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REGAL™ ELECTRONIC CYLINDER SCALES

Models ECS401 Single Cylinder Scales and ECS402 Dual Cylinder Scales

INTRODUCTION

REGAL Series ECS400 single and dual cylinder electronic scales are designed for use in multiple water treatment applications to monitor the chemical weight of Chlorine, Sulfur Dioxide and Ammonia supplied in 150 lb. cylinders. The scales are an essential part of all REGAL Gas Feed Systems, providing the user with instantaneous Gross and Net weight readings. The two models available are the ECS401 for single cylinder applications and the ECS402 for dual cylinders.

IMPORTANT NOTES

1. All software including design, appearance, algorithms, and source codes are copyrighted and owned by Chlorinators Incorporated.
2. The entire contents of this manual **MUST** be read and understood prior to installing and operating this equipment.
3. **DO NOT** discard this instruction manual upon completion of the installation as this manual contains information essential to the safe handling, operation, and maintenance of this equipment.
4. Additional instruction manuals are available at nominal cost from Chlorinators Incorporated.
5. Plastic pipe or tubing connector fittings may be broken or damaged if tightened excessively. **HAND TIGHTEN ONLY.**
6. For optimum operation, the installation should be indoors so that the minimum and maximum temperature limitations as listed in the “TECHNICAL SPECIFICATIONS” section of this manual are not exceeded.

WARNINGS

1. This equipment is suitable for use only with the gases specified. **DO NOT USE THIS EQUIPMENT WITH OTHER GASES.** Such use can result in failures having hazardous consequences.
2. This equipment is designed FOR VACUUM SERVICE **ONLY.**
3. To insure proper and safe operation of this equipment, use only REGAL parts. The use of non-REGAL parts can result in equipment failures having hazardous consequences and voids the REGAL warranty and insurance coverage.
4. Maintenance should be performed by competent personnel familiar with this type of equipment, such as Chlorinators Incorporated themselves.
5. It is essential that all external wiring be done exactly as shown on the wiring diagrams depicted in this manual. Incorrect wiring or improper grounding of this equipment **WILL** cause improper operation and presents a safety hazard.
6. Field wiring **MUST** conform to national and local electrical codes.
7. **DISCONNECT POWER BEFORE** removing the cover or servicing this equipment.
8. **ALWAYS** make sure that the cover is in place and securely fastened to prevent the entry of moisture, water, or corrosive gases and also to eliminate the potential for electric shock.
9. Any equipment powered by AC line voltage presents a potential shock hazard. Installation and servicing of this equipment should only be attempted by qualified electronics technicians.
10. This non-metallic enclosure **DOES NOT** automatically provide grounding between the conduit connections. Grounding **MUST** be provided as part of the installation.
11. Damage to the circuit boards or internal components incurred by drilling the enclosure for field wiring or connecting power lines to low voltage signal terminals voids the warranty.
12. Changing parameter settings and selections **WILL** affect the operation of this equipment. If unsure, consult Chlorinators Incorporated **BEFORE** changing parameters or selections.

CHLORINATORS INCORPORATED ONE (1) YEAR LIMITED WARRANTY

Chlorinators Incorporated (hereinafter called "C.I.") sets forth the following warranties with respect to its REGAL Model ECS Electronic Cylinder Scales. This warranty does not apply to the purchase of spare parts or other services performed by C.I. or its authorized dealers. This represents the entire agreement between C.I. and Buyer (also referred to as "end-user") and shall apply unless modified in writing and signed by a C.I. Officer, and this warranty and its intended terms shall supersede any prior negotiations, correspondence, understandings, or agreements, written or oral. The Buyer agrees to and accepts all terms of this warranty by its contracting for or acceptance of C.I.'s products, and forms or other documents or statements issued by Buyer or any other person shall not modify or otherwise affect any of the following terms. Buyer should be aware that reseller must rely entirely upon Chlorinators Incorporated's warranties, or assume their own responsibility.

The following states C.I.'s entire warranty and represents Buyer's exclusive remedy with respect to its product. Such warranties are expressly given in lieu of any other warranty, expressed or implied, including but not limited to those of merchantability and fitness for a particular purpose. This expressed warranty or any other warranty implied by law shall not cover defects due to accident, improper use, or non-compliance with C.I.'s operating and maintenance, assembly, installation manual and instructions.

Recommendations and advice as to specifications, capabilities, design, installation, engineering, application, and use of products are provided as an accommodation and are intended only as suggestions. C.I. assumes no liability for such recommendations and advice and they are not to be construed as constituting any warranty, expressed or implied.

