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KISTLER-MORSE®
Measure of Success

SVS2000
Installation & Operation Manual

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Installation & Operation Manual

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SAFETY SYMBOLS

WARNING:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS INJURY. RISK OF ELECTRICAL SHOCK.

CAUTION:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS DAMAGE OR FAILURE OF THE EQUIPMENT.

SVS2000
Installation & Operation Manual

I. HANDLING AND STORAGE

SAVE THESE INSTRUCTIONS

INSPECTION AND HANDLING

Do not dispose of the carton or packing materials.

Each package should be inspected upon receipt for damage that may have occurred due to mishandling during shipping. If the unit is received damaged, notify the carrier or the factory for instructions. Failure to do so may void your warranty. If you have any problems or questions, consult Customer Support at 800-xxx-xxxx.

DISPOSAL AND RECYCLING

This product can be recycled by specialized companies and must not be disposed of in a municipal collection site. If you do not have the means to dispose of properly, please contact for return and disposal instructions or options.

STORAGE

If the device is not scheduled for immediate installation following delivery, the following steps should be observed:

1. Following inspection, repackage the unit into its original packaging.
2. Select a clean dry site, free of vibration, shock and impact hazards.
3. If storage will be extended longer than 30 days, the unit must be stored at temperatures between 32º and 104º F (0º to 40° C) in non-condensing atmosphere with humidity less than 85%.

CAUTION: DO NOT STORE A NON-POWERED UNIT OUTDOORS FOR A PROLONGED PERIOD.

II. GENERAL SAFETY

AUTHORIZED PERSONNEL

All instructions described in the document must be performed by authorized and qualified service personnel only. Before installing the unit, please read these instructions and familiarize yourself with the requirements and functions of the device. The required personal protective equipment must always be worn when servicing this device.

USE

The device is solely intended for use as described in this manual. Reliable operation is ensured only if the instrument is used according to the specifications described in this document. For safety and warranty reasons, use of accessory equipment not recommended by the manufacturer or modification of this device is explicitly forbidden. All servicing of this equipment must be performed by qualified service personnel only. This device should be mounted in locations where it will not be subject to tampering by unauthorized personnel.

MISUSE

Improper use or installation of this device may cause the following:

- Personal injury or harm
- Application specific hazards such as vessel overfill
- Damage to the device or system

If any questions or problems arise during installation of this equipment, please contact Customer Support at 800-426-9010.

III. PRODUCT DESCRIPTION

FUNCTION

The SVS2000 accepts input signals from half- or full-bridge strain gage load cells through a high resolution (up to 21-bit) analog-to-digital converter. Resolution and gain are adjustable for optimal system performance. Weight is displayed at the indicator and the data can be serially polled from a master device. Analog and digital outputs can be generated from the inputs to the SVS2000 to provide auxiliary controls.

QUICK CONFIGURATION

Adjusts system parameters and precalibrates unit without special load cells.

SENTRY™ DSP FILTER

Separates mixer and plant vibrations from weight changes. This provides accurate and reliable weight readings.

HIGH-SPEED, HIGH-RESOLUTION WEIGHT CONVERSION

Performance for demanding applications with up to 21-bit resolution.

ALPHANUMERIC BACKLIT LCD DISPLAY

Simple, understandable operator messages eliminates special coding/decoding, cryptic setup and diagnostic messages.

Displays the weight as a bar graph or digital readout.

NEMA-4X ENCLOSURE

ABS or optional stainless steel offers the right protection for your environment.

TECHNICAL SPECIFICATIONS

FUNCTIONAL	
Voltage - Operating Range	AC Power: 115 VAC ± 10%, 50/60 Hz; 230 VAC ± 10%, 50/60 Hz 30 VA
Operating Temperature	-4º to 122º F (-20º to 50º C)
PERFORMANCE	
Transducer/Sensor Input	All Kistler-Morse half-bridge sensors, full-bridge foil gage
Excitation	Programmable between 5 and 13 volts @ 400 mA
Resolution	Selectable 16 bits (1 part in 65,536) to 21 bits (1 part in 2,097,152) in 1 bit increments
Conversion Speed	16 bits = 17 ms, 17 bits = 20 ms, 18 bits = 25 ms, 19 bits = 34 ms, 20 bits = 50 ms, 21 bits = 100 ms
Span	Programmable between ± 3.0 V @ 12 V excitation, Gain = 1 ± 19.5 mV @ 10 V excitation, Gain = 128
Temperature Stability	Zero 1 ppm/º C; Span 5 ppm/º C
Common Mode Rejection	92 db min @ DC; 150 db min @ 60 Hz
Normal Mode Rejection	100 db min @ 60 Hz
Multi-Vessel Remote Tare	
Relay Output	2 relay outputs; Form "C" SPDT, programmable, 10 A 110 VAC, 8 A 230 VAC non-inductive; for motors and other large inductive loads, contractors rated for the load are required.
PHYSICAL	
Display	Back lit alphanumeric liquid crystal, one line of 16 characters, selectable bar graph or engineering units format
Programming/Parameter Entry	Integral 19-key sealed membrane tactile keypad
Setup	Menu-driven prompts
Memory	Non-volatile RAM
Enclosure	Designed to meet NEMA 4X ABS or NEMA 4X 304L SS
Humidity	1% to 95% (non-condensing)
Storage	-4º to 140º F (-20º to 60º C)
Dimensions	ABS version: 6.375" x 11" x 5.68" (161.91 mm x 279.4 mm x 144.27 mm) SS version: 7.87” x 9.84” x 5.91” (199.9 mm x 249.94 mm x 150.11 mm)
Mounting Hole Pattern	ABS version: 2.5" x 10.4" (63.5 mm x 264.16 mm). SS version: 5.31” x 9.13” (134.87 mm x 231.90 mm)
Shipping Weight	ABS version: 6 lbs (2.6 kg). SS version: 11.3 lbs (5.1 kg)
OPTIONS	
PCBs	RS-422, RS-485: (optical isolation standard), baud rate 1200, 2400, 4800, 9600 or 19.2K. PLC interfaces: DeviceNet (polled slave), Profibus DP, Ethernet I/P. Analog Output: 0-20 or 4-20 mA, 14 bit resolution, 500 VAC isolation, maximum load 600 ohms with internal loop supply
APPROVALS	
	UL (US and Canada): General Purpose

IV. MECHANICAL INSTALLATION

WARNING: REMOVE POWER FROM THE UNIT BEFORE INSTALLING, REMOVING, OR MAKING ADJUSTMENTS.

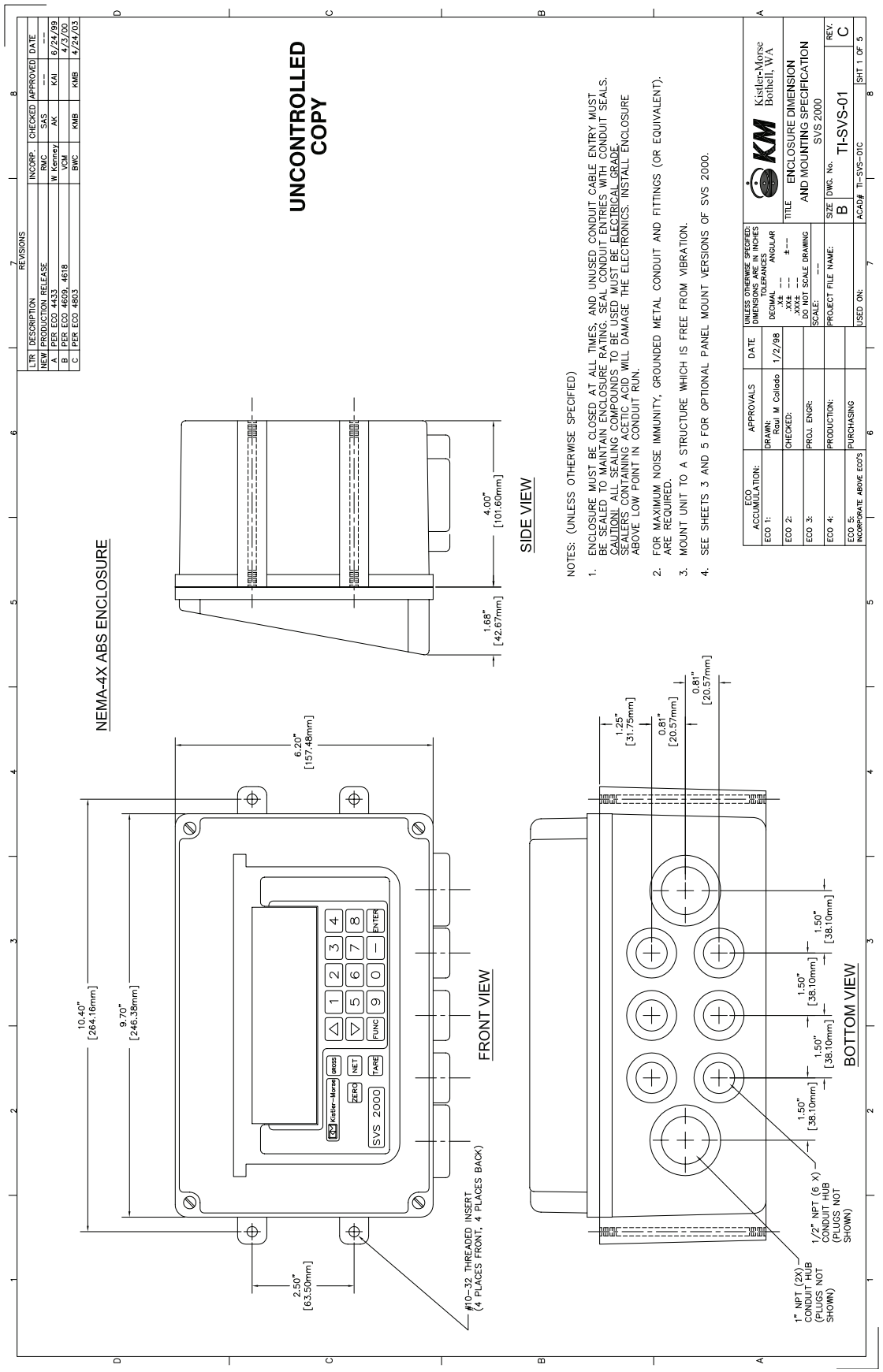
MOUNTING

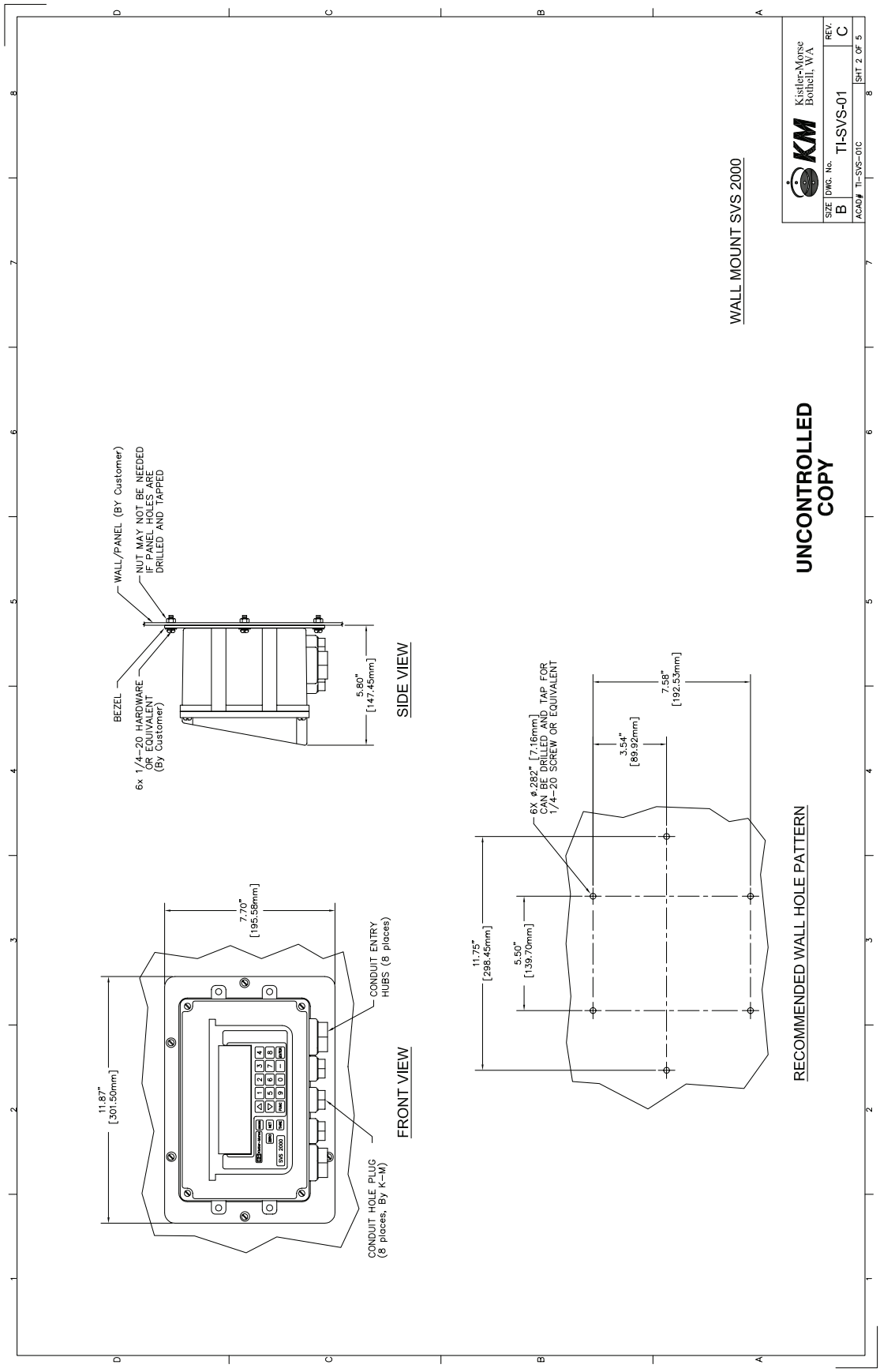
The hardware used to mount the SVS2000 is provided by the customer. (Including suggested torque wrench Sturtevant-Richmond with torque range 4-12 lbf-in.) The SVS2000 ABS enclosure dimensions are shown in TI-SVS-01. Refer to Product Specifications, for Stainless Steel dimensions, and also product environmental specifications before mounting the SVS2000.

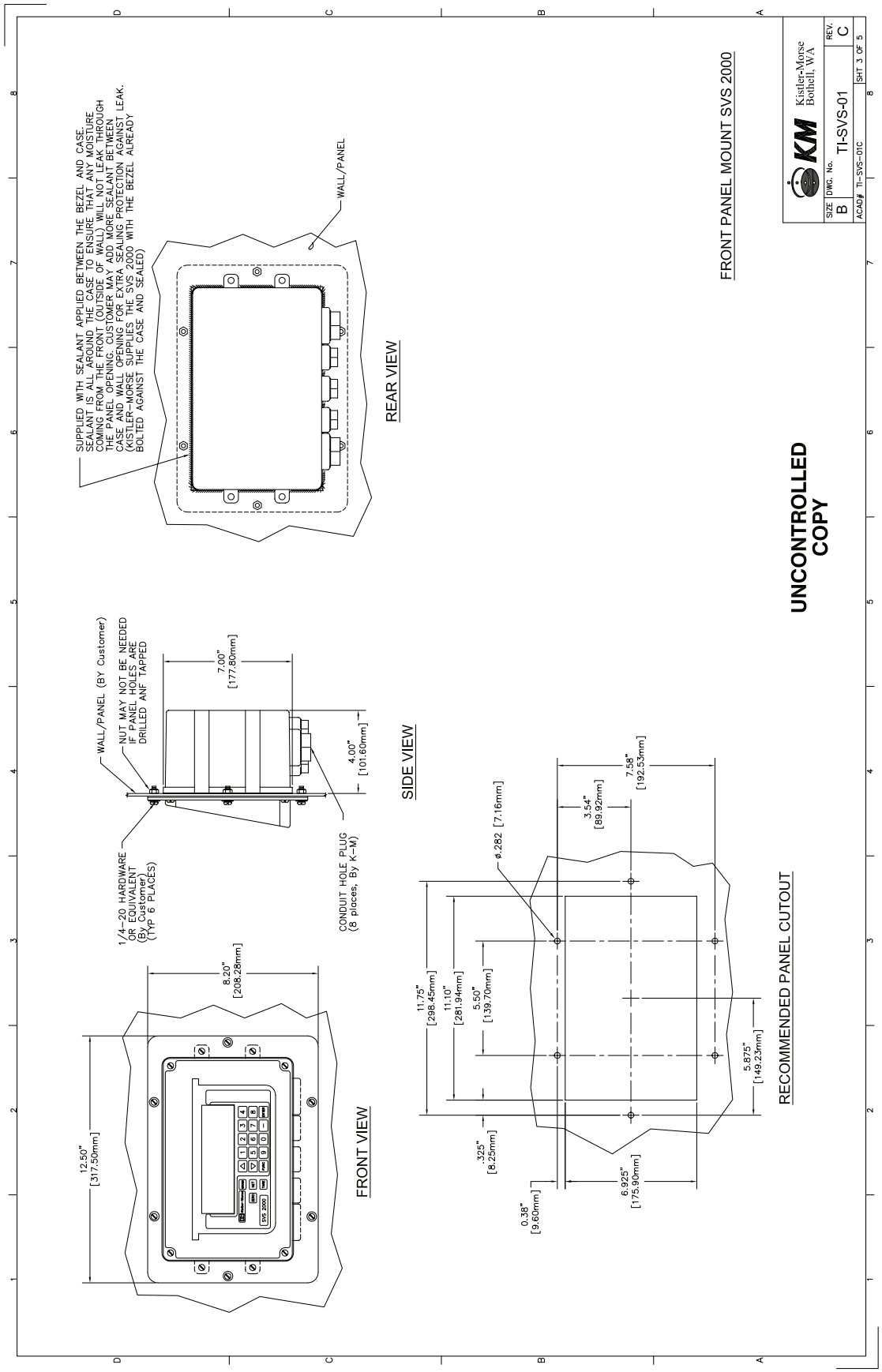
CAUTION: ONLY USE SIKAFLEX 1A POLYURETHANE SEALANT OR DOW CORNING RTV 739 OR RTV 738. OTHER SEALANTS MAY CONTAIN ACETIC ACID, WHICH IS HARMFUL TO SENSORS AND ELECTRONICS.

