

THAYER SCALE

PROCESS MEASUREMENT & CONTROL EQUIPMENT

SERIES 5200 Weigh Feeder Controller and Integrator

**POWERFULL,
PRECISE MEASUREMENT**



**OPERATOR FRIENDLY
EASY TO USE**



**ROBUST
STATE-OF-THE-ART
ELECTRONICS**



**SYSTEM INTEGRATION
PROCESS COMMUNICATIONS**



THAYER SCALE SERIES 5200 WEIGH FEEDER CONTROLLER & INTEGRATOR

The SERIES 5200, Thayer Scale's new generation of operator interface for control and monitoring of any process weighing and flow control equipment.

- For use with any Strain Gauge or LVDT type load cell.
- Powerful internal 24 bit (1 part in 4,000,000) load resolution produces unparalleled system accuracy.
- Minimal customer wiring. The Scale Unit (SU-5200) mounted at the feeder gathers, load, speed and temperature; and communicates this information to the central processor (CPU) through a 2-wire RS422/485 connection.

SCALE UNIT (SU-5200)

This is the heart of the control system. It is responsible for continuously monitoring the major sensor signals of the process weighing equipment and digitally communicating their status back to the CPU for further processing. The Scale Unit consists of a motherboard that accepts several optional plug-in boards. These boards allow it to be easily applied to a variety of process weighing or flow equipment with sensors; Digital or Analog, temperature sensors, two Channel Industrial Encoders, three Wire NPN Open Collector Proximity Switches or Piezoelectric Accelerometer speed sensors; and Analog or Digital flow rate sensors. The mother board is also equipped with digital Input/Output terminals that can monitor and/or control specific weighing equipment signals such as; Automated Calibration Devices, Belt Tracking Limit Switches and other similar devices. It is located within ten feet their meters) of the load sensor (if applicable). The factory mounts the unit to the equipment's frame and pre-wires any of the critical sensors that are an integral part of this framework.

The Scale unit typically receives its power from the main instruments dedicated DC power supply and digitally transmits its information back to the instrument via an RS-485 communication link. Both of these cables are typically contained in a single dedicated conduit run.



SERIES 5200 CPU

The CPU is the brain of the control system. It is responsible for monitoring, displaying and/or controlling the variables of the process weighing or flow equipment. At the foundation of this instrument is the CPU or Embedded PC (EPC). This executes the proprietary application specific software based on real time operating system firmware. Both the software and firmware are stored in a nonvolatile memory format compact FLASH card). Sub-components of the instrument include: power supply that convert incoming AC power to the required DC supply for this unit as well as that required by the SU-5200 and OI-5200. Interface cards that handle the RS-485 communications between the SU-5200 and OI-5200 and Input/Output cards for the fixed and programmable inputs and outputs that are available.

OPERATOR INTERFACE

This is the human interface of the control system. It is responsible for providing the operator with a means of easily interfacing with the process weighing of flow equipment. It includes 24 graphic keypad controls, a 4 x 20 vacuum fluorescent display and audio beeper that combined provide visual as well as the tactile aid needed to program, operate, maintain, diagnose, and troubleshoot the entire control system.

Each application can contain up to three interfaces. One unit is typically mounted in the door of the instrumentation (CPU) and the others (if applicable) are shipped loose for remote mounting. Remote mounted units are available in industrial rated enclosures or as open chassis and are supplied if additional operator interfaces are required. Each unit, regardless of its location in the system, receives its information to and from the instrument controls via a communications link. A minimum of one operator interface unit is required for system operation.



SYSTEM INTEGRATION/COMMUNICATIONS

Thayer Scale provides a wide variety of interface options, including standard bi-directional analog and serial communications such as:

- Serial DF1 Allen Bradley Interface.
- Serial RTU Modbus Interface.
- Fieldbus DeviceNet Interface.
- Fieldbus Profibus Interface.