TERMS OF WARRANTY

C.I. warrants its REGAL Model ECS Scales for a period of one (1) year from date of shipment from C.I. Date of shipment from the factory shall be determined solely on the basis of the serial code sticker inside the monitor enclosure. The serial number contains a date code. All serial numbers are also registered by Chlorinators Incorporated as to date of shipment, model number and billing name. If the serial number is missing, defaced, changed, or in any way rendered unreadable, Chlorinators Incorporated shall, at its option, have the right to declare the warranty void. If the serial number does not match the registered model number as to, but not limited to, such items as maximum chlorine feed rate, the same option shall be applicable.

The warranty shall apply against material defects in components and workmanship occurring in the course of manufacture. Buyer's sole remedy for breach of said warranty shall be, at C.I.'s option, either repair or replacement of any unit which is received by C.I. at its plant in Stuart, Florida (shipping charges prepaid by buyer), within the time period set forth above and which is found by C.I. to be defective by reason of manufacture.

Notwithstanding the foregoing, C.I. shall not be liable to Buyer for damages, including personal injury or death to any person or persons, or claims of any kind by a third party or property damage, loss of business or profits. In no event shall C.I. be liable to Buyer for consequential or accidental damages of any kind, even if C.I. was aware of the possibility of such damages. There are no remedies except those set forth. Further, that there are no other authorized warranty repair facilities other than those at the Chlorinators Incorporated factory in Stuart, Florida.

EXCLUSIONS

The following are considered external environmental factors beyond the control of C.I., and which may cause damage and/or need for service which will be specifically excluded from this warranty (i.e., not a material defect in components and workmanship occurring in the course of manufacture).

1. Damage by extraneous causes such as fire, water, lightning, chemical or galvanic attack, etc.
2. Damage to the circuit boards or internal components incurred by drilling the enclosure for field wiring.
3. Damage due to the connection of power lines to low voltage signal terminals.
4. Physical damage due to force, dropping, misuse or other abuse.
5. Use other than that as described in this Instruction Manual (misapplication).
6. Repair by someone other than Chlorinators Incorporated.
7. Improperly installed.
8. This warranty **DOES NOT** cover wear items subject to periodic replacement such as o-rings, gaskets, seals and packing.

The exclusions listed above are provided for purposes of clarification, and are not intended to, in any way, limit or eliminate other possible exclusions.

NO OTHER WARRANTIES

Unless otherwise explicitly agreed in writing, and signed by a C.I. officer, it is understood that this is the only written warranty given by C.I. for the systems and components stated.

The dealers or representatives of C.I. may not make verbal representations that add, modify or change the written warranties contained herein or change the extent and nature of C.I.'s liability. In no event shall C.I. be liable for direct, consequential, special, incidental or punitive damages of any kind with respect to the product, including but not limited to those which may allegedly arise out of breach of warranty, breach of contract, negligence, strict liability, or any other law, governmental regulation, or court decision, except as provided herein.

GENERAL INFORMATION

The REGAL Single Cylinder (ECS401) and Dual Cylinder (ECS402) Electronic Scales come equipped with the following standard features:

- Easy to read LCD digital display(s).
- LED indicators for low and empty weight conditions.
- Auto Zero feature with back-up pushbutton.
- 4-20 milliamp analog output circuits for data recording and SCADA interface.
- Stainless steel electronic strain gage load cells.
- Low profile base(s) for easy changing of cylinders.
- Solid PVC platforms and stainless steel hardware.
- Cylinder Stop(s) for proper positioning of cylinders.
- Accommodates Chlorine, Sulfur Dioxide and Ammonia cylinders.
- Wall mount brackets with cylinder restraining chains.
- Low weight alarm relay circuits.
- Displays "Gross" or "Net" cylinder weight with the push of a button.

SPECIFICATIONS

Capacity:	300 lbs./base
Cylinder Size:	14" Dia. Max.
Overload Capacity:	150%
Temperature Rating:	32° to 122° F
Resolution:	0.2 lbs.
Accuracy:	±1% Full Scale
Pushbuttons:	3 or 4 tactile-dome
Updates/second:	Four
Display	
Indicators:	LED (three per channel)
Digital Display:	LCD
Auto Zero Maintenance:	±4 Graduations
Load Cell Excitation:	5 VDC
Power:	115V/230V AC
Power Consumption:	10 Watts
Milliamp Output:	4-20mA (500 Ohms)
Fuse:	1/4 Amp (115V), 1/8 Amp (230V)
Low Level Alarm Relays (5 Amp or Better)	
Form:	C (N/O & N/C)
Function:	Low Weight Alarm

INSTALLATION

A) SCALE PLATFORM(S)

The Scale Platform(s) should be installed near a wall in a clean and dry area. A hard, smooth and LEVEL floor surface is necessary to ensure accuracy and help prevent damage.