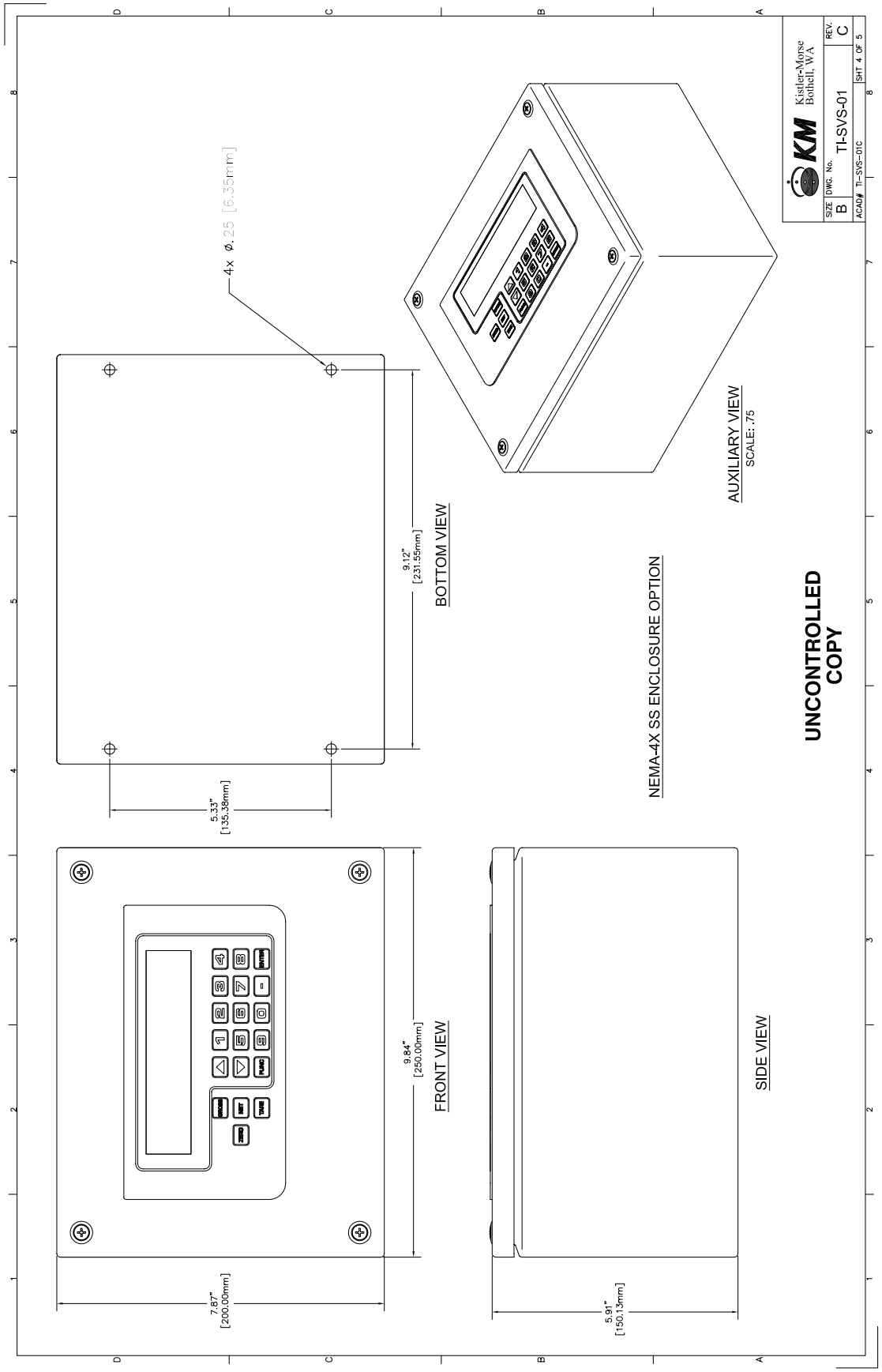
Follow this procedure to mount the SVS2000 (ABS and SS versions):

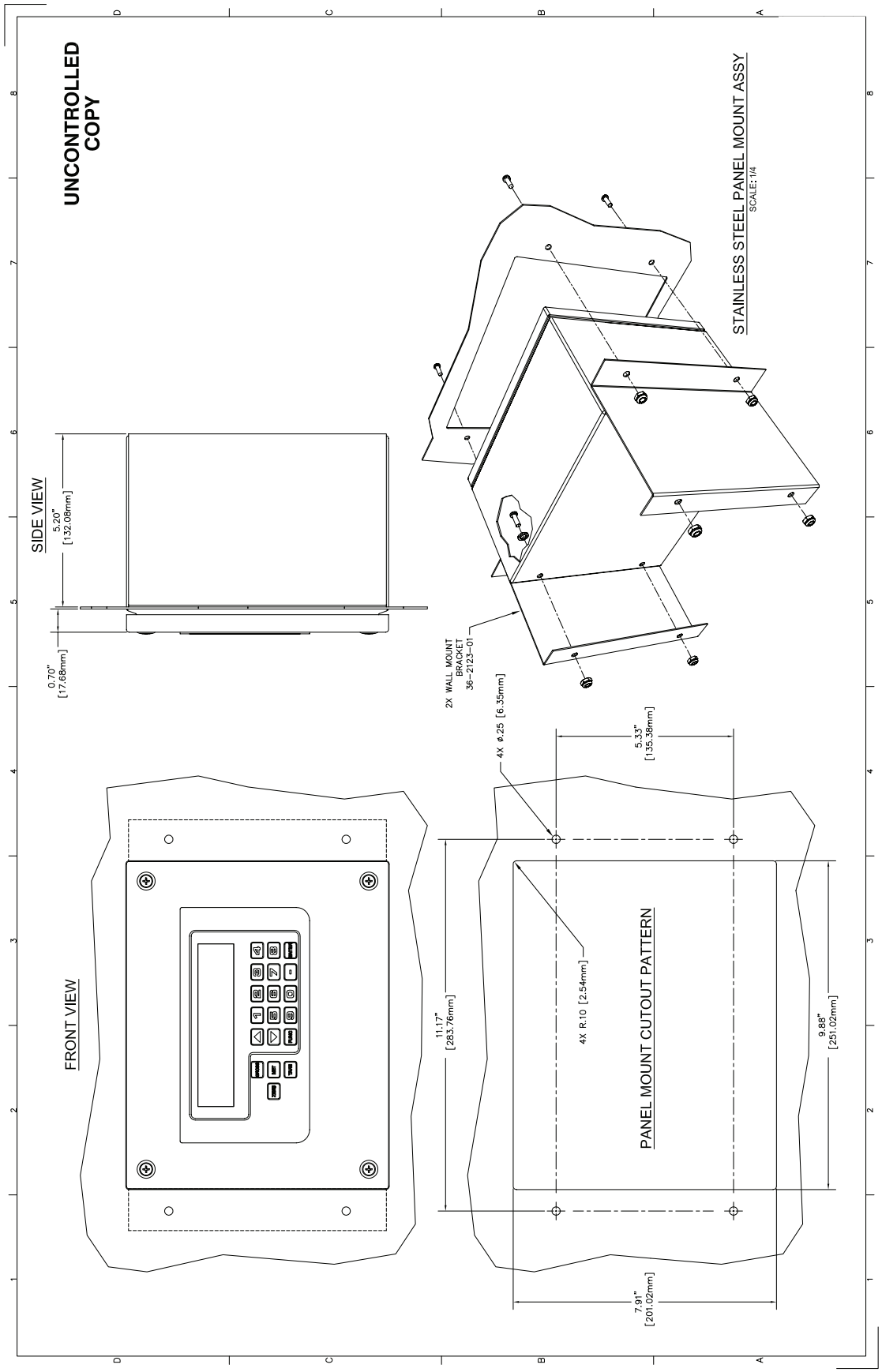
1. (SS version) Remove electronics by unscrewing baseplate screws (4). Baseplate and electronics are removed together.
2. Hold the SVS2000 in the desired location and mark the positions of the mounting holes.
3. Drill the mounting holes.
4. Install the SVS2000 using hardware that will secure it firmly in place.
5. (SS version) Make entry holes in the bottom of the enclosure for cables and conduit. Hole location is critical for proper PCB re-installation. Check clearances to ensure fittings and wire routing will not interfere with the PCB.
6. (SS version) Re-install baseplate with electronics.


UNCONTROLLED COPY
NEMA-4X ABS ENCLOSURE
FRONT VIEW
SIDE VIEW
BOTTOM VIEW
NOTES: (UNLESS OTHERWISE SPECIFIED)
1. ENCLOSURE MUST BE CLOSED AT ALL TIMES, AND UNUSED CONDUIT CABLE ENTRY MUST BE SEALED TO MAINTAIN ENCLOSURE RATING. SEAL CONDUIT ENTRIES WITH CONDUIT SEALS. CAUTION: ALL SEALING COMPOUNDS TO BE USED MUST BE ELECTRICAL GRADE. SEALERS CONTAINING ACETIC ACID WILL DAMAGE THE ELECTRONICS. INSTALL ENCLOSURE ABOVE LOW POINT IN CONDUIT RUN.
2. FOR MAXIMUM NOISE IMMUNITY, GROUNDED METAL CONDUIT AND FITTINGS (OR EQUIVALENT). ARE REQUIRED.
3. MOUNT UNIT TO A STRUCTURE WHICH IS FREE FROM VIBRATION.
4. SEE SHEETS 3 AND 5 FOR OPTIONAL PANEL MOUNT VERSIONS OF SVS 2000.
Kistler-Morse Bothell, WA
TITLE ENCLOSURE DIMENSION AND MOUNTING SPECIFICATION SVS 2000
SIZE B
DWG. No. TI-SVS-01
REV. C
SHT 1 OF 5


WALL MOUNT SVS 2000
UNCONTROLLED COPY
Kistler-Morse Bothell, WA
SIZE B
DWG. No. TI-SVS-01
REV. C
ACAD# TI-SVS-01C
SHT 2 OF 5
WALL/PANEL (BY Customer)
NUT MAY NOT BE NEEDED IF PANEL HOLES ARE DRILLED AND TAPPED
BEZEL
6x 1/4-20 HARDWARE OR EQUIVALENT (By Customer)
5.80" [147.45mm]
SIDE VIEW
7.70" [195.58mm]
11.87" [301.50mm]
CONDUIT ENTRY HUBS (8 places)
CONDUIT HOLE PLUG (8 places, By K-M)
FRONT VIEW
6X Ø.282" [7.16mm] CAN BE DRILLED AND TAP FOR 1/4-20 SCREW OR EQUIVALENT
3.54" [89.92mm]
7.58" [192.53mm]
11.75" [298.45mm]
5.50" [139.70mm]
RECOMMENDED WALL HOLE PATTERN


SUPPLIED WITH SEALANT APPLIED BETWEEN THE BEZEL AND CASE. SEALANT IS ALL AROUND THE CASE TO ENSURE THAT ANY MOISTURE COMING FROM THE FRONT (OUTSIDE OF WALL) WILL NOT FLOW THROUGH THE PANEL OPENING. CUSTOMER MAY ADD MORE SEALANT BETWEEN CASE AND WALL OPENING FOR EXTRA SEALING PROTECTION AGAINST LEAK. (KISTLER-MORSE SUPPLIES THE SVS 2000 WITH THE BEZEL ALREADY BOLTED AGAINST THE CASE AND SEALED)
WALL/PANEL
REAR VIEW
FRONT PANEL MOUNT SVS 2000
UNCONTROLLED COPY
Kistler-Morse Bothell, WA
SIZE B
DWG. No. TI-SVS-01
REV. C
ACAD# TI-SVS-01C
SHT 3 OF 5
WALL/PANEL (BY Customer)
NUT MAY NOT BE NEEDED IF PANEL HOLES ARE DRILLED ANF TAPPED
7.00" [177.80mm]
4.00" [101.60mm]
1/4-20 HARDWARE OR EQUIVALENT (By Customer) (TYP 6 PLACES)
CONDUIT HOLE PLUG (8 places, By K-M)
SIDE VIEW
8.20" [208.28mm]
12.50" [317.50mm]
FRONT VIEW
ø.282 [7.16mm]
3.54" [89.92mm]
7.58" [192.53mm]
11.75" [298.45mm]
11.10" [281.94mm]
5.50" [139.70mm]
5.875" [149.23mm]
.325" [8.25mm]
0.38" [9.60mm]
6.925" [175.90mm]
RECOMMENDED PANEL CUTOUT


4x Ø.25 [6.35mm]
9.12"
[231.55mm]
5.33"
[135.38mm]
BOTTOM VIEW
AUXILIARY VIEW
SCALE: .75
NEMA-4X SS ENCLOSURE OPTION
UNCONTROLLED
COPY
9.84"
[250.00mm]
7.87"
[200.00mm]
FRONT VIEW
5.91"
[150.13mm]
SIDE VIEW
KM
Kistler-Morse
Bothell, WA
SIZE
B
DWG. No.
TI-SVS-01
REV.
C
ACAD# TI-SVS-01C
SHT 4 OF 5


UNCONTROLLED COPY
STAINLESS STEEL PANEL MOUNT ASSY
SCALE: 1/4
SIDE VIEW
5.20" [132.08mm]
0.70" [17.68mm]
2X WALL MOUNT BRACKET 36-2123-01
4X ø.25 [6.35mm]
5.33" [135.38mm]
FRONT VIEW
11.17" [283.76mm]
4X R.10 [2.54mm]
PANEL MOUNT CUTOUT PATTERN
9.88" [251.02mm]
7.91" [201.02mm]

V. ELECTRICAL INSTALLATION

WARNING: VERY HIGH VOLTAGE IS PRESENT. REMOVE POWER FROM THE UNIT BEFORE INSTALLING, REMOVING, OR MAKING ADJUSTMENTS

GENERAL SAFETY

When using electrical equipment, you should always follow basic safety precautions, including the following:

- The installation and wiring of this product must comply with all national, federal, state, municipal, and local codes that apply.
- Properly ground the enclosure to an adequate earth ground.
- Do not modify any factory wiring. Connections should only be made to the terminals described in this section.
- All connections to the unit must use conductors with an insulation rating of 300 V minimum, rated for 212º F (105º C), a minimum flammability rating of VW-1, and be of appropriate gauge for the voltage and current required (see specifications).
- Do not allow moisture to enter the electronics enclosure. Conduit should slope downward from the unit housing. Install drip loops and seal conduit with silicone rubber product.

DISCONNECT REQUIREMENTS FOR PERMANENTLY INSTALLED EQUIPMENT

A dedicated disconnecting device (circuit breaker) must be provided for the proper installation of the unit. If independent circuits are used for power input and main relay outputs, individual disconnects are required.

Disconnects must meet the following requirements:

- Located in close proximity to the device
- Easily accessible to the operator
- Appropriately marked as the disconnect for the device and associated circuit
- Sized appropriately to the requirements of the protected circuit (See specifications)

INSTALLATION

CAUTION: ONLY USE SIKAFLEX 1A POLYURETHANE SEALANT OR DOW CORNING RTV 739 OR RTV 738. OTHER SEALANTS MAY CONTAIN ACETIC ACID, WHICH IS HARMFUL TO SENSORS AND ELECTRONICS.