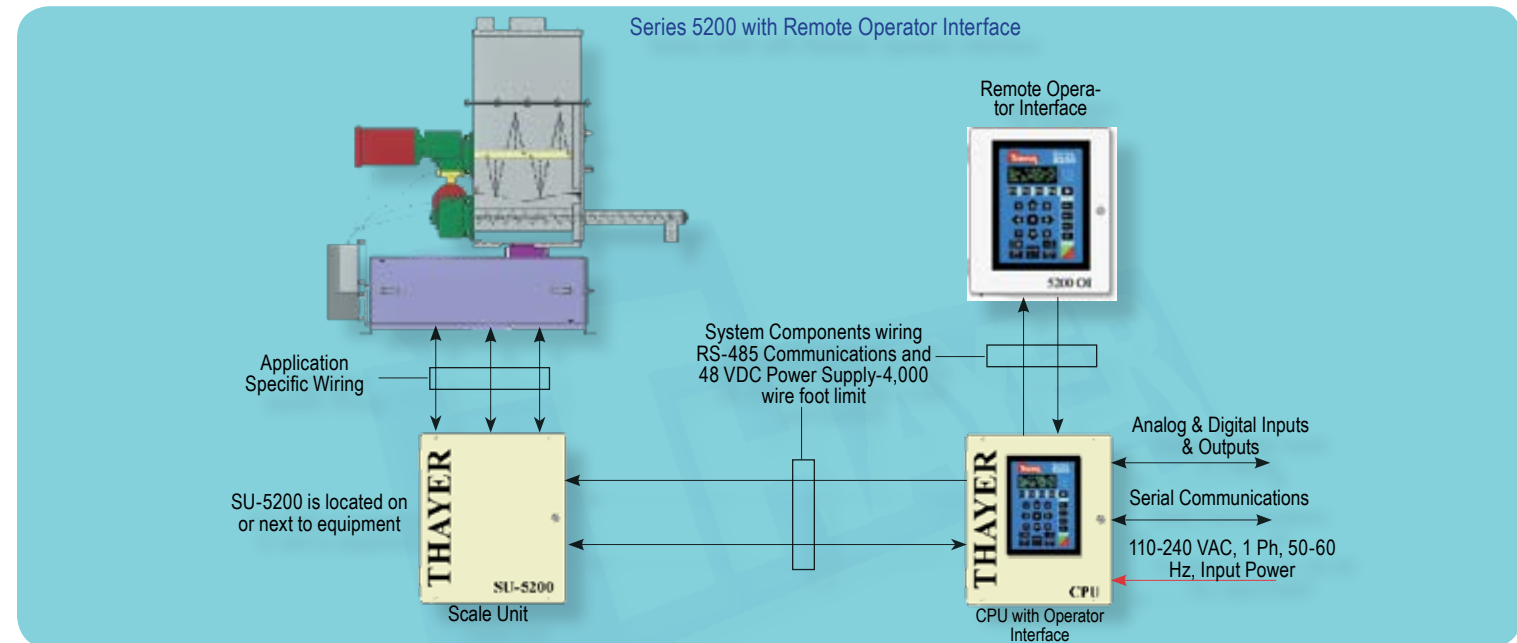
SOFTWARE

The Embedded PC (EPC) executes proprietary software based on real time operating system firmware. Both the software and firmware are stored in a nonvolatile memory format (compact FLASH card). The EPC directly boots from this FLASH card each time the instrument power is cycled. This makes it easily reconfigurable to manage a variety of open and closed loop software applications such as:

- Weigh-Belt Integrator Software-Noncommercial Version, open loop.
- Weigh-Belt Integrator Software-Commercial (Security) Version, open loop.
- Weigh-Belt Controller Software-PI Controller, closed loop.
- Loss-In-Weight Controller Software-PI Controller, closed loop.
- Loss-In-Weight Batch Controller Software-Batch out, open or closed loop.
- Rate Controller Software-PI Controller, closed loop.



At the initial boot up the EPC retrieves all vital information regarding the application software it is to execute from the FLASH card. This software must then be programmed and set-up for the actual piece of process equipment it will manage. During this process all of the application specific information is stored on the FLASH card so all successive boots require no further action to be taken other than the normal operational commands



OPERATOR INTERFACE (OI)

- 4 x 20 Vacuum Florescent Display.
- Key presses are both tactile audible.
- Numeric Keys for numeric entries.
- Single Menu Key for:
- Normal MENU FUNCTIONS
- Kernel Menu Functions.
- Exception Menu Functions.
- Diagnostic Menu to view information about:
 - Software revisions.
 - Raw Data.
 - Alarm & Calibration histories.
- Calibration key for normal calibration function with simple YES and NO response keys.
- Acknowledge and Silence keys for alarms and shutdown.
- Minimal customer wiring:
- Single supply required from the CPU or local 24-48 VDC supply.
- RS-485 2-wire communication to the Central Processor Unit, max. 4,000 wire feet.

CENTRAL PROCESSOR UNIT (CPU)

- Communications:
 - Isolated RS-485, 4,000 wire feet max, to SU.
 - Isolated RS-485, 4,000 wire feet max, to operator interface.
- Power requirements:
 - 100 to 240 VAC @ 50-60 Hz.
- Communications:
 - FieldBus communication for DeviceNet or PROFIBUS.
- Serial Communications for RS-232/485 Allen-Bradley Ethernet/TCP or MODBUS/ TCP protocols.
- Parallel Port for printing totalizer & amount delivered since last print.