1) After inspection, position each base 1 to 3 inches from the wall. See Drawing No. 1C. DO NOT allow the base to touch the wall.

2) Before anchoring the angle brackets to the floor, make sure they rotate freely around the bolts that attach them to the platform. If necessary, loosen the bolts SLIGHTLY to allow for easy rotation. This will allow the platform to properly hinge and provide even distribution of weight to the load cell. The hinge also allows the platform to be lifted for easy access to the floor surface when cleaning.

3) After anchoring the angle ("L") brackets to the floor, mount the cylinder restraining wall bracket at a height of 38 to 40 inches above the floor. See Drawing No. 1A.

B) MONITOR

The monitor enclosure is designed to mount on an inside wall, at eye level, to allow easy access while ensuring that temperature limitations (32° to 122° F) are not exceeded.

1) With the AC power* off (unplugged), remove the front cover from the monitor enclosure by loosening the four corner screws. Carefully lift the cover and unplug the ribbon cable from inside the main enclosure.

2) Mount the main enclosure to the wall with the proper length pan head screws (#12 minimum) inserted into the four corner openings that are visible once the cover is removed. See Drawing No. 3C.

NOTE: When determining the screw length, figure an additional 1 1/8" to compensate for the amount recessed into the enclosure.

3) Using Drawing No. 3B as a guide, route the cable from each scale base into the monitor enclosure through the cable grip fittings. Connect the five cable leads to Terminal Block 10 (TB10) of the CPU/Display Circuit Board(s) as follows:

   a) Black and Yellow leads to -E
   b) Red lead to -S
   c) White lead to +S
   d) Green lead to +E

NOTE: On a dual cylinder scale, there is a left and a right display board. Viewing the monitor with the cover in place, make sure the leads from the left platform are connected to the left display board and likewise for the right side. Also, be sure to tighten the cable grip fittings once a sufficient amount of wire is fed into the enclosure to make connections.

***IMPORTANT: If the AC power is to be directly wired, an experienced, licensed technician is required. Also, it is essential to install external power conditioning equipment (surge suppressors, filters) to protect electronic circuitry, regardless of the power source.**

4) If the 4-20mA output circuit(s) is to be used, connect the leads (supplied by others) to Terminal Block 2 (TB2) of the Power Supply Circuit Board. See Drawing No. 3C.

5) If the Low Weight Alarm Relays (K1 and K2) are to be used, see Drawing No. 3C for proper connections to Terminal Block 1 (TB1) of the Power Supply Circuit Board.

6) After all wiring is completed, re-connect the ribbon cable to the Power Supply Circuit Board, replace the front cover and proceed to Calibration.

CALIBRATION

1) With NO WEIGHT on the scale platform(s), plug in the power cord OR switch the AC power on if the unit is wired directly. The monitor(s) will most likely display a weight reading other than zero. Simply press the GROSS/NET (ZERO) keypad button to change the reading to zero.

NOTE: Based on how it applies, the GROSS/NET (ZERO) keypad button will be referred to as either GROSS/NET or ZERO.

NOTE: On a Dual Cylinder Scale (Model ECS402), each platform requires separate calibration. Press the TOGGLE button a few times and take note of the alternating Green LED which indicates which platform is activated. Press ZERO and the active indicator will respond. TOGGLE over to the second platform and press ZERO again. Both platforms (one at a time) are now ready for calibration.

2) Place a FULL cylinder on the platform making sure it is centered and pressed firmly against the stop(s). Place the restraining chain around the cylinder and attach it to the wall bracket to help prevent the cylinder from being tipped over.

3) Mount the vacuum regulator to the cylinder valve using a new lead gasket. With the cylinder wrench in place, calculate the GROSS weight of the cylinder as follows:

Cylinder Tare Weight + Chemical (Net) Weight (150 lbs.)
+ 4.5 lbs. (Vacuum Regulator) + 0.8 lbs (Cylinder Wrench)
= GROSS WEIGHT

4) Allow time for the chemical to stop moving around in the cylinder until you have a constant reading. Press and HOLD the GROSS/NET keypad button for ~10 seconds until CAL (calibrate) appears on the display. Release the button and a numerical display with a blinking triangle will appear. The number shown represents the GROSS weight and the blinking triangle designates that you have entered the calibration mode.