This section describes how to wire the SVS2000. Installation of sensors is described in the applicable sensor installation manuals.

Route the AC power cable and the set point cables separate from the low-level signal cable. Doing so will avoid electrical interference in the sensor signals and the communications signals.

1. Connect sensor wiring.
2. Connect relay output, digital output, analog output, serial output, and remote input wiring, as applicable.
3. Connect AC power.
4. Apply power and check display.
5. Seal openings in enclosure, using Sikaflex 1A or Dow Corning RTV 739 or 738 sealant.
6. Tighten set screws that secure wires to the terminal boards to 8 lbf/in. of torque.

GENERAL (ABS ENCLOSURE)

The bottom of the SVS2000 ABS enclosure has eight openings for wiring sensors, power, setpoints, etc. Refer to page 6 for fitting sizes. Prepare the enclosure for wiring by installing a fitting in each desired hole. Seal all fittings against water entry. If applicable, install conduit drains at conduit's lowest elevation(s) to allow condensation to drain.

The SVS2000 power supply is 115/230 VAC switch selectable.

WIRING SENSORS

Refer to page 16 for details on wiring the sensors to the SVS2000. The wiring between the junction box and SVS2000 must be continuous (no splices). Note If the voltage decreases as weight is added to the vessel during operation, check wiring for polarity errors.

WIRING RELAYS, DIGITAL OUTPUTS, AND REMOTE TARE

Refer to page 15 for details on wiring the relays, digital outputs, and remote tare input.

WIRING OPTIONAL PCBS

The SVS2000 accepts up to two optional PCBs, stacked out from the Power Supply PCB with standoffs. The SVS2000 arrives from K-M with the specified PCBs installed. Refer to the following for wiring details:

- Current Output PCB — TI-SVS.XOUT-01 on page 17
- Serial Communication PCB —TI-SVS.SER-01 on page 18
- Ethernet/IP/DeviceNet/Profibus wiring in manual

SEALING OPENINGS IN ENCLOSURE

After you complete wiring installation, seal the openings in the SVS2000 enclosure to prevent moisture seepage. Spread a generous bead of sealant around the threads of each K-M supplied plug. Screw a plug into each opening in the enclosure not being used for wiring.

POWER FUSE

There is one power fuse in the SVS2000.

Fuse	Part Number	Purpose	Voltage	Current
F1	18-1002-01	AV	250 V	1.0 A

INSTALLING PCBS

The SVS2000 arrives from K-M with the specified PCBs installed. However, you can expand your system by purchasing optional PCBs and installing them into vacant positions. The SVS2000 accepts up to two optional PCBs, stacked out from the Power Supply PCB with standoffs. Each optional PCB is wired to terminal J2 of the PCB behind it with ribbon cable. The PCB closest to the Power Supply attaches to terminal J2 of the Power Supply PCB.

A new PCB from KM comes with the following items:

- PCB
- Four 6-32 PH screws and standoffs to secure the PCB to the unit Refer to the Electrical section, and follow this procedure to install an optional PCB into the SVS2000:

If you are installing a PLC Interface PCB (Ethernet/IP, DeviceNet, etc.), it must be placed in the position closest to the Power Supply PCB. Change to serial or 4-20 must be first.

1. Disconnect power to the SVS2000.
2. Remove the cover of the SVS2000.
3. If one optional PCB is already installed in the SVS2000:
   A. Remove the screws attaching the PCB to the fixed standoffs on the Power Supply PCB.
   B. Screw the supplied standoffs into the fixed standoffs.
4. Slide the end of the optional PCB's ribbon cable onto the J2 pins of the PCB behind it.
5. Place the optional PCB in position on the standoffs.
6. Secure the new PCB in place with:
   - The supplied screws, or
   - The supplied standoffs (if installing another PCB above this one)
7. Repeat Steps 4 through 6 to install another optional PCB, if applicable.
8. Connect the field wiring to the PCB(s).
9. Restore power to the SVS2000. Replace the cover. Installation is complete.

Figure 1. Wiring Diagram

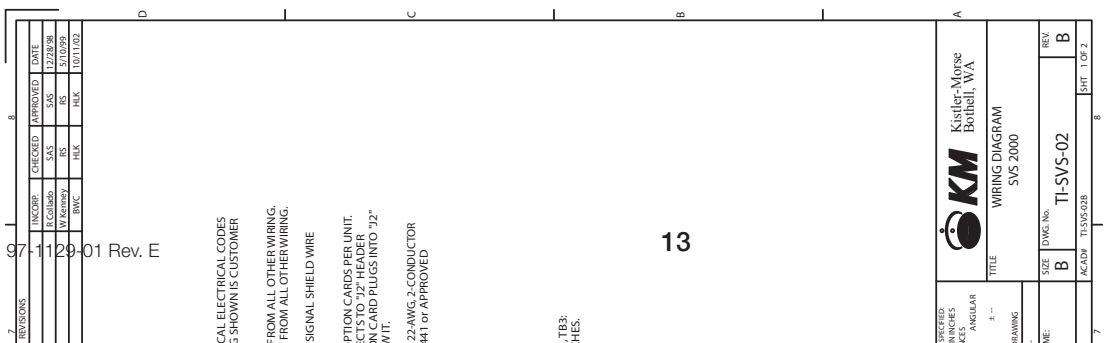


Figure 2. Wiring Diagram

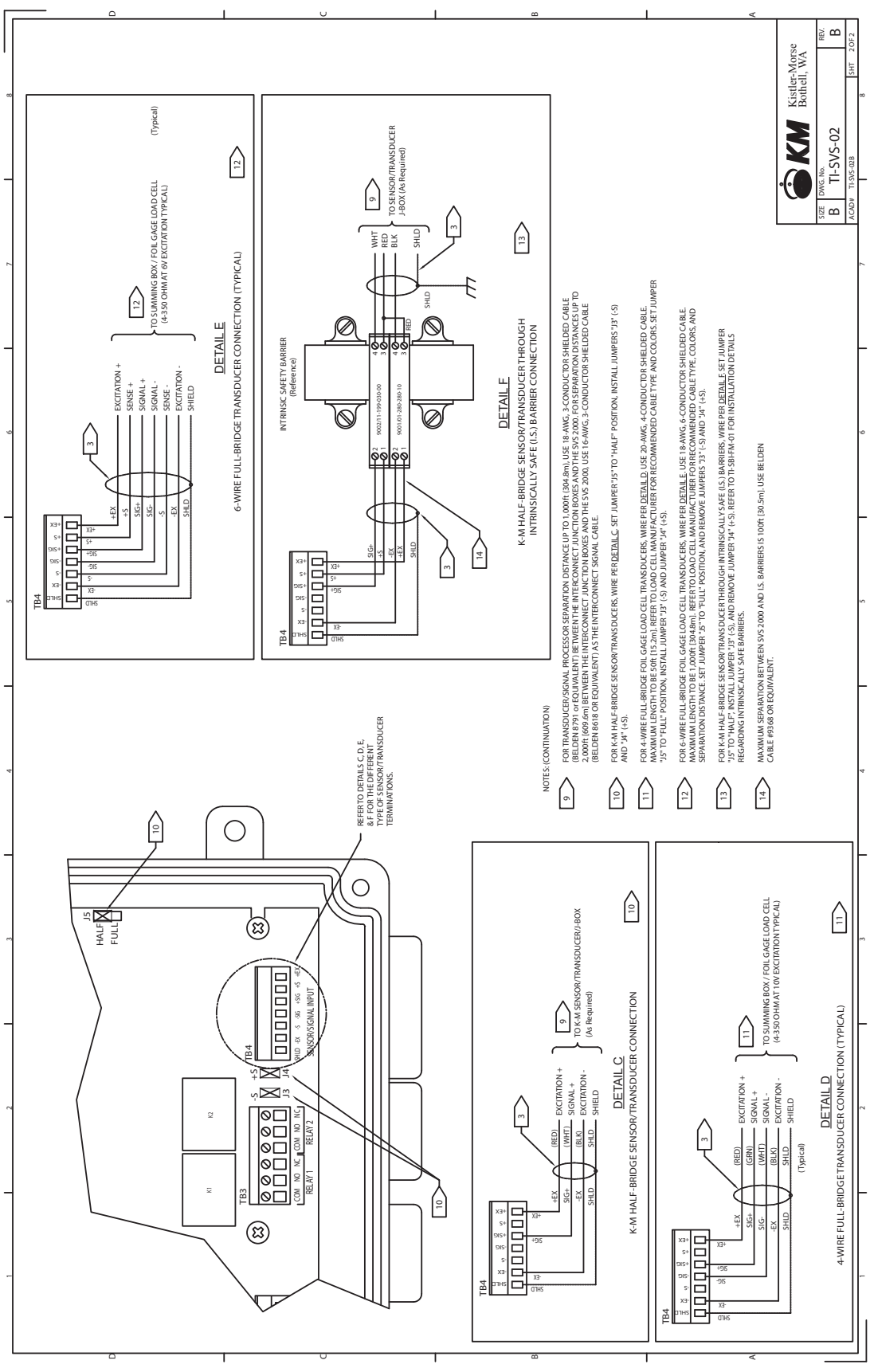


Figure 3. Wiring Diagram Current Output Card

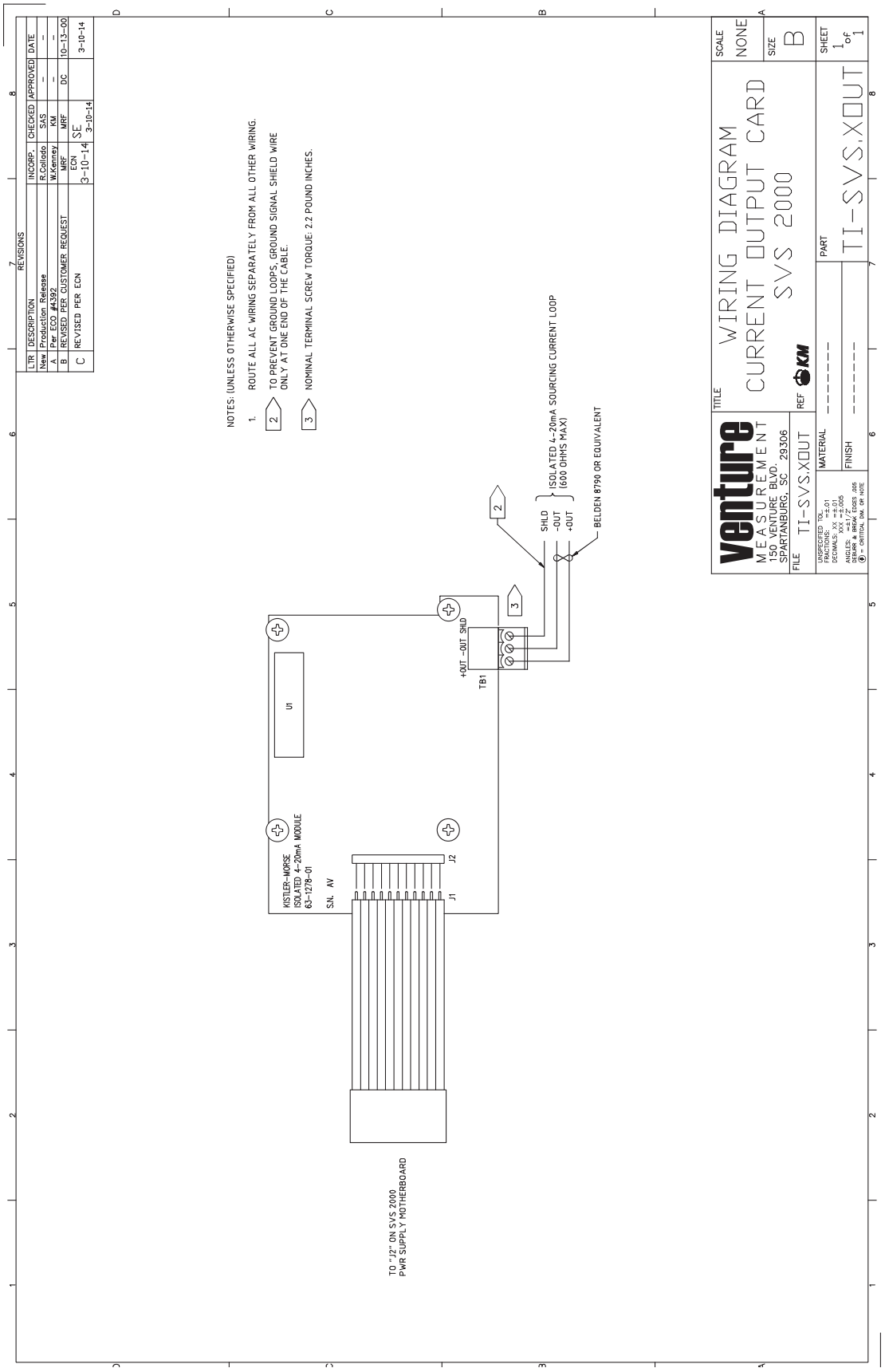
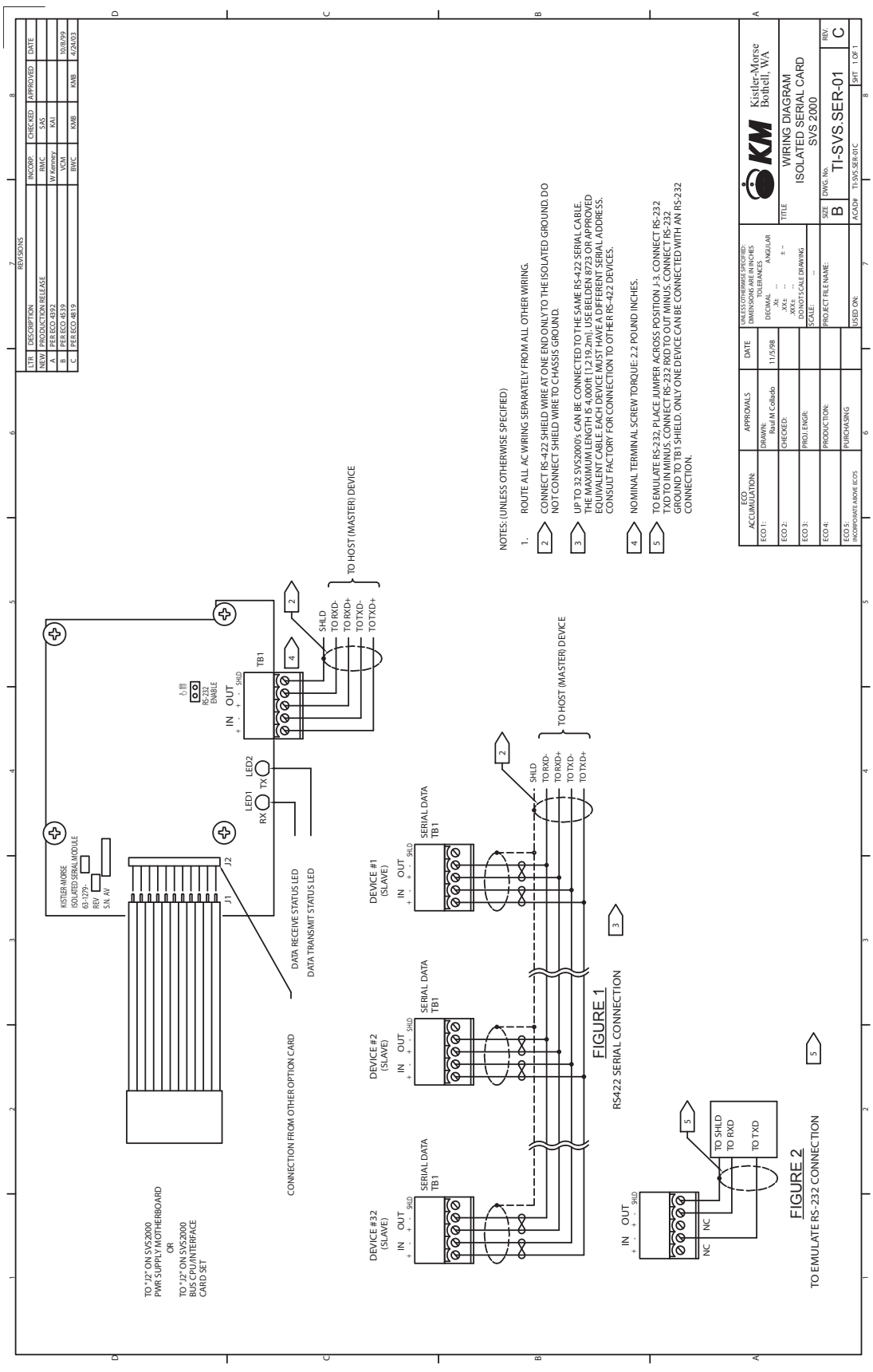


Figure 4. Wiring Diagram Isolated Output Card



VI. SET-UP

The SVS2000 is designed to get you up and running quickly once the system is installed. The SVS2000 guides you through the Quick Configuration questions. Your responses provide the SVS2000 with the information needed to pre-calibrate the system for your application.

