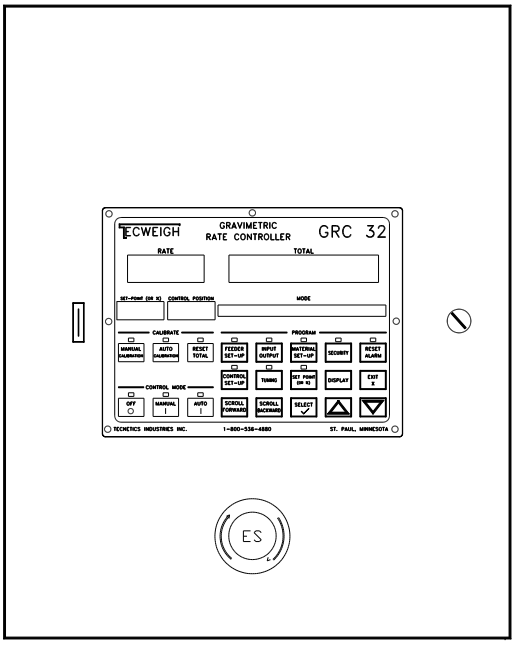
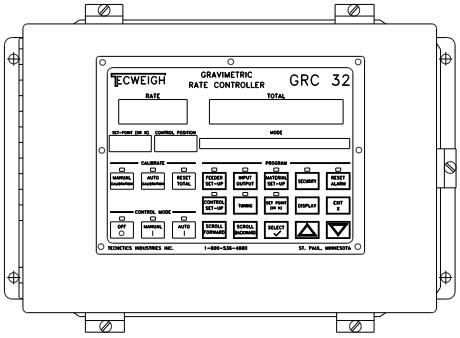
INSTALLATION AND OPERATION MANUAL

Gravimetric Rate Controller

Model: GRC32 Controller Version 1.XX firmware





Tecnetics Industries Inc.
Manufacturer of
Tecweigh Products
1811 Buerkle Road
Saint Paul, MN 55110
Ph (651) 777-4780
Fax (651) 777-5582
www.tecweigh.com

P/N 30043600 [Last Update, May 2, 2011]

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CHAPTER 1 – SAFETY

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

This symbol is intended to alert the user of the presence of dangerous voltages within the electrical enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

1.01 The Manual

This entire manual should be read thoroughly to gain the proper knowledge of how the system works and how to operate it safely. Also be sure to read the safety instructions and warnings. Failure to heed these safety instructions and warnings could result in serious personal injury or death.

1.02 Lifting Equipment

The scale includes a minimum of four mounting holes located in the four corners of the scale's main carriage. It is recommended that these holes be used when lifting the equipment. The use of a crane or forklift with a spreader bar is recommended. Use caution at all times when rigging, or hoisting scale carriages. Mishandling can cause damage and/or injury to personnel.

It is not recommended that the equipment be manually lifted, but if the equipment must be lifted manually a minimum of two people should lift the equipment. At no time should manual lifting or installation be attempted on conveyor scales designed for 48" or wider belts.

1.03 Transporting Equipment

Portable conveyor belts are a common location for scale installations. Use caution at all times when transporting, rigging, or hoisting scale carriages. Mishandling can cause damage and/or injury to personnel. Remove the calibration weights during transport to prevent damage to the scale and also to prevent the weights from falling.

1.04 Electrical Codes

WARNING! – DANGER! Follow all local electrical and safety codes as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA). Improper wiring or improper grounding could cause serious personal injury or death. Disconnect and lock out all power from the scale before servicing. Only authorized service technicians should have access to the inside of the electrical enclosures. This includes the signal conditioner enclosure on the scale and the WP20 processor enclosure. Even with the equipment's power disconnected, live voltage can be present inside the WP20's enclosure.

1.05 Hazardous Environments

WARNING! The standard scale is not "explosion-proof". The standard scale must not be operated in an environment where conditions exist that could cause an explosion of dust or gas. Specially built explosion proof scales, signal conditioner enclosures, and speed sensors are available from **Tecnetics** for hazardous environments.

1.06 Scale Over-Loading

WARNING! Excessive loading on the scale could result in damage to the scale, conveyor, or cause injury to personnel. Information that applies to your specific application is available in Section 12 of this manual. An increase in maximum rate and/or a reduction of belt speed could result in overloading the scale. Additionally, increasing the idler center-to-center distance (refer to Section 7.02.5), which increases the loading on the weigh idler, can also result in overloading the scale.

1.07 Environment

The equipment is designed to be operated in wet or dry environments, within a temperature range of 32-104 degrees Fahrenheit (0-40 degrees Celsius), and a relative humidity less than 80%. Although the equipment will operate outside this temperature range, the accuracy of the equipment might be affected. If the equipment is to be stored for an extended period of time, keep it in a cool dry area and do not expose the shipping crate or pallet to the weather unless care is taken to protect it from rain exposure.

1.08 Printed Circuit Board (PCB) Precautions

Disconnect and lock out all power to the scale before servicing. When handling PCBs, always use a commercially available grounding wrist strap to prevent electrostatic discharge, which can destroy electronic components. Store unused PCBs in electrostatic protection bags made for that purpose.

1.09 Welding Precautions

Do not do electrical welding on or near the scale carriage, electrical enclosures, load cells or LVDT's, or signal wiring. Electrical current passing through the PCBs will destroy them, as can electromagnetic radiation. If welding near the scale is absolutely necessary, place the ground clamp as close to the welding area as possible.

CHAPTER 2 – BASIC INFORMATION

2.00 Tecnetics Industries, Inc. and Tecweigh.

Tecnetics Industries, Inc., is the legal name for Tecnetics. Tecweigh is the product brand name. They are frequently used interchangeably in this manual and within the company.

2.01 Contacting Tecnetics Industries (Tecweigh), Inc.

When contacting Tecweigh service about a GRC32 loss-in-weight controller, please have the serial number and model number available. Their location and how they are identified is as follows:

Inside the enclosure on the printed circuit board (PCB) there are two hand printed numbers, a model number and a serial number. The serial number identifies both who owns the unit and the date it was shipped. The model number indicates the design revision of the processor's components. Be sure to disconnect and lock out all power before opening any enclosures.

Examples of model numbers:

MP500-00-00

A 500 series MP (Main Processor) on its initial hardware version (-00) and initial firmware version (-00).

DI310-02-01

A 300 series DI (**D**isplay **I**nterface) on its second hardware version (-02) and first firmware version (-01).

Tecnetics (Tecweigh) Service Department contact information:

Phone: 651-777-4780 (General number).
651-233-1946 (Service Department)
651-233-1976 (Parts)
FAX: 651-777-5582
Email: svobodac@tecweigh.com (Service Department)
Tecweigh web site: www.tecweigh.com

2.02 Wording Conventions in this Manual

This manual uses two specific wording conventions to help identify the two most important components of the processor; the Parameter Table and the faceplate KEYS.

First letter **C**apitalized	A Parameter will always appear with its first letter **C**apitalized and will also be spelled as it appears in the processor's Parameter Table. That is, if a Parameter needed to be truncated for the GRC32 display's mode window, then it will also be truncated in this manual.
ALL CAPITALIZED	When referring to the pushbutton KEYS and WINDOWS on the face of the processor, all the letters are CAPATIALIZED. Examples: RESET TOTAL, OFF, or TOTAL window.

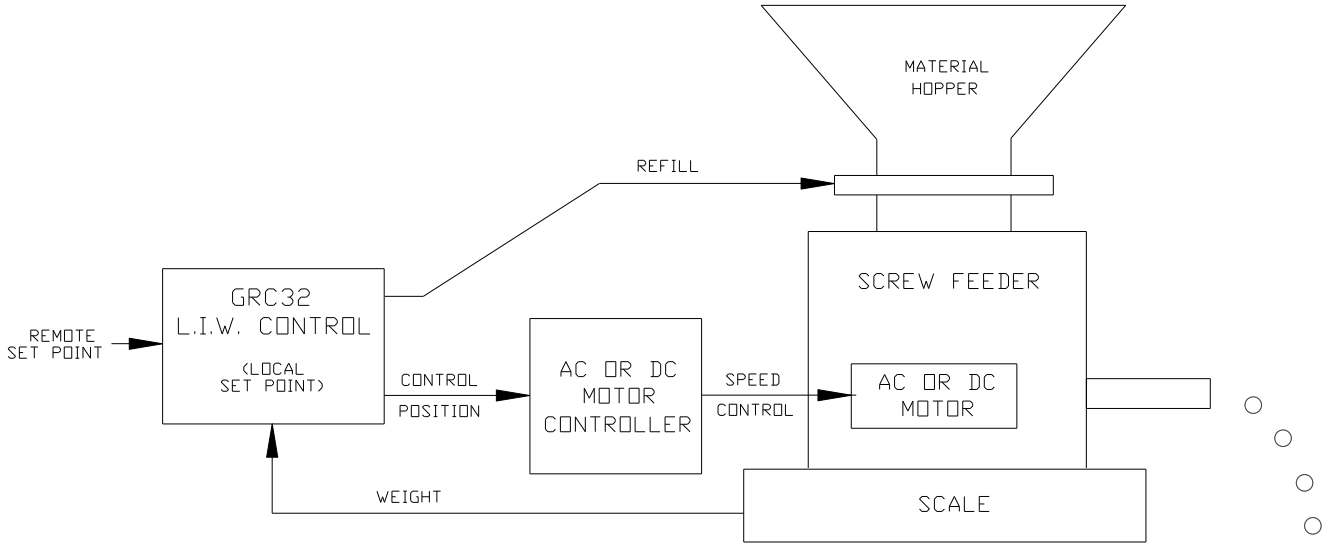
CHAPTER 3 – OVERVIEW

3.01 The GRC32 Gravimetric Loss-In-Weight (L.I.W) Rate Controller

The GRC32's function is to continuously monitor the weight of material in a screw feeder or most any other kind of dispensing device. Refer to the following figure. The equipment that feeds the material must be situated either on a scale (with load cell(s)) or on individual load cell(s), so the weight can be sensed. As the material is dispensed by the feeding device, the GRC32 analyzes the change in the load cell signal over time, that is, the **L**oss-**I**n-**W**eight (L.I.W.) of the material being weighed, in order to calculate the RATE at which the feeder is dispensing the material. This calculated RATE value is then compared to a previously determined SETPOINT value, and using **P**roportional, **I**ntegral, and **D**erivative (PID) math calculations, the GRC32 utilizes an output connected to the dispensing device to increase or decrease the feed RATE in order to maintain the SETPOINT. This kind of system is intended to run continuously, therefore, it is referred to as a gravimetric continuous Loss-In-Weight system.

Data points (usually RATE and TOTAL) are commonly collected over time for the purpose of remotely controlling other aspects of the overall process. This remote control operation can be done via a number of GRC32 input and output ports. The data collection/process-management device is commonly a Programmable Logic Controller (PLC) and/or a Personal Computer (PC), but could also be another kind of client provided device.

At all times, the GRC32 controller will display on its faceplate the RATE, TOTAL (or LIVE LOAD), the SET POINT (Directly or %), and the CONTROL POSITION output.



The GRC32 controller has a variety of installation configurations. The basic configuration is in a NEMA 4 enclosure approximately 14"W x 9"H x 5"D. A NEMA 4X (stainless steel) enclosure is optional. Also available is a bezel mount (panel mount) unit that requires field mounting. Additionally available are packaged units where the feeder, drives, and controls are supplied as a package and only requires power application before commencing with the system configuration. During installation be certain to refer to all installation documentation that comes with the equipment.

3.02 Inputs and Outputs (I/O)

A basic GRC32 L.I.W. system will consist of the scale or load cell input, an analog speed control output (CONTROL POSITION), and a refill interlock relay dry contact output. These inputs and outputs are the minimum used in a typical L.I.W. application. All the default values for the I/O Parameters were determined for this purpose. Configuration Parameters for the following described I/O can be viewed in the Parameter Table in Section 11.02.

Digital (discrete) inputs

The GRC32 has eight digital (discrete) inputs on the PCB. They are designated DI1 through DI8, with a common for each pair. They can all be configured for the same eight different functions. These functions are: Unused, Off/Auto, Manual Refill, Auto Refill, Emergency Stop, Short TOTAL Reset, Long TOTAL Reset, and Alarm Reset.

Relay outputs

The GRC32 has six individual relays each with a single-pole single-throw (SPST) dry (non powered) output contact, that is, as it sits unpowered on the shelf it has one normally open (N.O.) contact. Relays 1 and 2 are not configurable, however, relays 3 to 6 can be configured for the functions below:

Relay 1 is hard coded as the run interlock relay for the feeder equipment. It is not editable, that is, it cannot be used for any other function. This relay is energized in the MANUAL and AUTO modes of operation.

Relay 2 is hard coded as the refill relay to control the device that refills the process with material. It is not editable, that is, it cannot be used for any other function.

Relays 3-6 can be configured as: unused, a refill alarm, a weight (Live Load) alarm, a RATE alarm, a RATE fail, run interlock, or material refill.

Analog inputs

Analog input 1 (AI1+, AI1-) is utilized for setting up a remote SET POINT input signal (1(0)-5 vdc or 4(0) to 20 milliamps) from a remote source. Analog input 2 is presently unused.

Analog outputs

There are four analog outputs which are used or can be configured for the following functions:

Analog out 1 is a 4-20 ma output and is hard coded as the feeder speed control. It is termed throughout this manual as the CONTROL POSITION.

Analog out 2 through 4 can be configured as: Unused, Auger Speed Control, Agitator Paddles Speed Control, Average Running RATE, Running RATE, or Material Weight (Live Load).

Serial port communications

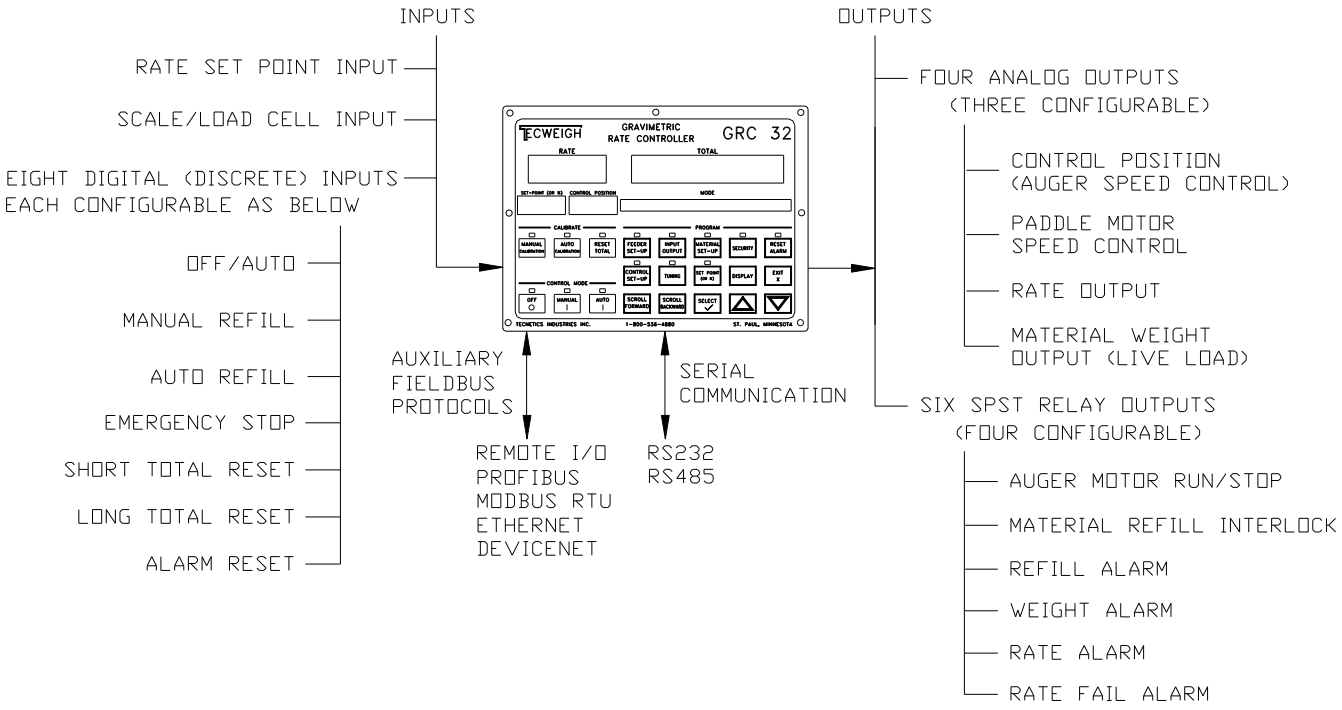
There are two serial ports that go to the same electronic chip on the microprocessor. Serial port B can be utilize either RS232 or RS485 ports that can be used for remote control and/or data collection. The RS485 port can be used in a multiple node installation by utilizing that serial port's unique Station ID Parameter. Serial ports and communications are discussed in Section 9.

Fieldbus communications protocols

Fieldbus communication cards are available for interfacing with the GRC32 processor. The protocols available are Modbus RTU, Device Net, Profibus, Ethernet IP (modbus TCP), and

Remote I/O. They are optional plug-in interface cards that allow the user to monitor the processor, record data, and modify settings remotely via the selected protocol.

Refer to the following visual representation for a quick reference to the I/O functions available on the GRC32.



3.03 Removable Flash Memory Module

A removable flash memory module will be available later that can be used to store Parameters, to copy Parameters from one GRC32 to another, or for long term data logging or storage. Currently this feature is still under development.

CHAPTER 4 – INSTALLATION & WIRING

4.01 Installation Cautions

Proper installation of the GRC32 Gravimetric Rate Controller (L.I.W.) system is critical for attaining high accuracy and repeatability. Special attention should be directed to the weighing and metering equipment itself. Refer to the manuals supplied with that specific equipment when installing it so it is properly installed. The following is a general list of important things to avoid when installing the L.I.W. system.

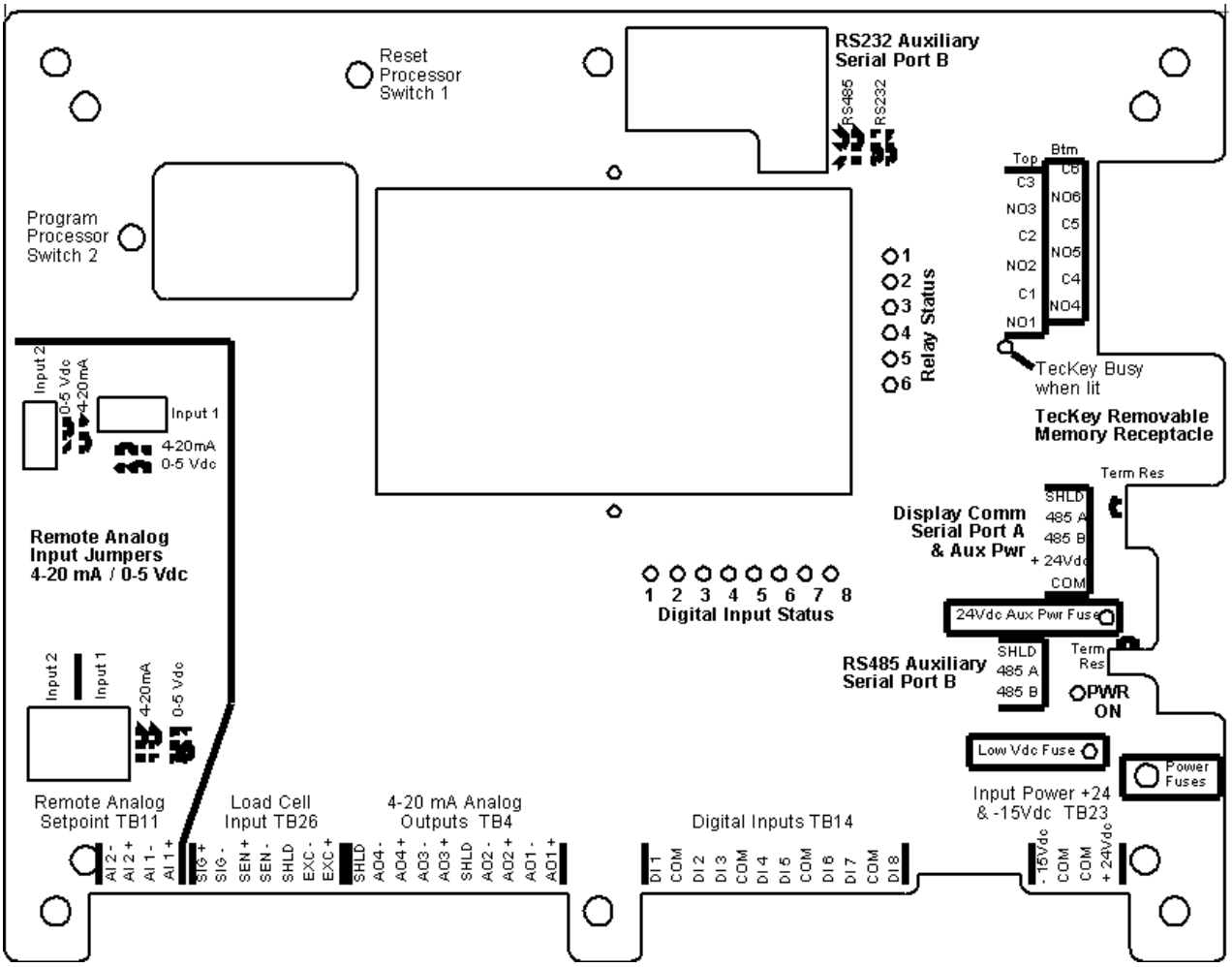
- Weak and/or flexible mounting surfaces or structures.
- Vibrations other than that originating from the metering equipment itself.
- Physical bridges between the scale/metering equipment and any other structure.
- Rigid connections from the equipment on the scale to equipment off the scale.
- Loose cabling coming from the equipment without proper mounting/support.
- Large magnetic fields from any source (large motors, power wires, etc.).
- Electrically "noisy" power supplies.

4.02 GRC32 Installation

Mount the GRC32 in a reasonably clean area that's not exposed to severe heat or cold and also isolated from vibration. For enclosure mounting dimensions refer to Section 4.05. For outdoor installations, avoid areas of direct sunlight since the lighted displays might be difficult to read in those circumstances. The GRC32 should be sheltered under a "roof" or "dog house" to provide rain and snow protection as well as shade. When mounting the GRC32, be sure to allow room for the enclosure door swing.

4.03 GRC32 Wiring

Basic processor wiring and the most common configurations of auxiliary equipment wiring are covered in the following sections. A dedicated field wiring diagram is usually included at the back of the Installation, Operation, and Maintenance manual for the application at hand. If it should happen to not be there, call **Tecweigh** Customer Service (Section 2.01) to obtain a copy. (It can usually be emailed (.pdf or .dwg formats) or FAXed). Wiring connections should only be made through the bottom of the enclosure using waterproof/dust-tight fittings. To prevent possible shorts across the terminals or to the printed circuit boards, keep the wiring neat and be sure to tape all shield ends. A physical location diagram of the inputs and outputs follows. The outputs can be used with devices not described here, consult the wiring diagrams provided with those specific devices. Section 7.02 covers the Parameter settings required to enable the GRC32 output features.



4.04 Wiring Precautions

To avoid unnecessary problems during or after installation, observe these precautions:

- Wiring should be compliant with all applicable electrical codes.
- Input power must be 100 to 240 VAC, 47-63 HZ, 75 watts min.
- The electrical power source must be of utility quality and specification.
- Only apply input power after assuring all wiring is correct.
- Never splice wires. Replace short wires with one continuous length.
- **Always** run power wiring and signal wiring in **separate** conduits.
- Ground shield wires at only one location and to a good ground.
- To prevent possible shorts, tape all shielded wire ends and keep the wiring neat.
- Use properly sized water tight compression fittings on cables entering the enclosure.
- **Do not** connect any wires to terminals designated as unused.
- Pay particular attention to proper grounding as depicted in the wiring diagrams.

4.05 Component Wiring

Load cell(s)

If the load cells are contained within a platform scale, refer to the scale's manual for wiring color codes. If separate load cells were provided by **Tecweigh**, the wiring for one of the models below should apply. The **Tecweigh** "standard" color code for wiring load cells changes from time to time because of load cell availability. The following is a cross reference for the different load cell manufacturers that have been used and their color codes.

Load Cell Model	CI-LC22	SB1 or LC	CB6-XX-T
Excitation +	green	red	red
Excitation -	black	black	black
Signal +	white	green	green
Signal -	red	white	white

Relay outputs

The GRC32 has six PCB mounted relays that provide dry contact outputs. The relays are single-pole-single-throw (SPST) and should not be used to control more than 250 VA. Note that even though the relay contacts are rated for up to 250 VA, it is highly recommended that electrical noise emitted from the relays be minimized to assure problem free operation of the GRC32 processor. Toward that end, it is recommended that 24 Vdc (10 amps max.) be used to drive external loads. When higher voltages or loads are required, an interposing relay should be installed between the GRC32 output relay and the load. Two variations of how to wire an interposing relay are shown in Sections 4.09 & 4.10.

The normally open (N.O.) or normally closed (N.C.) operation of the relay can be set by changing the relay logic Parameter. The default logic is N.O., but that condition can be changed to N.C. by changing the logic Parameter. When Power is off to the processor, the relay will always revert to a physically open condition. When N.C. logic is used, it is critical that an interposing relay be used in conjunction with running the equipment or auxiliary equipment. This will ensure personnel safety in a power off condition or if the logic Parameter setting is lost.