5) Use the Up and DOWN (arrow) buttons to change the displayed value to match the calculated GROSS WEIGHT.

6) Once the correct Gross Weight value is set, EXIT the Calibration mode by Pressing and HOLDING the GROSS/NET keypad button for ~10 seconds. After exiting, the Gross weight will remain displayed with no blinking triangle.

7) Now Press and Release the GROSS/NET keypad button to display the NET weight. A triangle (non-blinking) will appear just left of the numerical display to confirm that the Net Weight is being shown. Use the UP and DOWN (arrow) buttons to adjust the displayed value to read 150 lbs. When changing the NET weight, it is necessary to Press and Hold ONE of the arrow keys for ~5 seconds before the monitor responds. Once activated, the keys will respond accordingly. The delay is incorporated to help prevent inadvertent changes from being made while the system is in operation.

8) After the NET value is set, wait ~5 seconds and the displayed value will flash as it "locks in". The scale is now ready for operation.

NOTE: On a Dual Cylinder Scale, remember to switch (toggle) to the second platform and proceed to complete the calibration process.

When calibrating the scales for weight measures in kilograms (kg) versus pounds (lbs.), simply enter the equivalent numerical value for the Gross and Net weights when performing steps 3 through 7. For example, the Net weight for a standard 150 lb. cylinder would be entered as 68 (kg). Entering these values simply sets the range that will measure within, therefore, the true weight value is automatically understood.

The analog output, representing the Net weight, will also need to be changed from 150 (lbs.) to 68 (kg). The Low weight (10 lbs.) and Cylinder Empty (2 lbs.) alarm settings should be changed as well. Approximate values are sufficient. For example, 5 (kg) for Low weight and 1 (kg) for Empty. To make all of these changes, refer to steps 1, 3 and 4 under SWITCH SETTINGS on page 5.

OPERATION

1) To ensure accuracy, the scale should be calibrated each time a cylinder is replaced. Once calibrated, simply press the GROSS/NET keypad button to alternately display the weight readings.

2) On a Dual Cylinder Scale, be sure to activate (toggle) each platform separately to check the weight readings.

SWITCH SETTINGS

Only Needed for Custom Applications

The main DIP switch (S1) with twelve settings is located on the back side of the Display Circuit Board(s). See Drawing No. 3B. For most applications, none of these settings need to be changed from the factory settings. More specifically, Switches No. 1, 2, 5, 8, 9, 10, 11 and 12 should NEVER be changed. Switches No. 3, 4, 6 and 7 are explained below and should be changed only if necessary.

NOTE: The AC power supply must remain on when making the following changes. Therefore, an experienced, licensed technician is required.

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1) Switch No. 3 is used to change the Full Scale of the 4-20 milliamp output. This applies when cylinders with a Net Weight LESS than the factory set standard (150 lb.) are going to be used on a regular basis. To change this setting, turn switch No. 3 ON (closed). Then use the UP and DOWN arrow buttons to adjust to the new (lower) weight setting. Once the proper setting is displayed, turn switch No. 3 OFF (open) to lock in the value.

IMPORTANT: When the Full Scale is changed, remember to use the New Net Weight when performing Calibration Steps No. 3 and 7.

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2) Switch No. 4 is used to calibrate the 4-20 milliamp output circuits for remote indication, data recording and SCADA interface. Simply turn Switch No. 4 ON (closed) and use the ZERO button to alternately display the 4 & 20 milliamp points. Use a milliamp meter to check the readings for the Channel(s)* located on the Power Supply Circuit Board (See Drawing No. 3C). To make any necessary changes, use potentiometers VR1 (span) and VR2 (zero) for Channel #1. Use VR3 (span) and VR4 (zero) for Channel #2. When the points are properly set, turn Switch No. 4 OFF (open) to lock in the new settings.