Before you begin Quick Configuration, gather the information shown in Table 1 or 2 depending on product and reference Figure 5.

When performing Quick Configuration, do not worry if you make an error. You can make changes by backing up through Quick Configuration using the Func Key. Alternatively, parameters can be changed in the menu tree after you complete Quick Configuration, or the entire Quick Configuration can be repeated by defaulting the system.

Table 1. Quick Config: Bolt-On Sensor

Bolt-On Sensor Type	Options	Value Selected
Units	Lbs or kg	
Sensor Type (1)	L-Cell or Microcell	
If Microcells (2)		
Installed on horizontal legs?	Yes/No	
Installed on vertical legs?		
Rosette Arrays?		
Vertical Mircocells?	Yes/No	
Vessel Working Capacity	Lbs or kg	
Vessel Working Stress	PSI or kg/mm2	
Current Material Weight	Lbs or kg	

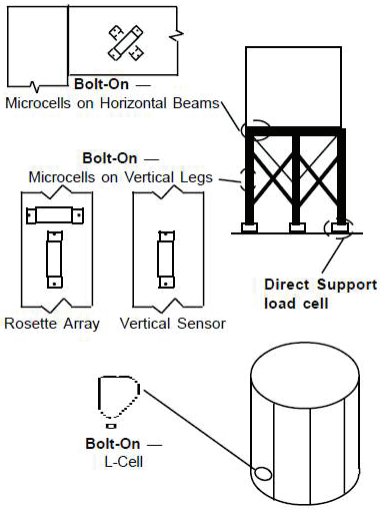
1. See the Application Data Form for sensor type and configuration, capacity, and stress. A copy of the form was returned to you with your order. If you cannot locate the form, contact K-M to get another copy before you proceed.
2. Internal calculations in the SVS2000 for Microcells are based on 3-inch Microcells on carbon steel. Modify the calibration after Quick Config is complete if the application is for installation on stainless steel or aluminum or uses 2-inch Microcells.

Table 2. Quick Config: Direct Support Load Cell

Direct Support Sensor	Options	Value Selected
Units	Lbs or kg	
Rated Load Per Cell		
Sensitivity	mV/V	
Number of Supports per Vessel		
Current Live Load		

1. See the load cell label or the sensor manual rated load and sensitivity

Figure 5. Quick Config Terminology



KEY	FUNCTION
Enter	Press the Enter Key to save in memory any selection you make or any value entered. Each time the Enter Key is pressed, the SVS2000 briefly acknowledges the entry before proceeding to the next display.
Arrow Keys	Press an Arrow Key to scroll the display through the selections at a given level. Press the Up Arrow Key when the display shows the last selection in the menu to 'roll over' the display to the first selection.
Numeric Keys	Press the Numeric Keys to type in numbers. If you make an error while typing a number but have not pressed the Enter Key yet, do one of the following: • Use the Arrow Keys to increase or decrease the number before you press the Enter Key. • Press the key for the first (left-most) digit in the number until the display 'rolls over' and that digit appears as the only digit on the display. Then proceed to enter the remainder of the number and press the Enter Key.
Func Key	Press the Func Key to back up through Quick Config to review and/or correct an entry.
Gross/Net Key	Press the Gross or Net Key to abort Quick Config and go to the gross or net display in Run Mode. The SVS2000 operates with factory defaults if you abort

NOTE: Round numeric values to match the displayed format. For example, the display has two 'dummy' zeroes for a bolt-on application working capacity. Round the working capacity to the nearest 100 lbs or 100 kg and enter the digits that are to the left of the dummy zeroes.

Figure 6. Preparing Supplied Plug for Unused Openings

QUICK CONFIGURATION PROCEDURE

1. Apply power to the unit while pressing the Enter Key. The display shows:

QUICK CONFIG

PRESS ENTER...

...TO CONTINUE

2. Press the Enter Key. The display shows:

   UNITS? lbs

   The choices for units are lbs or kg. For kg, press the Up Arrow Key; the display shows:

   UNITS? kg

   Note: You can change units after Quick Config is complete.

3. When the display shows the desired units, press the Enter Key. The display acknowledges the selection and shows:

   KM BOLT-ON?

   The choices for sensor type are K-M bolt-on or direct support. For direct support sensors, press the Up Arrow Key;the display shows:

   DIRECT SUPPORT?

4. When the display shows the desired sensor type, press the Enter Key. The display acknowledges the selection.
   - For KM bolt-on sensors, proceed to Step 5.
   - For direct support sensors, proceed to Step 16.

5. If you selected KM Bolt-On, the display shows:

   L-CELLs?

   The choices for KM bolt-on sensor are L-Cells or Microcells. For Microcells, press the Up Arrow Key; the display shows:

   MICROCELLs?

6. When the display shows the desired bolt-on sensor, press the Enter Key. The display acknowledges the selection.
   - For L-Cells, proceed to Step 11.
   - For Microcells, proceed to Step 7.

7. If you selected Microcells, the display shows:

   HORIZONTL BEAMS?

   The choices for location are horizontal beams or vertical legs. For vertical legs, press the Up Arrow Key; the display shows:

   VERTICAL LEGS?

8. When the display shows the desired Microcell location, press the Enter Key. The display acknowledges the selection.
   - For Microcells on horizontal beams, proceed to Step 11.
   - For Microcells on vertical legs, proceed to Step 9.

9. If you selected Vertical Legs, the display shows:

   ROSETTE ARRAYS?

The choices for Microcell configuration are rosette arrays ('T' configuration) or vertical sensors. For vertical sensors, press the Up Arrow Key; the display shows:

VERTICL SENSORS?

10. When the display shows the desired Microcell configuration, press the Enter Key. The display acknowledges the selection.
11. The display shows:

    WORKNG CAPACITY:

12. Press the Enter Key. The display looks like this:

    > 000 lbs

    If you selected kg, the display shows kg.

13. Use the Numeric Keys to input the working capacity. Press the Enter Key. The display acknowledges the entry and shows:

    WORKING STRESS:

14. Press the Enter Key. The display looks like this:

    > 0 psi

    If you selected kg, the display shows stress units of kg/mm2.

15. Use the Numeric Keys to input the working stress. Press the Enter Key. The display acknowledges the entry. Proceed to Step 23.

    Note: If you input a stress that is outside the range of typical values, the SVS2000 requests verification by showing Stress Too Low? or Stress Too High? for a few seconds. The SVS2000 returns to the stress input screen and allows you to re-enter the stress if desired.

16. If you selected Direct Support, the display shows:

    CELL RATED LOAD:

17. Press the Enter Key. The display looks like this:

    > 00 lbs

    If you selected kg, the display shows kg.

18. Use the Numeric Keys to input the rated load per load cell. Press the Enter Key. The display acknowledges the entry and shows:

    CELL SENSITIVTY:

19. Press the Enter Key. The display shows:

    > .000 mV/V

    Note: Cell sensitivity is input in millivolts/ volt. For example, if the sensitivity is 26.7 millivolts/volt, the display should look like this after you input the value:

    > 26.700 mV/V

20. Use the Numeric Keys to input the load cell sensitivity. Press the Enter Key. The display acknowledges the entry and shows:

    # OF SUPPORTS:

21. Press the Enter Key. The display shows:

    > 0 SUPPORTS

22. Use the Numeric Keys to input the number of vessel supports. Press the Enter Key. The display acknowledges the entry.
23. The display shows:

    CURRNT LIVE LOAD
24. Press the Enter Key. The display looks like this:

    > 0 lbs

    If you selected kg, the display shows kg.
25. Use the Numeric Keys to input the weight of material currently in the vessel. Press the Enter Key. The display acknowledges the entry and shows:

    CONFIG COMPLETE!

Quick Config is complete. The system is mointoring the vessel contents using a calculated calibration based on your inputs. Note that Quick Config calibration does not take into account the actual structural response to changes in load. We theoretically expect a change in load to result in a proportional change in digital counts, but the structure's actual response to load and interaction with piping, catwalks, a roof, discharge chutes, etc. prevent the system from achieving the theoretically expected values. Additionally, Quick Config calibration could be inaccurate if your estimate of the current material weight was off. When scheduling permits you to move material into or out of the vessel, perform a live load calibration (Auto Cal) to obtain the highest accuracy.

RUN MODE DISPLAY

When Quick Config is complete, the SVS2000 automatically switches the display to Run Mode. In Run Mode, the SVS2000 displays material weight or other indication of vessel contents. While in Run Mode, toggle between the displays for gross weight, net weight, total weight, and relay status by pressing an Arrow Key. Pressing the Gross Key or Net Key causes the SVS2000 to go directly to the respective displays. The displays look like this:

GRS 12345600 lbs

NET 12345600 lbs

TOT 12345600 lbs

RLY1ON RLY2OFF

If you selected kg as the unit of measure in Quick Config, the displays show kg.

Note: If you set up a Keyboard Lock Code, the SVS2000 will not respond to any keys if more then 3 minutes has elapsed since the last time you pressed a key. Enter the Keyboard Lock Code to 'unlock' the keyboard.

GROSS WEIGHT DISPLAY

BAR GRAPH DISPLAY

Note: Immediately after Quick Config, the SVS2000 uses the default value for the Bar Graph Span to determine the value for the bar graph display. Enter the correct Bar Graph Span in the Display Menu.

You can choose to view a bar graph of the gross weight. To toggle between numerical and bar graph gross weight:

1. Use an Arrow Key to scroll to the gross weight display. The display looks like this:
   GRS 12345600 lbs
2. Press the Enter Key. The display looks like this:
   75%||||||||| |

Press the Enter Key again to return to the numerical gross weight display.

ZERO GROSS WEIGHT DISPLAY

Zeroing the gross weight quickly adjusts an empty vessel's calibration by setting the gross weight to zero. Follow this procedure:

1. Use an Arrow Key to scroll to the gross weight display. The display looks like this:
   GRS 12345600 lbs
2. Press the Zero Key. The display shows:
   ZERO GRS DISPLY?
3. Press the Enter Key to zero the gross weight. Press any other key to abort this function.
4. If you set up a User Access Code the display shows:
   USER CODE?
   Enter the User Access Code. Press the Enter Key.
5. The display briefly shows:
   GROSS ZEROED

Notes:

1. The SVS2000 verifies the gross weight is within user-set tolerance limits, to prevent accidental zeroing of a vessel that is not empty. If the gross weight is not within tolerance, the display shows Outside Zero Tol and does not zero the gross weight. See Zero Tolrance in Cal Menu, to set the tolerance limit.

2. Disp Val Correct can also zero the vessel. However, Disp Val Correct has no tolerance limits and allows the current gross weight to be set to a non-zero value. See Refining the Calibration with the Display Value Correction in Cal Menu.

NET WEIGHT DISPLAY

The net weight is the change in weight since the last tare. To tare the vessel:

1. While in Run Mode, press the Tare Key for 1 second.

2. If you set up a User Access Code the display shows:

   USER CODE?

   Enter the User Access Code. Press the Enter Key.
3. The display briefly shows:

   TARE IMPLEMENTED

TOTAL WEIGHT DISPLAY

The total weight is the algebraic sum of the net weights. It is updated each time the vessel is tared.

ZERO TOTAL WEIGHT

To reset the total weight to zero:

1. Use an Arrow Key to scroll to the total weight display. The display looks like this:

   TOT 12345600 lbs
2. Press the Zero Key. The display shows:

   ZERO TOTALIZER?
3. Press the Enter Key to zero the totalizer. Press any other key to abort this function.
4. If you set up a User Access Code (see Service Menu) the display shows:

   USER CODE?

   Enter the User Access Code. Press the Enter Key.
5. The display briefly shows:

   TOTALIZER CLEARD

DISPLAY NUMBER OF TARES

To display the number of tares that have occurred since the total weight was reset:

1. Use an Arrow Key to scroll to the total weight display. The display looks like this:

   TOT 12345600 lbs
2. Press the Enter Key. The display briefly looks like this:

   #TAREs: 21

TOGGLING BETWEEN RUN MODE AND FUNCTION MODE

After Quick Config is complete, the SVS2000 has two modes of operation:

Run Mode — Monitoring	Displays material weight or other indication of vessel contents

Function Mode — Menu Tree	Accesses the menu tree to allow the user to view and/or modify setup parameters

Toggle between Function and Run Modes as described below:

- In Run Mode —
  – Press the Func Key to access the first item in the main menu, or
  – Press the function number for a menu and then press the Enter Key to go directly to a particular menu.
- In Function Mode, press the Gross or Net Key while in any function in the menu tree to return to the gross or net display in Run Mode.

FUNCTION MODE MENU TREE

The menu tree, is used to view and modify setup parameters and to troubleshoot the system. There are nine numbered main headings in the menu tree:

Menu	Description
Display	set up display units, format, count by, and bar graph span
Cal	calibrate the system
Setpoint	set up relay and digital output parameters, view digital output status, and test relays and digital outputs
I-Output	set up, adjust, and test current output
Com	enter serial port configuration and PLC interface parameters
Sensor	adjust excitation, resolution, and gain; and display raw, filtered, and output sensor data
Filter	set up and monitor filtering functions to reduce the effect of 'noise'
Tracking	set up and monitor tracking functions to reduce the effect of 'noise' and drift
Service	set up user access and keyboard lock codes, troubleshoot, and default the system

Each of the nine main headings has numbered submenus beneath it. Some of these submenus have additional, unnumbered submenus beneath them.

MENU TREE NAVIGATION

Menu tree navigation is simple:

- Use the Func Key to access the menu tree or use the function number and Enter Key to go to a particular menu.
- Use the Arrow Keys to move among menus at the same level.
- Use the Enter Key to select a menu and access its submenus.

Following are two examples illustrating how to navigate to the Relay1 Deadband Menu:

Example 1. Go directly to nearest numbered menu —

1. In Run Mode, press the '3' Key and '1' Key. The display shows:
   FUNCTION: 31
   Press the Enter Key. The display shows:

31 SLCT RELAY #1

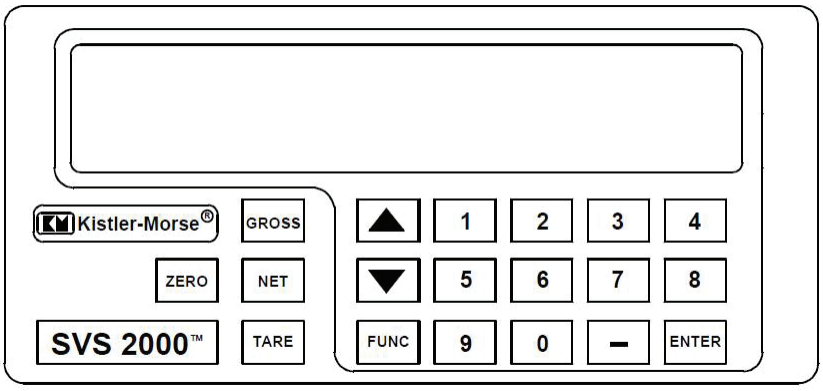
2. Press the Enter Key to select this menu. The display shows:
   RELAY1 VALUE
3. Press the Up Arrow Key to go to the next menu at this level. The display shows:
   RELAY1 DEADBAND
4. Press the Enter Key to select this menu.

Example 2. Navigate through menus —

1. In Run Mode, press the Func Key. The display shows:
   10 DISPLAY MENU
2. Press the Up Arrow Key to go to the next menu at this level. The display shows:
   20 CAL MENU
3. Press the Up Arrow Key to go to the next menu at this level. The display shows:
   30 SETPOINT MENU
4. Press the Enter Key to select this menu. The display shows:
   31 SLCT RELAY #1
5. Press the Enter Key to select this menu. The display shows:
   RELAY1 VALUE
6. Press the Up Arrow Key to go to the next menu at this level. The display shows:
   RELAY1 DEADBAND
7. Press the Enter Key to select this menu.

KEYBOARD

The SVS2000 keyboard is used to input setup parameters during Quick Config, access Run Mode display screens, and access Function Mode menus to input setup parameters and troubleshoot.



The function of each key is described below.