NOT FOLLOWING THE ABOVE PROCEDURE COULD RESULT IN PERSONAL INJURY OR DEATH

Digital (discrete) inputs

The discrete inputs are designated DI1 through DI8, with a common for each pair. Normally a remote relay dry (non-powered) contact or switch contact is wired across the input(s), but an input can also be jumpered with a wire, depending on what the input is to be used for.

Analog input(s) (4 to 20 ma or 1 to 5 Vdc)

The GRC32 has two optically isolated analog inputs (AI1 +/1, AI2 +/-), however input 2 is presently not used. They can receive either 4(or 0) to 20 ma or 1(or 0) to 5 Vdc analog signals. NOTE: Voltage inputs are NOT optically isolated. Refer to the figure in Section 4.3 for jumper locations and positions for the two different signal types. Use a 2 wire (one twisted pair) shielded cable for all current loop wiring, Belden #8760 is recommended (it can be obtained through **Tecweigh**). The GRC32 is factory set for a 4-20 ma input. This input can also be used for master/slave control systems. When using that kind of control system, other **Tecweigh** controllers with 4-20 ma RATE outputs would connect to this input.

Analog outputs (4(or 0) to 20 ma loop) (A1+A1-, A2+A2-, A3+A3-, A4+A4-)

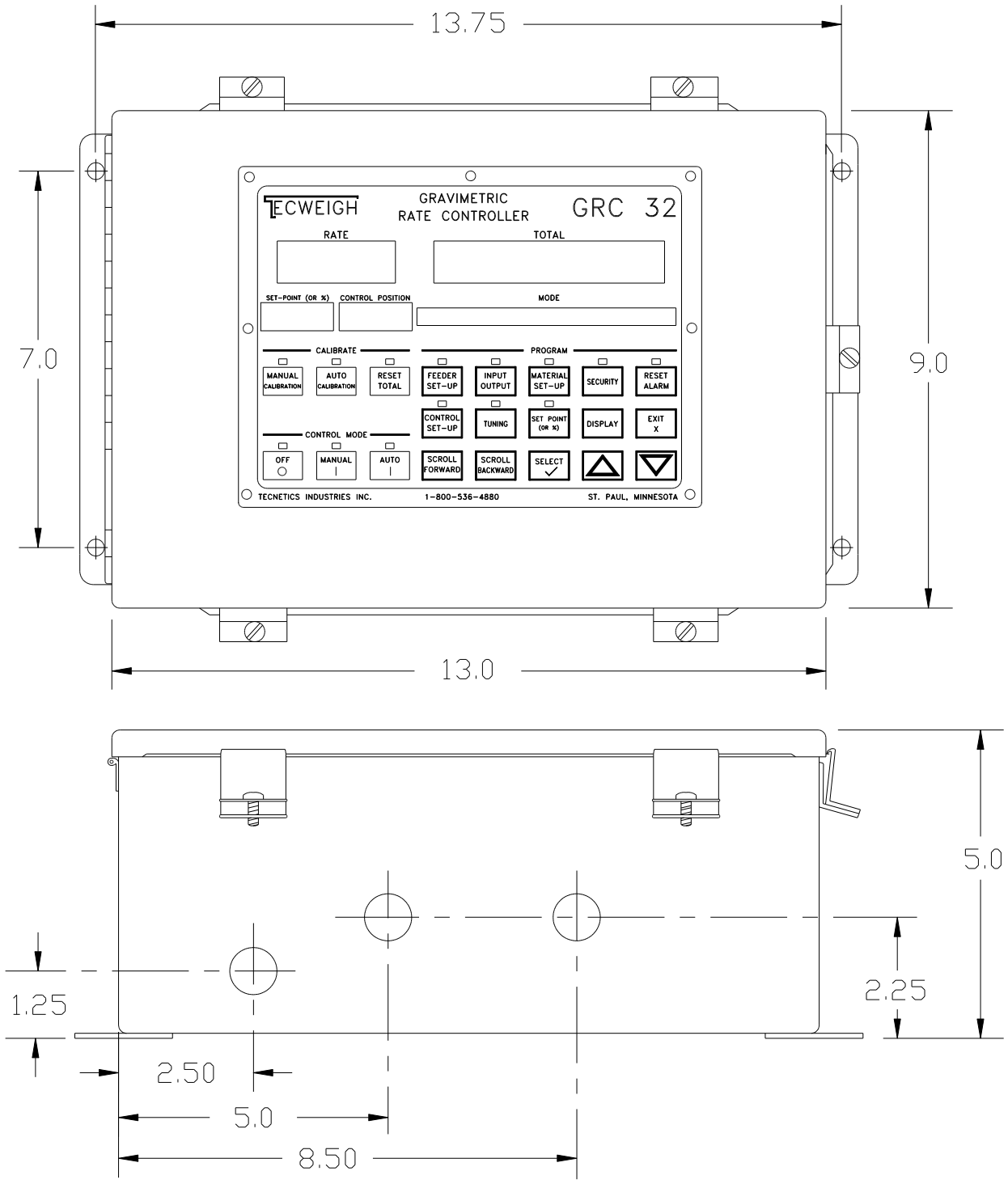
CAUTION: The 4-20 ma outputs are active , that is, a DC voltage is present at the terminals. Ensure that the outputs are connected to resistive passive loads only or damage will result.

Use a 2 wire (one twisted pair) shielded cable for all current loop wiring, Belden #8760 is recommended (it can be obtained through **Tecweigh**). The GRC32 analog outputs are optically isolated, however, to eliminate ground loops when more than one load is in the loop, all loads in the loop must be isolated except the last one. Proper shield grounding is also essential. Shields should be grounded at one end only, usually the signal source end. Tape all shield ends. Additionally, the maximum load resistance that can be driven by any single current loop output is approximately 750 ohms, with a maximum output voltage of 18.5 Vdc. If the load is larger than approximately 750 ohms, a current to current amplifier will be needed to drive the load. Refer to the figure in Section 4.07 for an example of proper current loop wiring.

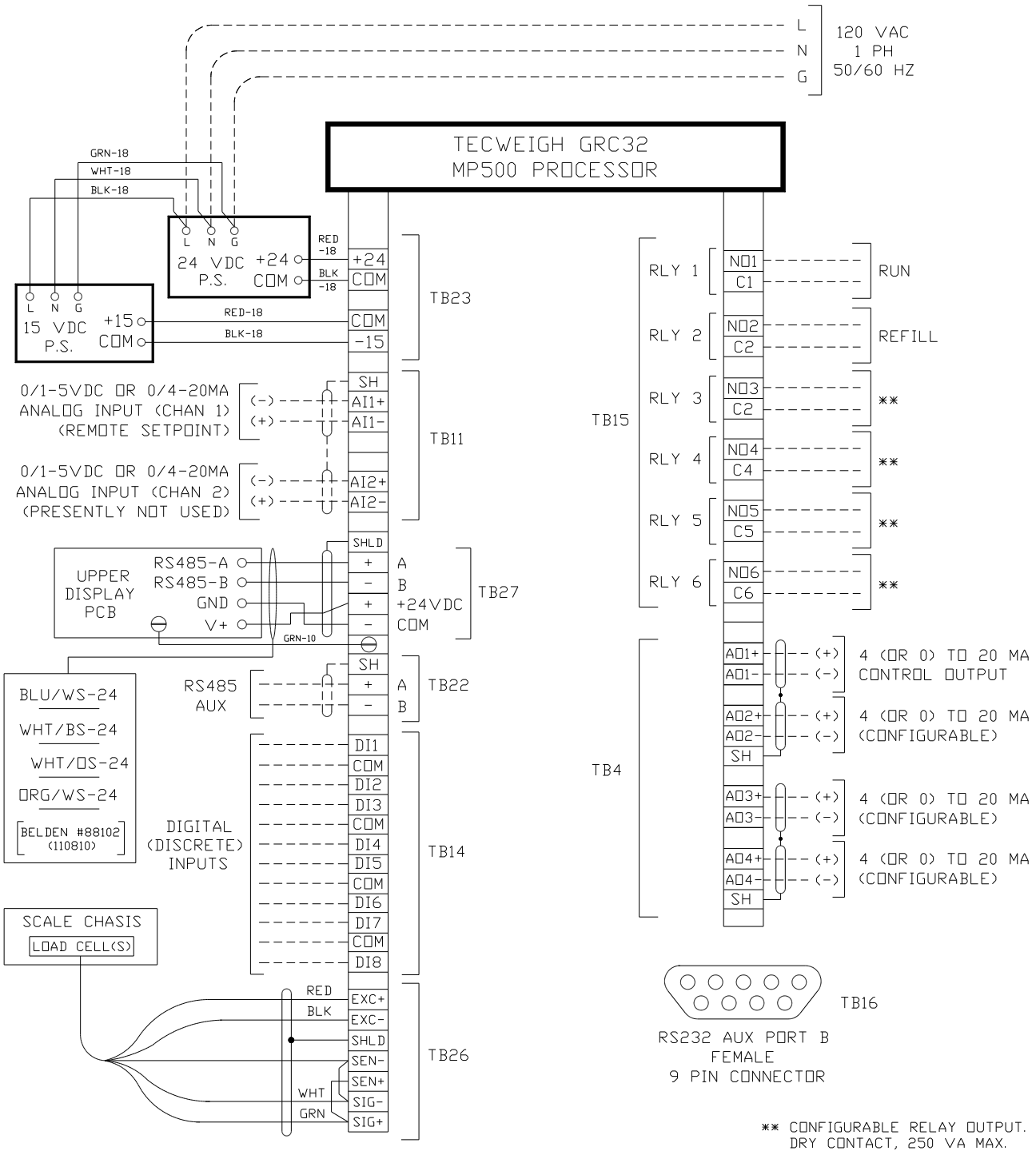
Serial ports

There are two B serial ports that connect to the same electronic chip on the printed circuit board (PCB). One serial port B is used for RS232 communications and the other serial port B is used for RS485 communications, however the two ports have different physical locations and connection methods. The RS232 port B is a nine pin “D” connector (DB9), and the RS485 port B is a screw terminal connection. They can both be used for remote control and/or data collection. Refer to Section 4.06 for port wiring, and Chapter 9 for complete serial communications operational information.

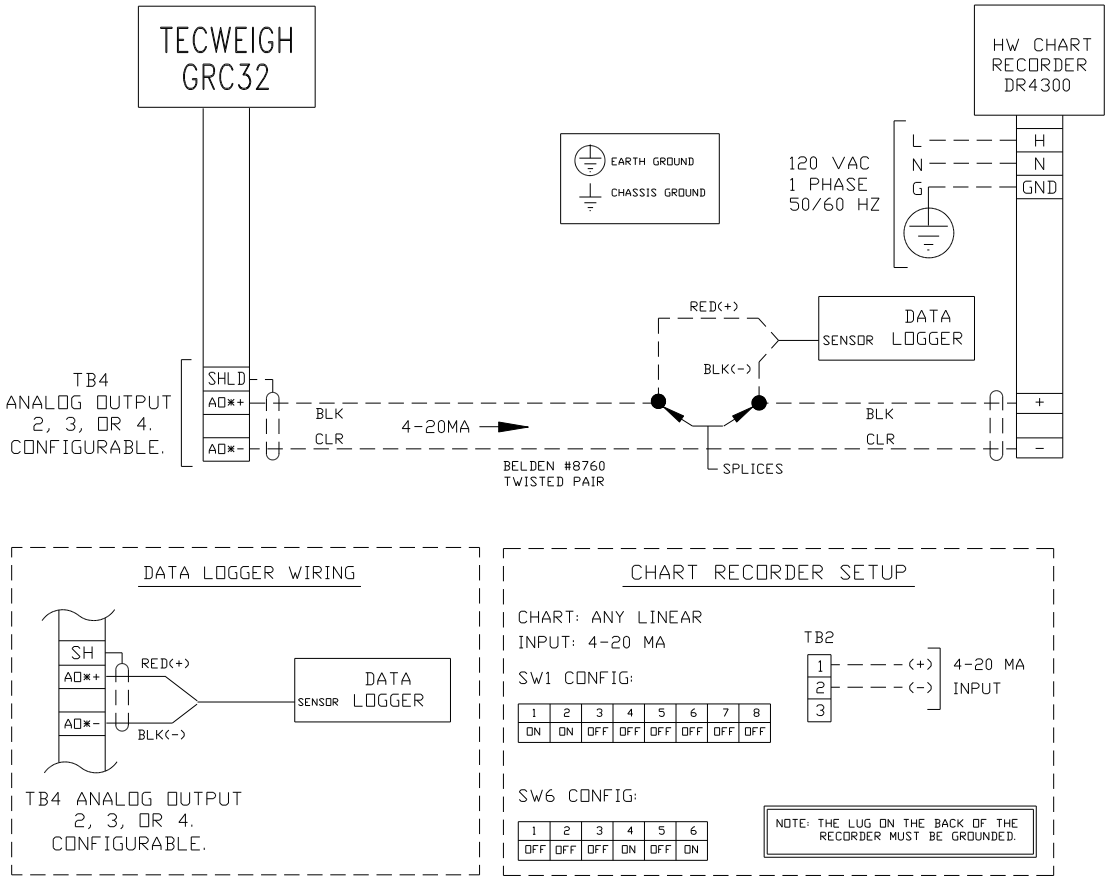
4.05 Enclosure mounting dimensions.



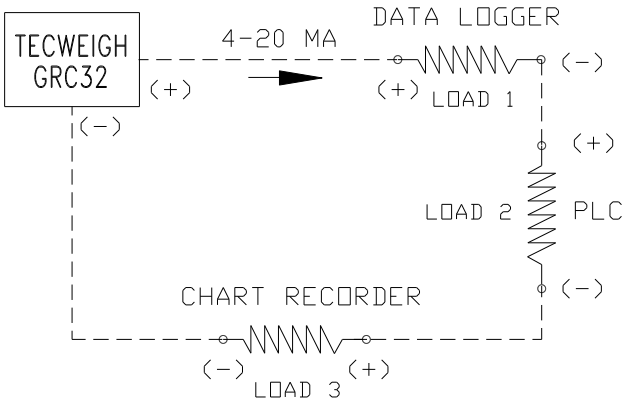
4.06 Input/output (I/O) Wiring for the GRC32.



4.07 Chart Recorder & Data logger using the 4-20 ma output.



FIELD CONNECTIONS FOR A DATA LOGGER &/OR CHART RECORDER
UTILIZING THE 4-20 MA RATE OUTPUT FROM THE GRC32,
WHEN THE RECORDING DEVICES USE A 4-20 MA INPUT.

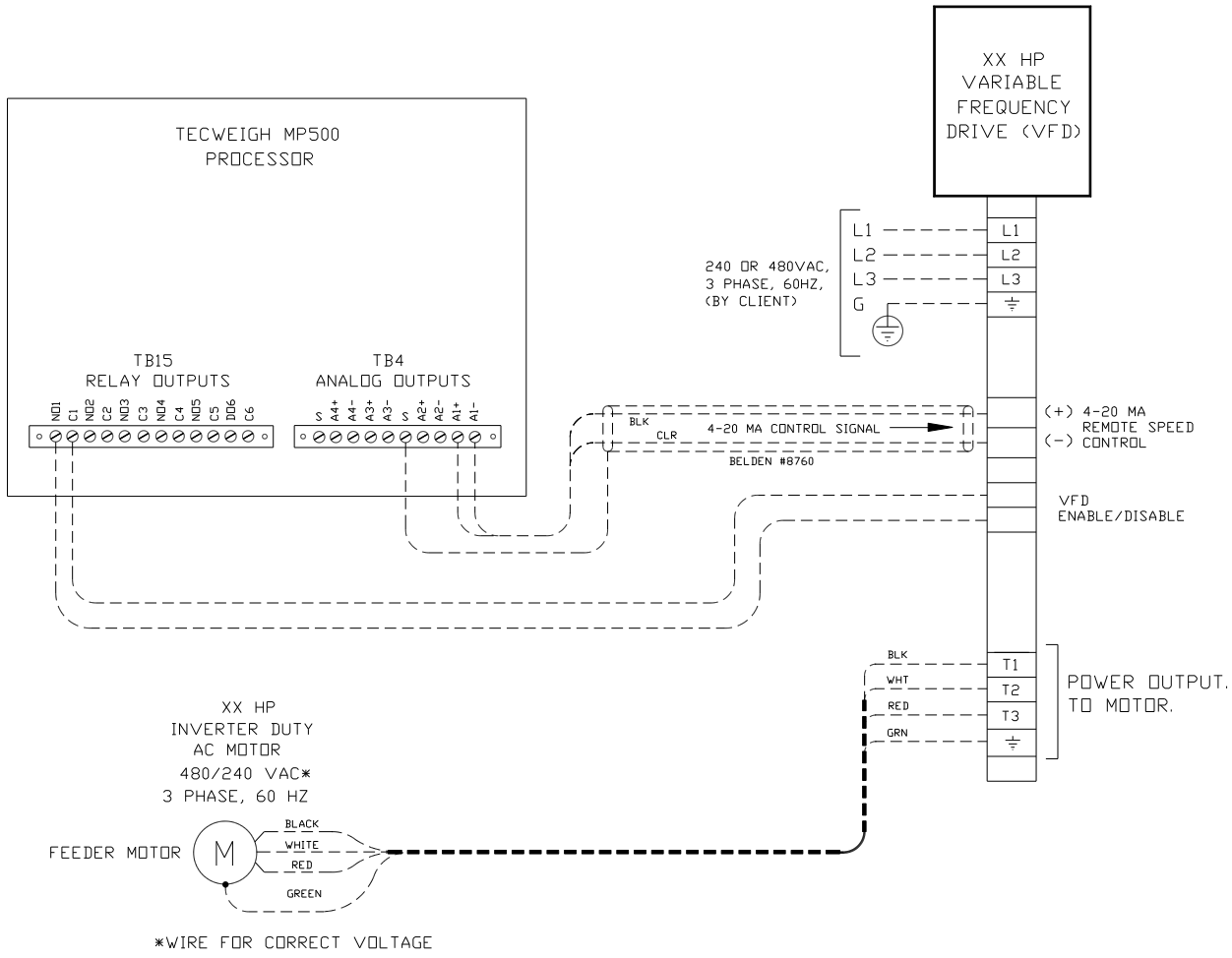


IMPORTANT NOTES:

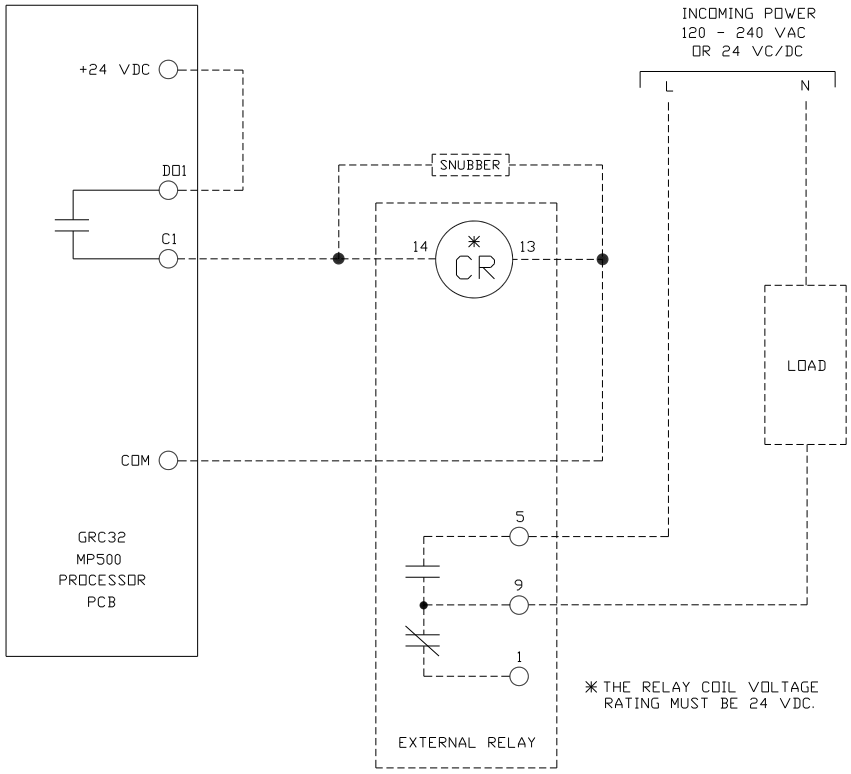
1. EVERY LOAD MUST BE ISOLATED, EXCEPT THE LAST ONE.
2. THE TOTAL LOAD RESISTANCE, LOAD 1 + LOAD 2 + LOAD 3, MUST BE LESS THAN APPROXIMATELY 750 OHMS.

TYPICAL WIRING FOR A 4-20 MA CURRENT
LOOP WITH MULTIPLE LOAD DEVICES

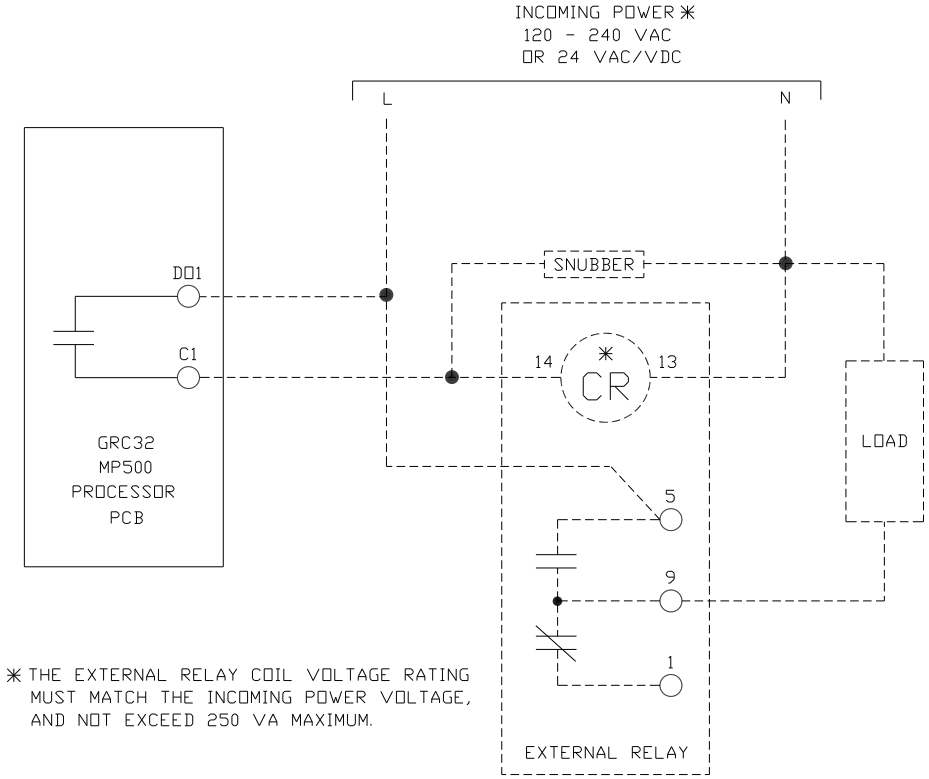
4.08 GRC32 to Variable Frequency Drive (VFD) wiring (typical).



4.09 Interposing relay with 24 vdc power.



4.10 Interposing relay with 120 vac power.

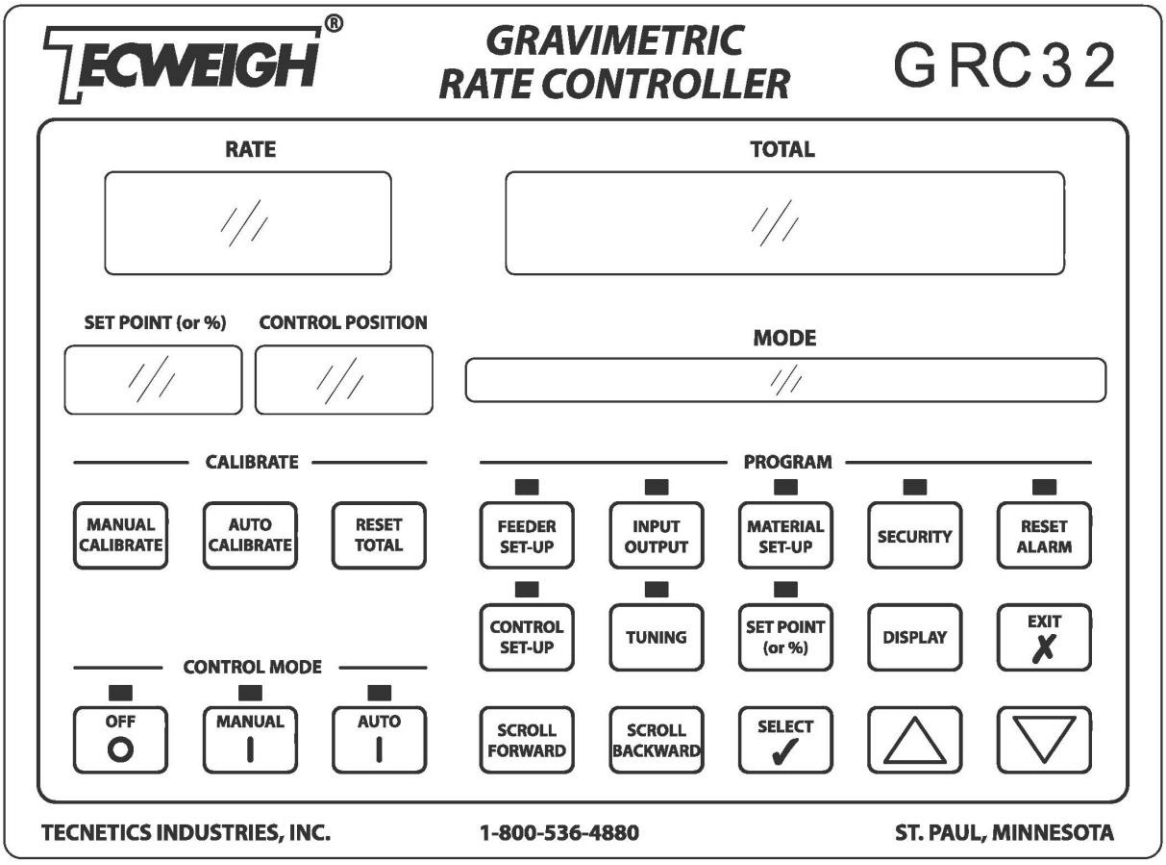


CHAPTER 5 – USER INTERFACE

5.01 The Display Area

At this point, the gravimetric feeder equipment should be installed and the GRC32 LIW controller mounted and wired. Now power up the system. The display windows should light up and the GRC32 will go through a short self test routine before the LED displays produce information. Since the GRC32 has not yet been calibrated to the specific application at hand, disregard any error messages or incorrect values on the displays.