*** On a Single Cylinder Scale (ECS401), only Channel #1 is active.**

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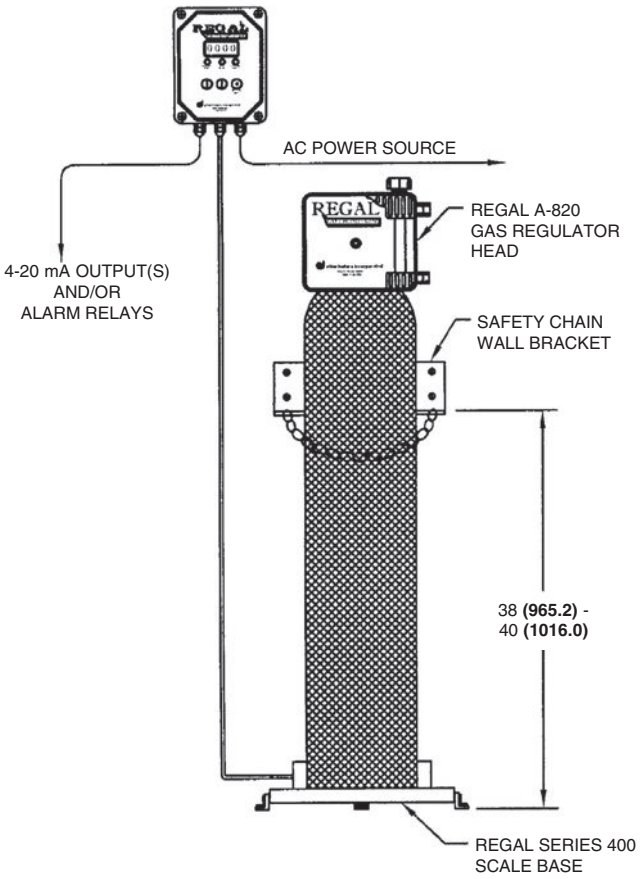
3) Switch No. 6 is used if it is necessary to change the point at which the Cylinder Empty LED (and Alarm Relay) will turn on. The factory setting is 2.00 lbs. To change this setting, turn Switch No. 6 ON (closed) and adjust the value using the UP and DOWN arrow buttons. Once the preferred setting is displayed, turn Switch No. 6 OFF (open) to lock in the new value.

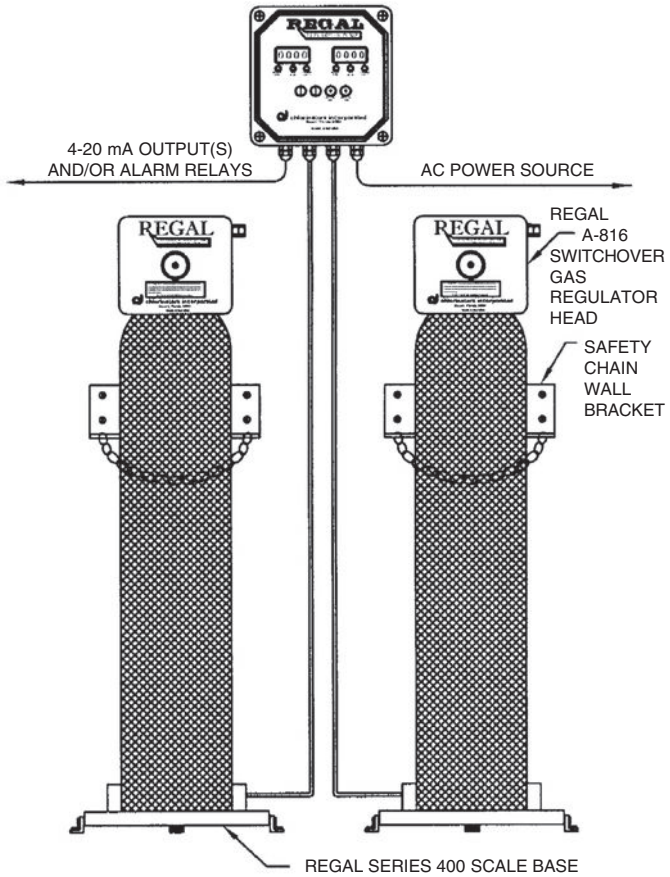
4) Switch No. 7 is used if it is necessary to change the point at which the Low Weight LED (and Alarm Relay) will turn on. The factory setting is 10.00 lbs. To change this setting, turn Switch No. 7 ON (closed) and adjust the value using the UP and DOWN arrow buttons. Once the preferred setting is displayed, turn Switch No. 7 OFF (open) to lock in the new value.