Key	Description
Func	Used in Run Mode only. Press the Func Key to switch to Function Mode and access the first item in the menu tree. Note: To go directly to a particular menu in the menu tree while in Run Mode, press the function number for the menu and then press the Enter Key
Arrow	• Run Mode — Press an Arrow Key to scroll through the gross weight, net weight, total weight, and relay status display screens. • Function Mode — 1.Press an Arrow Key to scroll through the menu selections at a given level. 2.Press an Arrow Key to scroll to a desired value when entering parameters. For example, when setting Hi Span Cal, the Arrow Keys can be used to scroll to a desired value instead of entering the number with the Numeric Keys. Pressing the Up Arrow Key when the display shows the last menu selection at a given level 'rolls over' the display to the first selection.
Net	Change the display to net weight (weight added to or removed from the vessel since the last time the Tare Key was used): • Run Mode — press the Net Key to go to the net weight display. • Function Mode — press the Net Key to exit the menu tree and go to the net weight display in Run Mode
Gross	Change the display to gross weight (total weight of material in vessel): • Run Mode — press the Gross Key to go to the gross weight display. • Function Mode — press the Gross Key to exit the menu tree and go to the gross weight display in Run Mode.
Tare	Used in Run Mode only. Press the Tare Key for 1 second to 'tare' the vessel, setting the net weight value to zero. The SVS2000 briefly shows Tare Implemented and then switches to the net weight display. The tare function is useful when you want to monitor how much material is added to or removed from the vessel from a given point. Note that the total weight display is updated each time the vessel is tared. Note:The SVS2000 also has a remote tare function. See TI-SVS-02 in Electrical System, for wiring details. To tare the vessel from the remote station, hold the remote tare push button for 1 second.
Zero	Used in Run Mode: • On the gross weight display — Press the Zero Key to change the calibration for the vessel, setting the gross weight value to zero. The Zero Key is useful when you want to quickly adjust the calibration for an empty vessel without entering the menu tree. See the Run Mode Display section in this chapter for details. • On the total weight display — Press the Zero Key to reset the total weight to zero. See the Run Mode Display section in this chapter for details

Enter	Has several functions: • In Run Mode — —Gross weight display: Press the Enter Key to toggle from numerical format to bar graph format. The display remains in the bar graph format (even if the SVS2000 is turned off and back on again) until the Enter Key is pressed to toggle back to the numerical format. —Total weight display: Press the Enter Key to briefly display the number of tares since the last time the totalizer was reset. • In Function Mode — —Press the Enter Key to access submenus. For example, if the display shows: 21 AUTO CAL pressing the Enter Key advances to the first Auto Cal submenu: LO SPAN CAL Pressing the Enter Key again advances to the display where the value for the Lo Span is entered: > lbs —Press the Enter Key to save in memory any parameter set up in the menus. For example, when setting Lo Span Cal, pressing the Enter Key saves it to memory. The value remains in memory until a new value is entered.
Numeric	Has several functions: • Run Mode — Press Numeric Keys to enter the function number for the desired menu in the menu tree (press the Enter Key after the number is entered). • Function Mode — Press Numeric Keys to type in numbers to set up the SVS2000. If you make an error while typing a number but haven't pressed the Enter Key yet, do one of the following: —Use the Arrow Keys to increase or decrease the number before you press the Enter Key. —Press the key for the first (left-most) digit in the number until the display 'rolls over' and that digit appears as the only digit on the display. Then proceed to enter the remainder of the number and press the Enter Key. —Or, press the Gross or Net Key to return to Run Mode and then come back into the menu to try again

DISPLAY MENU [10]

The Display Menu is used to set up the parameters that govern the display functions when in Run Mode. This chapter provides explanations of the display parameters and detailed navigation procedures through the menu tree.

11 DISP (DISPLAY) FORMAT

Note: Disp Format was set by the SVS2000 based on your entries in Quick Config. In the Disp Format Menu you can change the format. However, if you change Disp Format you must also change other setup parameters. See Modifying Disp Format and Disp Units in this chapter for details.

This menu allows you to set up the numerical format by selecting the number of digits to be displayed to the left and right of the decimal point while in Run Mode. Listed below are the seven formats available (x is a place holder and 0 is a 'dummy' zero):

xxxxxx xxxxx.x xxxx.xx xxx.xxx

xx.xxxx xxxxxxo xxxxxxoo

Disp Format is used with Disp Countby to provide a stable display, and to provide meaningful results consistent with system accuracy. For example, you do not want to have the display showing weights like 1000.01 lbs if system accuracy is +/- 20 lbs.

Follow this procedure to modify Disp Format:

1. If the SVS2000 is in Run Mode, press the '1' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   11 DISP FORMAT

2. Press the Enter Key to access this menu. The display looks like this:

   FORMAT: *xxxxxx

   (Asterisk indicates the current selection.)

   If the displayed menu does not have the desired format, press the Up Arrow Key to display the next page of the menu.

   Continue to press an Arrow Key until you see the desired format (there are seven pages to the Disp Format Menu).

3. When the display shows the desired format, press the Enter Key. The display acknowledges the selection and returns to:

   11 DISP FORMAT

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

12 DISP (DISPLAY) COUNTBY

Note that Disp Countby was set by the SVS2000 based on your entries in Quick Config. In the Disp Countby Menu you can change the countby. This menu is used to set up the display to count by increments of 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 5000, or 10000. A Disp Countby of 1 causes the rightmost active digit on the display to change in increments of 1. A Disp Countby of 100 causes the rightmost three active digits on the display to change in increments of 100. Use Disp Countby to adjust the display to a resolution consistent with the accuracy of the system and reduce display flickering.

Note that the selection for Disp Format affects how the SVS2000 interprets the Disp Countby value. Table 3 shows some examples of how these are related. Example: For a 10,000 lb maximum weight and Disp Format of xxxxxx, a Disp Countby of 1 is meaningful only if the system accuracy is ±0.01% of maximum load. A more typical accuracy for a bolt-on strain gage application might be ±1%. Since 1% of 10,000 lbs is 100 lbs, a more realistic DispCountby for this system is 100.

Table 3. Interaction of Format and Countby

Display Format	Disp Countby	Example Value
xxxx.xx	1	397.25
xxxx.xx	100	397.00

Xxxxxx	1	39725
Xxxxxx	100	39700
Xxxxxxoo	1	3972500
xxxxxxoo	100	3970000

Follow this procedure to modify

Disp Countby:

1. If the SVS2000 is in Run Mode, press the '1' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

   12 DISP COUNTBY

2. Press the Enter Key to access this menu. The display looks like this:

   COUNTBY: *1

   (Asterisk indicates the current selection.) If the displayed menu does not have the desired countby, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired countby (there are twelve pages to the Disp Countby Menu).

3. When the display shows the desired countby, press the Enter Key. The display acknowledges the selection and returns to:

   12 DISP COUNTBY

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

13 DISP (DISPLAY) UNITS

Note: In Quick Config you selected lbs or kg as the unit of measure. In the Disp Units Menu you can choose from a larger selection of units. However, if you change Disp Units you must also change other setup parameters. See Modifying Disp Format and Disp Units in this chapter for details. This menu allows you to select the unit of measure for the Run Mode. Listed below are the units available:

lbs (pounds)	kg (kilograms)
CWT (hundred-weight)	tns (tons)
gal (gallons)	Ltr (liters)
bbl (barrels)	bu (bushels)
% (percent)	ft (feet)
m (meters)	mV (millivolts)
(none)	SCK

Follow this procedure to modify Disp Units:

1. If the SVS2000 is in Run Mode, press the '1' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

   13 DISP UNITS

2. Press the Enter Key to access this menu. The display looks like this:

   UNITS: *lbs

   (Asterisk indicates the current selection.) If the displayed menu does not have the desired units, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired units (there are thirteen pages to the Disp Units Menu).

3. When the display shows the desired units, press the Enter Key. The display acknowledges the selection and returns to:

   13 DISP UNITS

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

14 BARGRAPH SPAN

Note: Bargraph Span was set by the SVS2000 based on your entries in Quick Config. In the Bargraph Span Menu you can change the value. You can choose to view a numerical display or a bar graph of the gross weight while in Run Mode. The maximum span for the bar graph is set with this menu. The bar graph displays the vessel contents as a numerical percentage to the left of the graph, as shown below:

75%||||||||| |

The 0% point of the bar graph is always 0. The 100% point of the bar graph is set with the Bargraph Span. For example, entering the vessel's maximum capacity of 5000 lbs as the Bargraph Span results in a bar graph with 0% corresponding to 0 lbs and 100% corresponding to 5000 lbs. If the gross weight in the vessel falls outside the range, the bargraph display does the following:

- Gross weight falls below 0 (caused by inaccuracies in the calibration, vibration, drift, etc.) — The graph remains at 0% and the numerical percentage remains at 0%.
- Gross weight goes above the Bargraph Span value — The graph remains at 100% and the numerical percentage reflects the actual weight. For example, if Bargraph Span is 5000 lbs and the gross weight is 7500 lbs, the numerical percentage displayed is 150% while the graph remains at 100%.

While viewing the gross weight in Run Mode, pressing the Enter Key toggles the display between bar graph and numerical display. Follow this procedure to modify Bargraph Span:

1. If the SVS2000 is in Run Mode, press the '1' Key, '4' Key, and Enter Key to access the menu tree. The display shows:

   14 BARGRAPH SPAN

2. Press the Enter Key to access this menu. The display looks like this:

   > 9999 lbs

   (Units are consistent with Disp Units.)

3. Use the Numeric or Arrow Keys to enter the desired value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   14 BARGRAPH SPAN

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

MODIFYING DISP (DISPLAY) FORMAT AND DISP (DISPLAY) UNITS

If you modify Disp Format and/or Disp Units, you may need to modify other parameters as well. Changing Disp Format moves the decimal place for all parameters based on it. Changing Disp Units changes the units for all

parameters based on it. The SVS2000 does not 'convert' parameter values based on changes in units — it simply changes the name of the unit. Below are the parameters that are affected by changes to DispFormat or Disp Units. If you are not using or have not yet set up a function (for example, you have not set up digital outputs yet), the changes will not affect the operation of the system. Before you change Disp Format and/or Disp Units, record the values for each of the parameters that may change with Disp Format or Disp Units.

Example 1. Change Disp Format from xxxxxx00 to xxxxxx

Record current parameter values:
Disp Format = xxxxxx00
Scale Factor Weight = 100,000
Relay1 Value = 90,000 (dummy zeroes underlined)
Change Disp Format. As a result of the change, the parameter values change to:
Scale Factor Weight = 1,000
Relay1 Value = 900
Re-enter parameter values:
Scale Factor Weight = 100,000
Relay1 Value = 90,000

Parameters Affected By Changes To Disp Format or Disp Units

Bargraph Span [14]
Scale Factor Weight [22]
Linearize Set [23]
Zero Tolrance [24]
Relay and Digout Value, Deadband, and
Preact [31 through 38]
lOut 4/0 mA [42] and 20 mA [43]
DSP Step [73]
Rate Threshld [81]
Zero Trak Win [83]
Drift Limit [84]

Example 2. Change Disp Units from lbs to tns and Disp Format from xxxxxx00 to xxxxx.x

Record current parameter values:
Disp Format = xxxxxx00
Scale Factor Weight = 100,000 lbs
Relay1 Value = 90,000 lbs
(dummy zeroes underlined)
Change Disp Units and Disp Format.
As a result of the changes, the parameter values change to:
Scale Factor Weight = 100.0 tns
Relay1 Value = 90.0 tns
Re-enter parameter values:

Scale Factor Weight =

100,000 lbs ÷ 2000 lbs/ton = 50.0 tns

Relay1 Value =

90,000 lbs ÷ 2000 lbs/ton = 45.0 tns

Example 3. Change Disp Units from lbs to % and Disp Format from xxxxxx00 to xxxxxx

When changing Disp Units to %, you must calculate the current parameter values in terms of the full scale (100%) load:

New Value (in %) = Old Value ÷ Full Scale Load where:

Full scale load = vessel working capacity (from Application Data Form)

Current parameter values:

Disp Format = xxxxxx00

Scale Factor Weight = 100,000 lbs

Relay1 Value = 90,000 lbs (dummy zeroes underlined) Change Disp Units and Disp Format. As a result of the changes, the parameter values change to:

Scale Factor Weight = 1000 %

Relay1 Value = 900 %

The vessel working capacity is 150,000 lbs.

Re-enter parameter values:

Scale Factor Weight =

100,000 lbs ÷ 150,000 lbs = 75%

Relay1 Value =

90,000 lbs ÷ 150,000 lbs = 60%

CAL (CALIBRATION) MENU [20]

Quick Config got your system up and running with a calibration based on system and sensor characteristics. The Cal Menu is used to refine and improve the calibration. This section provides explanations of each of the calibration parameters and detailed navigation procedures through the menu tree for each type of calibration.

Cal Menu has five submenus:

Auto Cal	Sets Lo Span, Hi Span, and Display Value Correction values while moving material into or out of the vessel. Auto calibration will result in the highest system accuracy
Manual Cal	Manually set scale factor weight, scale factor counts, and zero counts. Use manual calibration to fine-tune the calibration or re-enter previous calibration data.
Linearization	Sets up and turns on and off the linearization table. Use this function if the vessel's structure responds nonlinearly, but consistently, to changes in load, resulting in consistent, incorrect weight readings after the system has been correctly calibrated.
Zero Tolerance	set the range within which the Zero Key can be used to zero the gross weight
Cal Display	display input and internally calculated calibration parameters

21 AUTO CAL (AUTOMATIC CALIBRATION)

There are three methods for performing automatic calibration:

- High-Accuracy Calibration
- Calibration by Adding a Known Quantity of Material
- Calibration by Subtracting a Known Quantity of Material

Each method requires moving a known quantity of material, representing at least 25% of the vessel's total capacity, into or out of the vessel. The latter two methods do not provide as high accuracy calibration as the first method. However, these lower accuracy calibrations can be later refined to increase the accuracy (see Refining the Calibration with the Display Value Correction in this section).

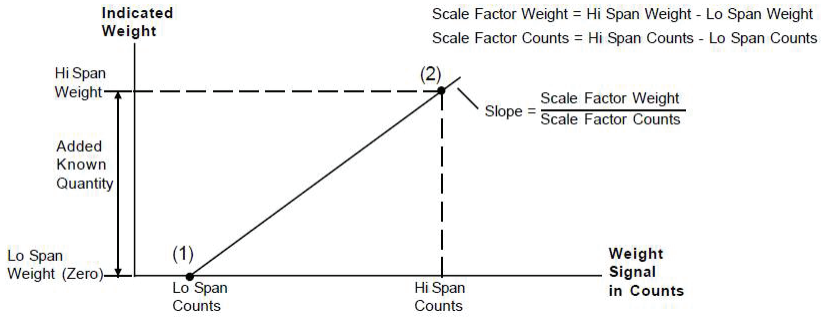
Note: See Troubleshooting Section for an explanation of error messages you may encounter while performing an Auto Calibration.

HIGH-ACCURACY CALIBRATION

This procedure provides the highest accuracy, but requires that the vessel be completely empty to start. The principle behind the calibration follows.

The vessel is completely emptied, and the Lo Span weight is set to zero [point (1) in Figure 7]. A known quantity of material, representing at least 25% of the vessel's total capacity, is then added to the vessel. That quantity is entered as the Hi Span weight [point (2) in Figure 7]. The SVS2000 saves in memory the entered Lo Span and Hi Span weights as well as the digital counts associated with each weight. These values define the straight line shown in Figure 7. The slope of the line is called the Scale Factor, which is calculated internally.

Figure 7. High Accuracy Calibration



The accuracy of the calibration improves the greater the known quantity of material added during the calibration procedure. For example, adding 50% of the vessel's total capacity results in greater accuracy than adding 25% of the total capacity. Follow this procedure to perform a high accuracy calibration:

1. Completely empty the vessel.
2. If the SVS2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   21 AUTO CAL
3. Press the Enter Key to access this menu. The display shows:

   LO SPAN CAL
4. Press the Enter Key to access the Lo Span Cal Menu. The display looks like this:

   > ------ lbs

   (Units are consistent with Disp Units.)
5. Use the Numeric or Arrow Keys to input zero. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   LO SPAN CAL
6. Press the Up Arrow Key to proceed to the next menu. The display shows:

   HI SPAN CAL
7. Add a known quantity of material, representing at least 25% of the vessel's total capacity, to the vessel.
8. Press the Enter Key to access the Hi Span Cal Menu. The display looks like this:

   > ------ lbs

   (Units are consistent with Disp Units.)
9. Use the Numeric or Arrow Keys to input a value that represents the quantity of material added to the vessel. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   HI SPAN CAL
10. Press the Gross or Net Key to return to Run Mode.

The SVS2000 is now calibrated to the highest accuracy.

CALIBRATION BY ADDING A KNOWN QUANTITY OF MATERIAL

This calibration method does not require the vessel to be completely empty. The principle behind the calibration follows.

A weight estimated to be the quantity of material in the vessel is entered as the Lo Span weight [point (1) in Figure 8]. A known quantity of material, representing at least 25% of the vessel's total capacity, is added to the vessel. The sum of the known quantity plus the estimated quantity is entered as the

Hi Span weight [point (2) in Figure 8]. The SVS2000 saves in memory the Lo Span and Hi Span weights as well as the digital counts associated with each weight. These values define the dashed straight line and the calculated Zero

Counts shown in Figure 8.

