to the drive. Replace DriveGuard Safe-Off Option (Series B) board.
		Hardware Enable circuitry has failed. Replace drive.
F122	I/O Board Fail	Cycle power. Replace drive if fault cannot be cleared.

[1] Auto-Reset/Run type fault. Configure with parameters A092 and A093

TABLE A-1   POWERFLEX40 FAULT CODES