DRAWING NO. 1

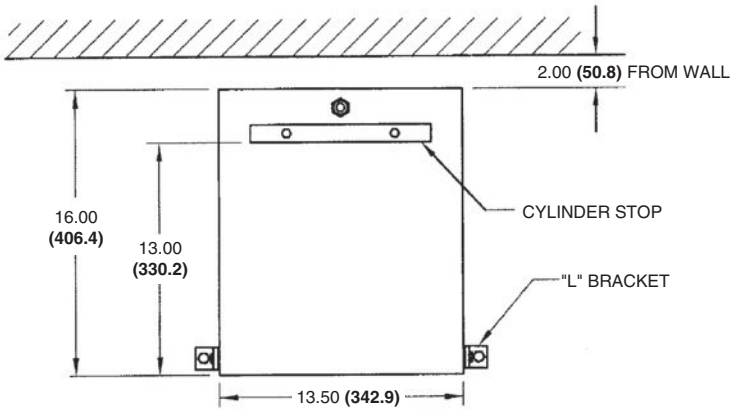
A) REGAL Model ECS401
Single Cylinder Electronic Scale



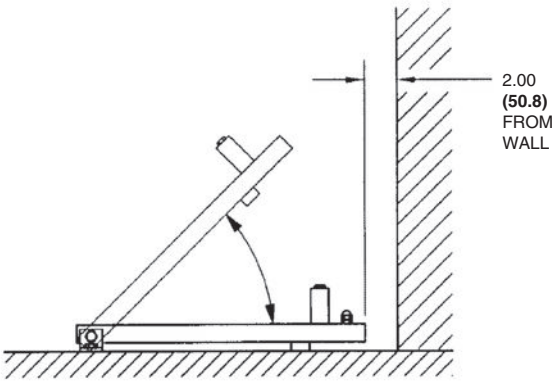
B) REGAL Model ECS402
Dual Cylinder Electronic Scale