The slope of the line is called the Scale Factor, which is calculated internally. The slope of the line is reasonably accurate, because it is calculated based on the known difference between the Lo Span and Hi Span weights and counts. However, if the estimated Lo Span weight is incorrect, the actual 'location' of the line is incorrect, resulting in errors in monitoring. The greater the error in the estimated Lo Span, the greater the resulting error. The 'location' of the line can be adjusted to the solid line by entering a Display Value Correction [point (3) in Figure 8] (see Refining the Calibration with the Display Value Correction in this section).

The greater the known quantity of material added during the calibration procedure, the greater the accuracy of the calibration. Adding 50% of the total capacity results in greater accuracy than adding 25% of the total capacity. Follow this procedure to calibrate by adding a known quantity of material:

1. If the SVS2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   21 AUTO CAL
2. Press the Enter Key to access this menu. The display shows:

   LO SPAN CAL
3. Press the Enter Key to access the Lo Span Cal Menu. The display looks like this:

   > ------ lbs
   (Units are consistent with Disp Units.)
4. Use the Numeric or Arrow Keys to input a value that represents the estimated quantity of material in the vessel. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   LO SPAN CAL
5. Press the Up Arrow Key to proceed to the next menu. The display shows:

   HI SPAN CAL
6. Add a known quantity of material, representing at least 25% of the vessel's total capacity, to the vessel.
7. Press the Enter Key to access the Hi Span Cal Menu. The display looks like this:

   > ------ lbs

   (Units are consistent with Disp Units.)
8. Use the Numeric or Arrow Keys to input a value equal to the sum of the known quantity (Step 6) and the estimated quantity (Step 4). Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   HI SPAN CAL
9. Press the Gross or Net Key to return to Run Mode.

Note: Shifting from the dashed to the solid line in Figure 8 is accomplished by entering a Display Value Correction when the vessel contains a known quantity of material (usually none) at a later date. This procedure is described in Refining the Calibration with the Display Value Correction in this section.

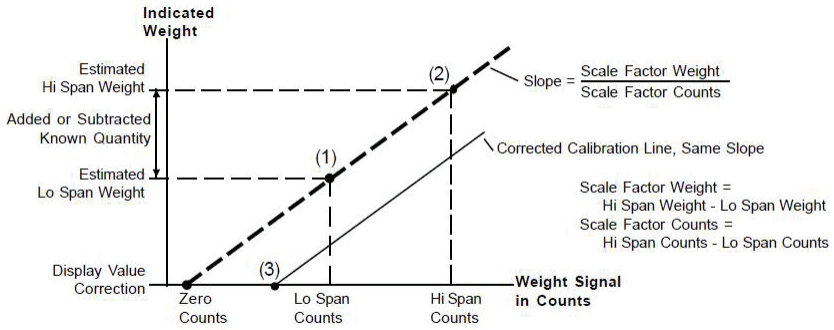
CALIBRATION BY SUBTRACTING A KNOWN QUANTITY OF MATERIAL

This calibration method does not require the vessel to be empty. This method of calibration is appropriate when it is easier to remove material from the vessel than to add it. The principle behind the calibration follows. A weight estimated to be the quantity of material in the vessel is entered as the Hi Span weight [point (2) in Figure 8]. A known quantity of material, representing at least 25% of the vessel's total capacity, is removed from the vessel.

The estimated Hi Span weight minus the known quantity that is removed is entered as the Lo Span weight [point (1) in Figure 8]. The SVS2000 saves in memory the Lo Span and Hi Span weights as well as the digital counts associated with each weight. These values define the dashed straight line and the calculated Zero Counts shown in Figure 8. The slope of the line is called the Scale Factor, which is calculated internally. The slope of the line is reasonably accurate, because it is calculated based on the known difference between the Lo Span and Hi Span weights and counts.

However, if the estimated Hi Span value is incorrect, the actual 'location' of the line is incorrect, resulting in errors in vessel monitoring. The greater the error in the estimated Hi Span, the greater the resulting error. The 'location' of the line can be adjusted to the solid line by entering a Display Value Correction [point (3) in Figure 8] (see Refining the Calibration with the Display Value Correction in this section). Similarly to the other calibration methods, the greater the known quantity of material movedduring the calibration procedure, the greater the accuracy. Removing 50% of the total capacity results in greater accuracy than removing 25% of the total capacity. Follow this procedure to calibrate by subtracting a known quantity of material:

Figure 8. Calculation by Subtracting a Known Quantity



1. If the SVS2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   21 AUTO CAL

2. Press the Enter Key to access this menu. The display shows:

   LO SPAN CAL

3. Press the Up Arrow Key to proceed to the next menu. The display shows:

   HI SPAN CAL

4. Press the Enter Key to access the Hi Span Cal Menu. The display looks like this:

   > ------ lbs

   (Units are consistent with Disp Units.)

5. Use the Numeric or Arrow Keys to input a value that represents the estimated quantity of material in the vessel. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   HI SPAN CAL
6. Press the Down Arrow Key to return to the previous menu. The display shows:

   LO SPAN CAL
7. Remove a known quantity of material, that represents at least 25% of the vessel's total capacity, from the vessel.
8. Press the Enter Key to access the Lo Span Cal Menu. The display looks like this:

   > ------ lbs

   (Units are consistent with Disp Units.)
9. Use the Numeric or Arrow Keys to input a value equal to the estimated quantity (Step 5) minus the known quantity (Step 7). Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   LO SPAN CAL
10. Press the Gross or Net Key to return to Run Mode.

Note: Shifting from the dashed to the solid line in Figure 8 is accomplished by entering a Display Value Correction when the vessel contains a known quantity of material (usually none) at a later date. This procedure is described in Refining the Calibration with the Display Value Correction in this section.

Refining the Calibration with the Display Value Correction

The Disp Val Correct Menu is used to allow the SVS2000 to establish a known live load. Disp Val Correct translates the calibration line of Figure 8 from the dashed line to the solid line position. Entering a weight for Disp Val Correct establishes point (3) in the figure. This weight must be entered only when there is a known quantity of material in the vessel (usually zero material, but it can be a known, non-zero quantity). Disp Val Correct is often entered at some time after the initial installation and calibration of the SVS2000, when it is practical to empty the vessel and refine the calibration.

Disp Val Correct may be used to compensate for the following circumstances:

- The estimated weight used when performing a calibration by adding or subtracting a known quantity of material is off by a greater margin than can be tolerated.
- The vessel was not completely empty at the start of a high-accuracy calibration procedure.

Notes:

1. Disp Val Correct cannot 'repair' a calibration in which the known quantity added or subtracted was actually incorrect, because the slope of the line is not affected by Disp Val Correct. If necessary, recalibrate.

2. If the known material weight is zero, you can also use the Zero Key while on the gross weight display in Run Mode to refine the calibration. See the Zero Tolerance section in this chapter.

Follow this procedure to refine the calibration by entering a Display Value Correction:

1. If the SVS2000 is in Run Mode, press the '2' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   21 AUTO CAL

2. Press the Enter Key to access this menu. The display shows:

   LO SPAN CAL

3. Press the Down Arrow Key to proceed to the previous menu. The display shows:

   DISP VAL CORRECT

4. Press the Enter Key to access the Disp Val Correct Menu. The display looks like this:

   > 0 lbs

   (Units are consistent with Disp Units.)

5. Use the Numeric or Arrow Keys to input a value that represents the known quantity of material (usually zero) in the vessel. Press the Enter Key to save the value in memory. The display acknowledges your entry and returns to:

   DISP VAL CORRECT

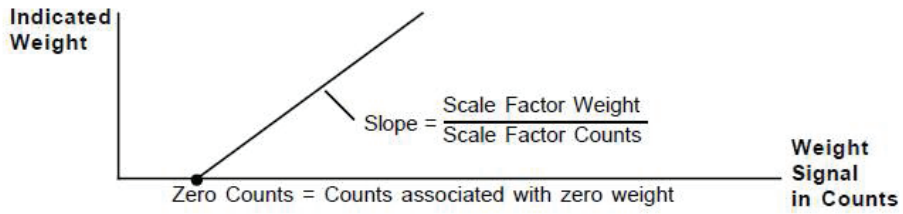
6. The SVS2000 automatically makes all of the necessary corrections.
7. Press the Gross or Net Key to return to Run Mode.

22 MANUAL CAL (CALIBRATION)

See Figure 9. For Manual Cal, you calculate and input directly Scale Factor Weight, Scale Factor Counts, and Zero Counts for the calibration line. There are two reasons for performing a manual calibration:

- Refining the calibration — You performed an Auto Cal. Later, you moved material into an empty vessel and kept an accurate record of actual material weight (based on a truck weight or some other accurate information) and indicated material weight (from the SVS2000). However, you did not perform an Auto Cal at the time. You want to use this information now to refine the calibration.
- Re-entering calibration data — You performed an Auto Cal and recorded the results (Scale Factor Weight, Scale Factor Counts, and Zero Counts). Later you performed another Auto Cal to try to improve accuracy, but an error was made. You want to re-enter the data from the previous calibration.

Figure 9. Manual Calibration



1. If the SVS2000 is in Run Mode, press the '2' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

   22 MANUAL CAL

2. Press the Enter Key to access this menu. The display shows:

   SCALE FACTOR WGT

3. Press the Enter Key to access the Scale Factor Wgt Menu. The display looks like this:

   > 9999 lbs

   (Units are consistent with Disp Units.)

4. Use the Numeric or Arrow Keys to input a value for the scale factor weight. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   SCALE FACTOR WGT

5. Press the Up Arrow Key to proceed to the next menu. The display shows:

   SCALE FACTOR CTS

6. Press the Enter Key to access the Scale Factor Cts Menu. The display looks like this:

   > 250000 cnts

7. Use the Numeric or Arrow Keys to input a value for the scale factor counts. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   SCALE FACTOR CTS

8. Press the Up Arrow Key to proceed to the next menu. The display shows:

   ZERO COUNTS

9. Press the Enter Key to access the Zero Counts Menu. The display looks like this:

   > 1048576 cnts

10. Use the Numeric or Arrow Keys to input a value for the zero counts. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

    ZERO COUNTS

11. Press the Gross or Net Key to return to Run Mode.

23 LINEARIZATION

The linearization function is used to correct nonlinearities from a vessel's sensor/transducer output. Linearization may be required if you notice one of the following after the system is correctly calibrated (using Auto Cal):

- The SVS2000 gives accurate results when the live load is close to 0 and close to the full scale (maximum live load) value, but is consistently inaccurate between those values.
- The SVS2000 gives accurate results over some of the live load range, but is consistently inaccurate in one area.

The word 'consistent' refers not only to an error occurring, but that the error is approximately the same each time. This type of error may be caused by a non-linear response of the vessel's structure to changes in load. This type of error can also result from layering of multiple types of material in the vessel, with differing densities, in distinct, consistently defined layers.

Note: Changing the linearization table incorrectly can cause the SVS2000 to display incorrect sensor data. Do not change the linearization table unless one of the above problems has been noted. The SVS2000's linearization algorithm uses a five-point piece-wise linearization method with linear interpolation between points. Figure 10

illustrates the linearization operation. The linearization table consists of five raw weights as inputs and five corrected weights as outputs. The default for Linearization is Off. Additionally, the raw and corrected default values are identical, so the default linearization table has no effect on the SVS2000, even if linearization is On. Following is an example of a situation where use of the linearization table may be required:

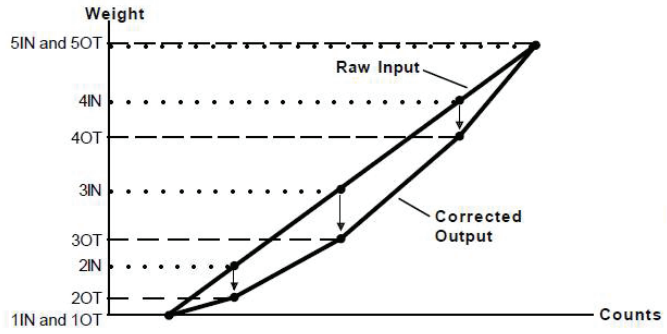
Example: When the vessel is empty, the SVS2000 correctly shows approximately 0 lbs. You start putting truckloads of material into the vessel, and notice the following pattern:

Truck	Total Indicated Load	Total Actual Load
	0	0
1	6,000	5,000
2	11,500	10,000
3	16,000	15,000
4	20,000	20,000

After the fourth truckload, the indicated load from the SVS2000 is reasonably accurate. You notice this same pattern and magnitude of errors every time you start with an empty vessel. To correct for the non-linear response, you input the following values in the Linearization Set Menu:

1IN = 0 lbs	1OT = 0 lbs
2IN = 6000 lbs	2OT = 5000 lbs
3IN = 11,500 lbs	3OT = 10000 lbs
4IN = 16000 lbs	4OT = 15000 lbs
5IN = 20000 lbs	5OT = 20000 lbs

Figure 10. Linearization



Linearizing Table

Raw Input	Corrected Output
1IN	1OT
2IN	2OT
3IN	3OT
4IN	4OT
5IN	5OT

Requirements of table values:
1IN = 1OT
5IN = 5OT
1IN < 2IN < 3IN < 4IN < 5IN
1OT < 2OT < 3OT < 4OT < 5OT

Follow this procedure to set up and enable the linearization table:

1. If the SVS2000 is in Run Mode, press the '2' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

   23 LINEARIZATION

2. Press the Enter Key to access this menu. The display shows:

   LINEARIZE SET

3. Press the Enter Key to access the Linearize Set Menu. The display looks like this:

   1IN 0 lbs

   (Units are consistent with Disp Units.)

4. Use the Numeric or Arrow Keys to enter a value for the raw input for this point in the linearization table. Press the Enter Key to save the value in memory. The display acknowledges the entry and proceeds to a display that looks like this:

   1OT 0 lbs

5. Use the Numeric or Arrow Keys to enter a value for the corrected output for this point in the linearization table. Press the Enter Key to save the value in memory. The display acknowledges the entry and proceeds to a display that looks like this:

   2IN 2500 lbs

6. Repeat Steps 4 and 5 until the linearization table setup is complete. After the corrected output for point 5 is entered, the display returns to:

   LINEARIZE SET

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

   LINEARIZE ENABLE

8. Press the Enter Key to access the linearization enable function. The display looks like this:

   LINEARIZE *OFF

   (Asterisk indicates the current selection.)

   If the displayed menu does not show Linearize On, press the Up Arrow Key to display the next page of the menu:

   LINEARIZE ON

9. When the display shows Linearize On, press the Enter Key. The display acknowledges the selection and returns to:

   LINEARIZE ENABLE

10. Press the Gross or Net Key to return to Run Mode.

24 ZERO TOLRANCE (TOLERANCE)

The Zero Key is used on the gross weight display in Run Mode to establish a known live load when the vessel is empty. Similar to the use of the Disp Val Correct, pressing the Zero Key translates the calibration line of Figure 6-3 from the dashed line to the solid line position, establishing point (3) in the figure at zero weight. Unlike the use of DispVal Correct, you can set a tolerance limit (Zero Tolrance) for the Zero Key.

Zero Tolrance establishes a tolerance limit to prevent accidental zeroing of a vessel that is not empty. When you press the Zero Key while on the gross weight display in Run Mode, the SVS2000 verifies that:

- Gross weight is negative, or
- Gross weight is less than Zero Tolrance

If the gross weight does not meet this criteria, the display shows Outside Zero Tol and does not zero the gross weight. The default for zero Tolrance is 100, with decimal point/dummy zeroes consistent with Disp Format.

Note: Pressing the Zero Key cannot 'repair' a calibration in which the known quantity added or subtracted was actually incorrect, because the slope of the line is not affected by zeroing the gross weight. If necessary, recalibrate.

Follow this procedure to set Zero Tolrance:

1. If the SVS2000 is in Run Mode, press the '2' Key, '4' Key, and Enter Key to access the menu tree. The display shows:

   24 ZERO TOLRANCE
2. Press the Enter Key to access this menu. The display looks like this:

   > 100 lbs

   (Units are consistent with Disp Units.)
3. Use the Numeric or Arrow Keys to input a value for the zero tolerance. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   24 ZERO TOLRANCE
4. Press the Gross or Net Key to return to Run Mode.

29 CAL (CALIBRATION) DISPLAY

Accessing this menu allows you to view the calibration values that have been entered or internally calculated, as shown in Table4. Follow this procedure to display the calibration parameters:

1. If the SVS2000 is in Run Mode, press the '2' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   29 CAL DISPLAY
2. Press the Enter Key to access this menu. The display looks like this:

   Cnt/mV 699
3. Press the Arrow Keys to scroll through the other calibration display parameters.
4. Press the Gross or Net Key to return to Run Mode.