The following diagram shows the GRC32 user interface front panel. There are five windows that display information, along with 21 pushbutton keys. The following describes the window displays:



RATE window - Displays the calculated RATE of material flow from the gravimetric feeder. The display can be set for 0, 1 or 2 decimal places. The RATE display is updated every second. When the RATE display is solid on it is the direct result of actual loss of weight calculations. When the RATE display is blinking it is an assumed RATE, such as during the refill process or when initially put into AUTO mode during the control delay period (Parameter 404, Control Delay).

TOTAL window – Depending upon the kind of display selected, this window can display the TOTAL weight of material dispensed, the Live Load weight, or the load count. Refer to the MODE window for information on which is active when SHORT TOTAL, LONG TOTAL, or LOAD COUNTS, are shown in the TOTAL window. When the LIVE LOAD of material in the equipment is displayed, "LL" is shown at the far left of this window.

MODE window - There are three different modes in which the GRC32 can run. Only certain information is displayed in each mode and only certain functions are available.

1) Normal Running Modes - Always displays the UNITS OF MEASURE to the far left. It also displays status messages, weight information, time and date. Pressing the DISPLAY key when in normal run mode will permit scrolling through the various display options available.
2) Program Mode - Displays the Parameters and settings when in a menu.
3) Calibration Mode - Prompt displays for the user to complete manual scale calibration and auto calibrate the feeder.

SET-POINT (or %) window – Displays the RATE SET POINT that the GRC32 maintains by varying the CONTROL POSITION output. The decimal point position for this display will automatically match the decimal point position on the RATE display.

CONTROL POSITION window – The CONTROL POSITION output is displayed as a percent of full scale to tenths of a percent. It represents the percentage of full speed in which the feeder will operate.

5.02 The Pushbutton Keys

5.02.01 The DISPLAY Key

When the GRC32 is powered up, the first display is a momentary self test, the next display is the default display. In the TOTAL window, this consists of LL on the left and the LIVE LOAD value on the right. In the MODE window, it consists of the UNITS OF MEASURE on the left, and MM/DD/YY HH:MM:SS on the right. Also displayed in their respective windows will be the RATE, SET POINT (or %), and the CONTROL POSITION, all in a fixed format. However, the TOTAL and MODE window displays can be changed by pressing the DISPLAY key. Each time the DISPLAY key is pressed, the two windows will scroll through four different displays including the default display.

With the refill Parameter (Parameter 106, Auto Rfl) in Weight mode, the displays that consecutively follow the default display each time the DISPLAY key is pressed are:

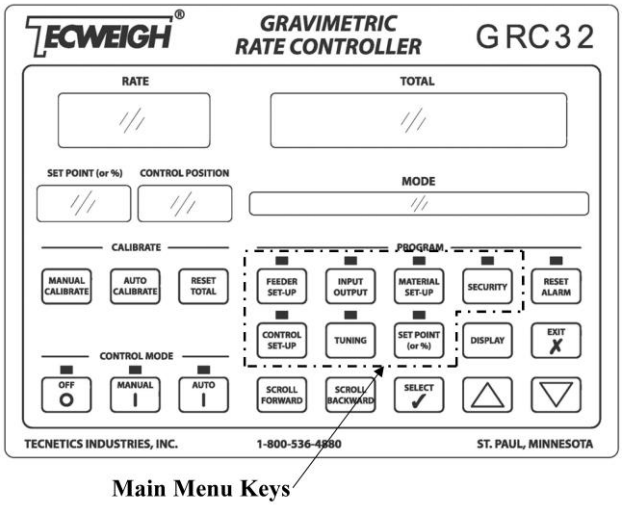
1) The TOTAL window will scroll through the SHORT TOTAL, LONG TOTAL, and LIVE LOAD. To distinguish between the two TOTALs and the LIVE LOAD, LL will appear at the left side of the window when the LIVE LOAD is displayed. To decipher between SHORT TOTAL and LONG TOTAL refer to the MODE window.

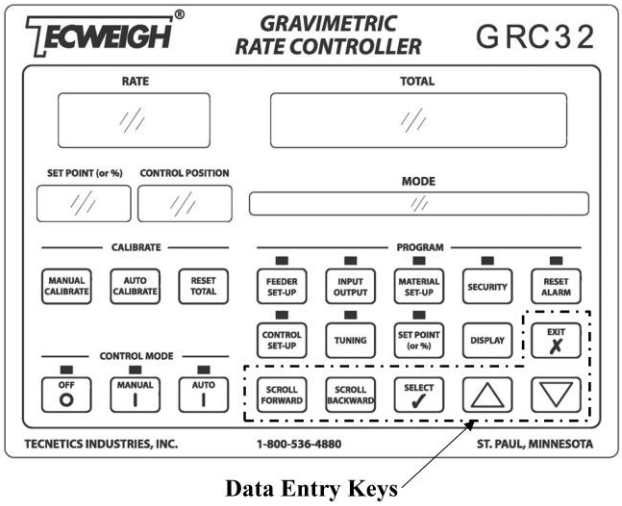
2) The MODE window UNITS OF MEASURE will remain constant, but on the right, the display will be the SHORT TOTAL SINCE MM/DD/YY HH:MM:SS in two repeating segments. The next display will be the LONG TOTAL SINCE MM/DD/YY HH:MM:SS in two repeating segments. The last display will be REFILL@#####LB IN APRX HH:MM:SS in two repeating segments.

The next press of the DISPLAY key will cause the displays to scroll back to the default display.

Remote % Mode exception: When the SET POINT is in the Remote % mode, meaning the local SET POINT is a percent of a remote SET POINT, there is an alternating display in the MODE window when at the default display. This alternating display states the actual resulting RATE SET POINT after the local % SETPOINT is applied to the remote SET POINT.

In either the MANUAL or AUTO modes, the time until the next refill, is calculated using the average actual running RATE. When in the OFF mode, the SET POINT value will be used to calculate the time before the next refill.





5.02.02 The Main Menu Key Group

The GRC32 is configured by accessing seven main menus via their respective keys on the front panel. Refer to the above left figure. Each menu consists of viewable Parameters, most of which can be edited. Whether a Parameter is visible or not might depend upon other Parameter selections. A LED will illuminate above the key to indicate which menu is active. It is possible to move from one menu to another without exiting. The KEYs functions are as follows:

5.02.03 The Data Entry Key Group

After a menu is entered via one of the Main Menu Keys above, the Data Entry Keys are used to access and modify the Parameters in the menu. Refer to the figure at above right.

Parameters - Accessed using the SCROLL FORWARD and SCROLL BACKWARD keys.

Parameter values - Modified by pressing the SELECT and then the up/down ARROW keys.

SCROLL FORWARD and SCROLL BACKWARD KEYS – Once a menu key has been pressed, to locate a specific Parameter simply press the SCROLL FORWARD or SCROLL BACKWARD keys until the Parameter appears in the mode window. All Parameters indicate their current values. Note that some Parameters will not appear, because the settings of other Parameters cause their functions to not be applicable.

SELECT KEY - After the desired Parameter is located, use the SELECT key to highlight an editable Parameter. This enables the Parameter to be modified. The editable parameter can be a word or a number. If it is a number, pressing the SELECT key highlights the digits horizontally one at a time. The enabled digit flashes for recognition. Always press the SELECT key to stop the Parameter or digit from flashing before advancing to the next Parameter or exiting the menu.

ARROW KEYS (Increment and Decrement) - Once the desired Parameter has been located (SCROLL key), and enabled (SELECT key), use the UP ARROW (increase) or DOWN ARROW (decrease) keys to modify the value. If the Parameter is a word, this will cause it to scan through the list of selections for that specific Parameter. Changes to Parameters are stored automatically when the SELECT key is pressed, which also stops the Parameter from flashing.

EXIT KEY - The EXIT key is used to exit the program mode and return to normal operation. It is not necessary to press the EXIT key to change from one menu to another. Exiting program mode automatically saves any changed values. Menus can be accessed from one to another without losing their internal positions.

5.02.04 The CALIBRATE Keys

AUTO CALIBRATION – The AUTO CALIBRATION key is used to direct the GRC32 to automatically learn the material running characteristics. The GRC32 will run material at various CONTROL POSITIONs and measure the running RATE. A number of Parameter values will then be automatically updated. The equipment will be calibrated and ready to run after a successful completion of Auto Calibration.

MANUAL CALIBRATION – The MANUAL CALIBRATION key is used to manually calibrate the scale. The GRC32 will step the user through a series of prompts in order to perform a calibration using a known calibration weight. The procedures include selecting a zero, determining the span, and determining the tare weight (empty equipment weight).

This key is also is used for selecting a zero and tare weight when electronic calibration is used.

When stepping through the prompts that appear, use the SELECT key (green check mark) for "Yes" or "Continue" responses and the EXIT key (red "X") for "No" or "Cancel" type responses.

RESET TOTAL – To display the desired TOTAL, press the SCROLL FORWARD key until it appears. To reset the TOTAL to zero, press the RESET TOTAL key once. The message "CONFIRM SHORT (OR LONG) TOTAL RESET" followed by a check mark and x. To confirm the reset, press the check mark (SELECT key), to not confirm press the x (EXIT key). The GRC32 prompts the user to accept resetting to avoid accidental resetting of the TOTALs.

IMPORTANT: If the SHORT TOTAL is displayed, only the SHORT TOTAL will be reset. If the LONG TOTAL is displayed, then **both** TOTALs are reset.

5.02.05 The CONTROL MODE Keys

The CONTROL MODE keys select the three basic modes that the GRC32 can operate in. Some features are only available in certain control modes.

The GRC32 can be switched between different modes of operation unless:

1) The CONTROL MODE keys are locked.
2) A MANUAL CALIBRATION is being performed.
3) An AUTO CALIBRATION is being performed or data is being exported to the removable memory module or through the serial port.

OFF – Pressing the OFF key stops the equipment from running. Run interlock relays revert to their "off" state, and PID and RATE calculations stop. Manual Calibration, Data exporting, and Simulation of RATE or WEIGHT, are only available to the user in this mode of operation. The CONTROL POSITION output can also be raised or lowered manually by using the up and down ARROWS.

MANUAL – Pressing the MANUAL key starts the equipment and calculates a running RATE, but PID calculations do not proceed. The CONTROL POSITION output can be increased or decreased manually using the up and down ARROWS. Both the Rate Alarm and Rate Fail Alarm are disabled in Manual mode, however, Auto refills and other live load alarms will still operate.

The MANUAL mode of operation is very useful when running drop tests during material testing. The GRC32 will also automatically run in MANUAL mode when performing an AUTO CALIBRATION.

AUTO – Pressing the AUTO key starts the equipment, calculates a running RATE, accumulates TOTALs, performs PID calculations, and makes changes to the CONTROL POSITION output to maintain the RATE SET POINT. The Auto Refill alarms, Rate alarms, and Live Load alarms are active.

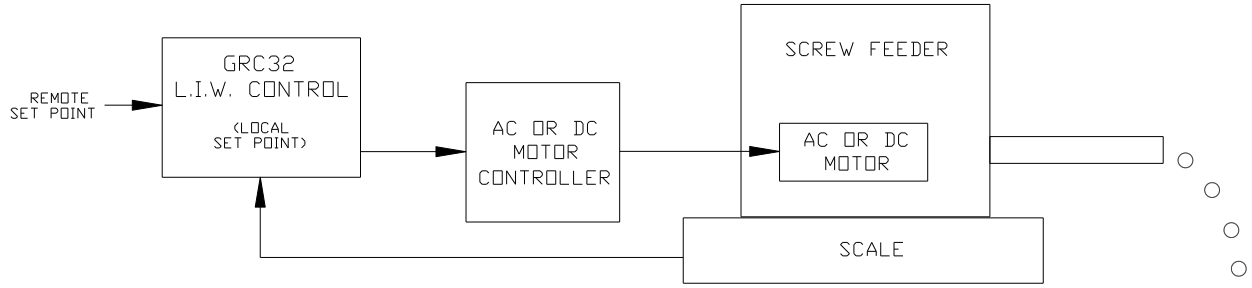
5.02.06 The SET POINT (or %) Key

The SET POINT (or %) key is used to enter the desired feed RATE SET POINT into the GRC32. To manually enter a SET POINT, press the SET POINT (or %) key which opens the Set Point menu and allows entry of a new Set Point. When the key is pressed, the MODE display will change to read **Setpoint: 0000.000**. When the new SET POINT has been entered, press the EXIT key to return to normal control. SET POINTs can be entered at any time, even while a process is running. Refer to Sections 6.05, 6.06, and 7.08 for more information on the Set Point Parameter as related to material blending functions and procedures.

CHAPTER 6 – OPERATION

6.01 Basic Operation

The **Tecweigh** GRC32 Gravimetric Loss-In-Weight (L.I.W.) controller was mainly designed to operate in conjunction with **Tecweigh** screw feeders. The basic function of the GRC32 is to automatically maintain a material feed RATE based upon a local or remotely entered SET POINT. Refer to the following figure.



The GRC32 displays direct readings of SET POINT, CONTROL POSTITION, RATE, and TOTAL. As material is feed from the screw feeder, the GRC32 continuously compares the material Loss-In-Weight (L.I.W.), that is, the feed RATE as measured by the scale, to the pre-selected SET POINT. Any difference between these two quantities is referred to as the "error". The 4(or 0) to 20 ma CONTROL POSTITION output to the motor controller is then increased or decreased to correct this error. The CONTROL POSITION window will display (in percent of full scale) the value of the 4(0)-20 ma output control signal. Large errors will yield large corrections in output and small errors will yield small corrections. Consequently, a smooth flow of material is desired, otherwise oscillations above and below the SET POINT, referred to as "hunting", might occur. When the material feed RATE again equals the SET POINT, the 4(0)-20 ma output value will be maintained until an error reoccurs. This control method is commonly referred to as a PID control (**P**roportional-**I**ntegral-**D**erivative).

When the feeder material weight reaches a pre-selected low weight Parameter 107 (Rfl Lo), the GRC32 will output a dry contact refill signal (Rly 2). This signal will be maintained while the feeder is refilling. When a pre-selected high weight Parameter 108 (Rfl Hi) is reached, the refill signal will be discontinued. During the refill time the feed RATE prior to the call to refill is maintained. The refill time Parameter 109 (Rfl Time) sets the allowable amount of time for the GRC32 to complete the refill process. If this time elapses a Refill Alarm will occur. See Section 6.06 for a full description of the alarm.

Output interfaces from the GRC32 also offer the ability to monitor production by utilizing printers, PLC's, and other remote client provided devices. Additionally, a RS232 or RS485 serial interface port permits remote control from PLC's or computers, thereby aiding plant automation.

6.02 Disturbance Cruise Control (DCC)

The GRC32 continually monitors the live load count of the load cell output to analyze whether the oscillation of this signal is indicative of the normal feeder oscillation and vibration. If the load count pattern should change suddenly, the GRC32 will pick up on the change and switch over to a DCC mode, or Disturbance Cruise Control.

This mode of operation locks the running RATE into the last known good running RATE and ignores the sudden changes in the load count signal. The signal continues to be monitored and the processor waits until the signal returns to a normal state. When this happens, the DCC mode switches off and the GRC32 returns to normal operation.

Parameter 408, DCC Sense, controls the sensitivity of this feature. Defaulted is 3, this number can be lowered to make it more sensitive or increased to make it less sensitive.

6.03 TOTAL Accumulation

The TOTAL amount of material dispensed from the feeder is accumulated to the TOTAL display. This is done in two different ways. When in the AUTO or MANUAL running modes, the TOTAL accumulates gravimetrically. It does this by monitoring the loss-in-weight of material in the equipment. This is termed Gravimetric Accumulation.

When the feeder is being Refilled, or is in a Disturbance Cruise Control mode, the TOTAL will accumulate based on the last known RATE that was being fed. This is termed Rate Based Accumulation.

Gravimetric Accumulation

The TOTAL weight of material being dispensed from the feeder accumulates by monitoring the Load Count. The TOTAL will always count up while material is being dispensed (load count dropping) and will ignore large increases in weight on the scale base. In other words, the TOTAL will always increment and never decrement. Should there be a sudden increase in the scale Load Counts, the GRC32 will ignore the gain in weight and start incrementing the TOTAL again only after the Load Count drops below its previous low point.

Due to the normal oscillations/vibrations of the equipment on the scale base that is usually caused by paddle movement, etc., the TOTAL has a 2 second delay in incrementing to avoid over TOTALing. It will react to a Load Count based on a 50 sample running average, and will increment one Total Res value behind the actual running average. If the TOTAL resolution is set to increment 0.0, 0.5, 1.0, 1.5, 2.0…, then the TOTAL will display 1.5 only after the running average has breached 2.0 as the TOTAL. This keeps the TOTAL from overshooting. When the equipment stops running and the oscillations/vibrations cease, the running average will flush out and the resulting TOTAL will, at the most, be one unit of resolution off of actual.

Rate Based Accumulation

When the GRC32 enters the Refill mode of operation, or indicates there is a DCC condition, the TOTAL will switch to this mode of totalizing. During this mode of totalizing the RATE will blink, indicating to the user the change in TOTAL accumulation mode. The last known running RATE will be used to accumulate the TOTAL through the refill cycle. Every second, the last known RATE will be divided down to one second of TOTAL accumulation and added to the existing TOTAL. The TOTAL will update at a one second interval (always) and will only return to Gravimetric Totalizing after the refill cycle is complete or the DCC condition is resolved.

6.04 Simulation Modes

The Tecweigh GRC32 Rate Controller has the ability to simulate RATEs and WEIGHTs that would occur when running in the AUTO or MANUAL Modes. This can be very a useful feature when setting up all forms of remote communications. Not only the settings themselves can be verified, but the interconnecting wiring to refill valves, alarms, warning lights, serial interfaces, and other field bus protocols can be verified. For safety considerations, this Simulation Mode is

only accessible when the GRC32 is in the OFF Mode. Therefore, the run interlock relay is the only item that cannot be tested when in Simulation Mode.

The Simulation Mode functions by manipulating various Parameters xxx – xxx. The RATE and/or WEIGHT (live load) can be simulated independently. The user can turn on Sim Rate (Parameter 300) and/or Sim Weight (Parameter 302) and can then enter other menus to change I/O Parameters without exiting the Simulation Mode. However, as soon as the Parameter Entry Mode is exited, the Simulation Mode returns to OFF.

Simulated RATE:

Note that the simulated RATE does not include any decimal points. It also ignores the Rate DP (Parameter 102) setting. When Sim Rate (Parameter 300) is on, and the simulated RATE is above zero, the GRC32 will also accumulate a LONG and SHORT TOTAL. These totals will accumulate at the indicated RATE, and will always reset to zero every time the simulated RATE is restarted. However, it has no effect on the Weight (live load). When Sim Rate is off, the previous long and short TOTALs will return to their original values.

Simulated WEIGHT:

Note that the simulated WEIGHT does not include any decimal points. It also ignores the Total DP (Parameter 104) setting. When Sim Weight (Parameter 302) is on, the actual Live Load WEIGHT is overridden by the simulated WEIGHT. It has no effect on the RATE or TOTALs, and it is not affected by a simulated RATE. The WEIGHT value remains static. When Sim Weight is off, the previous WEIGHT (live load) will return to its original value. As an example, if the operator wishes to simulate a refill cycle, a low refill (Parameter 107, Rfl Lo) start value would have to be entered and then a high refill (Parameter 108, Rfl Hi) stop value entered. If this is not done within the refill time (Parameter 109, Rfl Time) setting, the refill alarm will be activated.

6.05 Single Loop Control

A single loop control is the simplest application of Rate Control. The SET POINT can be entered either locally or from a remote location, and is entered as a value with units of measure as indicated by the GRC32, i.e., tons per hour, pounds per minute, etc. Refer to the figure in Section 6.01.

Local Set Point

The following Parameter settings affect the GRC32 for a single loop control with a locally entered Set Point:

<u>Tuning Menu Parameters</u>

404 Control Delay	Short delay when initially put in AUTO mode (10 seconds)
405 Sample Time	Interval between Control Position Changes (5 seconds)

<u>Control Set Up Menu Parameters</u>

203 Min Output	Minimum Control Position output (10%)
204 Max Output	Maximum Control Position output (90%)
205 Max Change	Maximum % of change each PID calculation (5%)
206 Setpoint type	Enables the Local Set Point to be edited

Any remote Set Point signals received will be ignored.

Remote Set Point

Single loop control using a remote Set Point provides for a follower type system. The signal can originate from a remote PLC or computer as an analog signal (4-20ma or 0-5vdc), a digital signal (RS232, RS485), or as a field bus communications signal (Modbus RTU, Device Net, Profibus, Ethernet IP (modbus TCP), or Remote I/O). Once the remote signal is received it is scaled (analog only), then sent to the SET POINT display representing tons per hour, pounds per minute, etc. Several GRC32 rate control systems can be linked to one remote signal, which permits complete plant automation. The local Set Point Menu is disabled when using the Remote Set Point mode.

Tuning Menu	
404 Control Delay	Short delay when initially put in AUTO mode (10 seconds)
405 Sample Time	Interval between Control Position Changes (5 seconds)
Control Set Up Menu	
203 Min Output	Minimum Control Position output (10%)
204 Max Output	Maximum Control Position output (10%)
205 Max Change	Maximum % of change each PID calculation (5%)
206 Setpoint type	Enables remote Set Points (REMOTE)
207 Rem Set Pnt	Select the remote set point type. mA/Fieldbus/serial/VDC
208 mA@0 R SetP	Usually 4 for mA analog inputs. (mA or VDC Only)
209 R SetP@20mA	Used to set the rate at full scale. (mA or VDC Only)
210 SP LTrim	Trims the low end of the scale. (mA or VDC Only)
211 SP HTrim	Trims the high end of the scale. (mA or VDC Only)

6.06 Ratio (Master/Slave) Control

Some applications require a feed RATE that is a percentage of (or proportional to) a remote process. This is commonly termed a “ratio” or “master/slave” control, where the local process is a percentage (or ratio) of the remote process. This kind of material blending system utilizes the GRC32’s % Remote Set Point function. The received remote signal is continuously re-calculated using the desired percent (ratio) value that was previously entered via the SETPOINT (or %) key, i.e. 50 for 50%. The resultant value is used as the local Set Point. By this process the GRC32 will always maintain the desired feed rate percentage (or ratio) of the remote process.

Example 1: If the remote signal represents 150 tons per hour and the local SET POINT (or %) display is 50.0, the resultant local Set Point value will be 75 tons per hour (150 x 0.50 = 75).

The remote input signal (analog, serial, or field bus) can originate from a PLC or PC, but can also originate from the analog output, serial output, or field bus card output of. a **Tecweigh** WP20, FC20, or another GRC32. Analog (not serial or field bus) signals must be scaled to the units of measure indicated by the GRC32. This is done using Parameters 208 (mA@0R SetP) and 209 (R SetP@ 20mA), located in the CONTROL SET-UP menu. A serial signal must be in Set Point format (Section 9.02, command 20). When the system is using a **Tecweigh** WP20, FC20, or another GRC32 for the remote process, be certain that the Units, Rate DP, and Station ID Parameters, match between the remote (master) WP20, FC20, or GRC32, and all local GRC32 (slave) controllers.