C) Scale Base Installation



TOP VIEW

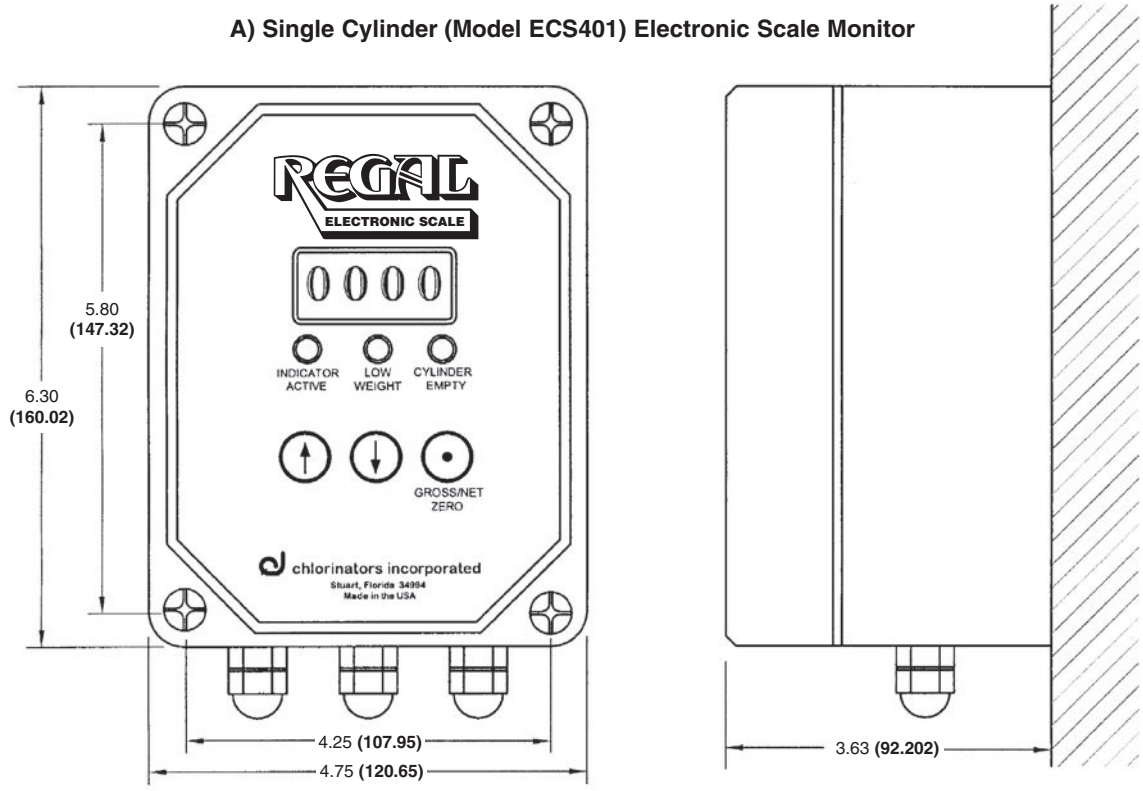


SIDE VIEW

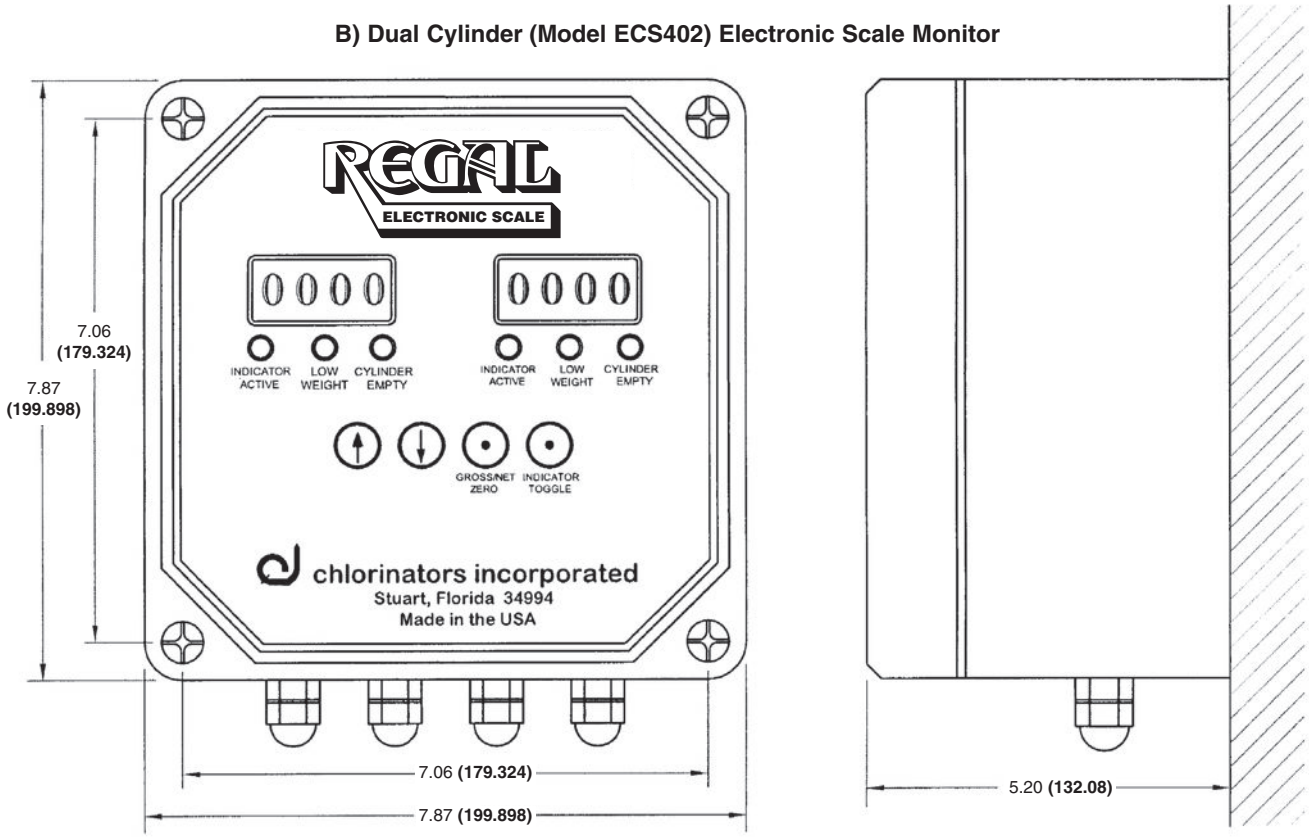
DIMENSIONS = INCHES (MILLIMETERS)

DRAWING NO. 2 - MODEL ECS4011 AND ECS402 MONITORS

A) Single Cylinder (Model ECS401) Electronic Scale Monitor



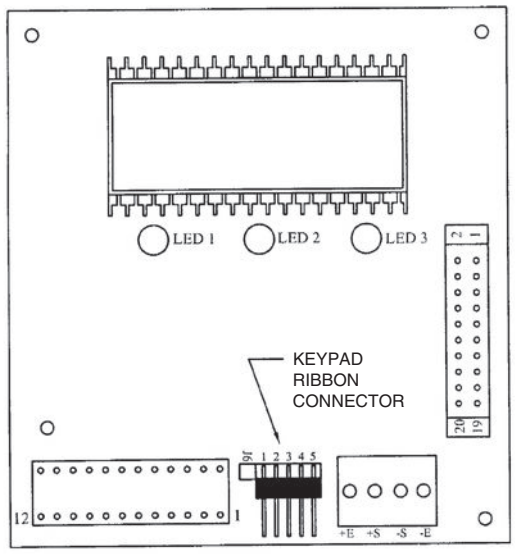
B) Dual Cylinder (Model ECS402) Electronic Scale Monitor