Table 4. Calibration Display

Calibration Parameter	Description
Cnt/mV	digital counts per millivolt of signal
ScfWgt 1	scale factor weight [entered scale factor weight from Manual Cal or (hi span weight - lo span weight) from Auto Cal]

ScfCnt 1	scale factor counts [entered scale factor counts from Manual Cal or (hi span counts - lo span counts) from Auto Cal]
ZeroCnt	zero counts = digital counts corresponding to zero weight
DispVCW 2	entered display value correction weight
HiSpanW 2, 3	entered hi span weight
LoSpanW 2, 3	entered lo span weight
HiSpanC 2, 3	hi span counts = digital counts corresponding to hi span weight
LoSpanC 2, 3	lo span counts = digital counts corresponding to lo span weight
0mV_Cnt	digital counts corresponding to 0 millivolts of signal

Notes:

1. These values are entered in a Manual Cal or are calculated from the Auto Cal data; the display reflects the most recent calibration.
2. These values are blanked out with '- - -' if the most recent calibration entry was a Manual Cal parameter.
3. These values are blanked out with '- - -' if the most recent calibration entry was a Display Value Correction or the use of the Zero Key.

SETPOINT MENU [30]

For both Relays (#1 - #2) and Digital Outputs (#1 - #6):

The Setpoint Menu is used to enter parameters for relays and digital outputs, review digital output status, and test relays and digital outputs. This chapter provides explanations of each of the setpoint parameters and detailed navigation procedures through the menu tree.

31-32 SLCT (SELECT) RELAY AND 33-38 SLCT DIGTL (SELECT DIGITAL)

The Descriptions section defines each of the parameters. The Setpoint Example section provides an example with two relays. The Setting Up the Setpoints section provides the procedure for using the SVS2000.

DESCRIPTIONS

The relay value is the weight measurement in a vessel where you wish a device (for example, a pump or a valve) to energize or de-energize. Up to two relays can be set up for the SVS2000.

The digital output value is the weight measurement in a vessel where you wish to control the output. When the setpoint energizes, the output is driven low. When it de-energizes, the output is driven high. Up to six digital outputs can be set up for the SVS2000. Refer to TI-SVS-02 for details on use.

The relay and digital output setup functions are similar and are accessed in these menus. They include selecting energizing levels, high or low energizing, deadband values, preact values, fail-safe parameters, and track mode for energizing.

Value	Establishes the energizing value, the point where the setpoint changes state. The '-' Key toggles between positive and negative for the value entered. The default is 0.
Deadband	Determines the point at which a setpoint returns to its normal on/off state after the setpoint has been energized. Deadband equals the amount of material that will be added to or removed from the vessel before the setpoint is de-energized. K-M recommends the use of a non-zero Deadband to prevent setpoints from oscillating. The default is 10, with decimal point/dummy zeroes consistent with Disp Format.
Hi/Lo	Setpoints can be configured to change state either above (Hi) or below (Lo) the setpoint Value. The default is Lo.
Track	Setpoints can be set to energize based on tracking the gross weight (Grs), net weight (Net), total weight (Tot), or a system fault (Flt). Energizing based on the gross weight is the default. Note: If Track is set to Flt, the setpoint remains energized except in a fault condition or if power is turned off.
Failsafe	If the SVS2000 detects a problem, one of three fail-safe conditions can be applied to a setpoint: • On • Off — default • NC (no change) On energizes the setpoint in a fail-safe condition. Off de-energizes the setpoint in a fail-safe condition. NC makes no change to the setpoint in a fail-safe condition (i.e., if it was energized before the problem was detected it will continue to be energized). A fail-safe condition remains in effect until the problem has been corrected. The following are examples of fail-safe conditions: • ADC (analog-to-digital converter) overrange/underrange condition • Engineering units overrange • Communication error with a serial device
Preact	Determines the point before Value is reached at which a setpoint is energized. Preact provides the ability to take into account the time required for the setpoint and associated control equipment to respond. Preact equals the amount of material that will be added to or removed from the vessel after the setpoint is energized. The default is 0.

SETPOINT EXAMPLE

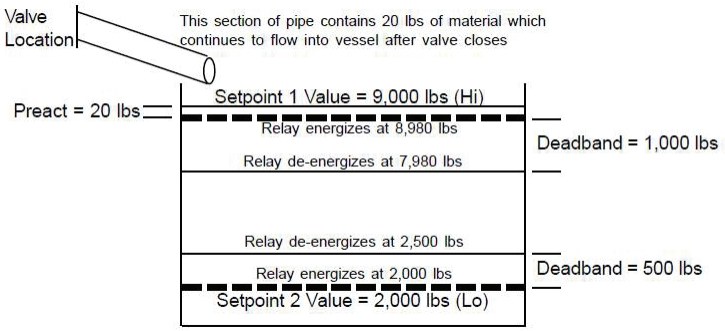
See Figure 11. A vessel with a 9,100 lb capacity has Relay 1 Value set at 9,000 lbs gross weight (Track is Grs). The Hi/Lo function is set to Hi. This relay controls the closure of a valve to stop material flow into the vessel. However, after the valve closes, the material still in the inclined pipe continues to flow into the vessel. Preact is set to 20 lbs to take account of the material in the pipe, so the maximum material weight in the tank will not exceed 9,000 lbs. (Note that the same operational effect can be achieved by setting Value to 8,980 lbs and Preact to 0 lbs.) Deadband is set at 1,000 lbs. When the contents exceed 8,980 lbs (9,000 lbs minus the 20 lb preact), the relay energizes, closing the

valve to stop material flow into the vessel.

The valve remains closed until the relay deenergizes at a material weight of 7,980 lbs (8,980 lbs minus the 1,000 lb deadband). This vessel has Relay 2 Value set at 2,000 lbs gross weight (Track is Grs). The

Hi/Lo function is set to Lo and the Deadband is set at 500 lbs. When the contents falls below 2,000 lbs, the relay energizes, activating a pump to fill the vessel. The pump continues to operate until the relay deenergizes at a material weight of 2,500 lbs (2,000 lbs plus the 500 lb deadband).

Figure 11. Set Point



SETTING UP THE SETPOINTS

Follow this procedure to set up relay 1. The procedure for the other relay and for the digital outputs is similar.

1. If the SVS2000 is in Run Mode,press the '3' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   31 SLCT RELAY #1
2. Press the Enter Key to access this menu. The display shows:

   RELAY1 VALUE
3. Press the Enter Key to access the Relay1 Value Menu. The display looks like this:

   > 0 lbs

   (Units are consistent with Disp Units.)
4. Use the Numeric or Arrow Keys to input a value where you want the relay to energize. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   RELAY1 VALUE
5. Press the Up Arrow Key to proceed to the next menu. The display shows:

   RELAY1 DEADBAND
6. Press the Enter Key to access the Relay1 Deadband Menu. The display looks like this:

> 10 lbs

(Units are consistent with Disp Units.)

7. Use the Numeric or Arrow Keys to input the deadband. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   RELAY1 DEADBAND

8. Press the Up Arrow Key to proceed to the next menu. The display shows:

   RELAY1 HI/LO

9. Press the Enter Key to access the Relay1 Hi/Lo Menu. The display looks like this:

   RELAY1 ON: *LO

   (Asterisk indicates the current selection.)

   If the displayed menu does not have the desired selection, press the Up Arrow Key to display the second page of the menu (there are two pages to the Relay Hi/Lo Menu).

10. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

    RELAY1 HI/LO

11. Press the Up Arrow Key to proceed to the next menu. The display shows:

    RELAY1 TRACK

12. Press the Enter Key to access the Relay1 Track Menu. The display looks like this:

    RLY1 TRACK:*GRS

    (Asterisk indicates the current selection.)

    If the displayed menu does not have the desired selection, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired selection (there are four pages to the Rly1 Track Menu).

13. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

    RELAY1 TRACK

14. Press the Up Arrow Key to proceed to the next menu. The display shows:

    RELAY1 FAIL-SAFE

15. Press the Enter Key to access the Relay1 Fail-Safe Menu. The display looks like this:

    FAIL-SAFE: *OFF

    (Asterisk indicates the current selection.)

    If the displayed menu does not have the desired selection, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired selection (there are three pages to the Fail-Safe Menu).

16. When the display shows the desired fail-safe, press the Enter Key. The display acknowledges the selection and returns to:

    RELAY1 FAIL-SAFE

17. Press the Up Arrow Key to proceed to the next menu. The display shows:

RELAY1 PREACT

18. Press the Enter Key to access the Relay1 Preact Menu. The display looks like this:

    > 0 lbs

    (Units are consistent with Disp Units.)

19. Use the Numeric or Arrow Keys to input the preact. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

    RELAY1 PREACT

20. Press an Arrow Key to scroll to another menu for this setpoint or press the Gross or Net Key to return to Run Mode.

39 DIGTL (DIGITAL) STATUS

This menu allows you to view the status of each of the digital outputs.

Note: The status of relays 1 and 2 can be viewed in Run Mode by pressing the Arrow Keys to toggle between gross weight, net weight, total weight, and relay status displays. Follow this procedure to view the digital output status:

1. If the SVS2000 is in Run Mode, press the '3' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   39 DIGTL STATUS

2. Press the Enter Key to access this menu. The display looks like this:

   DIG:1*2*3 4 5 6*

   An asterisk indicates that the digital output is energized. In the example screen shown, digital outputs 1, 2, and 6 are energized.

3. When done viewing the digital output status display, press the Enter Key. The display returns to:

   39 DIGTL STATUS

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

SETPOINT TEST

This menu allows you to turn the setpoints on and off for test purposes. Setpoint Test is at the same level as menus 31 through 39, but does not have a menu number. Follow this procedure to test the setpoints:

CAUTION: MANUALLY ACTIVATING SETPOINTS MAY CAUSE DAMAGE IF CONTROL EQUIPMENT IS CONNECTED. DISCONNECT CONTROL EQUIPMENT BEFORE PROCEEDING.

1. If the SVS2000 is in Run Mode, press the '3' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   39 DIGTL STATUS

2. Press the Up Arrow Key to proceed to the next menu. The display shows:

SETPOINT TEST

3. Press the Enter Key to access this menu. The display shows:

   SELECT RELAY #1

   If the displayed menu does not have the desired setpoint, press the Up Arrow Key until the display shows the desired setpoint.

4. Press the Enter Key to select the setpoint. The display scrolls this message: Note: Test changes setpoint control from auto to manual. Press Enter to continue test. If you press any key other than the enter Key, the SVS2000 returns to the Setpoint Test display. If you press the Enter Key, the SVS2000 proceeds to the testing function. The display looks like one of the following:

   RELAY #X: OFF

   DIGITAL #X: OFF

5. Press an Arrow Key to toggle the setpoint between On and Off.
6. To test another setpoint:
   A. Press the Enter Key to exit the test for this setpoint.
   B. Press an Arrow Key until the display shows the next desired setpoint.
   C. Repeat Steps 4 and 5.
7. Press the Gross or Net Key to terminate the test and return to Run Mode. Once the test is terminated, the setpoints return to automatic control.

I-OUTPUT

MENU [40]

The I-Output Menu is used to enter parameters for current output, calibrate the current output to the receiving device, and set the current output to specific values for test purposes. This chapter provides explanations of each of the current output parameters and detailed navigation procedures through the menu tree. Current output is typically used to retransmit continuous weight data to a remote display or PLC/Distributed Control System (DCS). One current output can be assigned to the vessel using the Current Output PCB (optional) with your SVS2000.

41-46 CURRENT OUTPUT SETUP PARAMETERS

The Descriptions section defines each of the parameters. The Current Output Examples section provides two examples. The Setting Up Current Output section provides the procedure for using the SVS2000.

DESCRIPTIONS

These menus are used to assign values to determine the points where the transmitter outputs the current; designate those values as net or gross weights; define a fail-safe condition for the current output; and enable and disable the current output. There are six current output setup parameters:

41 IOut Range	The current transmitter can be set up to output 4-20 mA or 0-20 mA. This menu is used to select one of the two operating ranges. The default is 4-20 mA.

42 IOut: 4/0mA	Sets the low current (4 mA or 0 mA) operation point. The value entered determines the weight where the transmitter outputs the minimum current. The '-' Key toggles between positive and negative for the value entered. The default value is 0.
43 IOut: 20mA	Sets the high current (20 mA) operation point. The value entered determines the weight where the transmitter outputs the maximum current. The '-' Key toggles between positive and negative for the value entered. Notes: 1. IOut: 20mA was set by the SVS2000 based on your entries in Quick Config. In this menu you can change the value. 2. The value entered for the 4/0 mA operation point can be smaller than or larger than the value entered for the 20 mA operation point.
44 IOut Track	The current transmitter can be set to interpret the value entered for the low current and high current operation points as gross or net weight. Transmitting current based on gross eight is the default.
45 IOut Failsafe	If the SVS2000 detects a problem, one of three fail-safe conditions can be applied to a current output: — Hi — Lo — default — NC (no change) Lo forces the current output to be 0 (in 0-20 mA range) or 4 mA (in 4-20 mA range) in a fail-safe condition. Hi forces the output to be 20 mA in a fail-safe condition. NC makes no change to the current output in a fail-safe condition (i.e., what was being transmitted before the problem was detected will continue to be transmitted). A fail-safe condition remains in effect until the problem has been corrected. The following are examples of fail-safe conditions: — ADC overrange/underrange condition — Engineering units overrange — Communication error with a serial device
46 IOut Enable	Enables and disables the current transmitter. If you are not using the current transmitter, disabling it increases the processing speed of the SVS2000. The factory default for IOut Enable is Off. However, if you enter a value for one or more current output functions (41 through 45), the SVS2000 automatically changes IOut Enable to On.

CURRENT OUTPUT EXAMPLES

Example 1: You want an early warning via a current output to a PLC/DCS that a 20,000 lb capacity vessel is nearly full or empty. You enter 3,000 lbs as the low current value and 17,000 lbs as the high current value, both asgross values, for a 4-20 mA operation. When the gross weight is 3,000 lbs, 4 mA current is transmitted, providing an early warning that the vessel is close to being empty. When the gross weight is 17,000 lbs, 20 mA is transmitted, providing an early warning that the vessel is close to being full.

Example 2: You want to monitor how much material is being added to or removed from a vessel, and transmit a current output to a remote display. You enter -5,000 lbs as the low current value and 7,000 lbs as the high current value, both as net values, for a 0-20 mA operation. When the net weight is -5,000 lbs (5,000 lbs has been removed

since you last tared the vessel), 0 mA current is transmitted. When the net weight is +7,000 lbs (7,000 lbs has been added since you last tared the vessel), 20 mA current is transmitted.

SETTING UP CURRENT OUTPUT

Follow this procedure to set up current output:

1. If the SVS2000 is in Run Mode, press the '4' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   41 IOUT RANGE
2. Press the Enter Key to access this menu. The display looks like this:

   RANGE: *4-20mA

   (Asterisk indicates the current selection.)

   If the displayed menu does not have the desired range, press the Up Arrow Key to display the next page of the menu. The display looks like this:

   RANGE: 0-20mA
3. When the display shows the desired range, press the Enter Key. The display acknowledges the selection and returns to:

   41 IOUT RANGE
4. Press the Up Arrow Key to proceed to the next menu. The display looks like this:

   42 IOUT: XmA

   ('4' or '0' is in place of 'X,' depending on selection for IOut Range.)
5. Press the Enter Key to access the IOut:4/0mA Menu. The display looks like this:

   > 0 lbs

   (Units are consistent with Disp Units.)
6. Use the Numeric or Arrow Keys to input value for the weight where you want the current transmitter to output 4/0 mA. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   42 IOUT: XmA
7. Press the Up Arrow Key to proceed to the next menu. The display shows:

   43 IOUT: 20mA
8. Press the Enter Key to access the IOut:20mA Menu. The display looks like this:

   > 9999 lbs

   (Units are consistent with Disp Units.)
9. Use the Numeric or Arrow Keys to input value for the weight where you want the current transmitter to output 20 mA. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   43 IOUT: 20mA
10. Press the Up Arrow Key to proceed to the next menu. The display shows:

    44 IOUT TRACK
11. Press the Enter Key to access the IOut Track Menu. The display looks like this:

    IOUT TRACK:*GRS

    (Asterisk indicates the current selection.)

If the displayed menu does not have the desired selection, press the Up Arrow Key to display the next page of the menu. The display looks like this:

IOUT TRACK: NET

12. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

    44 IOUT TRACK

13. Press the Up Arrow Key to proceed to the next menu. The display shows:

    45 IOUT FAILSAFE

14. Press the Enter Key to access the IOut Failsafe Menu. The display looks like this:

    FAIL-SAFE: *LO

    (Asterisk indicates the current selection.)

    If the displayed menu does not have the desired fail-safe, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired selection (there are three pages to the Fail-Safe Menu).