The following Parameter settings affect the GRC32 for a ratio control with a remote Set Point:

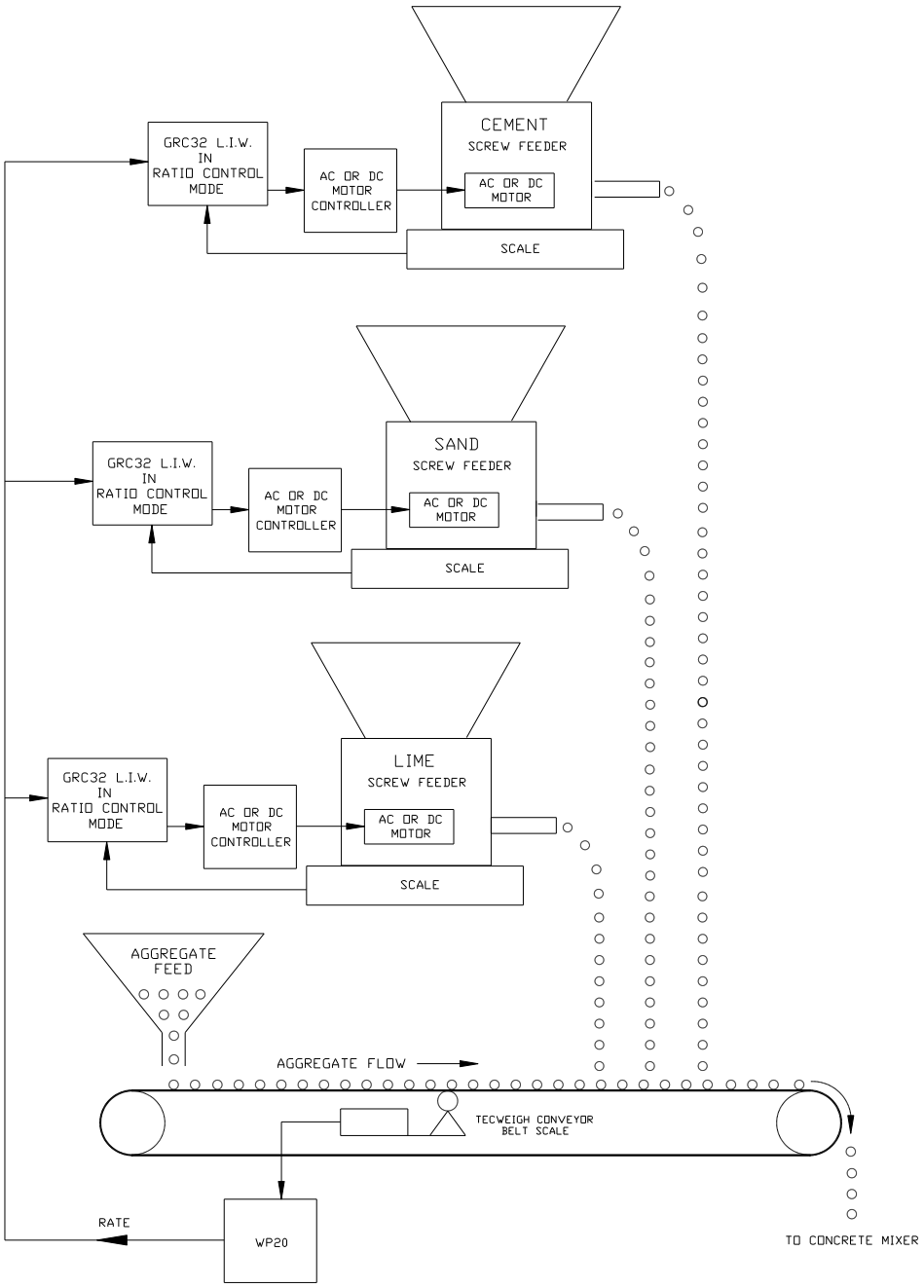
Tuning Menu

404 Control Delay	Short delay when initially put in AUTO mode (10 seconds)
405 Sample Time	Interval between Control Position Changes (5 seconds)

Control Set Up Menu

203 Min Output	Minimum Control Position output (10%)
204 Max Output	Maximum Control Position output (10%)
205 Max Change	Maximum % of change each PID calculation (5%)
206 Setpoint type	Enables remote Set Points (REMOTE%)
207 Rem Set Pnt	Select the remote set point type. mA/Fieldbus/serial/VDC
208 mA@0 R SetP	Usually 4 for mA analog inputs. (mA or VDC Only)
209 R SetP@20mA	Used to set the rate at full scale. (mA or VDC Only)
210 SP LTrim	Trims the low end of the scale. (mA or VDC Only)
211 SP HTrim	Trims the high end of the scale. (mA or VDC Only)

Example 2: A concrete blending system proportions the flow of Portland cement, sand, and lime, as an additive to an aggregate flow on a belt. The aggregate weight is continuously measured as it passes over a **Tecweigh** conveyor belt scale. The weight signal is continuously transmitted to a **Tecweigh** WP20, which outputs a 4-20 ma RATE signal to three GRC32s. Each GRC32 calculates a percentage of the remote signal and uses it as its local SET POINT. The GRC32s then control the flow of cement, sand, and lime into the aggregate by adjusting the speed of their screw feeders. Refer to the following figure.



6.07 Alarms and Alarm Reset

The GRC32 is equipped with an alarm function. The alarm selections are Weight, Rate, Rate Fail, and Refill. The set up Parameters are in the Feeder Set-Up menu. When any alarm condition is true, a specific message for it will be displayed in the MODE window. Additionally, for some alarms a local action will also take place, like an equipment shutdown. When an alarm condition occurs, alarm relay output contacts can be configured to activate, so indication can be sent to an external management system and/or audible or visual alarms. Relays 3 to 6 are used for this purpose and their set up Parameters are 329 to 341. When an alarm condition is present, the red LED located just above the RESET ALARM key is also illuminated.

Pressing this ALARM RESET key will cause any alarm to reset.

WEIGHT (Live Load) Alarm

The Live Load Alarm (Parameters 110, Alrm Lo, & 111, Alrm Hi) is active in both the MANUAL and AUTO control modes, and controls the limits of acceptability for the Live Load. For example, the operator can program the alarm to activate when the Live Load reaches 5 lbs. on the low end and 2000 lbs. on the high end. The alarm Parameters must be set outside the Rfl Lo (Parameter 107) and Rfl Hi (Parameter 108) normal operating settings.

In MANUAL mode when the alarm occurs, the message "WEIGHT ALARM" will appear in the MODE window, but no changes will occur in the selected control mode (Off, On, or Auto).

In AUTO mode when the alarm occurs, the message "WEIGHT ALARM" will appear in the MODE window and the GRC32 will automatically switch to the OFF control mode, shutting the equipment off. Any relays that have their function set up as Wght Alrm will also change state during this alarm condition.

RATE Alarm

The RATE Alarm (Parameters 113, Rate Alrm Lo, & 114, Rate Alrm Hi) is only active in the AUTO control mode, and can be used as a tolerance band limit for the RATE. For example, the operator can program the ALARM to activate when the actual feed RATE deviates 10 % above or 20 % below the feed RATE Set Point.

When the alarm occurs, the message "RATE ALARM" will appear in the MODE window, but no changes will occur in the selected control mode (Off, On, or Auto). Any relays that have their function set up as Rate Alrm will also change state during this alarm condition.

RATE FAIL Alarm

The RATE Fail Alarm (Parameters 113, Rate Alrm Lo, & 114, Rate Alrm Hi) is only active in the AUTO control mode, and can be used as a tolerance band limit for the RATE. For example, the operator can program the ALARM to activate when the actual feed RATE deviates 10 % above or 20 % below the feed RATE Set Point.

When the alarm occurs, the message "RATE FAIL ALARM" will appear in the MODE window and the GRC32 will automatically switch to the OFF control mode, shutting the equipment off. Any relays that have their function set up as Rate Fail will also change state during this alarm condition.

REFILL Alarm

The REFILL Alarm is only active in the AUTO control mode and is dependent upon Parameters 106, Auto Rfl; 108, Rfl Hi; and 109, Rfl Time. When Auto Rfl is set to Weight, the Rfl Time becomes the control to indicate a failed refill cycle.

A normal refill cycle ends when the Parameter 108, Rfl Hi setting is attained. As the refill process is proceeding, the Rfl Time setting is also timing. If the Rfl Hi setting is attained before Rfl Time times out, then the alarm is discontinued. However, if the Rfl Time times out, the message "REFILL ALARM" appears in the MODE window and the GRC32 will automatically switch to the OFF control mode, shutting the equipment off. Any relays that have their function set up as Ref Alrm will also change state during this alarm condition.

CHAPTER 7 – THE PARAMETER TABLE

7.01 Factory Settings

For quick reference, the table in chapter 11.02 has a summary of all the Parameter values that were entered at the factory for the particular application at hand. However, each application will require some customization of the factory settings. After customizing the Parameters for the particular installation, the values should be recorded for future reference and use. Note that it is critical not to rely entirely on the factory values! Learn about each Parameter and enter the value that best meets the needs of the application.

7.02 Parameter Definitions, General

Each Parameter description should be read and understood and its appropriate value entered for the application at hand. The particular application or desired options usually do not require re-setting all the Parameters. Additionally, it is recommended that the feeder and scale be properly calibrated before enabling the optional outputs.

Note also, that if a Parameter's function is "Unused", then additional set up Parameters for that Parameter will not be visible.

7.03 FEEDER SET-UP Menu Parameters

The FEEDER SET-UP Menu contains Parameters which pertain to the actual weighing equipment and to some functions of the GRC32. Parameters that refer to items such as the calibration weight (cal weight), refill type, or alarm settings, are found in this menu. The following is an item by item description of all of the Parameters that are contained within the FEEDER SET-UP Menu.

***100*) Mass Units:** - Select the desired units of measure for the mass. This will be the unit of measure for the TOTAL window, except during calibration when it shows the load count of the load cell output instead.

Oz	Oz	Ounces
Lb	Lb	Pounds **(Default setting)**
Ton	Tn	Standard Ton (2000 lbs)
Gram	Gm	Grams
Kg	Kg	Kilograms
Mton	mT	Metric Tons (2000 Kg)

***101*) Time Units:** - Select the desired units of measure by which the RATE will be computed. This will be the unit of measure for the SET POINT and RATE when coupled with the Mass Units Parameter.

Sec	S	Seconds
Min	M	Minutes **(Default setting)**
Hr	H	Hours

For example, when the Mass Units and Time Units are set to Lb (Pounds) and M (Minutes) respectively, the MODE window will display Lb/M.

***102*) Rate DP:** - Enter the desired decimal point position for the RATE window. A good rule of thumb is to set it to ONES when the maximum RATE will be greater than 100, set it to TENS when the maximum RATE will be less than 100, and set it to HUNDS when the

maximum operating RATE will be less than 10. If the RATE exceeds what will fit in the display, a series of dashes will appear in the RATE window and looks like -----.

Ones	0000 **(Default setting)**
Tens	000.0
Hunds	00.00

***103*)** **Rate Avg:** - Enter the number of samples in the running average for the displayed RATE. Averaging (also termed damping) makes the RATE display more stable so the numbers do not change faster than they can be read. A higher setting allows for a more stable reading. Rate Avg does not affect the totalizing or the accuracy of the system. A Setting of 00 or 01 will turn the averaging "off".

00 to 99 Selection is in seconds. **(Default value is 15).**

104) **Total DP:** - Enter the desired decimal point position for the TOTAL window. If the TOTAL exceeds what will fit in the display, a series of dashes will show in the TOTAL WINDOW and looks like -----.

Ones	00000000 **(Default setting)**
Tens	0000000.0
Hunds	000000.00
Thous	00000.000

105) **Total Inc:** - The total WEIGHT can be set to increment at a set resolution that is different from the decimal point value. This setting always affects the least significant digit on the TOTAL. For example, if Total DP is set to Ones and Total Inc is set to 2, the Total and Weight would increment 0, 2, 4, 6, 8, 10, … If the Total DP is set to Hunds and Total Inc is set to 2 the total would increment .00, .02, .04, .06, .08, …

1	No effect on resolution. **(Default value).**
2	If Total DP is set to Ones, resolution increments every 2 mass units.
5	If Total DP is set to Ones, resolution increments every 5 mass units.
10	If Total DP is set to Ones, resolution increments every 10 mass units.

106) **Auto Rfl:** - Select the method of refilling the gravimetric feeder's hopper. Rly 2 is set as the default output relay to control the refill process. The **automatic** refill cycle will only occur when the GRC32 is in the AUTO mode of operation.

None	Automatic refill is not done. Use this option if refill of the hopper is done manually, or the refill process is not done when in the AUTO mode of operation.
Weight	This selection will base the start of the refill process on the setting of Parameter 107, Rfl Lo, and stop the refill process on the setting of Parameter 108, Rfl Hi. **(Default setting).**
Wt/Time	This selection will base the start of the refill process on the setting of Parameter 107, Rfl Lo, and stop the refill process when the time setting of Parameter 109, Rfl Time, elapses.

107) **Rfl Lo:** - When Parameter 106, Auto Rfl, is set to None, this Parameter is not visible

When Parameter 106, Auto Rfl, is set to Weight or Wt/Time, this Parameter is the hopper material weight that triggers the start of the refill process.

0010.000 This Parameter is not adjusted for decimal point (DP) settings, but it will update upon changing the Mass Units. **(Default setting).**

108) **Rfl Hi:** - When Parameter 106, Auto Rfl, is set to None, this Parameter is not visible

When Parameter 106, Auto Rfl is set to Weight, this Parameter is the hopper material weight setting that will trigger the end of the refill process.

When Parameter 106, Auto Rfl is set to Wt/Time, this Parameter is the control that determines if a refill cycle has failed. In Wt/Time mode, the refill cycle lasts a set amount of time (Parameter 109, Rfl Time, following). If this Rfl Hi Parameter setting has not been achieved in that time, a Refill Alarm will occur.

0015.000 This Parameter is not adjusted for decimal point (DP) settings, but it will update upon changing the Mass Units. **(Default setting).**

109) **Rfl Time:** - When Parameter 106, Auto Rfl, is set to None, this Parameter is not visible.

When Parameter 106, Auto Rfl is set to Weight, the refill cycle ends when the Rfl Hi setting is attained. This Parameter becomes the control to determine if the refill cycle has failed. It specifies the maximum amount of time allotted for the refill process to achieve the Rfl Hi Parameter setting. If the Rfl Time elapses before the Rfl Hi setting is attained, a refill alarm will occur.

When Parameter 106, Auto Rfl is set to Wt/Time, this value is the time in seconds that the refill process remains active.

10.0 This Parameter is settable from 00.1 to 99.9 seconds. **(Default setting).**

110) **Alrm Lo:** - This Parameter is only active in the MANUAL and AUTO modes of operation. It is used to shut down the system if a refill process fails to fill the hopper and the hopper is in danger of being emptied completely. This Parameter value must be set lower than Parameter 107, Rfl Lo, but it is recommended that it be set high enough to keep the feeder from being emptied completely. It can also be tied to external devices by using a relay's Alarm function. If this condition occurs, the mode of operation (Off, Manual, Auto) will change to OFF and the message "LOW WEIGHT ALARM" will be displayed in the MODE window. This Parameter can be disabled by setting it to zero

0005.000 This Parameter is not adjusted for decimal point (DP) settings, but it will update upon changing the Mass Units. **(Default setting).**

111) **Alrm Hi:** - This Parameter is only active in the MANUAL and AUTO modes of operation. It is used to shut down the system if a refill process fails to stop and the hopper is in danger of being over-filled. This occurrence would prevent the L.I.W. process from operating correctly or could possibly damage system components. This Parameter value must be set higher than Parameter 108, Rfl Hi, but it is recommended that it be set low enough to prevent excessive weight from damaging the load cells. It can also be tied to external devices by using a relay's Alarm function. If this condition occurs, the mode of operation (Off, Manual, Auto) will change to OFF and the message "HIGH WEIGHT ALARM" will be displayed in the MODE window. This Parameter can be disabled by setting it to zero

000150 This Parameter is not adjusted for decimal point (DP) settings, but it will update upon changing the Mass Units. **(Default setting).**

******* The following two Parameters 112, Rate Al Type, and 116, R Fail Type, can be used together to create Rate Alarm "bands", one inside the other. The inner band, Rate Al Type, would be used to generate just an alarm if the Rate went outside its boundaries, and the outer

band would be used to generate an alarm and also shut down the equipment if the Rate went outside its boundaries. Parameters 112 through 119 are used to set up the two bands.***

***112*)** **Rate Al Type:** - This Parameter is only active in the AUTO mode of operation and selects how a Rate Alarm condition is determined. When this alarm is activated, the GRC32 indicates in the MODE window that an alarm condition exists, however, it does not change the mode of operation (OFF, MANUAL, AUTO). The alarm can also be tied to external devices by using a relay's Alarm function. The selections are Percent or Direct:

Percent — This selection determines a RATE alarm based upon a percentage of error from the SET POINT value. If the following two Parameters 113 & 114 are both set to 5, then the ALARM condition would exist if the actual RATE varied +/- 5% from the SET POINT. **(Default setting).**

Direct — This selection determines a RATE alarm based upon a minimum and maximum actual RATE value, regardless of SET POINT. If the following two Parameters 113 & 114 are set to 5 and 50, then the ALARM condition would exist if the actual RATE was below 5 or above 50, regardless of the SET POINT.

***113*)** **Rate Alrm Lo:** - This Parameter sets the low value for the RATE alarm. Refer to Parameter 112, Rate Al Type, above. If Rate Al Type is set to Percent, this value represents percent from SET POINT, if set to Direct, it represents that actual RATE value. If a low RATE condition should occur using either method, the message "RATE ALARM" will appear in the MODE window, but an equipment shutdown will not occur.

0000.00 — This Parameter is not adjusted for decimal point (DP) settings, Mass Units, or Time Units changes. **(Default setting).**

***114*)** **Rate Alrm Hi:** - This Parameter sets the high value for the RATE alarm. Refer to Parameter 112, Rate Al Type, above. If Rate Al Type is set to Percent, this value represents percent from SET POINT, if set to Direct, it represents that actual RATE value. If a high RATE condition should occur using either method, the message "RATE ALARM" will appear in the MODE window, but an equipment shutdown will not occur.

0000.00 — This Parameter is not adjusted for decimal point (DP) settings, Mass Units, or Time Units changes. **(Default setting).**

***115*)** **Rate Alrm Delay:** - This Parameter value is the time in seconds that the alarm state has to exist before the Rate alarm is activated.

01.0 — This Parameter is settable from 00.1 to 99.9 **(Default setting).**

***116*)** **R Fail Type:** - This Parameter is only active in the AUTO mode of operation and selects how a Rate Alarm condition is determined. When this alarm is activated, the GRC32 indicates in the MODE window that an alarm condition exists and also changes the mode of operation (OFF, MANUAL, AUTO) to OFF. The alarm can also be tied to external devices by using a relay's Alarm function. The selections are Percent or Direct:

Percent — This selection determines a RATE alarm based upon a percentage of error from the SET POINT value. If the following two Parameters 113 & 114 are both set to 5, then the ALARM condition would exist if the actual RATE varied +/- 5% from the SET POINT. **(Default setting).**

Direct This selection determines a RATE alarm based upon a minimum and maximum actual RATE value, regardless of SET POINT. If the following two Parameters 113 & 114 are set to 5 and 50, then the ALARM condition would exist if the actual RATE was below 5 or above 50, regardless of the SET POINT.

***117*)** **R Fail Al Lo:** - This Parameter sets the low value for the RATE alarm. Refer to Parameter 116, R Fail Type, above. If R Fail Type is set to Percent, this value represents percent from SET POINT, if set to Direct, it represents that actual RATE value. If a low RATE condition should occur using either method, the message "RATE FAIL ALARM" will appear in the MODE window, and the operating mode will be changed to OFF.

0000.00 This parameter is not adjusted for DP (decimal point) settings, Mass Units or Time Units changes. **(Default setting).**

118) **R Fail Al Hi:** - This Parameter sets the high value for the RATE alarm. Refer to Parameter 116, R Fail Type, above. If R Fail Type is set to Percent, this value represents percent from SET POINT, if set to Direct, it represents that actual RATE value. If a high RATE condition should occur using either method, the message "RATE FAIL ALARM" will appear in the MODE window and the operating mode will be changed to OFF.

0000.00 This Parameter is not adjusted for decimal point (DP) settings, Mass Units, or Time Units changes. **(Default setting).**

119) **R Fail Del:** - This Parameter value is the time in seconds that the alarm state has to exist before the Rate alarm is activated.

01.0 This parameter is settable from 00.1 to 99.9 **(Default setting).**

120) **Zero Counts:** - This Parameter is not editable, but is viewable, and is calculated during the Auto Zero function. It displays the Load Counts that the processor is using as a Zero Reference which can be used for technical troubleshooting.

121) **Span Counts:** - This Parameter is not editable, but is viewable, and is calculated during the Auto Span function. It displays the Load Counts that the processor is using as a Span Reference which can be used for technical troubleshooting

122) **SCF:** - The Span Correction Factor is used to adjust the load cells(s) calibration for altitude, or because electronic calibration was done without specific information. Refer to Chapter 8, Calibration, for additional information.

1.000 This parameter is settable from .500 to 2.000 **(Default setting).**

123) **Alarm Output:** - The Alarm Output function is used to lock or hold the CONTROL POSITION to a pre-selected percentage when Rate Alarm or External Alarm conditions occur. For example, if the operator sets Alarm Output to 25%, and an alarm condition occurs, the CONTROL POSITION display will hold at 25%. The CONTROL POSITION will return to AUTO mode when either one of the two following conditions is met:

a) The alarm condition returns to a "safe condition", or

b) The operator presses the RESET ALARM key on the front panel.

An Alarm Output setting of 000.0 % will disable this alarm output function.

000.0 Settable from 000.0 to 100.0 percent. **(Default setting).**

124) **Agit Speed:** - If the material feeder has a separate drive motor for the feeder paddles or an agitator, this Parameter sets the speed of that motor. This Parameter is not functional

unless an analog output is set to function as "Agit Ctrl" output and that output is wired to the motor's speed controller.

050.0 This parameter settable from 0-150%. **(Default setting).**

7.04 Control Set-Up Menu Parameters

This Control Set-up Menu is used to configure the GRC32 for specific gravimetric Loss-In-Weight (L.I.W.) RATE control applications. It is also used to set the internal time clock and to set up the variables that determine the GRC32 front panel display.

A local SET POINT provides for local single loop control. Remote, or % Remote SET POINTs provide for remote single loop control or ratio (master/slave) control. Remote SET POINTs can represent tons per hour, lbs per minute, etc, and be sent to the GRC32 via an analog signal, serial communications, or the field bus interface option. The following is an item by item description of all of the Parameters that are contained within the CONTROL SET-UP Menu.

200) **Cal Wt:** - Enter the exact value of the calibration weight (cal weight). If a cal weight from the factory is being used, then this value is stamped on the end of the calibration weight (in pounds). Be sure to use the same units of measure as Parameter 100, Mass Units, found in the Feeder Set Up menu. (Kilograms (KG) = 0.453 x Pounds (LBS)).

0048.000 This Parameter is not adjusted for DP (decimal point) settings, but it will update upon changing the Mass Units. **(Default setting).**

***201*)** **Time Set:** - This Parameter is for setting the internal clock. Before edits are made to this Parameter, the existing internal time setting is displayed. Upon exiting this Parameter the internal time clock will be updated.

HH:MM Defaults to the existing clock setting.

***202*)** **Date Set:** - This Parameter is for setting the date. Before edits are made to this Parameter, the existing internal setting for the date is displayed. Upon exiting this Parameter the internal date will be updated.

YY/MM/DD Defaults to the existing date setting.

***203*)** **Min Output:** - This Parameter sets the CONTROL POSITION output minimum limit. (The front panel CONTROL POSITION is displayed in percent).

010.0 Settable from 000.0 to 100.0 percent. **(Default setting).**

204) **Max Output:** - This Parameter is used to set the CONTROL POSITION output maximum limit. (The front panel CONTROL POSITION is displayed in percent).

090.0 Settable from 000.0 to 200.0 percent. **(Default setting).**

205) **Max Change:** - This Parameter sets the maximum amount the CONTROL POSITION can change per each change. Whenever a CONTROL POSITION change request comes via the PID calculations, it will be limited to this amount in percent. This keeps the feeder under control if the material flow is briefly interrupted resulting in a large error in RATE.

005.0 Settable from 000.0 to 200.0 percent. **(Default setting).**

206) **Setpoint Type:** - This Parameter selects the function of the GRC32 SET POINT. The selections are; Local, Remote, and %Remote. A short summary is: when set to Local, the displayed SET POINT represents direct tons/hour, lbs/min, etc. When set to Remote, the local SET POINT will be disabled and only a SET POINT received from a remote location will be active. When set to %Remote, the displayed SET POINT will represent a percentage (0-100%) of the incoming remote SET POINT. Analog remote SET POINTs

must initially be scaled for proper operation. Refer to Section 7.08, Set Point Menu Parameter, for information on SET POINT entry.

The Set Point mode to be used is determined by the kind of RATE control application that is required. One application might require the LOCAL mode which is normally used for single loop control. Another application might require the REMOTE mode where one or more remote SET POINTs are sent to the GRC32 by a PLC (Programmable Logic Controller). A third application might require the %REMOTE mode where material blending is required. In this mode, a remote SET POINT is sent to the GRC32 from a remote device such as a PLC and then the GRC32 takes a pre-determined percentage (ratio) of it and uses that as the local SET POINT.

The following describes in more detail the Set Point modes available in the GRC32.

Local - When the Local Set Point mode is selected, the GRC32 operates only as a single loop controller. The displayed SET POINT represents a direct value of tons per hour, pounds per minute, or as indicated in the MODE display. If the RATE display uses a decimal point of XXX.X or XX.XX, the same decimal point location will automatically be reflected in the SET POINT display. For example, if the RATE display shows 250.00 and the units of measurement is set to "TONS/HR", then the SET POINT would be displayed as XXX.00 tons per hour.