SCALE UNIT (SU)

MECHANICAL:

- Enclosure: 300 mm High X 250 mm Wide X 150 mm Deep.
- Standard: NEMA 4 (IP 65), Mild Steel, Enclosure Mounting
- Optional: NEMA 4X (IP65), 304 or 316 Stainless Steel Mounting.
- Power Requirements: +24 to +48 VDC $\pm 5\%$, 10 watts.
- Area Classification: Consult Factory.
- Speed and load sensor boards:
- LVDT & Strain Gauge plug-in boards.
- 24 bit A/D resolution with an effective resolution of 1 part in 4 million.
- No hardware programming required.

ENVIRONMENTAL

- Operating Temperature: -10° to $+60^{\circ}$ C.
- Operating Humidity: 10 to 90%, non-condensing.
- Storage Temperature: -20 to $+85^{\circ}$ C.
- Storage Humidity: 5 to 95%, Non-condensing.
- Operating Vibration:
 - $10 \leq f < 57$ 0.375 mm amplitude continuous, 0.075 mm occasional
 - $57 \leq f < 150$ 0.5g constant acceleration continuous, 1.0g constant acceleration continuous,
 - 15g, 11 ms half-sine in three axis.
- Shocks: up to 2,000 M operational.
- Altitude: 3,000 M storage (70 kPa).



THAYER SCALE-HYER INDUSTRIES, INC.

91 Schoosett St., Pembroke, MA 02359

Ph: 781-826-8101 Fax: 781-826-7944

e-Mail: Sales@ThayerScale.com

WEB: www.ThayerScale.com



General Description Functions of Displays and Controls of the Series 5200 Operator Interface

DESCRIPTIONS

1 Vacuum Fluorescent Display - A four line by twenty character vacuum fluorescent display. It displays all information available from the system to the operator.

2 Function Keys (F1-F4) - The function keys are used to select operations indicated by the four labels on the bottom line of the display. If more than four labels are available, the MORE key (12) can be pressed to rotate to the next group.

3 Numeric Keys (0-9, ".") - These keys are used to enter numeric data. The decimal point is entered at the desired position. It cannot be the first character. Always precede a decimal point with a zero for numbers less than one.

The numbers 2,4,6 and 8 are shaped like arrows and serve as multiple purpose keys as follows:

- When in Menu mode they are used as navigation keys. The Left/Right arrow keys are used to scroll from category to category (side to side) and the Up/Down arrow keys are used to scroll from line to line (up and down) of each category. In the programming mode, when the entries calls for a non-numeric item, the Up/Down arrow keys are used to scroll through a list of available menu entry selections.

- When in Run-time mode and Controller Application software is installed they are used as process adjustment keys. The Left/Right arrow keys are used in the Manual mode of operation to ramp the controllers Output up and down. The Up/Down arrow keys are used in the Automatic mode of operation to ramp the controllers Setpoint up and down. 4 ACK, SIL (0, ".") Keys - During run time operations the zero key doubles as the acknowledge key and the decimal point key functions as the silence key as follows:

- The **SIL** key is used to silence any programmed audible outputs. This key will disable any user programmed audible outputs that are currently active. Pressing this key a second time will not re-enable the outputs. However, pressing the ACK key twice will sound the audible outputs again. If the instrument has gone into the shutdown mode, it must be acknowledged by pressing the ACK key before normal operations are allowed to resume.

- The **ACK** key is used to acknowledge an alarm or shutdown condition and acts as a toggle switch. During an alarm condition pressing this key will stop the reporting of the alarm on the third line of the display and disable any programmed outputs activated by the condition. Both audible and non-audible alarms are deactivated. Pressing this key a second time will bring the alarm message back onto the display and re-enable all programmed outputs associated with that alarm. The alarm indicator on the operator interface (the middle red LED to the right of the display) will remain lit as long as the alarm condition remains. It cannot be turned off by the acknowledge key.

5 ESC Key - This key is used to cancel entry of data, to abort special functions and to exit the menu structure. During menu operations pressing escape (ESC) clears any incorrectly entered data already entered allowing new data to be entered. Pressing the key a second time prior to entering data after opening a field will close the open field and restore the previous data. The menu area is exited by pressing the ESC key when no data field is open. Escape is also used to abort some procedures that have been evoked.

6 ENTER Key - This key is used to open a programming data field. After data has been keyed in the ENTER key must be pressed again to store the data and close the field.

7 MENU Key - This key is valid only while the run-time screen is being displayed. When pressed the bottom line of the display will offer a selection of menus. Select the desired menu by pressing the corresponding function key (2) or the MORE key (12) to see other menus if available. While inside the menu structure pressing the MENU key will move the cursor back to the first item in the first category. Use the escape key (5) to exit a menu.