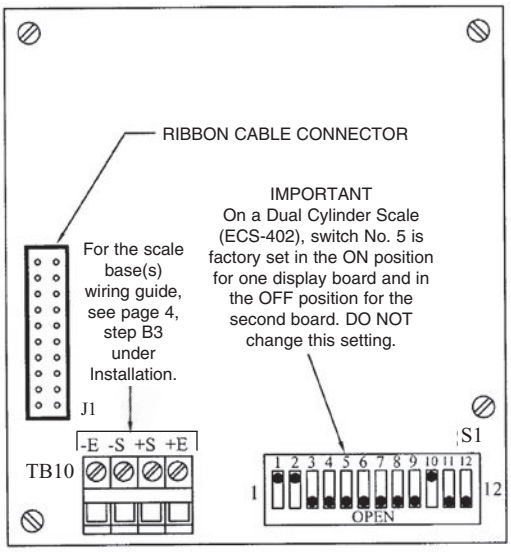
DIMENSIONS = INCHES (MILLIMETERS)

DRAWING NO. 3 - CIRCUIT BOARDS FOR ECS SERIES ELECTRONIC CYLINDER SCALES

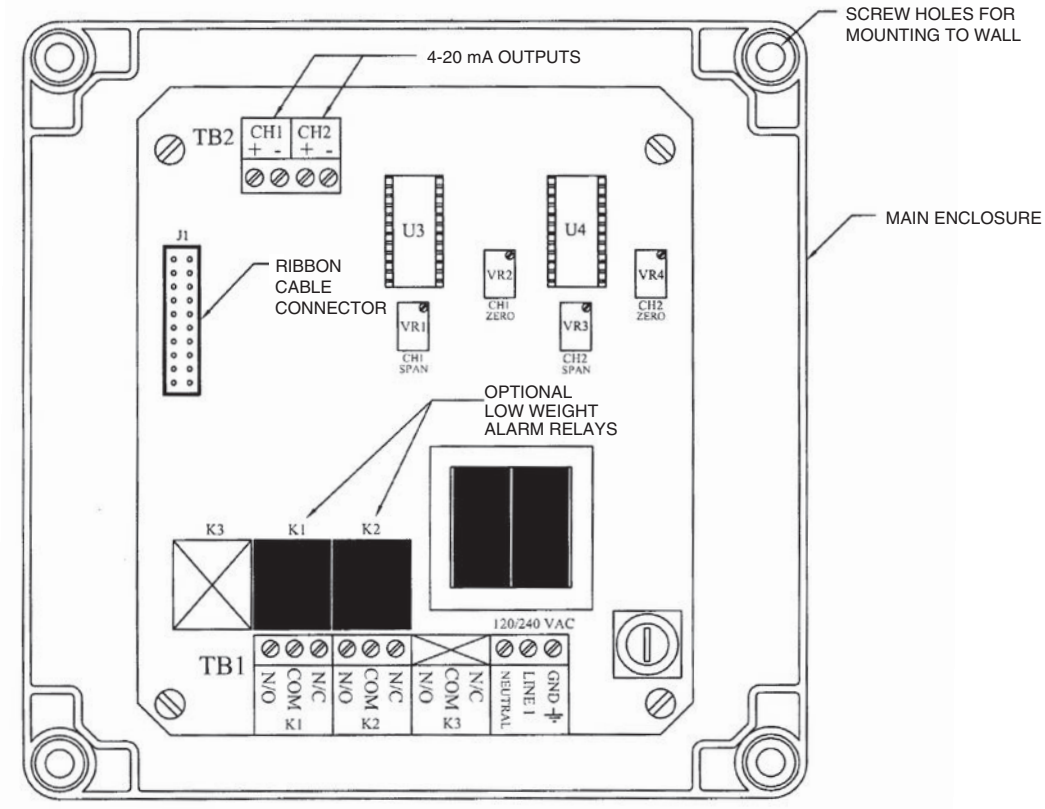
A) Front Side of Display Board



B) Back Side of Display Board



C) Power Supply Circuit Board in ECS-402 (Dual Cylinder) Enclosure



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Printed in U.S.A.
Pub. No. 0813-1