Remote - When the Remote Set Point mode is selected, GRC32 is enabled to receive remote Set Point signals either via an analog input (terminals "AI1+ & AI1-"), a serial input (RS232 or RS485 protocols), or via an installed optional field bus communications card. The Set Point (or %) Menu is disabled in this mode of operation. When received, the Remote Set Point is converted to direct units of measurement as indicated by the GRC32, tons per hour, pounds per minute, etc., and are then transferred directly to the SET POINT display, functioning as a direct follower. The following Parameter 207, Rem Set Pt, determines which Set Point format the GRC 32 will accept.

% Remote - When the % Remote Set Point mode is selected, the GRC32 is enabled to receive remote Set Point signals either via an analog input (terminals "AI1+ & AI1-"), a serial input (RS232 or RS485 protocols), or via an installed optional field bus communications card. The Set Point (or %) Menu is disabled in this mode of operation.

This % Remote mode is mainly used for material blending applications. In many processes one or more ingredients are required to follow the main ingredient, but in different proportions. In this situation, the local Set Point will be a function of a remote process and is required to be proportional to that remote process. This type of relationship is often termed a "Ratio" or "Master/Slave" Control. When using this function, the displayed SET POINT is actually a percentage (or ratio) of the remote Set Point (or process). The following Parameter 207, Rem Set Pt, determines which Set Point format the GRC 32 will accept.

Example: Assume the incoming remote signal is 300 tons/hour, and the displayed SET POINT indicates 50.0 (50.0 %). Then the actual GRC32 internal RATE Set Point would be 150 tons/hour, since 50 % of 300 (300 x 0.5) equals 150. As the incoming remote Set Point changes, the GRC32 local Set Point will directly follow it as a displayed percentage.

Local	The SET POINT is entered via the GRC32 keypad. **(Default setting).**
Remote	The SET POINT is received (analog or digital) from a remote device. An analog remote SET POINT must initially be scaled.

%Remote The SET POINT is received from a remote device, the pre-set percentage is calculated, and the result is used as the local SET POINT. The pre-set percentage is displayed in the SET POINT (or %) window. An analog remote SET POINT must initially be scaled.

207) **Rem Set Pnt:** - This Parameter selects the format used by the remote SET POINT signal. It is only active, however, when the preceding Parameter 206, Setpoint Type, is set to Remote or %Remote. The format selections are: Analog, Digital, or Fieldbus, and are described as follows:

Analog - When set to Analog, the GRC32 will accept an analog input signal that must initially be scaled to match the corresponding RATE. This is done using Parameters 208 (mA@0R SetP) and 209 (R SetP@ 20mA), located in the CONTROL SET-UP menu. Selecting Analog permits either a 4(or 0) to 20 ma or a 1(or 0) to 5 Vdc signal to be received. If the signal is 4(or 0) to 20 milliamps, refer to Section 4.05, Component Wiring (Analog Inputs), for jumper locations and additional information.

Digital - When set to Digital, the GRC32 will accept Set Points properly sent to one of the serial ports. Scaling is not required. Refer to Section 9 for additional information on serial communications.

Fieldbus - When set to Fieldbus, the GRC32 will accept a Set Point signal that's related to the installed field bus protocol communications card (Modbus RTU, Device Net, Profibus, Ethernet IP (modbus TCP), or Remote I/O). Scaling is not required.

Analog SET POINTs are received via analog signal. **(Default setting).**
Digital SET POINTs are received via RS232 or RS485 serial communications.
Fieldbus SET POINTs are received via an optional field bus protocol PCB.

208) **mA@0 R SetP:** - This Parameter sets the value (such as 4 or 0 ma, or 1 or 0 Vdc) of the remote analog Setpoint input signal when it's at its minimum. This Parameter is only active when the preceding Parameter 206, Setpoint Type, is set to Remote or %Remote, and Parameter 207, Rem Set Pnt, is set to Analog. Note that the displayed SET POINT needs to be scaled in tons per hour, pounds per minute, etc.

4.0 Adjustable from 0.0 to 9.9. This parameter updates upon changes to the Rate DP parameter. **(Default setting).**

209) **R SetP@20mA:** - This Parameter is used to set the full scale value of the remote Setpoint (usually 20 ma or 5 Vdc). This Parameter is only active when the preceding Parameter 206, Setpoint Type, is set to Remote or %Remote, and Parameter 207, Rem Set Pnt, is set to Analog. When the incoming Setpoint is at its maximum value, adjust this value until the displayed SET POINT represents the maximum SET POINT. Note that the displayed SET POINT needs to be scaled in tons per hour, pounds per minute, etc.

0010 Adjustable from 0000 to 9999. This parameter updates upon changes to the Rate DP parameter. **(Default setting).**

210) **SP LTrim:** - This Parameter allows tuning of Parameter 208, mA@0 R SetP. Raise the number to increase the current input and decrease the number to decrease the current input. This parameter is only visible if Parameter 206, Setpoint Type, is set to Remote and Parameter 207, Rem Set Pnt, is set to Analog.

100 Adjustable from 000 to 200. **(Default setting).**

211) **SP HTrim:** - This Parameter allows tuning of Parameter 209, R SetP@20mA. Raise the number to increase the current input and decrease the number to decrease the current input. This Parameter is only visible if Parameter 206, Setpoint Type, is set to Remote and Parameter 207, Remote Set Pnt, is set to Analog.

100 Adjustable from 000 to 200. **(Default setting).**

***212*)** **LC Cap:** - Enter the total load cell capacity of the gravimetric feeder or the scale base. Use the same units of measure as Parameter 100, Mass Units, in the Feeder Set Up menu. This Parameter is required for electronic load cell calibration. Enter 0000 to disable.

0000 **(Default setting).**

***213*)** **LC Mv/v:** - Enter the load cell actual millivolts per volt excitation value. If more than one load cell exists and their values differ, enter the average Mv/v value of all the load cells. This Parameter is required for electronic load cell calibration. Enter 0.00000 to disable.

0.00000 **(Default setting).**

***214*)** **Load Counts:** - The GRC32 displays raw counts from the load cells for use during technical troubleshooting.

7.05 Input - Output Menu Parameters

The Input Output (I/O) Menu is used to set up and calibrate the GRC32's I/O capabilities. For example, relay outputs can be configured to operate in conjunction with alarms. Other applications might require remote control capabilities or a PLC interface. This section describes all the remote interface Parameters available for setting up the I/O functions in the GRC32.

***300*)** **Sim Rate:** - This Parameter, when set to ON, is an artificial RATE with the resulting accumulated TOTAL. This function is useful during the initial system setup and also when setting up accessories connected to GRC32 outputs such as chart recorders, PLC's, feeder controls, remote displays, etc. The simulated RATE value is entered in the following Parameter 301, Sim Rate Valu. The TOTAL is then a calculated value based upon the Sim Rate Valu Parameter. When Sim Rate is ON, the existing **operational** TOTAL display is automatically saved to memory and is then automatically restored when Sim Rate is set to OFF or when the EXIT key is pressed. The selections are OFF or ON.

OFF Normal operation. **(Default setting).**

ON The GRC32 will run using a simulated RATE.and a calculated TOTAL.

***301*)** **Sim Rate Valu:** - This Parameter is the desired simulated RATE value that the GRC32 will use when the preceding Parameter 300, Sim Rate, is set to ON. This Parameter ignores decimal point settings when active.

100 Selectable from 0000 to 9999. **(Default setting).**

***302*)** **Sim Weight:** - This Parameter, when set to ON, is a simulated WEIGHT value that the GRC32 uses to overwrites the actual equipment and material weight. The simulated WEIGHT value is entered in the following Parameter 303, Sim Wght Valu. This feature can be useful when setting up components that are related to the weight alarm relay outputs. The selections are OFF or ON.

OFF Normal operation. **(Default setting).**

ON The GRC32 will run using a simulated WEIGHT.

***303*) Sim Wght Valu: -** This Parameter is the simulated weight that is used when Parameter 302, Sim Weight, is set to ON. This Parameter ignores decimal point settings.

00000100 Settable from 0000000 to 9999999. Simulated weight, or live load **(Default setting).**

***303*) AO1 Fun: -** This Parameter configures analog output 1 (A1 +/-). Analog output 1 is hard coded as the auger motor speed control output. The default selection, AugCtrl 4-20, has an output where 4-20 mA is equal to a 0-100% Control Position output. However, these values are not calibrated for every controller so there might be a slight error. If it is desired to tighten up the 4-20 vs. 0-100 accuracy, or change the values altogether; then change the selection to AugCrtl Spcl, at which time Parameters 305, 306, 307 and 308 will become visible and editable.

AugCtrl 4-20 Un-editable 4-20 ma output. **(Default setting).**

AugCtrl Spcl Use parameters 305-308 to edit the analog current range.

***305)* AO1 Lo: -** This Parameter sets the low end of analog output 1 (A1 +/-) and is settable from 0.0 to 9.9. It is the current output in milliamps when the CONTROL POSITION is at zero percent. Refer to Parameter 307, AO1 LTrim, for fine tuning.

4.0 Adjustable from 0.0 to 9.9. **(Default setting).**

***306)* AO1 Hi: -** Enter the CONTROL POSITION value in percent that will correspond to an analog output 1 (A1 +/-) of 20 mili-amps. Refer to Parameter 308, AO1 HTrim, for fine tuning.

100.0 Adjustable from 000.0 to 200.0%. **(Default setting).**

***307)* AO1 LTrim: -** This Parameter is used to fine tune Parameter 305, AO1 Lo. Raise the value to increase the current and decrease the value to decrease the current.

100 Adjustable from 000 to 200. **(Default setting).**

***308)* AO1 HTrim: -** This Parameter is used to fine tune Parameter 306, AO1 Hi. Raise the value to increase the current and decrease the value to decrease the current.

100 Adjustable from 000 to 200. **(Default setting).**

***309)* AO2 Func: -** This Parameter is used to configure analog output 2 (A2 +/-). The output can be configured as the speed control for the feeder auger or agitator. It can also be configured as a RATE or WEIGHT indication output signal for remote displays such as chart recorders, LED displays, etc.

Unused Analog output 2 is not used. **(Default setting).**

Aug Ctrl This selection allows analog output 2 to mimic analog output 1. Its set up is dependant upon the same set up Parameters as analog output 1 and cannot be scaled differently.

Agit Crtl This function allows analog output 2 to control the speed of a separate paddle/agitator motor. The speed value itself is entered via Parameter 124, Agit Speed, in the Feeder Set-Up Menu.

Rate Avg Selecting this function will allow analog output 2 to be scaled to represent the running RATE of the feeder. This output is affected by Parameter 103, Rate Avg.

Rate — Selecting this function will allow analog output 2 to be scaled to represent the running RATE of the feeder. This output is NOT affected by Parameter 102, Rate Avg, and will not be as stable as the Rate Avg selection above.

Weight — This function allows analog output 2 to be scaled to represent the weight of material in the feeder and hopper.

310) **AO2 Lo: -** This Parameter sets the low end of analog output 2 and is settable from 0.0 to 9.9. It represents in milliamps the zero value of the function the output signal represents. Example: If set to 4 mA, it could represent zero WEIGHT, zero RATE, or zero %. The following Parameter 312, AO2 LTrim, fine tunes this Parameter. This Parameter is not visible if Parameter AO2 Func above is set to Unused.

4.0 Adjustable from 0.0 to 9.9. **(Default setting).**

311) **AO2 Hi:** - Enter the RATE, WEIGHT, or PERCENT value that corresponds to an analog output 2 value of 20 mA. This Parameter is adjustable from 0000 to 9999 for RATE, 000000 to 999999 for WEIGHT, or 000.0 to 200.0 % for PERCENT. This Parameter is not visible if Parameter AO2 Func above is set to Unused.

0010 This Parameter is updated upon changes to the DP Parameters, whether or not it represents RATE, WEIGHT, or PERCENT. **(Default setting).**

312) **AO2 LTrim:** - This Parameter is used to tune Parameter 310, AO2 Lo. Raise the value to increase the current and decrease the value to decrease the current. This Parameter is not visible if Parameter AO2 Func above is set to Unused.

100 Adjustable from 000 to 200. **(Default setting).**

313) **AO2 HTrim:** - This Parameter is used to tune Parameter 311, AO2 Hi. Raise the value to increase the current and decrease the value to decrease the current. This Parameter is not visible if Parameter AO2 Func above is set to Unused.

100 Adjustable from 000 to 200. **(Default setting).**

314) **AO3 Func:** - This Parameter is used to configure analog output 3 (A3 +/-). The output can be configured as the speed control for the feeder auger or agitator. It can also be configured as a RATE or WEIGHT indication output signal for remote displays such as chart recorders, LED displays, etc.

Unused — Analog output 3 is not used. **(Default setting).**

Aug Ctrl — This selection allows analog output 3 to mimic analog output 1. Its set up is dependant upon the same set up Parameters as analog output 1 and cannot be scaled differently.

Agit Crtl — This function allows analog output 3 to control the speed of a separate paddle/agitator motor. The speed value itself is entered via Parameter 124, Agit Speed, in the Feeder Set-Up Menu.

Rate Avg — Selecting this function will allow analog output 3 to be scaled to represent the running RATE of the feeder. This output is affected by Parameter 103, Rate Avg.

Rate — Selecting this function will allow analog output 3 to be scaled to represent the running RATE of the feeder. This output is NOT affected by Parameter 102, Rate Avg, and will not be as stable as the Rate Avg selection above.

Weight — This function allows analog output 3 to be scaled to represent the weight of material in the feeder and hopper.

315) **AO3 Lo: -** This Parameter sets the low end of analog output 3 and is settable from 0.0 to 9.9. It represents in milliamps the zero value of the function the output signal represents. Example: If set to 4 mA, it could represent zero WEIGHT, zero RATE, or zero %. The following Parameter 317, AO3 LTrim, fine tunes this Parameter. This Parameter is not visible if Parameter AO3 Func above is set to Unused.

4.0 — Adjustable from 0.0 to 9.9. **(Default setting).**

316) **AO3 Hi:** - Enter the RATE, WEIGHT, or PERCENT value that corresponds to an analog output 3 value of 20 mA. This Parameter is adjustable from 0000 to 9999 for RATE, 000000 to 999999 for WEIGHT, or 000.0 to 200.0 % for PERCENT. This Parameter is not visible if Parameter AO3 Func above is set to Unused.

0010 — This Parameter is updated upon changes to the DP Parameters, whether or not it represents RATE, WEIGHT, or PERCENT. **(Default setting).**

317) **AO3 LTrim:** - This Parameter is used to tune Parameter 310, AO3 Lo. Raise the value to increase the current and decrease the value to decrease the current. This Parameter is not visible if Parameter AO3 Func above is set to Unused.

100 — Adjustable from 000 to 200. **(Default setting).**

318) **AO3 HTrim:** - This Parameter is used to tune Parameter 311, AO3 Hi. Raise the value to increase the current and decrease the value to decrease the current. This Parameter is not visible if Parameter AO3 Func above is set to Unused.

100 — Adjustable from 000 to 200. **(Default setting).**

319) **AO4 Func:** - This Parameter is used to configure analog output 4 (A2 +/-). The output can be configured as the speed control for the feeder auger or agitator. It can also be configured as a RATE or WEIGHT indication output signal for remote displays such as chart recorders, LED displays, etc.

Unused — Analog output 4 is not used. **(Default setting).**

Aug Ctrl — This selection allows analog output 4 to mimic analog output 1. Its set up is dependant upon the same set up Parameters as analog output 1 and cannot be scaled differently.

Agit Crtl — This function allows analog output 4 to control the speed of a separate paddle/agitator motor. The speed value itself is entered via Parameter 124, Agit Speed, in the Feeder Set-Up Menu.

Rate Avg — Selecting this function will allow analog output 4 to be scaled to represent the running RATE of the feeder. This output is affected by Parameter 103, Rate Avg.

Rate — Selecting this function will allow analog output 4 to be scaled to represent the running RATE of the feeder. This output is NOT affected by Parameter 102, Rate Avg, and will not be as stable as the Rate Avg selection above.

Weight — This function allows analog output 4 to be scaled to represent the weight of material in the feeder and hopper.

320) **AO4 Lo: -** This Parameter sets the low end of analog output 4 and is settable from 0.0 to 9.9. It represents in milliamps the zero value of the function the output signal represents.

Example: If set to 4 mA, it could represent zero WEIGHT, zero RATE, or zero %. The following Parameter 322, AO4 LTrim, fine tunes this Parameter. This Parameter is not visible if Parameter AO4 Func above is set to Unused.

4.0 Adjustable from 0.0 to 9.9. **(Default setting).**

321) **AO4 Hi:** - Enter the RATE, WEIGHT, or PERCENT value that corresponds to an analog output 4 value of 20 mA. This Parameter is adjustable from 0000 to 9999 for RATE, 000000 to 999999 for WEIGHT, or 000.0 to 200.0 % for PERCENT. This Parameter is not visible if Parameter AO4 Func above is set to Unused.

0010 This Parameter is updated upon changes to the DP Parameters, whether or not it represents RATE, WEIGHT, or PERCENT. **(Default setting).**

322) **AO4 LTrim:** - This Parameter is used to tune Parameter 320, AO4 Lo. Raise the value to increase the current and decrease the value to decrease the current. This Parameter is not visible if Parameter AO4 Func above is set to Unused.

100 Adjustable from 000 to 200. **(Default setting).**

323) **AO4 HTrim:** - This Parameter is used to tune Parameter 321, AO4 Hi. Raise the value to increase the current and decrease the value to decrease the current. This Parameter is not visible if Parameter AO4 Func above is set to Unused.

100 Adjustable from 000 to 200. **(Default setting).**

***324*)** **Rly1 Func: -** Relay 1 is hard coded as the run interlock output relay for the auger motor. This is a non-editable Parameter for reference only.

Run Auger motor start/run/stop output interlock relay. **(Default setting).**

325) **Rly1 Run Log: -** This Parameter sets the normally open (N.O.) or normally closed (N.C.) logic for relay 1. When set to N.O., the relay is open (de-energized) in the OFF mode, and is closed (or energized) in the MANUAL or AUTO modes. When set to N.C., the relay is closed (or energized) in the OFF mode and open (de-energized) when in the MANUAL or AUTO modes.+

NO Normally Open (de-energized). **(Default setting).**
NC Normally Closed (energized).

326) **Rly1 Run Del: -** This Parameter provides a time delay for the actuation of relay 1 after the run mode (AUTO or MANUAL) is initiated, and thereby providing a starting time delay for the equipment that the relay controls. This is useful when several GRC32s require an interval starting sequence with each one using a single output relay with a time delay.

00 Adjustable from 00-99 seconds. **(Default setting).**

***327*)** **Rly2 Func: -** Relay 2 is hard coded as the refill interlock output relay that controls the equipment that performs the material refill. This is a non-editable Parameter for reference only.

Refill Relay 2 output for control of the material refill equipment.

***328*)** **Rly2 Rfl Log: -** This Parameter sets the normally open (N.O.) or normally closed (N.C.) logic for relay 2. When set to N.O., the relay is open (de-energized) during normal running modes and is closed (or energized) when refilling the hopper. When set to N.C., the relay is closed (or energized) when in normal running modes and is open (de-energized) when refilling.

NO	Normally Open (de-energized). **(Default setting).**
NC	Normally Closed (energized).

***329*) Rly3 Func: -** Relay 3 is a run interlock relay.

Unused	This relay output is not used. **(Default setting).**
Ref Alrm	Set up and function is dependant on Parameters #107, 108, and 109.
Wght Alrm	Set up and function is dependant on Parameters #110 and 111.
Rate Alrm	Set up and function dependant on Parameters #112, 113, 114, and 115.
Rate Fail	Set up and function is dependant on Parameters #116, 117, 118, and 119.
Run	Relay 3 will function the same as relay 1, except it can be set to have different logic and time delay settings.
Refill	Relay 3 will function the same as relay 2, except it can be set to have a different logic setting and can incorporate a time delay setting.

***330)* Rly3 Log: -** This Parameter sets the normally open (N.O.) or normally closed (N.C.) logic for relay 3. This Parameter is not visible if Parameter Rly3 Func is set to Unused.

NO	Normally Open (de-energized). **(Default setting).**
NC	Normally Closed (energized).

***331)* Rly3 Del:** - This Parameter provides up to a 99 second time delay before the actuation of relay 3. When the above Rly3 Func Parameter is set to; Ref Alrm, Wght Alrm, Rate Alrm, or Rate Fail, the actuation time delay will be in addition to the time delays set in the Feeder Set-Up Menu. This Parameter is not visible if Parameter Rly3 Func is set to Unused.

00	Selectable from 00 to 99 seconds. **(Default setting).**

***332)* Rly4 Func: -** Relay 4 is a run interlock relay.

Unused	This relay output is not used. **(Default setting).**
Ref Alrm	Set up and function is dependant on Parameters #107, 108, and 109.
Wght Alrm	Set up and function is dependant on Parameters #110 and 111.
Rate Alrm	Set up and function dependant on Parameters #112, 113, 114, and 115.
Rate Fail	Set up and function is dependant on Parameters #116, 117, 118, and 119.
Run	Relay 4 will function the same as relay 1, except it can be set to have different logic and time delay settings.
Refill	Relay 4 will function the same as relay 2, except it can be set to have a different logic setting and can incorporate a time delay setting.

***333)* Rly4 Log: -** This Parameter sets the normally open (N.O.) or normally closed (N.C.) logic for relay 4. This Parameter is not visible if Parameter Rly4 Func is set to Unused.

NO	Normally Open (de-energized). **(Default setting).**
NC	Normally Closed (energized).

***334)* Rly4 Del:** - This Parameter provides up to a 99 second time delay before the actuation of relay 4. When the above Rly4 Func Parameter is set to; Ref Alrm, Wght Alrm, Rate Alrm, or Rate Fail, the actuation time delay will be in addition to the time delays set in the Feeder Set-Up Menu. This Parameter is not visible if Parameter Rly4 Func is set to Unused.

00	Selectable from 00 to 99 seconds. **(Default setting).**

***335)* Rly5 Func: -** Relay 5 is a run interlock relay.

Unused	This relay output is not used. **(Default setting).**
Ref Alrm	Set up and function is dependant on Parameters #107, 108, and 109.
Wght Alrm	Set up and function is dependant on Parameters #110 and 111.
Rate Alrm	Set up and function dependant on Parameters #112, 113, 114, and 115.
Rate Fail	Set up and function is dependant on Parameters #116, 117, 118, and 119.
Run	Relay 5 will function the same as relay 1, except it can be set to have different logic and time delay settings.
Refill	Relay 5 will function the same as relay 2, except it can be set to have a different logic setting and can incorporate a time delay setting.

336) **Rly5 Log: -** This Parameter sets the normally open (N.O.) or normally closed (N.C.) logic for relay 5. This Parameter is not visible if Parameter Rly3 Func is set to Unused.

NO	Normally Open (de-energized). **(Default setting).**
NC	Normally Closed (energized).

337) **Rly5 Del:** - This Parameter provides up to a 99 second time delay before the actuation of relay 5. When the above Rly5 Func Parameter is set to; Ref Alrm, Wght Alrm, Rate Alrm, or Rate Fail, the actuation time delay will be in addition to the time delays set in the Feeder Set-Up Menu. This Parameter is not visible if Parameter Rly5 Func is set to Unused.

00	Selectable from 00 to 99 seconds. **(Default setting).**

***338*)** **Rly6 Func: -** Relay 6 is a run interlock relay.

Unused	This relay output is not used. **(Default setting).**
Ref Alrm	Set up and function is dependant on Parameters #107, 108, and 109.
Wght Alrm	Set up and function is dependant on Parameters #110 and 111.
Rate Alrm	Set up and function dependant on Parameters #112, 113, 114, and 115.
Rate Fail	Set up and function is dependant on Parameters #116, 117, 118, and 119.
Run	Relay 6 will function the same as relay 1, except it can be set to have different logic and time delay settings.
Refill	Relay 6 will function the same as relay 2, except it can be set to have a different logic setting and can incorporate a time delay setting.

339) **Rly6 Log: -** This Parameter sets the normally open (N.O.) or normally closed (N.C.) logic for relay 6. This Parameter is not visible if Parameter Rly6 Func is set to Unused.

NO	Normally Open (de-energized). **(Default setting).**
NC	Normally Closed (energized).

340) **Rly6 Del:** - This Parameter provides up to a 99 second time delay before the actuation of relay 6. When the above Rly6 Func Parameter is set to; Ref Alrm, Wght Alrm, Rate Alrm, or Rate Fail, the actuation time delay will be in addition to the time delays set in the Feeder Set-Up Menu. This Parameter is not visible if Parameter Rly6 Func is set to Unused.

00	Selectable from 00 to 99 seconds. **(Default setting).**

***341*)** **Di1 Func: -** This Parameter configures digital input 1. Activating the input (DI1 and COM), will initiate the following selected function.

Unused	Digital input 1 is not used. **(Default setting).**
Off/Auto	The Off/Auto selection causes digital input 1 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote

input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.

Man Rfl — The Man Rfl selection permits initiating a manual refill when digital input 1 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 1 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 1 is de-activated, the GRC32 to revert back to the mode previous to activation.

Auto Rfl — The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 1 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).

E-Stop — When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 1 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.

STot Res — The STot Res selection causes the short total to be reset to zero when digital input 1 is **momentarily** activated.

LTot Res — The LTot Res selection causes the short and long total to be reset to zero when digital input 1 is **momentarily** activated.