8 RUN/STOP Key - This is an Application software dependent Key. Function of this key is solely dependent on the application type and menu parameter set-up. Reference must be made to the individual Application Manuals for detailed information regarding the setup and operation of this key. Embedded within this key outline is a green LED. It illuminates when the system is in the Weigh or Run mode.

9 PRINT Key - This key instructs the program to send predefined data consisting of header information, current totalizer value, totals delivered, and current date and time to the printer port.

10 CAL Key - This key instructs the program to initiate a Normal Calibration run for all weighing applications.

11 YES/NO Key - These keys are used to answer questions asked during programming, procedural set-ups and calibration procedures.

12 MORE Key - This key is used to show the next group of function keys (if available), on the bottom line of the display.

13 FAULT, ALARM, SHUTDOWN LED'S - These three red LED'S are used to display instrument status and will illuminate if the following set of conditions are met.

FAULT No illumination indicates that the Instrument is communicating properly with the OI-5200 and SU-5200. Steady Red indicates that the OI-5200 has lost its communications with the Instrument.

Flashing Red indicates that the SU-5200 has lost its communications with the Instrument.

DISPLAY MODES

- **RUN-TIME** Run-time is the normal operating display. The information displayed includes a broad range of system data such as rate, totals, mode, and various status conditions. During operation the information presented on the third line of the display may be alternated with information regarding specific events such as alarm conditions.

- **SUPPLEMENTAL** Supplemental displays are extensions of run-time displays. They provide detailed information on specific system variables and operations. These displays are typically called up by a technician performing diagnostic procedures or advanced system configurations.

- **MENU** Menu displays allow the programmer or operator to scroll through and modify application setup parameters, activate support routines, present diagnostic information and configure the instrument for operation. Various password levels can optionally be employed to prevent changes by unauthorized personnel.

- **PROCEDURAL** Procedural displays appear as logical steps within a procedure, such as calibration or count belt pulses. Procedural displays give information about the step logic being performed. These displays also prompt the operator for confirmation before continuing with specific procedures.



PRODUCTS & MARKETS SERVED

Thayer Scale supplies the world with process measurement & control equipment with emphasis on solids flow weighing and metering. Our products include: Loss-In-Weight Feeder, Weigh Belt Feeders, Conveyor Belt Scales, Measurement & Control Instrumentation and Bin & Hopper Material Flow Aids. The markets we serve include: Forest Products, Plastics, Food, Chemicals and Cement to

MAJOR PRODUCTS & TECHNOLOGIES

- Patented "FMSS" Force Measurement Suspension System Cable Scales
- Patented Loss-In-Weight "Differential™" Screw Feeder
- Patented "Nodal-Membrane" Vibratory Tray Feeders.
- Patented "Spiralator™" Hopper Agitator
- Patented "Rocking Flexure" Belt Scales
- Patented "PF" Volumetric Screw Feeder
- Patented "Bridge Breaker™" Bin & Hopper Dischargers.
- Low Feed Rate "Miniature" Weigh Belt & Loss-In-Weight Feeder.
- "NAR" NTEP Approved commercial grade Conveyor Belt Scales (approved for legal trade).
- "SI" Insertion Weigh Belt Feeder and Scale.
- "MFLI" Mass Flow Liquid Injection System.
- High Capacity, Heavy Industry Weigh Belts.
- Modular, Singular or Multi Feeder Continuous or Batch Control Systems.

SUPPORT SERVICES

TEST FACILITIES:

Thayer Scale operates three fully equipped dry particle test centers in a dedicated wing of our Massachusetts facility. A full time staff performs product application and performance testing with user supplied materials. These facilities are designed to duplicate as closely as possible industrial processing conditions.

SERVICE:

Thayer Scale has a well trained professional service department with an outstanding record of longevity, experience and achievement. Thayer's technicians are available for start-up support, inspection, diagnosis and repair service, routine maintenance and material testing services.

TRAINING:

Thayer Scale offers formal training either here at the factory in Pembroke, MA or at the customer's plant. Each training class is tailored to the specific instrumentation and mechanical equipment used in their facility.



Volumetric Feeders



Conveyor Belt Scales



Tote Batch Systems



Material Flow Aids



Heavy Duty, High Capacity Weigh Belts



Process Instrumentation



Loss-In-Weight Feeders



Specialty Weigh Belts



Low Capacity Weigh Belts



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THAYER SCALE-HYER INDUSTRIES, INC.

91 Schoosett St., Pembroke, MA 02359

Ph: 781-826-8101 Fax: 781-826-7944

e-Mail: Sales@ThayerScale.com

WEB: www.ThayerScale.com