Alrm Res — The Alrm Res selection causes the GRC32 to reset all alarms when digital input 1 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

342) **Di1 Log: -** This Parameter selects the input logic for digital input 1. If the logic is selected as NO, then closing the external contact across the input terminals (DI1 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di1 Func is set to Unused.

NO — Normally Open input logic. **(Default setting).**
NC — Normally Closed input logic.

343) **Di1 Del:** - This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 1. This Parameter is not visible if Parameter Di1 Func is set to Unused.

00 — Adjustable from 00-99 seconds. **(Default setting).**

344) **Di2 Func: -** This Parameter configures digital input 2. Activating the input (DI2 and COM), will initiate the following selected function.

Unused — Digital input 2 is not used. **(Default setting).**

Off/Auto — The Off/Auto selection causes digital input 2 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.

Man Rfl — The Man Rfl selection permits initiating a manual refill when digital input 2 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 2 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 2 is de-activated, the GRC32 to revert back to the mode previous to activation.

Auto Rfl — The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 2 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).

E-Stop — When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 2 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.

STot Res — The STot Res selection causes the short total to be reset to zero when digital input 2 is **momentarily** activated.

LTot Res — The LTot Res selection causes the short and long total to be reset to zero when digital input 2 is **momentarily** activated.

Alrm Res — The Alrm Res selection causes the GRC32 to reset all alarms when digital input 2 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

345) **Di2 Log: -** This Parameter selects the input logic for digital input 2. If the logic is selected as NO, then closing the external contact across the input terminals (DI2 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di2 Func is set to Unused.

NO — Normally Open input logic. **(Default setting).**
NC — Normally Closed input logic.

346) **Di2 Del:** - This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 2. This Parameter is not visible if Parameter Di2 Func is set to Unused.

00 — Adjustable from 00-99 seconds. **(Default setting).**

347) **Di3 Func: -** This Parameter configures digital input 3. Activating the input (DI3 and COM), will initiate the following selected function.

Unused	Digital input 3 is not used. **(Default setting).**
Off/Auto	The Off/Auto selection causes digital input 3 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.
Man Rfl	The Man Rfl selection permits initiating a manual refill when digital input 3 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 3 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 3 is de-activated, the GRC32 to revert back to the mode previous to activation.
Auto Rfl	The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 3 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).
E-Stop	When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 3 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.
STot Res	The STot Res selection causes the short total to be reset to zero when digital input 3 is **momentarily** activated.
LTot Res	The LTot Res selection causes the short and long total to be reset to zero when digital input 3 is **momentarily** activated.
Alrm Res	The Alrm Res selection causes the GRC32 to reset all alarms when digital input 3 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

348) **Di3 Log: -** This Parameter selects the input logic for digital input 3. If the logic is selected as NO, then closing the external contact across the input terminals (DI3 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di3 Func is set to Unused.

NO	Normally Open input logic. **(Default setting).**
NC	Normally Closed input logic.

349) **Di3 Del: -** This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 3. This Parameter is not visible if Parameter Di3 Func is set to Unused.

00 Adjustable from 00-99 seconds. **(Default setting).**

***350*)** **Di4 Func: -** This Parameter configures digital input 4. Activating the input (DI4 and COM), will initiate the following selected function.

Unused Digital input 4 is not used. **(Default setting).**

Off/Auto The Off/Auto selection causes digital input 4 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.

Man Rfl The Man Rfl selection permits initiating a manual refill when digital input 4 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 4 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 4 is de-activated, the GRC32 to revert back to the mode previous to activation.

Auto Rfl The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 4 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).

E-Stop When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 4 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.

STot Res The STot Res selection causes the short total to be reset to zero when digital input 4 is **momentarily** activated.

LTot Res The LTot Res selection causes the short and long total to be reset to zero when digital input 4 is **momentarily** activated.

Alrm Res The Alrm Res selection causes the GRC32 to reset all alarms when digital input 4 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

351) **Di4 Log: -** This Parameter selects the input logic for digital input 4. If the logic is selected as NO, then closing the external contact across the input terminals (DI4 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di4 Func is set to Unused.

NO Normally Open input logic. **(Default setting).**
NC Normally Closed input logic.

352) **Di4 Del:** - This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 4. This Parameter is not visible if Parameter Di4 Func is set to Unused.

00 Adjustable from 00-99 seconds. **(Default setting).**

***353*)** **Di5 Func: -** This Parameter configures digital input 5. Activating the input (DI5 and COM), will initiate the following selected function.

Unused Digital input 5 is not used. **(Default setting).**

Off/Auto The Off/Auto selection causes digital input 5 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.

Man Rfl The Man Rfl selection permits initiating a manual refill when digital input 5 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 5 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 5 is de-activated, the GRC32 to revert back to the mode previous to activation.

Auto Rfl The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 5 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).

E-Stop When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 5 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.

STot Res The STot Res selection causes the short total to be reset to zero when digital input 5 is **momentarily** activated.

LTot Res The LTot Res selection causes the short and long total to be reset to zero when digital input 5 is **momentarily** activated.

Alrm Res The Alrm Res selection causes the GRC32 to reset all alarms when digital input 5 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

354) **Di5 Log: -** This Parameter selects the input logic for digital input 5. If the logic is selected as NO, then closing the external contact across the input terminals (DI5 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the

external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di5 Func is set to Unused.

NO Normally Open input logic. **(Default setting).**
NC Normally Closed input logic.

355) **Di5 Del:** - This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 5. This Parameter is not visible if Parameter Di5 Func is set to Unused.

00 Adjustable from 00-99 seconds. **(Default setting).**

***356*)** **Di6 Func: -** This Parameter configures digital input 6. Activating the input (DI6 and COM), will initiate the following selected function.

Unused Digital input 6 is not used. **(Default setting).**

Off/Auto The Off/Auto selection causes digital input 6 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.

Man Rfl The Man Rfl selection permits initiating a manual refill when ditital input 6 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 6 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 6 is de-activated, the GRC32 to revert back to the mode previous to activation.

Auto Rfl The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 6 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).

E-Stop When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 6 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.

STot Res The STot Res selection causes the short total to be reset to zero when digital input 6 is **momentarily** activated.

LTot Res The LTot Res selection causes the short and long total to be reset to zero when digital input 6 is **momentarily** activated.

Alrm Res The Alrm Res selection causes the GRC32 to reset all alarms when digital input 6 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

357) **Di6 Log: -** This Parameter selects the input logic for digital input 6. If the logic is selected as NO, then closing the external contact across the input terminals (DI6 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di6 Func is set to Unused.

NO	Normally Open input logic. **(Default setting).**
NC	Normally Closed input logic.

358) **Di6 Del:** - This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 6. This Parameter is not visible if Parameter Di6 Func is set to Unused.

00	Adjustable from 00-99 seconds. **(Default setting).**

359) **Di7 Func: -** This Parameter configures digital input 7. Activating the input (DI7 and COM), will initiate the following selected function.

Unused	Digital input 7 is not used. **(Default setting).**
Off/Auto	The Off/Auto selection causes digital input 7 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.
Man Rfl	The Man Rfl selection permits initiating a manual refill when digital input 7 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of digital input 7 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 7 is de-activated, the GRC32 to revert back to the mode previous to activation.
Auto Rfl	The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 7 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).
E-Stop	When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 7 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.
STot Res	The STot Res selection causes the short total to be reset to zero when digital input 7 is **momentarily** activated.
LTot Res	The LTot Res selection causes the short and long total to be reset to zero when digital input 7 is **momentarily** activated.

Alrm Res — The Alrm Res selection causes the GRC32 to reset all alarms when digital input 7 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

360) **Di7 Log: -** This Parameter selects the input logic for digital input 7. If the logic is selected as NO, then closing the external contact across the input terminals (DI7 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di7 Func is set to Unused.

NO — Normally Open input logic. **(Default setting).**
NC — Normally Closed input logic.

361) **Di7 Del: -** This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 7. This Parameter is not visible if Parameter Di7 Func is set to Unused.

00 — Adjustable from 00-99 seconds. **(Default setting).**

***362*)** **Di8 Func: -** This Parameter configures digital input 8. Activating the input (DI8 and COM), will initiate the following selected function.

Unused — Digital input 8 is not used. **(Default setting).**

Off/Auto — The Off/Auto selection causes digital input 8 to toggle the GRC32 between the OFF and AUTO modes of operation. When used as a remote input start/stop control, it defaults to an open input being the OFF mode, and a closed input being the AUTO mode.

Man Rfl — The Man Rfl selection permits initiating a manual refill when digital input 8 is activated. A **maintained** activation state is required for as long as the manual refill process is required. Activation of Digital input 8 will cause the GRC32 to revert to its idle mode (the PID function stops), and also activate the refill output. When digital input 8 is de-activated, the GRC32 to revert back to the mode previous to activation.

Auto Rfl — The Auto refill selection allows starting the Auto Refill function ahead of its normal initiation time. When digital input 8 is activated by a **momentary** initiation action, the GRC32 will function as if the Rfl Lo Parameter (Parameter 107) value has been met. It will then initiate the action that was selected for the Auto Refill Parameter (Parameter 106).

E-Stop — When an external emergency stop (E-Stop) switch is used to stop the overall system, an E-Stop switch contact block should be connected across a GRC32 digital input. When the GRC32 then recognizes an emergency situation it can assist in the shutdown, and also assist in a systematic restart. When digital input 8 is activated with a **maintained** contact, the GRC32 will recognize the shutdown and cause the blinking message, E-STOP ACTIVATED, to be displayed in the MODE window. It will also change the GRC32's operating mode to OFF, and additionally illuminate the red LED above the RESET ALARM key. When the E-Stop input reverts back to normal, the message in the MODE window will change to, RESET ALARM TO START. Then when the RESET ALARM key is pressed, the GRC32 will resume its prior running mode.

STot Res — The STot Res selection causes the short total to be reset to zero when digital input 8 is **momentarily** activated.

LTot Res — The LTot Res selection causes the short and long total to be reset to zero when digital input 8 is **momentarily** activated.

Alrm Res — The Alrm Res selection causes the GRC32 to reset all alarms when digital input 8 is **momentarily** activated. This action corresponds to pressing the RESET ALARM key.

363) **Di8 Log: -** This Parameter selects the input logic for digital input 8. If the logic is selected as NO, then closing the external contact across the input terminals (DI8 & COM) will activate the input's selected function. If the logic is selected as NC, then opening the external contact across the input terminals will activate the input's selected function. This Parameter is not visible if Parameter Di8 Func is set to Unused.

NO — Normally Open input logic. **(Default setting).**
NC — Normally Closed input logic.

364) **Di8 Del:** - This Parameter provides up to a 99 second time delay before actuation of the selected function of digital input 8. This Parameter is not visible if Parameter Di8 Func is set to Unused.

00 — Adjustable from 00-99 seconds. **(Default setting).**

365) **Station ID:** - When using the serial communications features of the GRC32, a unique address termed its Station ID, is required for each unit. Select a Station ID for each unit starting with A.

A — Selections from A to Z. **(Default setting).**

366) **Parity: -** When using the serial communication features of the GRC32, select the same parity type as the remote device it's communicating with.

None — No parity. **(Default setting).**
Odd — Odd parity.
Even — Even parity.

***367*)** **Baud Rate: -** When using the serial communication features of the GRC32, select the same baud rate as the remote device it's communicating with.

300 — 300 Baud Rate.
600 — 600 Baud Rate.
1200 — 1200 Baud Rate.
2400 — 2400 Baud Rate.
4800 — 4800 Baud Rate.
9600 — 9600 Baud Rate. **(Default setting).**
19200 — 19200 Baud Rate.
38400 — 38400 Baud Rate.
57600 — 57600 Baud Rate.
115600 — 115600 Baud Rate.

***368*)** **Command Menu: -** When using the serial communication features of the GRC32, select the information group that is to be sent from the serial port. Refer to Section 9.02 for the Command Menu selections available.

00 — 00 to 24 selections. **(Default setting).**

***369*)** **Cmd Menu Interval: –** When data is being automatically sent from the serial port, this Parameter determines the data sending interval. It is adjustable from 1/10 of a second to 99 seconds.

01.0 Serial communications data auto sending interval. **(Default setting).**

NOTE: The following five Parameters will only appear in the Parameter menu if there is an optional field-bus protocol PCB mounted on the GRC32's main processor PCB (MP500).

370) **FB Data Type:** – The numerical information within the field-bus protocol card will always be 32 bits of data, but is selectable between integer and floating point.

Long 32 bit long integer. **(Default setting).**
Float 32 bit floating point.

371) **IP:** – Used only for the Ethernet field-bus interface card for identifying the processor's IP address.

***372*)** **IM:** – Used only for the Ethernet field-bus interface card for identifying the processor's IP mask if utilized.

373) **G1:** – Used only for the Ethernet field-bus interface card for identifying the processor's Gateway 1 if used.

374) **G2:** – Used only for the Ethernet field-bus interface card for identifying the processor's Gateway 2 if used.

375) **D1:** – Used only for the Ethernet field-bus interface card for identifying the processor's DNS 1 if used.

376) **D2:** – Used only for the Ethernet field-bus interface card for identifying the processor's DNS 2 if used.

***377*)** **Parameters:** - The four following Parameter selections allow the user's Parameter Table to be saved to and retrieved from flash memory, thereby allowing its restoration if it is inadvertently erased or corrupted due to a battery failure or an electrical spike. It also allows the retrieval of the default Parameter Table when necessary.

No Action - when selected, nothing will change. **(Default setting).**

Save - when selected, all the user's Parameters will be saved to flash memory along with the last calibration data. This needs to be done whenever there is a change to any Parameter or calibration. Upon exiting the Program Mode, the MODE window will display PARAMETERS SAVED.

Defaults - when selected, the defaults table will be used to restore the Parameter Table. Upon exiting the program mode the MODE window will display DEFAULTS RETORED.

Restore - when selected, all the user's parameter values that were previously entered will be retrieved. Upon exiting Program Mode, the MODE window will display MEMORY RESTORED.

It is highly recommended that once the system is calibrated and working properly and as desired, the user's Parameter Table be immediately saved to memory using the Store Now Parameter.

Note: if it's not possible to enter any Parameter, it usually means that the firmware has been corrupted and needs to be returned to **Tecweigh** to be "reflashed". Contact **Tecweigh** Service (Section 2.01) for assistance.

7.06 Tuning Menu Parameters

The GRC32 incorporates a PID (**P**roportional, **I**ntegral, **D**erivative) control system and the Tuning Menu is used to configure the GRC32 so it can maintain the selected SET POINT using that system. Refer to Section 6.01 for a basic discussion of the PID control system. During normal operation the three PID Parameters continuously calculate a new CONTROL POSITION output in order to maintain the SET POINT. Proportional, being the heart of the control loop, makes its contribution by finding the "error" between RATE and SET POINT. It then adjusts the CONTROL POSITION output to correct that error. Integral is used to make up for small errors when the RATE is near SET POINT. In some cases, the Proportional contribution may not be able to make extremely small adjustments, thereby creating offset. Integral uses a "sum error" calculation and continuously adds to or subtracts from the CONTROL POSITION output until the SET POINT is achieved. Derivative only responds to how quickly errors are being produced. If a sharp change in RATE is detected, Derivative will give a "kick" to the control output. Slow changes in error are basically ignored by the Derivative function.

400) **Tuning: -** This Parameter selects the tuning method of the GRC32 PID control. When set to Auto, the following Parameters do not require adjustment, since the GRC32 has internal settings suitable for most applications. However, when set to Manual, the user can "fine tune" the PID values, and other variables listed below, in order to provide the best response available of the CONTROL POSITION output. PID tuning requires some knowledge and experience, however, and should only be done by experienced personnel.

Auto	PID tuning is done automatically. **(Default settings).**
Manual	PID tuning is done manually.

401) **Proportional: -** The Proportional Parameter determines the amount of error adjustment that is applied to the CONTROL POSITION output. Increasing this setting will increase the amount of correction as determined by the error. If set to high, however, the RATE might tend to continuously overshoot the SET POINT, above and below. If set to low, the controller will take longer to achieve the SET POINT. Some amount of "trial and error" will be required to satisfy this Parameter.

0.5000 Adjustable from 0.0000 to 2.0000. **(Default setting).**

402) **Integral: -** The Integral Parameter is used to remedy offset conditions caused by the Proportional term of the controller. The proportional contribution to the CONTROL POSITION output correction alone will never satisfy the SET POINT, because there will always be some difference between the SET POINT and the actual RATE. Integral sums errors between the SET POINT and the RATE over time and then applies it to the CONTROL POSITION output. Increasing the Integral setting will increase the amount of time it takes to eliminate errors that the Proportional Parameter cannot eliminate. Decreasing this setting will decrease the time duration. Note: If set to low, oscillations in the output could occur.

0.1000 Adjustable from 0.0000 to 2.0000. **(Default setting).**

403) **Derivative: -** The Derivative Parameter provides its contribution by responding only to the rate of change in errors. A fast change in error between the SET POINT and feed RATE will yield high contributions from the Derivative output. As the rate of change in errors slow, the Derivative contribution will be reduced accordingly. Increasing the Derivative setting will increase the Derivative contribution to the CONTROL POSITION output when required.

0.0050 Adjustable from 0.0000 to 2.0000. **(Default setting).**

404) **Control Delay: -** This Parameter determines the time interval between the start of the AUTO mode operation and the first change in CONTROL POSITION done by the PID control. This start delay affects every aspect of initiating AUTO mode, whether it is remote indication, or recovering from an E-Stop, or responding to the pressing of a GRC32's key.

10 Adjustable from 00-99 seconds. **(Default setting).**

405) **Sample Time: -** This Parameter determines the time delay between changes to the CONTROL POSITION analog output. The GRC32 will make corrective actions based upon the average feed RATE during the sample time duration. A longer sample time yields a more accurate feed RATE sample. It is recommended that this Parameter be set between 5 and 10 seconds.

05 Adjustable from 00-99 seconds. **(Default setting).**

406) **ADC Range: -** This Parameter determines the max millivolt range of the load cell analog to digital converter (ADC).

10 10 millivolt max range input (not recommended).
20 20 millivolt max range input (use caution).
40 40 millivolt max range input (Typical for 2mv/v & 3mv/v load cells). **(Default setting).**
80 80 millivolt max range input.

407) **LC Filter: -** This Parameter determines the amount of filtering is done to the raw load count samples (sampled 100 per second). Increasing this number will slow down the response time, but increase stability in the RATE calculation. Decreasing this number will increase response time, but decrease stability in the RATE calculation.

3 Adjustable from 1-5. **(Default setting).**

408) **DCC Sense: -** This Parameter determines the level of sensitivity to the Disturbance Cruise Control feature. When this number is increased it will take a greater amount of disturbance to activate the DCC. Lowering this number will make the DCC more sensitive to scale/load cell disturbances.

3 Adjustable from 1-5. **(Default setting).**

7.07 Material Set-Up Menu Parameters

The GRC32 Material Set-Up menu allows the user to manage up to four different materials that might be metered by one gravimetric feeder. It can store four different Parameter sets for four different materials (A to D). Once material A is calibrated and all the I/O functions are set up, the Parameters for Material A can then be copied for Material B and recalibrated for that material, and then copied for material C, and so on. Then, for instance, when material A is required, it can be selected as the active material.

This feature is still under development, but when completed the GRC32 will also be able to export configured Parameter Tables to a removable memory module (Section 3.03). This will permit easy set up of other GRC32 controllers by inserting the appropriate material key and importing the selected material Parameter Table. The number of materials that can be stored on the key will be limited only by the memory capacity.

500) **Active: -** This Parameter selects which of the four possible active materials the GRC32 will be running. The GRC32 designates them A through D.

Material A **(Default setting).**

Material B

Material C

Material D

***501*)** **Rename:** - This Parameter allows editing of the material description to a more descriptive name. By using the SELECT key and up/down ARROWS the active material (Material A) description can be customized to make it more user friendly or descriptive.

***502*)** **Copy:** - This Parameter allows scrolling to a specific material and then copying all that material's Parameters to another material. Upon exiting, the active material's Parameter set will be copied to the selected material.

503) **P1 CP:** - This Parameter selects the CONTROL POSITION output for the first point that determines the line of linearity of the feeder's actual feed RATE.

030.0 Adjustable from 000.0 to 100.0 in percent. **(Default setting).**

504) **P1 Rate:** - This Parameter selects the actual feed RATE for the first point that determines the line of linearity of the feeder's actual feed RATE.

0000 Adjustable from 0000 to 9999 in percent. **(Default setting).**
(This Parameter does update the RATE DP setting).

505) **P1 Time:** - This Parameter selects the amount of time the unit will run while in auto calibrated. This time duration does not have an affect on manually entered rates.

01.00 Adjustable from 00.10 to 99.00 in minutes. **(Default setting).**

506) **P2 CP:** - This Parameter selects the CONTROL POSITION output for the second point that determines the line of linearity of the feeder's actual feed RATE.

060.0 Adjustable from 000.0 to 100.0 in percent. **(Default setting).**

507) **P2 Rate:** - This Parameter selects the actual feed RATE for the second point that determines the line of linearity of the feeder's actual feed RATE.

0000 Adjustable from 0000 to 9999 in percent. **(Default setting).**
(This Parameter does update the RATE DP setting).

508) **P2 Time:** - This Parameter selects the amount of time the unit will run while in auto calibrated. This time duration does not have an affect on manually entered rates.

01.00 Adjustable from 00.10 to 99.00 in minutes. **(Default setting).**

509) **P3 CP:** - This Parameter selects the CONTROL POSITION output for the third point that determines the line of linearity of the feeder's actual feed RATE.

000.0 Adjustable from 000.0 to 100.0 in percent. **(Default setting).**

510) **P3 Rate:** - This Parameter selects the actual feed RATE for the third point that determines the line of linearity of the feeder's actual feed RATE..

0000 Adjustable from 0000 to 9999 in percent. **(Default setting).**
(This Parameter does update the RATE DP setting).

511) **P3 Time:** - This Parameter selects the amount of time the unit will run while in auto calibrated. This time duration does not have an affect on manually entered rates.

01.00 Adjustable from 00.10 to 99.00 in minutes. **(Default setting).**

512) **P4 CP:** - This Parameter selects the CONTROL POSITION output for the forth point that determines the line of linearity of the feeder's actual feed RATE

000.0 Adjustable from 0000 to 9999 in percent. **(Default setting).**
(This Parameter does update the RATE DP setting).

513) **P4 Rate:** - This Parameter selects the actual feed RATE for the forth point that determines the line of linearity of the feeder's actual feed RATE..

0000 Adjustable from 0000 to 9999 in percent. **(Default setting).**
(This Parameter does update the RATE DP setting).

514) **P4 Time:** - This Parameter selects the amount of time the unit will run while in auto calibrated. This time duration does not have an affect on manually entered rates.

01.00 Adjustable from 00.10 to 99.00 in minutes. **(Default setting).**

515) **P5 CP:** - This Parameter selects the CONTROL POSITION output for the fifth point that determines the line of linearity of the feeder's actual feed RATE.

000.0 Adjustable from 000.0 to 100.0 in percent. **(Default setting).**

516) **P5 Rate:** - This Parameter selects the actual feed RATE for the fifth point that determines the line of linearity of the feeder's actual feed RATE. .

0000 Adjustable from 0000 to 9999 in percent. **(Default setting).**
(This Parameter does update the RATE DP setting).

517) **P5 Time:** - This Parameter selects the amount of time the unit will run while in auto calibrated. This time duration does not have an affect on manually entered rates.

01.00 Adjustable from 00.10 to 99.00 in minutes. **(Default setting).**

***513*)** **Rfl Offset:** - In percent of CONTROL POSITION change, the decrease in speed desired to adjust for density increase during a refill process.

00.0 Adjustable from 0-100 %. **(Default setting).**

***514*)** **Batch:** – When this Parameter is set to a number other than zero, the GRC32 will change to the OFF mode when the SHORT TOTAL reaches this value.

00.0 Adjustable from 00000.000 – 9999.999. **(Default setting).**

7.08 Set Point Menu Parameter

***600*)** **Setpoint: -** This Parameter is the GRC32's feed RATE SET POINT. Pressing the SET POINT key opens the Set Point (or %) menu and allows entering the SET POINT or making changes to an existing SET POINT. When the key is pressed, the MODE display will change to read **Set point: 0000.000**. After the new SET POINT has been entered, press the EXIT key to return to normal control. SET POINTs can be entered at any time, even while a process is running. When changes are made to the SET POINT, the SET POINT display will be immediately and automatically updated. The SET POINT Parameter decimal point setting will follow the RATE decimal point Parameter setting (Parameter 102, Rate DP). Refer to Parameters 206, Setpoint Type, and 207, Rem Set Pnt, for information on the types of Setpoints available and their uses.

7.09 Security Menu Parameters

***700*)** **Lock Calibrate:** - Select 1 or 2 to disable the MANUAL CALIBRATE and AUTO CALIBRATE keys.

NO	No security set. **(Default setting).**
YES	Security set.

701) **Lock Ctrl Mode:** - Select 1 or 2 to disable the CONTROL MODE keys.

NO	No security set. **(Default setting).**
YES	Security set.

***702*)** **Lock Reset:** - Select 1 or 2 to disable the RESET key.

NO	No security set. **(Default setting).**
YES	Security set.

***703*)** **Lock Menus:** - Select 1 or 2 to disable all the MENU keys.

NO	No security set. **(Default setting).**
YES	Security set.

704) **Lock Set Point: -** Select 1 or 2 to disable the SET POINT (OR %) menu Key.

NO	No security set. **(Default setting).**
YES	Security set.

705) **Lock Code:** – A Lock Code can be entered to prevent unauthorized personnel from using the five above mentioned areas. When a Lock Code is entered, an ENTER LOCK CODE message appears in the MODE window. Once the Parameter menu has been entered, all the menus can be accessed without re-entering the code. This condition will exist until the EXIT key is pressed. The value 00000 will disable the Lock Code. Upon pressing the EXIT key, the GRC32 becomes locked again and the code would need to be re-entered.

00000	Adjustable from 00000 to 99999. **(Default setting).**

CHAPTER 8 – CALIBRATION

8.01 Power Up The System

Assuming all the entered Parameters are correct and the equipment is installed properly, the GRC32 continuous Loss-In-Weight system must now be calibrated. A known calibration weight (cal weight) test can be used to calibrate the load cell(s) or it can be done via electronic calibration. Apply power to the system, including the GRC32, and let it all warm up for at least one-half hour to attain temperature stability. Consult Section 10 for troubleshooting tips. If necessary, call **Tecweigh** Customer Service for assistance (Section 2.01).

The Manual and Auto Calibration buttons initiate a MODE window prompted procedure where questions asked will be answered by the user by either selecting the SELECT (check mark) as a positive response, or the EXIT (red "X") as a negative response. In the following text a reference to Y or YES would be the SELECT key and N or NO would be the EXIT key.

8.02 Manual Calibration (load cell calibration)

Using a Calibration Weight

The GRC32 needs to be zeroed with only the empty screw feeder on the scale base or load cell so it knows the load cell output at zero Live Load. Make sure the screw feeder is empty and clean. Enter the calibration weight amount into Parameter 200, Cal Wt. Parameters 212, LC Cap, and 213, LC Mv/v, must be set to zero which is their default setting.

While in Off Mode, press the MANUAL CALIBRATE key to start the procedure. A prompt will appear as follows.

Start manual calibration?	Y or N
Is equipment empty?	Y or N
Load counts in total window?	Y or N If accepted the MODE window indicates TARE VALU ACCEPTED.
Place Calibration Weight on Scale?	Place the cal wt on the scale or equipment. The GRC32 will sense the change in load and advance automatically to the next step.
Is Cal Weight: XX.XX lbs/kg?	Y or N
Load counts in total window?	Y or N If accepted the MODE window indicates SPAN VALU ACCEPTED.
Remove Cal Weight	The user removes the calibration weight. When this is sensed by the controller, the final message is a blinking: MANUAL CAL COMPLETE.

If at any time during the process the user answers negatively, the process will prompt the user whether or not to exit the manual calibration process.

8.03 Initial Filling of the Material Hopper

To initially fill the material hopper, first change the value of Parameter 110, Alrm Lo, to zero. This will prevent the GRC32 from going into an alarm condition when placed in the AUTO mode. Now put the feeder in AUTO mode and the GRC32 will activate the refill relay. This

occurs because the Live Load value is below the value of Parameter 107, Rfl Lo. When the refill relay is activated, the refill equipment should be energized and the hopper will begin filling. When the Live Load value reaches the value of Parameter 108, Rfl Hi, the refill relay will be de-energized and thereby the refill equipment. Now that the hopper is full, return to Parameter 110, Alrm Lo, and set it to the minimum weight of material that is required in the hopper before a Weight or Live Load alarm condition is initiated.

It is now possible to manually or automatically complete the GRC32's Material Set Up menu so the GRC32 knows the expected flow rates of the material.

8.03 Auto Calibration (automatic feeder calibration)

The screw feeder will not dispense material accurately unless the GRC32 has accurate information on the amount of material the screw feeder will dispense at a minimum of two different running speeds. The GRC32 can determine material feed RATEs for up to five different running speeds, but the default value is two speeds. The Parameters that are used to determine the feed RATEs at all five speed points are Parameters 503 to 517 in the Material Set-Up menu. The two default running speeds are 30% (Parameter 503, P1 CP) and 60% (Parameter 506, P2 CP) of full speed (100%). The associated material feed RATEs at these two speeds are measured and recorded by the GRC32 and from the data a speed vs. RATE line can be calculated.

However, a screw feeder's output is not necessarily linear (a straight line) from 0-100% speed, so for greater accuracy, the other three speed point values can be pre-entered manually (Parameters 509, P3 CP; 512, P4 CP; and 515, P5 CP). The GRC32 will then use the data acquired from all five speed points to establish the speed vs. RATE line. When the line is established, material feed RATEs at speeds that were not measured can be calculated from it.

When an Auto Calibration is called for, the GRC32 automatically establishes the above described speed vs. RATE line by making the CONTROL POSITION output run the screw feeder at the pre-set speed points, and then measures and records the associated material feed RATEs. It can then calculate the speed vs. RATE line from the acquired data. As mentioned above, the default speed values for the first two speed points is 30% and 60%, so to use all five speed points, the three other speed values must be pre-entered (see above).

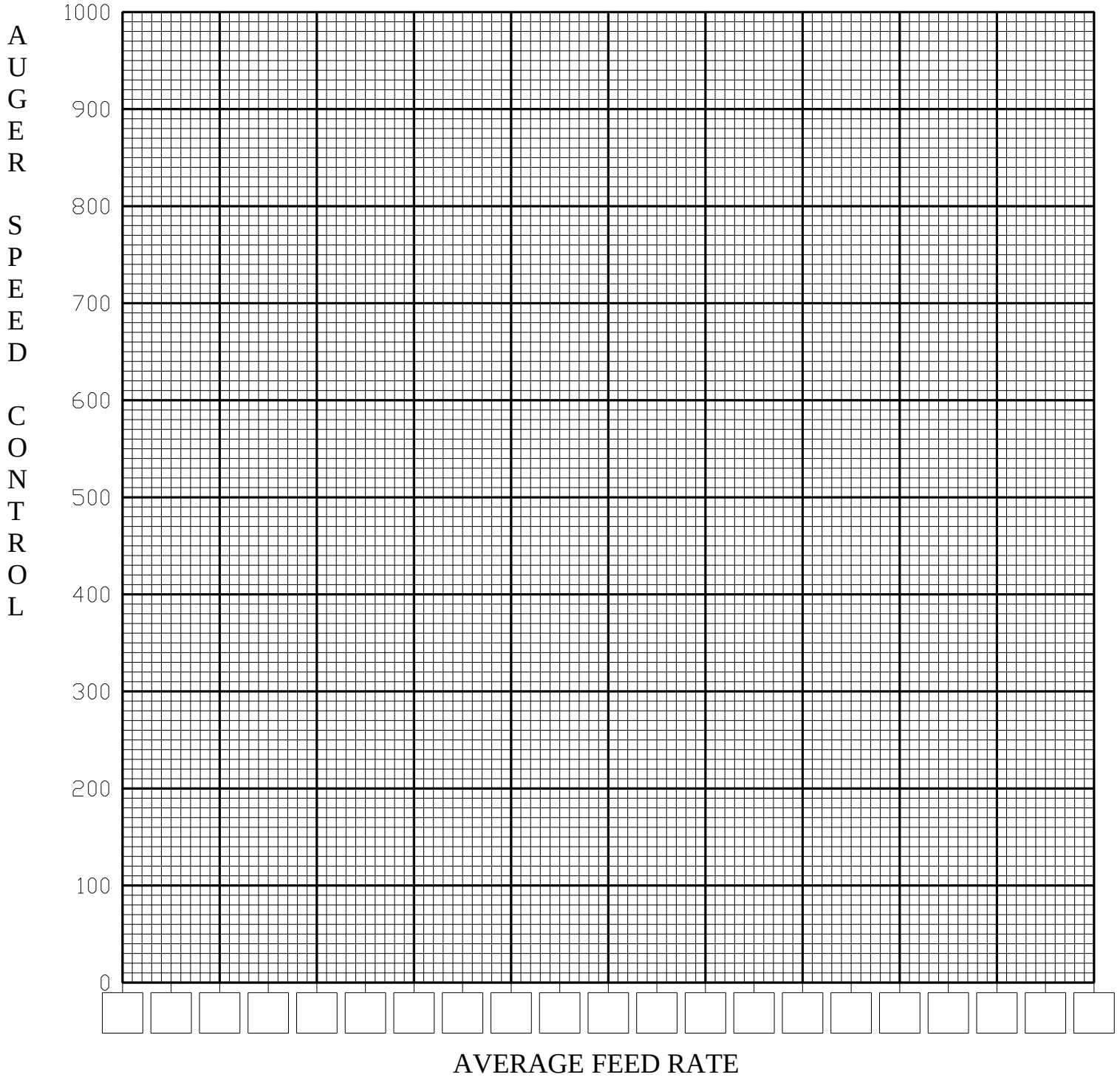
The time duration that the screw feeder is run at each speed point can also be changed. This is done using Parameters 505, P1 Time; 508, P2 Time; 511, P3 Time; 514, P4 Time; and 517, P5 Time. The default value for all five time duration Parameters is one minute. For very low running RATEs, these times might need to be increased to attain reliable information. In the case of high running RATEs, they might need to be lowered to limit the amount of material dispensed.

8.04 Manual Testing

If RATE information is already available for the material and feeder and the preference is to enter the data manually, Parameters 503, 504, 506, and 507; can be updated, and optionally, Parameters 509, 510, 512, 513, 515 and 516, can also be used to establish up to five speed points. The following chart can be used to record this data to gain a visual of the linearity of the feeder's capacity.

CALIBRATION GRAPH

Auger Diameter _____ Feeder Serial No. _____
Feeder Drive _____ Calibrated By _____
Material Fed _____ Date _____
Feed Rate in _____ per _____



CHAPTER 9 – SERIAL COMMUNICATIONS

9.01 Overview

The RS232C and RS485 serial interfaces of the **Tecweigh** Gravimetric Rate Control (GRC32), allow remote computers and PLC's to request Rate, Total, Status, and also to send/receive the Set Point, among other data. It will additionally accept Rate Control and Reset Control commands. The GRC32 can be configured to send data either automatically (every 1/10 second up to 99 sec) or upon request (manually). When sending data automatically, only one GRC32 can be on a serial link. The automatic mode is commonly used for sending Rate and/or Total to display devices. When requesting data manually, 26 units can be multi-dropped on one serial link and each GRC32 is addressed using capital letters A to Z. The characters used in all transmissions are ASCII. Before proceeding, be sure the devices are wired properly per Section 4 and be sure the serial communication related Parameters are properly set per Section 7.3, Parameters 365 to 369. Those Parameters are discussed in the following paragraphs.

9.02 Automatic Transmission

For automatic transmission, Parameter #368 (the Command Menu from the following table (other than 00)), and Parameter #369 (the Cmd Menu Interval (1/10 to 99 sec)), must be entered into the GRC32. Using ASCII characters, the GRC32 will then transmit the selected data automatically at the time interval selected for Parameter 369, Cmd Menu Interval (default is 1 sec.). For example, if the Command Menu is set to 04, and the Cmd Menu Interval is set to 2.0, the GRC32 will transmit the Rate and Short Total every two seconds.

Command Menu	Data Transmitted
00	(Used for manual data transmission only, see Section 9.03)
01	Rate
02	Short Total
03	Long Total
04	Rate, Short Total
05	Zero Count, Span Count, Cal Weight
06	Average Rate
07	Live Load
08	Average Rate, Short Total
09	Load Count
10	Status
11	Rate, Status
12	Total, Status
13	Time (HH:MM:SS)
14	Rate, Status, Short Total
15	Date
16	Average Rate, Status
17	Time (HH:MM:SS), Load Count
18	Average Rate, Status, Short Total
19	Time (HH:MM:SS), Date (MM:DD:YYYY)
20	Average Rate (In Set Point format).
21	Set Point
22	Set Point (In Set Point format).
23	Control Position
24	Control Position (in Set Point Format).

With a couple of exceptions, all the data being sent out of the serial port are in a comma separated variables style ending with a carriage return and line feed. Each variable in the string will include a decimal point if it applies. The RATE values will have a maximum of two decimal places (i.e. 123.12) and the LIVE LOAD, TOTALs, and Cal Weight values will have a maximum of three decimal places (i.e. 123.123).

When in the Automatic Transmission mode, data sent from the GRC32 will be in the following format:

[Station ID] [Comma] [Data Value(s) comma separated] [Carriage Return] [Line Feed]

Example 1: Command Menu set to 08, Station ID set to A, RATE at 15.25, and the SHORT TOTAL is 965.053.

A,15.25,965.053<cr><lf>

Automatic transmission modes 20, 22 and 24 are stated to be "in set point format". This format will not include commas or decimal points. This format allows transfer of data to other **Tecweigh** GRC32 processors as well as the FC20 belt scale processor. See Section 9.04 for more information.

When Status (Command Menu items 10, 11, 12, 14, 16 and 18) is sent, it is a single ASCII character, O, M, or A, as defined below. Codes E,F,S,R,L,X will also appear for their corresponding conditions and, if present, will override the O, M, A commands, and will appear in the hierarchy shown below. Multiple E to X conditions could be true simultaneously.

Code	Description
O	Control Mode Off, normal operation
M	Control Mode Manual, normal operation
A	Control Mode Auto, normal operation
E	Processor error
F	Refill Alarm
S	Rate Fail
R	Rate Alarm
L	Refill in Process
X	External Alarm condition

Example 2: Station A has a rate of 40.50 and the Command Menu Parameter is 01 (rate):

[Station ID] [Comma] [Rate] [Carriage Return] [Line Feed]

A , 40.5 <cr> <lf>

Example 3: Station K has a Rate of 103.8, a Control Mode of Off, the Total is 399.75, and the Command Menu Parameter is 14 (Rate, Status, Total):

[Station ID] [Comma] [Rate] [Comma] [Status] [Comma] [Total] [Carriage Return] [Line Feed]

K , 103.8 , O , 399.75 <cr> <lf>

9.03 Manual Data Transmission

When the Command Menu Parameter is set to 00 in the GRC32, it will only send data after a request is made. The same data is available and is returned using ASCII characters as outlined in the above section for Automatic transmission. The data request must use the format:

[Station ID] [Command Parameter] [Carriage Return]

and as defined below:

[Station ID] A to Z (one character)
[Command parameter] (from the list in sec. 8.2, (01 to 24) (two characters)
[Carriage Return] <cr> (one character)
[Line Feed] <lf> (one character) This character is optional. The GRC32 will accept and respond to the command with or without this character.

Example 4: A request to send RATE and SHORT TOTAL is sent to a GRC32 that is set as Station A. The string would be:

[Station ID]	[Command Parameter]	[Carriage Return]
A	04	<cr>

Note that the GRC32 will respond to Command Menu data requests with or without a line feed.

Multiple requests for data can be strung together with a comma separating each command string.

Example 5: A request to send SET POINT and CONTROL POSITION is sent to a GRC32 that is set as Station J. The ASCII string would be:

[St ID]	[Cmd Param]	[Carriage Ret]	[comma]	[St ID]	[Cmd Param]	[Carriage Ret]
J	21	<cr>	,	J	23	<cr>

9.04 Changing Control Mode Settings Off/Manual/Auto

The following GRC32 functions can be controlled by the following remote commands using ASCII characters and the format:

[Station ID] [Command] [Carriage Return]

Command	Action
OM	Sets Control Mode to Off
MM	Sets Control Mode to Manual
AM	Sets Control Mode to Auto

Example 6: A command is to be sent to Station F to set the Control Mode to Auto. The ASCII string would be:

[Station ID]	[Command]	[Carriage Return]
F	AM	<cr>

9.05 Setting the Set Point

SET POINTs can also be received by the GRC32 through its serial port. For the GRC32 to respond to serially sent SET POINTS, parameter 206, SetPoint Type, must be set to Remote or %Remote, and Parameter 207, Remote Set Pnt, must be set to Digital. When this is done, the GRC32 will accept a change to SET POINT when in any of the Control Modes (OFF, MANUAL, or AUTO). The format is:

[Station ID] [^S] [Set Point] [Carriage Return].

The transmitted SET POINT must contain four characters representing the four digits shown on the faceplate of the GRC32, but without the decimal point.

Example 7: The operator desires to send a SET POINT of 25.0 to station R. The GRC32 SET POINT display indicates a decimal point showing to the tenth position (XXX.X). The ASCII string would be:

[Station ID] [Control Parameter] [Set point] [Carriage Return]

R ^S 0250 <cr>

9.06 Changing the Control Position

The CONTROL POSITION can also be received by the GRC32 through its serial port. For the GRC32 to respond to serially sent CONTROL POSITION values, Parameter 206, SetPoint Type, must be set to Remote or %Remote, and Parameter 207, Remote Set Pnt, must be set to Digital. When this is done, the GRC32 will accept a change to SET POINT only when in the OFF or MANUAL Control Modes. The format is:

[Station ID] [^Q] [Control Position] [Carriage Return].

The transmitted CONTROL POSITION data must contain the four characters representing the four digits shown on the faceplate of the GRC32, but without the decimal point.

Example 8: The operator desires to send a CONTROL POSITION of 25.0 to station R, and the GRC32 CONTROL POSITION display indicates a decimal point showing to the tenth position (XXX.X). The ASCII string would be:

[Station ID] [Control Parameter] [Set point] [Carriage Return]

R ^Q 0250 <cr>

9.07 Resetting Totals or an Alarm

There are three additional Reset commands (defined below) that can be sent to the GRC32. Note that no data is returned after the request is sent. Use the following format to send Reset commands:

[Station ID] [Command] [Carriage Return]

Command	Action
RT	Resets the Long Total display
Rt	Resets the Short Total display
RA	Resets an existing Alarm condition

Example 9: To reset the SHORT TOTAL at Station E, the ASCII string would be:

[Station ID] [Command] [Carriage Return]

E Rt <cr>

9.08 Reference Information

The serial communication protocol for the GRC32 hinges on some key characters in the ASCII string of information. The following table provides some cross references for some of the less obvious characters used.

As Shown	ASCII Equivilent			As Shown	ASCII Equivilent		
In Ch 9	Description	Decimal	Hexidecimal	In Ch 9	Description	Decimal	Hexidecimal
A	Capital A	65	41	X	Capital X	88	58
B	Capital B	66	42	Y	Capital Y	89	59
C	Capital C	67	43	Z	Capital Z	90	5A
D	Capital D	68	44	t	Lower Case t	116	74
E	Capital E	69	45	<cr>	Carriage Return	13	D
F	Capital F	70	46	<lf>	Line Feed, New Line	10	A
G	Capital G	71	47	,	Comma	44	2C
H	Capital H	72	48	:	Colon	58	3A
I	Capital I	73	49	=	Equals Sign	61	3D
J	Capital J	74	4A	.	Decimal	46	2E
K	Capital K	75	4B	^S	Ctrl + S or DC3	19	11
L	Capital L	76	4C	^Q	Ctrl + Q or DC1	17	13
M	Capital M	77	4D	0	0	30	48
N	Capital N	78	4E	1	1	31	49
O	Capital O	79	4F	2	2	32	50
P	Capital P	80	50	3	3	33	51
Q	Capital Q	81	51	4	4	34	52
R	Capital R	82	52	5	5	35	53
S	Capital S	83	53	6	6	36	54
T	Capital T	84	54	7	7	37	55
U	Capital U	85	55	8	8	38	56
V	Capital V	86	56	9	9	39	57
W	Capital W	87	57				

CHAPTER 10 – TROUBLESHOOTING

10.01 Status Messages

Every time the GRC32 is powered up it performs two functions:

The first function is a scan to determine if a field-bus protocol communications card is present. The following message will be displayed:

"SCANNING FOR BUSCARD"

The second function it performs is a test of the RAM and flash memory "chips". The word "chip" is a commonly used substitute word for **I**ntegrated **C**ircuit (IC). RAM stands for **R**andom **A**ccess **M**emory, which is a type of memory that will loose its information when unpowered. Flash memory is a type of memory that retains its information when unpowered. These tests are performed to assure that no information has been corrupted or destroyed. When these tests are complete, one of the following messages will appear in the MODE window:

"SELF TEST – RAM PASS" The memory is OK. No changes have occurred.

"RAM BAD, FLASH RESTORE" The RAM memory is corrupt, the GRC32 has restored the Parameter Table from flash memory

"RAM/FLASH BAD, DEFAULTS" Both the RAM and flash memory are corrupt. The GRC32 has restored the Parameter Table from the default memory. (All user determined Parameters will need to be re-entered. Refer to Sections 7.01 and 7.02).

The MODE WINDOW can display many messages that either give status information or indicate a potential problem. Some of the messages have already been discussed as needed throughout the manual. The following discussion expands on some of those messages and also includes messages that have not yet been discussed. The discussion assumes that how to navigate through the menus and KEYPAD use is understood. Refer to Section 5 if not.

"AUTO CALIBRATION ERROR"

??

"FRAMING ERROR"

This message indicates an incorrect Parity or Baud Rate setting. Assure that all serial communications related Parameters are correct for the system, including Station ID, Parity, Baud Rate, Command Menu, Command Menu Interval (Sections 7.02.365-369), and also Data Type. Also assure that all remote plant controllers are operating with the same settings.

"LOAD ERROR"

On jobs that utilize individual load cells, this message indicates an improper load cell signal or that the weight on the load cells exceeds their capacity. Check Parameter 214, Load Counts, to make sure the load counts increase when the cal weight is used. See Section 10.04 for load cell testing and replacement if needed. Other possible causes of the message are:

- The load cell(s) are installed with the arrow pointing up rather than down.
- A load cell is incorrectly wired to the terminals. Refer to the load cell wire color code.
- A load cell wire(s) is damaged or broken.
- A loose terminal strip(s) or terminal screw(s).
- A load cell is physically damaged.
- A load cell has been overstressed and permanently damaged.

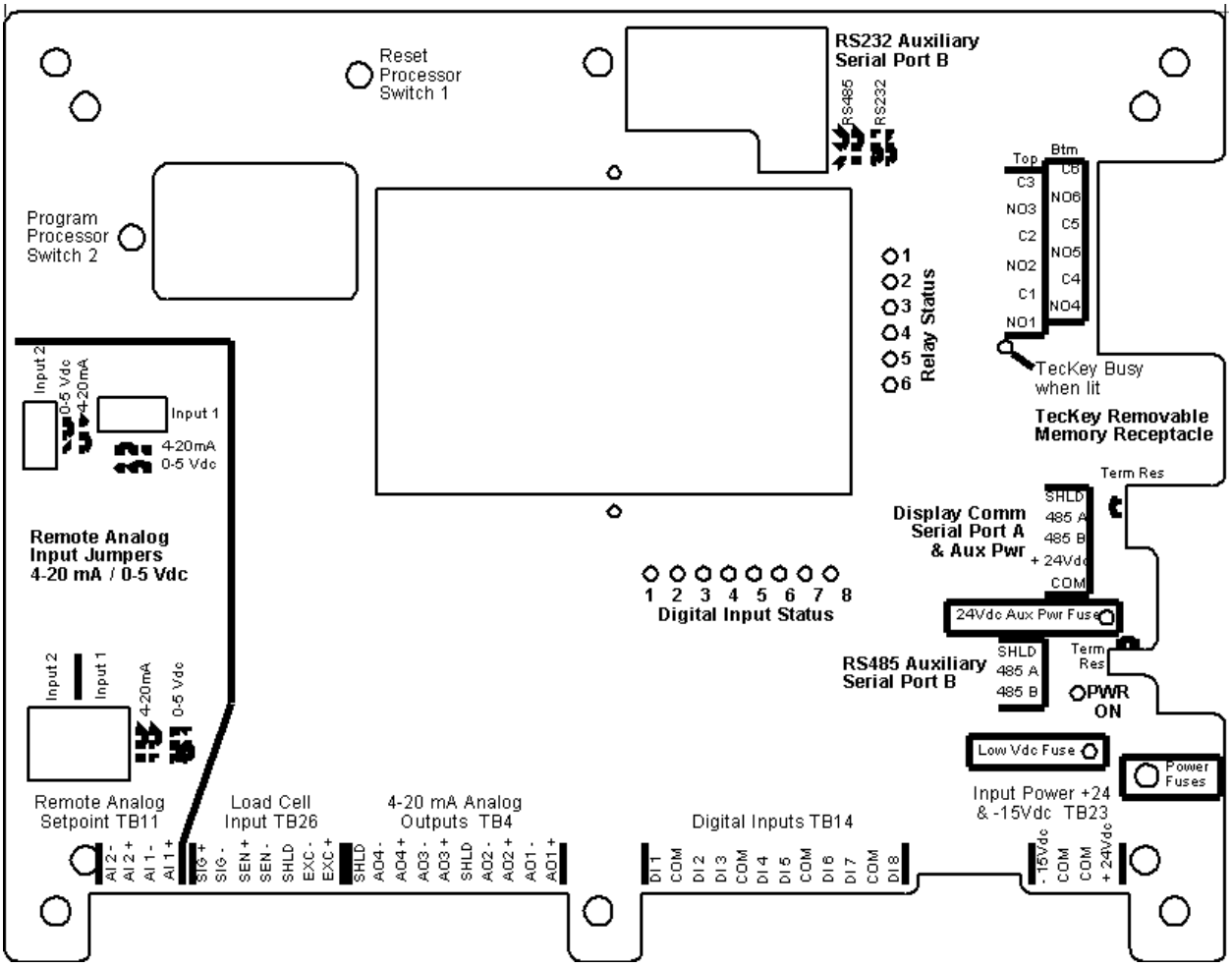
On jobs that utilize a unit scale, repair or replacement of the scale might be necessary. The scale is not user repairable. Contact the **Tecweigh** Service for assistance (Section 2.01).

"SELF TEST"
This message appears when the GRC32 is first powered up. It performs a quick self-diagnostic routine and then the message disappears.

"---------" This message indicates that the RATE or TOTAL values are too large to be displayed in their windows. Move the decimal position to the right using Parameter 102, Rate DP, or Parameter 104, Total DP. When the TOTAL display reaches its upper limit, it will need to be reset using the RESET TOTAL key.

10.02 Electrical Troubleshooting

This section provides methods for diagnosing lower level electrical problems. If the system is being installed for the first time, verify that it is wired correctly and that all the wires are secure in their terminals. For reference for the following paragraphs, the following shows the layout of the MP500 PCB.



Display does not light up…
Observe the green and red LEDs on the GRC32 processor printed circuit board (PCB). The green LED indicates sufficient power to the PCB and the red LED indicates PCB failure. If the green LED is off or the red LED is on, verify that the input AC voltage is at least 100 volts, and that

the two DC power supplies are working properly. The DC power supplies convert the incoming 100-240 VAC to +15 and +24 VDC reapectively. Also verify that the ribbon cable between the PCB and the display is installed correctly and is intact. If no deficiencies are discovered, contact the **Tecweigh** Service Department (Section 2.01), for more trouble shooting advice.

Other electrical problems…

Electrical "noise" from external equipment such as variable frequency drives (VFDs) and/or large motors can interfere with the GRC32 electronics. To prevent this problem:

- Put the GRC32 on its own separate power circuit and verify that terminal G is **earth** grounded.
- Use twisted pair shielded cable for control signals from the GRC32 to external equipment. Belden #8760 (1 pair), Belden #9418 (2 pair) is recommended.
- Connect shield wires to the GRC32 only, not at both ends.
- Do not mount the scale or the GRC32 near equipment that is a source of electrical "noise", or remove the "noise" source as much as is practical. This includes, but is not limited to, motors, VFDs, SCRs, and high voltage power electrical cabling.
- Do not run power or communication wires near equipment that is a source of electrical "noise". This includes 240/480 vac motor wires, but also 120 vac wires.
- Never electrically weld near or on the scale or GRC20, this can destroy the PCB's or load cells.
- Always take static precautions when handling PCB's (grounded wrist straps, static bags, etc.)(Section 1.08).
- Lightening storms can destroy PCBs. This can either be caused by electromagnetic radiation or voltage spikes generated in the power conductors. If after a lightening storm the GRC20 fails to work, or the Parameter values appear scrambled, replacement of the GRC20 PCB might be necessary. An indication of this condition is when one of the digits of a Parameter cannot be changed. This kind of damage is not repairable in the field. Contact the **Tecweigh** Service Department (Section 2.01) to determine replacement part requirements. Note that lightening strike damage is not covered under the warranty. (Section 12, Warranty & Service Policy).

Resetting the PCB…

If after trying other troubleshooting techniques, the equipment still does not perform up to expectations, press the reset button **on the MP500 PCB**. The reset button is a small white button near the top left area of the PCB. Also refer to the previous figure depicting its location. This action will check for corrupt data and also recover parameters from flash memory if necessary. If this has no effect, try disconnecting the power completely and then reconnecting it. If all this fails, contact the **Tecweigh** Service Department (Section 2.01) for assistance.

10.03 Auxiliary Equipment Troubleshooting

Display failure…

If the RATE, SPEED, and TOTAL displays do not appear, and the above trouble shooting techniques have been tried without results, there is problem which cannot likely be determined in the field. Contact the **Tecweigh** Service Department (Section 2.01) for advice and possible replacement parts. (Refer to section 12, Warranty & Service Policy).

Relay failure…

A green LED exists on the PCB for each relay. When a relay is energized, its LED will illuminate, and should illuminate whether a load is connected to the relay or not. The relays will also make a clicking sound as they open and close. If a relay is found to be mal-functioning per

the above, move to another relay if available. If all other relays are being used, replace the PCB. The relays are not field replaceable. Contact the **Tecweigh** Service or Parts Department (Section 2.01) for assistance.

If the relays are not working as expected, consider how realistic the configured relay Parameters are. Refer to Sections 7.05.324-340 for relay setup Parameters. The most common problem encountered when using the relays for RATE or WEIGHT alarms is that the selected limits are not realistic. This will cause the alarm condition to never exist or exist constantly. Also check the relay delay time. The alarm condition must exist for at least the length of the delay time before the relay will be energized.

Current loop outputs…

The current loop outputs are optically isolated and the values are configured using Parameters 7.05.303 to 323. For accurate current output adjustments, place a digital ammeter in series with the device using the current loop. If after adjusting the relevant Parameters an output current does not respond correctly during normal operation, replace the PCB. The outputs are not field repairable. Contact the **Tecweigh** Service or Parts Department (Section 2.01) for assistance.

Another possible problem that could arise is that the current output is functioning, but in a multi-load loop one or more loads are not functional. This problem is usually caused by the loads not being isolated. Every load in the current loop needs to be isolated (not connected to common or ground) except the last one. Refer to Section 4.02, Analog Outputs, for additional information.

If everything is correct and the system is operating normally, but a remote device still is not, consult the manufacturer of that device, otherwise, contact the **Tecweigh** Service Department (Section 2.01) for assistance.

10.04 Load Cell Testing / Replacement

The following explains how to test a load cell(s). First stop the feeder and disconnect power from the GRC32. Next disconnect the green connector from the GRC32 that the load cell wires are connected to. If more than one load cell is connected to the green connector, to get at accurate reading, the wires of the load cell to be tested will have to be removed from the connector. Then, using an ohmmeter, verify the following resistance values. If even one resistance value varies by more than +/- 10%, replace the load cell.

Model	CI-LC22	SB1 or LC	CB6-XX-T
Red-Black	310 Ohms	350 Ohms	400 Ohms
Red-Green	290 Ohms	280 Ohms	290 Ohms
Red-White	360 Ohms	280 Ohms	290 Ohms
Black-White	290 Ohms	280 Ohms	290 Ohms
Black-Green	390 Ohms	280 Ohms	290 Ohms
Green-White	290 Ohms	350 Ohms	350 Ohms

CHAPTER 11 –
FACTORY SETUP SHEET AND PARAMETER TABLE

11.01 Factory Setup Sheet

Job Number: _____ Serial Number:_____

Customer: _____

TECWEIGH GRC32:

Main Processor PCB Model: _____ Part No: _____

LED Display PCB Model: _____ Part No: _____

Date Shipped: _____ Set-up by: _____

EQUIPMENT DETAILS:

Screw Feeder Model:_____ Scale Base (if applicable): _____

Load Cell Capacity 1)_____ 2)_____ 3)_____ 4)_____

Load Cell Sensitivity 1)_____ mv/v 2)_____ mv/v 3)_____ mv/v 4)_____ mv/v

PRELIMINARY DATA: (order information)

Unit of measurement: _____

Feed Rate: _____ min, _____ avg, _____ max.

Material Density: _____ PCF

GRC32 supply voltage: 100-240 VAC 1 phase 50-60 Hz –or- _____

SPECIAL:

_____
_____
_____
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11.02 The Parameter Table

The following Parameter Table section shows all the Parameters in all the Menus of the GRC32. It shows each Parameter ID, how it looks in the MODE window when displayed, a short description of its function, the selections available, the default selection, and a column to write in the Factory or End User's values for each Parameter.

In the Parameter column note that some Parameters are *italicized*. This identifies that the Parameters are not always visible. For instance, Parameters 107, 108 and 109 set up the refill specifics. If the Auto Rfl (106) is set to NONE, then the italicized Parameters will not be visible. This is because they are not applicable and will be skipped when scrolling through the Parameter Table. The only time an italicized Parameter's visibility is dependant on something other than another Parameter's value is in the case of Parameters 370 to 376. The visibility of these Parameters is dependant upon whether a field bus daughter card (Ethernet, DeviceNet, Profibus, etc.) is installed or not. If a field bus card is not present, then these Parameters will not be viewable.

At the beginning of each menu is a heading with the menu name and either the term "material specific" or "global" in parenthesis. The GRC32 has the capacity to store different Parameters for different materials or different running RATE ranges. The menus that are material specific have duplicate values for each material, while the global menus only have one value for all materials. Refer to Parameters 500-502 for material set up information.

THE PARAMETER TABLE

ID	Parameter	Description	Range	Default	Factory
Feeder Set-Up Menu (material specific)					
100	Mass Units	Selects units of measure for the Mass	Ton, Lb, Oz, Mton, Kg, Gram	Lb	
101	Time Units	Selects units of measure for the Time	Min, Sec, Hr	Min	
102	Rate DP	Rate display decimal point setting	ONES, TENS, HUND	TENS	
103	Rate Avg	Rate display running average in number of samples	00-99	05	
104	Total DP	Total display decimal point setting	ONES, TENS, HUND, THOUS	TENS	
105	Total Inc	Total display resolution	1, 2, 5, 10	1	
106	Auto Rfl	Selects the method of refilling	NONE, WEIGHT, WGHT/TIME	WEIGHT	
107	*Rfl Lo*	Sets the live load weight where an auto refill sequence is initiated	0000.000 - 9999.999	10	
108	*Rfl Hi*	Sets the live load weight where an auto refill sequence is stopped	0000.000 - 9999.999	15	
109	*Rfl Time*	Sets the max time in which an auto refill must take, if exceeded - Refill Alarm	00.1 - 99.9	10.0	
110	Alrm Lo	The minimum live load required to run the feeder, if exceeded - Load Alarm	0000.000 - 9999.999	5	
111	Alrm Hi	The maximum live load required to run the feeder, if exceeded - Load Alarm	000000 - 999999	150	
112	Rate Al Type	Determines the type of rate alarm settings	Percent, Direct	Percent	
113	Rate Alrm Lo	Sets the rate alarm low setting, if exceeded - Rate Alarm	000.000 - 999.999	0	
114	Rate Alrm Hi	Sets the rate alarm high setting, if exceeded - Rate Alarm	000.000 - 999.999	0	
115	Rate Alrm Delay	Sets the time in seconds the alarm must occur before activating	00.0 - 99.9	1	
116	R Fail Type	Determines the type of rate failure settings	Percent, Direct	Percent	
117	R Fail Al Lo	Sets the rate failure low setting, if exceeded - Rate Failure	000.000 - 999.999	0	
118	R Fail Al Hi	Sets the rate failure high setting, if exceeded - Rate Failure	000.000 - 999.999	0	
119	R Fail Del	Sets the time in seconds the alarm must occur before activating	00.0 - 99.9	1	
120	Zero Counts	Load count selected during calibration to represent Zero	0-8388606	0	
121	Span Counts	Load count selected during calibration to represent Span	0-8388606	400000	
122	SCF	Span correction factor	0.50000 - 1.50000	1.00000	
123	Alarm Output	Alarm output control position setting	000.0-200.0	0	
124	Agit Speed	Sets the agitator speed when an analog output is used for motor control	000.0-200.0	50	

Control Set-Up Menu (global)					
200	Cal Wt	Calibration weight value	0000.000-9999.999	48	
201	Time Set	Sets the internal clock time	HH:MM:SS		
202	Date Set	Sets the internal calendar	YYYY/MM/DD		
203	Min Output	Minimum control position output	000.0-200.0	10	
204	Max Output	Maximum control position output	000.0-200.0	90	
205	Max Change	Maximum change to control position based on PID	00.0-99.9	5	
206	Setpoint Type	Selects set point type, local or remote	LOCAL, REMOTE, %REMOTE	LOCAL	
207	*Rem Set Pnt*	Selects remote set point type, analog or digital	mA INPUT, FIELDBUS, DIGITAL, 0-5VDC IN	mA INPUT	
208	*mA@0 R SetP*	Sets the mA output at zero rate set point	0.0 - 9.9	4.0	
209	*R SetP@20mA*	Sets the rate set point at 20 mA output	0000.000 - 9999.999	10	
210	*SP LTrim*	Tunes the low end of the analog remote set point	000 - 200	100	
211	*SP HTrim*	Tunes the high end of the analog remote set point	000 - 200	100	
212	LC Cap	Total capacity of all load cells combined	0000.000 - 9999.999	0	
213	LC Mv/v	mV per Volt of excitation rating of load cells	0.000000 - 9.999999	0	
214	Load Counts	Live load counts being indicated by Signal Conditioner	reference	reference	
Input Output Menu (global)					
300	Sim Rate	Provides artificial rate for calibrating I/O and other equipment	OFF, ON	OFF	
301	Sim Rate Valu	Artificial rate shown when Sim Rate is ON	0000.000 - 9999.999	100	
302	Sim Wght	Provides artificial weight for calibrating I/O and other equipment	OFF, ON	OFF	
303	Sim Wght Valu	Artificial weight shown when Sim Weight is ON	0000.000 - 9999.999	100	
304	AO1 Func	Selects basic 4-20mA = 0-100% Control Position, or editable range	AugCtrl 4-20, AugCtrlSpcl	AugCtrl 4-20	
305	*AO1 Lo*	Sets the mA output for 0% control position output	0.0 - 9.9	4.0	
306	*AO1 Hi*	Sets the control position output in % that represents 20.0 mA output.	000.0 - 200.0	100.0	
307	*AO1 LTrim*	Tunes the low end of the analog output	000 - 200	100	
308	*AO1 HTrim*	Tunes the high end of the analog output	000 - 200	100	
309	AO2 Func	Selects function of analog output #2	Unused, Aug Ctrl, Agit Ctrl, Rate Avg, Rate, Weight	Unused	
310	*AO2 Lo*	Sets the mA output for 0 control, rate or weight depending on the funcion	0.0 - 9.9	4.0	

311	*AO2 Hi*	Sets the control, rate or weight that represents 20.0 mA output.	0000.0 - 9999.9	100	
312	*AO2 LTrim*	Tunes the low end of the analog output	000 - 200	100	
313	*AO2 HTrim*	Tunes the high end of the analog output	000 - 200	100	
314	AO3 Func	Selects function of analog output #2	Unused, Aug Ctrl, Agit Ctrl, Rate Avg, Rate, Weight	Unused	
315	*AO3 Lo*	Sets the mA output for 0 control, rate or weight depending on the funcion	0.0 - 9.9	4.0	
316	*AO3 Hi*	Sets the control, rate or weight that represents 20.0 mA output.	0000.0 - 9999.9	100	
317	*AO3 LTrim*	Tunes the low end of the analog output	000 - 200	100	
318	*AO3 HTrim*	Tunes the high end of the analog output	000 - 200	100	
319	AO4 Func	Selects function of analog output #2	Unused, Aug Ctrl, Agit Ctrl, Rate Avg, Rate, Weight	Unused	
320	*AO4 Lo*	Sets the mA output for 0 control, rate or weight depending on the funcion	0.0 - 9.9	4.0	
321	*AO4 Hi*	Sets the control, rate or weight that represents 20.0 mA output.	0000.0 - 9999.9	100	
322	*AO4 LTrim*	Tunes the low end of the analog output	000 - 200	100	
323	*AO4 HTrim*	Tunes the high end of the analog output	000 - 200	100	
324	Rly1 Func	Run interlock relay, un-editable	Run	Run	
325	Rly1 Run Log	Relay #1 is hard coded as a run interlock for the auger, this sets logic	NO, NC	N.O.	
326	Rly1 Run Del	Relay #1 is hard coded as a run interlock for the auger, this sets the run delay	00-99	00	
327	Rly2 Func	Refill output relay, un-editable	Refill	Refill	
328	Rly2 Rfl Log	Relay #2 is hard coded as the refill interlock, this sets its logic	NO, NC	N.O.	
329	Rly3 Func	Selects the relay function	Unused, Ref Alrm, Wght Alrm, Rate Alrm, Rate Fail, Run, Refill	Unused	
330	*Rly3 Log*	Selects the relay logic	NO, NC	N.O.	
331	*Rly3 Del*	Selects the relay delay in seconds	00-99	00	
332	Rly4 Func	Selects the relay function	Unused, Ref Alrm, Wght Alrm, Rate Alrm, Rate Fail, Run, Refill	Unused	
333	*Rly4 Log*	Selects the relay logic	NO, NC	N.O.	
334	*Rly4 Del*	Selects the relay delay in seconds	00-99	00	
335	Rly5 Func	Selects the relay function	Unused, Ref Alrm, Wght Alrm, Rate Alrm, Rate Fail, Run, Refill	Unused	
336	*Rly5 Log*	Selects the relay logic	NO, NC	N.O.	
337	*Rly5 Del*	Selects the relay delay in seconds	00-99	00	

338	Rly6 Func	Selects the relay function	Unused, Ref Alrm, Wght Alrm, Rate Alrm, Rate Fail, Run, Refill	Unused	
339	*Rly6 Log*	Selects the relay logic	NO, NC	N.O.	
340	*Rly6 Del*	Selects the relay delay in seconds	00-99	00	
341	Di1 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
342	*Di1 Log*	Selects the digital input logic	NO, NC	N.O.	
343	*Di1 Del*	Selects the digital input delay in seconds	00-99	00	
344	Di2 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
345	*Di2 Log*	Selects the digital input logic	NO, NC	N.O.	
346	*Di2 Del*	Selects the digital input delay in seconds	00-99	00	
347	Di3 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
348	*Di3 Log*	Selects the digital input logic	NO, NC	N.O.	
349	*Di3 Del*	Selects the digital input delay in seconds	00-99	00	
350	Di4 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
351	*Di4 Log*	Selects the digital input logic	NO, NC	N.O.	
352	*Di4 Del*	Selects the digital input delay in seconds	00-99	00	
353	Di5 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
354	*Di5 Log*	Selects the digital input logic	NO, NC	N.O.	
355	*Di5 Del*	Selects the digital input delay in seconds	00-99	00	

356	Di6 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
357	*Di6 Log*	Selects the digital input logic	NO, NC	N.O.	
358	*Di6 Del*	Selects the digital input delay in seconds	00-99	00	
359	Di7 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
360	*Di7 Log*	Selects the digital input logic	NO, NC	N.O.	
361	*Di7 Del*	Selects the digital input delay in seconds	00-99	00	
362	Di8 Func	Selects the digital input function	Unused, Off/Auto, Man Rfl, Auto Rfl, E-Stop, STot Res, LTot Res, Alrm Res	Unused	
363	*Di8 Log*	Selects the digital input logic	NO, NC	N.O.	
364	*Di8 Del*	Selects the digital input delay in seconds	00-99	00	
365	Station ID	Selects the unique ID for the GRC32's serial communication ports	A through Z	A	
366	Parity	Selects the RS232/RS485 serial port's parity setting	None, Even, Odd	Even	
367	Baud Rate	Selects the RS232/RS485 serial port's baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115600	38400	
368	Command Menu	Determines the automatically sent serial information	00-24	00	
369	Cmd Menu Interval	Sets the interval at which automatically send data in seconds	00.0 - 10.0 (1/10 of a second to 10 second intervals)	1.0	
370	*FB Data Type*	Sets fieldbus data type	Floating Point, Interger	Floating Point	
371	*IP*	IP address of Ethernet interface card	000.000.000.000		
372	*IM*	IP Mask	000.000.000.000		
373	*G1*	Gateway address	000.000.000.000		
374	*G2*	Gateway address	000.000.000.000		
375	*D1*	DNS address	000.000.000.000		
376	*D2*	DNS address	000.000.000.000		
377	Parameters	Allows backing up existing parameter set to the TecKey	No Action, Save, Restore, Defaults	No Change	

Tuning Menu (material specific)					
400	Tuning	Selects auto (default) or manual tuning	AUTO/MANUAL	AUTO	
401	*Proportional*	Sets proportional gain for PID functions	0-2	0.5	
402	*Integral*	Sets integral gain for PID functions	0-2	.1	
403	*Derivative*	Sets derivative gain for PID functions	0-2	.005	
404	*Control Delay*	Delay in seconds before making first CP change after going into Auto mode	00-99	10	
405	*Sample Time*	Sets the number of seconds between control position changes	00-99	5	
406	*ADC Range*	Sets the load cell max millivolt range permitted	10, 20, 40, 80	40	
407	*LC Filter*	Sets the filtering/averaging of the raw load cell signal	0-5	3	
408	*DCC Sense*	Sets the sensitivety of the Disturbance Cruise Control	0-5	3	
Material Set-Up Menu (material specific)					
500	Active	Selects the active material.	Material A, Material B, Material C, Material D	Material A	
501	Rename	Allows user to rename the active material's default material description	User renames "Material 1" to desired description	Material A	
502	Copy	Copies active material parameters to selected material's parameter set	Material A, Material B, Material C, Material D	Material A	
503	P1 CP	Sets feeder's control position for linearity point #1	000-200	30	
504	P1 Rate	Sets feeder's running rate for linearity point #1	0000.000-9999.999	0	
505	P1 Time	Sets the duration of the test during feeder "auto" calibration P1 in minutes	00.00-99.99	1	
506	P2 CP	Sets feeder's control position for linearity point #2	000-200	60	
507	P2 Rate	Sets feeder's running rate for linearity point #2	0000.000-9999.999	0	
508	P2 Time	Sets the duration of the test during feeder "auto" calibration P2 in minutes	00.00-99.99	1	
509	P3 CP	Sets feeder's control position for linearity point #3	000-200	0	
510	P3 Rate	Sets feeder's running rate for linearity point #3	0000.000-9999.999	0	
511	P3 Time	Sets the duration of the test during feeder "auto" calibration P3 in minutes	00.00-99.99	1	
512	P4 CP	Sets feeder's control position for linearity point #4	000-200	0	
513	P4 Rate	Sets feeder's running rate for linearity point #4	0000.000-9999.999	0	

514	P4 Time	Sets the duration of the test during feeder "auto" calibration P4 in minutes	00.00-99.99	1	
515	P5 CP	Sets feeder's control position for linearity point #5	000-200	0	
516	P5 Rate	Sets feeder's running rate for linearity point #5	0000.000-9999.999	0	
517	P5 Time	Sets the duration of the test during feeder "auto" calibration P5 in minutes	00.00-99.99	1	
518	Rfl change	Selects if there is an offset to the control position during refills	None, Incr, Decr	None	
519	Rfl Offset	Sets decrease in auger speed desired during refill process	00-50%	0	
520	Batch	Stops feeder at this short total value for a simple batching routine	00000000 - 99999999	0	
Set Point Menu (global)					
600	Setpoint	Selects local rate control setpoint	0000.000	0	
Security Menu (global)					
700	Lock Calibrate	Sets security level for the Calibration buttons	NO, YES	NO	
701	Lock Ctrl Mode	Sets security level for the Control Mode buttons	NO, YES	NO	
702	Lock Reset	Sets security level for the RESET button	NO, YES	NO	
703	Lock Menus	Sets security level for the Menu buttons	NO, YES	NO	
704	Lock Set Point	Sets security level for the Set Point Menu button	NO, YES	NO	
705	Lock Code	Security passcode	00000	00000	

CHAPTER 12 – WARRANTY AND SERVICE INFORMATION

TECWEIGH®
Tecnetics Industries, Inc.

WARRANTY & SERVICE POLICY
Gravimetric Controllers and Feeders

Statement of Limited Warranty – Tecnetics Industries, Inc.

Tecnetics Industries, Inc., Warrants this equipment against faulty components or factory defects, for a period of five (5) years beginning on the date of shipment/invoice. Load cells shall have a warranty of one (1) year. During the warranty period, any defect will be repaired or replaced without charge, providing that the equipment is returned, pre-paid and undamaged to **TECNETICS'** factory. When on site repair or replacement is required, a **Tecnetics** authorized distributor or technician can be hired to diagnose and make necessary repairs. **The Warranty will cover affected parts, but excludes travel and labor expenses.**

Terms and Conditions of Limited Warranty

This obligation is limited exclusively to defective original equipment or supplied by Tecnetics and is subject to the inspection and analysis of Tecnetics to conclusively identify or confirm the nature and cause of failure.

During the product warranty period, defective components, mechanical or electrical, will be repaired or replaced, at the discretion and authorization of Tecnetics, providing equipment owner agrees to return the faulty components to the factory, freight prepaid.

Tecnetics is not responsible and will not be held liable for losses, injury or damage caused to persons, or property by reason of improper installation of Tecnetics products, or product.

This warranty is not applicable for expenses either direct or consequential that may arise from the use or failure of these products.

Tecnetics reserves the right to incorporate improvements in material and design of the products without notice and is not obligated to incorporate the same improvements in equipment previously manufactured.

Tecnetics shall not be obligated under any warranty different from its warranty as set forth herein. The Tecnetics warranty is limited to the initial customer and initial installation and is not intended to inure to the benefit of a secondary owner in the event of resale or subsequent installation.

Conditions Which Void Limited Warranty

This warranty shall not apply to equipment which:

A) Has had repairs or modification not authorized by Tecnetics which has affected the performance or reliability.

B) Has been subject to misuse, negligent handling, improper installation, accident, damage by fire, water, submersion, or an act of God.

C) Has had serial numbers altered, defaced or removed.

Freight Carrier Damage

Claims for equipment damaged in transit must be referred to the freight carrier. Visible damage should be reported immediately, and concealed damages as soon as possible, in any case, within fifteen (15) days of receipt of shipment, in accordance with freight carrier regulations.