15. When the display shows the desired fail-safe, press the Enter Key. The display acknowledges the selection and returns to:

    45 IOUT FAILSAFE

16. The SVS2000 automatically enabled the current output (46 IOut Enable) when you entered values for functions 41through 45 above. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

48 CURRENT ADJST (ADJUST)

This menu manually assigns counts-tomilliamps outputs for 0 mA, 4 mA, and 20 mA outputs to calibrate to another device. Follow this procedure:

1. If the SVS2000 is in Run Mode, press the ‘4’ Key, ‘8’ Key, and Enter Key to access the menu tree. The display shows:

   48 CURRENT ADJST

2. Press the Enter Key to access this menu. The display shows:

   ADJUST 0mA POINT

   If the current output range is 4-20 mA, press the Up Arrow Key to display the second page of the menu. The display shows:

   ADJUST 4mA POINT

3. When the display shows the low current output for your application, press the Enter Key. The display looks like this:

   > 3600 cnts

   Note: If you set up 4-20 mA output, the SVS2000 ignores entries for 0 mA. Similarly, if you set up 0-20 mA output, the SVS2000 ignores entries for 4 mA.

4. Use the Numeric or Arrow Keys to change the counts assigned to the current output if desired. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   ADJUST XmA POINT

('4' or '0' is in place of 'X.')

5. Press the Up Arrow Key once or twice to proceed to Adjst 20mA Point. The display shows:

   ADJST 20mA POINT

6. Repeat Steps 3, 4 for the 20 mA current output. After you adjust the 20 mA current output, the display returns to:

   ADJUST 20mA POINT

7. Press the Gross or Net Key to return to Run Mode.

49 TEST CURRENT

This function allows manual activation of current output outside of normal control. Follow this procedure to test current output:

CAUTION: MANUALLY ACTIVATING CURRENT OUTPUT CAN CAUSE DAMAGE IF CONTROL EQUIPMENT IS CONNECTED. DISCONNECT CONTROL EQUIPMENT BEFORE PROCEEDING.

1. If the SVS2000 is in Run Mode, press the '4' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   49 TEST CURRENT

2. Press the Enter Key to access this menu. The display scrolls this message: Warning: Test changes output control from auto to manual. Press Enter to continue test. If you press any key other than the Enter

   Key, the SVS2000 returns to the Test Current display. If you press the Enter Key, the SVS2000 proceeds to the testing function. The testing display looks like this:

   I-OUTPUT: XmA

   ('4' or '0' is in place of 'X,' depending on selection for IOut Range.) XmA is the current transmitted. If the

   IOut Range is 0-20 mA, the test current output ranges from 0 mA to 20 mA in 2 mA steps. If the IOut Range is 4-20mA, the test current output ranges from 4 mA to 20 mA in 2 mA steps.

3. Press the Up Arrow Key to increase the current output in 2 mA steps. Press the Down Arrow Key to decrease the current output in 2 mA steps.
4. Press the Enter Key to terminate the test. Once the test is terminated, the current output returns to automatic control. The display returns to:

   49 TEST CURRENT

5. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

COM: (COMMUNICATIONS) MENU [50]

The Com Menu is used to enter parameters for serial port configuration and PLC interface (both are available as options). This section explains of each of the parameters.

The Com Menu sets up serial communications between the SVS2000 and external equipment, such as a PLC, K-M MVS, KM ROPE system, etc. The SVS2000 is the slave to all external equipment.

The SVS2000 has one COM port for serial communications. Refer to the Electrical section for information on how to

serially connect the SVS2000 to external equipment.

The SVS2000's built-in serial communications settings are 8 data bits, 1 stop, no parity. These values are fixed, and cannot be modified by the user. The adjustable serial communications settings — address and baud rate — can be modified by the user, as described below under those menu items. When connecting the SVS2000 to external equipment, all of the serial communications settings must match for the equipment to communicate. As necessary, modify the default settings for address and baud rate of the SVS2000. Modify the data bits, stop, and parity settings in the external equipment to match the SVS2000's built-in settings.

51 SERIAL ADDRES (ADDRESS)

External equipment may have many signal processors daisy chain wired to it. The serial address of the signal processor identifies the signal processor and the associated vessel to the external equipment. Each device on the same serial connection must have a different address. The address of the SVS2000's serial port is set up in the Serial Addres Menu. The address is expressed in two forms— decimal (ranging from 0 to 255) and hexadecimal (ranging from 0 to FF). The default setting is 255 in decimal form (FF in hexadecimal form). Follow this procedure to input the address:

1. If the SVS2000 is in Run Mode, press the '5' Key, '1' Key and Enter Key to access the menu tree. The display shows:

   51 SERIAL ADDRES
2. Press the Enter Key to access this menu. The display looks like this:

   >255 DEC FF HEX

   The display shows two number fields. The first number is the decimal address. The second number is the hexadecimal equivalent. Only the decimal form of the address can be altered by the user; the hexadecimal form changes automatically to correspond to the decimal form.
3. Use the Numeric or Arrow Keys to input the decimal address. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   51 SERIAL ADDRES
4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

52 SERIAL BAUD

The baud rate (bits per second) is set up in the Serial Baud Menu. The baud rate determines the speed with which the SVS2000 communicates with the PLC, MVS, etc. There are five baud rates available:

1200, 2400, 4800, 9600 (default), 19200

Follow this procedure to select the baud rate:

1. If the SVS2000 is in Run Mode, press the '5' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

   52 SERIAL BAUD
2. Press the Enter Key to access this menu. The display looks like this:

BAUD RATE:*9600

(Asterisk indicates the current selection.)

If the displayed menu does not have the desired baud rate, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired baud rate (there are five pages to the Serial Baud Menu).

3. When the display shows the desired baud rate, press the Enter Key to save the selection in memory. The display acknowledges the selection and returns to:

   52 SERIAL BAUD

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

53 PLC MENU

The SVS2000 can provide direct serial communications to the following PLCs through optional PCBs:

- Ethernet/IP — Refer to the A-B RIO Interface Manual for SVS2000 for wiring and programming details.
- DeviceNet PLC — Refer to the DeviceNet Interface Manual for SVS2000 for wiring and programming details.
- Profibus PLC — (not available) Refer to the Profibus Interface Manual for SVS2000 for wiring and programming details.
- Modbus PLC — (not available) Refer to the Modbus Interface Manual for SVS2000 for wiring and programming details.

The SVS2000 can also provide serial communications to an Allen-Bradley PLC through a KM KM-RIO or a KM Multi-Vessel System MVS-RIO. Refer to the KM-RIO Interface Operator's Manual or the MVS-RIO Installation and Operation Manual, as applicable.

SENSOR MENU [60]

The Sensor Menu is used to adjust the excitation, resolution, and gain, and display raw, filtered, and output values. This chapter provides explanations of each of the sensor parameters and navigation procedures through the menu tree.

61 SENSOR ADJ EX (ADJUST EXCITATION)

This function is used to adjust the SVS2000's voltage output, which is used to excite the sensors. The excitation can range from 5 to 13 Volts. The SVS2000 set the excitation based on your entries in Quick Config:

- Direct support products with sensitivity typical of silicon sensors and all KM bolt-on products — 12 Volts, appropriate for KM silicon sensors without Intrinsically Safe (IS) Barriers
- Direct support products with sensitivity typical of foil gage sensors — 10 Volts

Notes

1. If using IS Barriers, it may be necessary to lower the excitation voltage.
2. If using foil gage sensors, refer to the manufacturer's data sheet for recommended excitation.

Follow this procedure to adjust the excitation:

1. If the SVS2000 is in Run Mode, press the '6' Key, '1' Key, and Enter Key to access the menu tree. The

display shows:

61 SENSOR ADJ EX

2. Press the Enter Key to access this menu. The display looks like this:

   EXCITATION: *12V

   (Asterisk indicates the current selection.)

   If the displayed menu does not have the desired excitation, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired excitation (there are nine pages to the Sensor Adj Ex Menu).

3. When the display shows the desired excitation, press the Enter Key to save the value in memory. The display acknowledges the selection and returns to:

   61 SENSOR ADJ EX

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

62 RESOLUTION

This function controls effective resolution by changing the conversion rate of the 21-bit A/D converter. In general, the higher the resolution, the slower the conversion time, but the greater the stability. The table below shows the effective resolution and associated conversion times. The default is 21 bit.

Effective Resolution (bits)	Conversion Time (mS)
16	17
17	20
18	25
19	34
20	50
21	100

Follow this procedure to adjust the effective resolution:

1. If the SVS2000 is in Run Mode, press the ‘6’ Key, ‘2’ Key, and Enter Key to access the menu tree. The display shows:

   62 RESOLUTION

2. Press the Enter Key to access this menu. The display looks like this:

   RESOLUTION:*21bt

   (Asterisk indicates the current selection.)

   If the displayed menu does not have the desired resolution, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired resolution (there are six pages to the Resolution Menu).

3. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

   62 RESOLUTION

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

63 SENSOR GAIN

Adjusting the gain increases or decreases system sensitivity. The type of sensors connected to the SVS2000 determines the required gain. For example, for a nominal excitation output of 12 volts, the reference voltage is one quarter of the excitation voltage, or 3 volts. At a gain of 1, the A/D converter spreads 2,097,152 counts over a range of ± 3 volts. A gain of 2 spreads the counts over a range of ± 1.5 volts, doubling the sensitivity. A gain of 4 spreads the counts over a range of ± 0.75 volts, doubling the sensitivity again, etc.

The SVS2000 set the gain based on your entries in Quick Config:

- KM bolt-on sensors (Microcells and L-Cells) — 2
- Direct support products with sensitivity typical of silicon sensors (KM Load Disc II, Load Stand II, and Load Link I and II) — 4
- Direct support products with sensitivity typical of foil gage sensors — 16 or 32

Table 5. Available gain settings and corresponding sensor input voltages.

Sensor Gain	Sensor Input Voltage
1	±3.0
2	±1.5
4	±0.75
8	±0.375
16	±0.1875
32	±0.09375
64	±0.046875
128	±0.0234375

Follow this procedure to adjust the gain:

1. If the SVS2000 is in Run Mode, press the ‘6’ Key, ‘3’ Key, and Enter Key to access the menu tree. The display shows:

   63 SENSOR GAIN

2. Press the Enter Key to access this menu. The display looks like this:

   ADC GAIN: *2

   (Asterisk indicates the current selection.)

   If the displayed menu does not have the desired gain, press the Up Arrow Key to display the next page of the menu. Continue to press an Arrow Key until you see the desired gain (there are eight pages to the ADC Gain Menu).

3. When the display shows the desired selection, press the Enter Key. The display acknowledges the selection and returns to:

   63 SENSOR GAIN

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

69 SENSOR DISPLY (DISPLAY)

This function allows you to display the raw and filtered A/D counts; raw, filtered, and output weight; and voltage. Figure 12 illustrates the relationship between raw, filtered, and output values.

Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '6' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   69 SENSOR DISPLY
2. Press the Enter Key to access this menu. The display looks like this:

   RAW 12345600 lbs

   Press the Up Arrow Key to toggle to the other pages of the display, which look like this:

   FTR 12345600 lbs

   OUT 12345600 lbs

   RAW 1234567 Cts

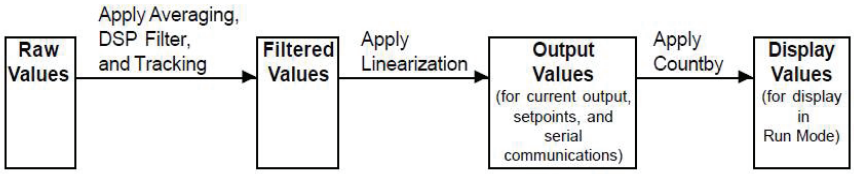
   FTR 1234567 Cts

   SENSOUT -123 mV

   (Units are consistent with Disp Units.)
3. Press the Enter Key to return to:

   69 SENSOR DISPLY
4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

Figure 12. Sensor Display



Notes:
- Averaging and DSP Filter — see Chapter 11, Filter Menu
- Tracking — see Chapter 12, Tracking Menu
- Linearization — see Chapter 6, Cal Menu
- Countby — see Chapter 5, Display Menu

FILTER MENU [70]

The Filter Menu is used to set up the SVS2000's filters — Averaging and the DSP Filter. Additionally, the Filter Menu allows you to monitor the DSP Filter. This chapter provides explanations of each of the filtering functions and navigation procedures through the menu tree.

71 AVERAGING

This menu is used to set the number of individual readings (from 1 to 255) the SVS2000 averages for each display reading while in Run Mode. The SVS2000 calculates a running average. The larger the number of individual readings in the running average, the smaller effect a variation in signal will have on the average. This results in fewer variations on the display reading and an easier to read display. Averaging affects the value seen on the display as well as setpoints, current outputs, and serial outputs. The default value for Averaging is 1. Follow this procedure to set the

Averaging value:

1. If the SVS2000 is in Run Mode, press the '7' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   71 AVERAGING

2. Press the Enter Key to access this menu. The display looks like this:

   > 1

3. Use the Numeric or Arrow Keys to enter the desired value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   71 AVERAGING

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

72-75 DSP FILTER PARAMETERS

Vibrations in a vessel can cause changes in the SVS2000's weight display and outputs, even though no material is moved, because the vibrations affect the vessel's structural response. The Sentry™ DSP filter helps to reduce display and output changes that can result from vibration. The principle behind the filtering follows. The ADC converter digitizes the signal coming from a sensor and the SVS2000 converts the signal to a 'raw' weight. The SVS2000 picks the first raw weight as a reference median; this is the value that is used in calculating the filtered weight. As shown in Figure 13, the SVS2000 then compares following raw weights to the reference median, and recalculates the reference median when either of the following happen:

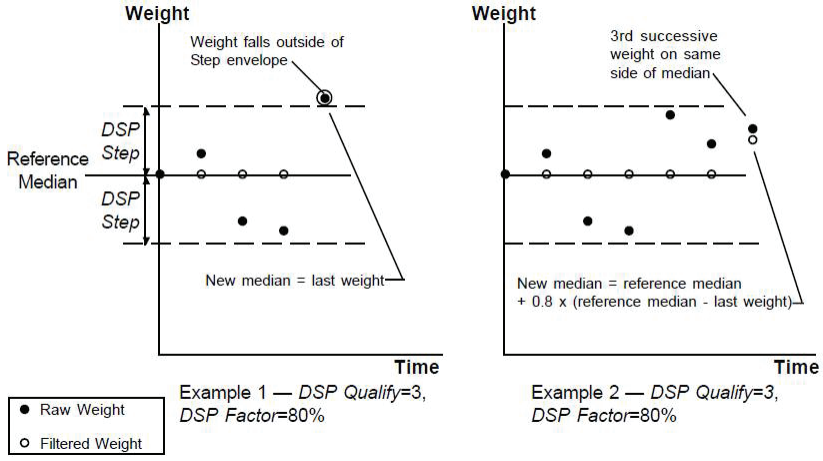
- the number of successive weights above or below the median exceeds a triggering number
- a weight falls outside of a user-defined window around the reference median When the SVS2000 recalculates the reference median, the filtered weight changes to correspond to the new reference median.

Note that the DSP Filter affects setpoints, current output, and serial output as well as the weight shown on the display. The DSP Filter has four parameters:

72 DSP Enable	DSP Enable turns the DSP filter function on and off. The default is On
73 DSP Step	DSP Step is a window of equal weight above and below the reference median. As shown in Figure 13, example 1, if a large signal change is detected that falls outside of the window, the SVS2000 immediately moves the location of the reference median to that point. This allows the SVS2000 to adjust quickly to rapid material movement in the vessel. The default is calculated by the SVS2000 based on a default step of 10,000 counts and the calibration parameters. Note that the SVS2000 recalculates DSP Step if the system is recalibrated.
74 DSP Qualify	The triggering number of successive weights above or below the median signal value, but within the DSP Step window. In example 2 shown in Figure 13, DSP Qualify is 3. When the third successive signal above the median value (but within the DSP Step window) is detected, the SVS2000 moves the location of the median value to that point (or a percentage of the distance from the old median as determined by DSP Factor). This allows the SVS2000 to respond to definite trends in weight changes. The default for DSP Qualify is 3.

75 DSP Factor	Determines the magnitude of change from the old reference median to the new reference median, for change triggered by the DSP Qualify parameter. In example 2 in Figure 13, the SVS2000 moves the reference median 80% of the distance from the old median to the last weight (which triggered the change), based on a DSP Factor of 80%. A value of 100% sets the new median to the last weight value; a value of 50% sets the new median halfway between the old median and the last weight value. Note that DSP Factor does not affect the change caused by a signal falling outside of the DSP Step window, as shown in example 1 in Figure 13. The default for DSP Factor is 100%.

Figure 13. DSP Filter Parameters



SETTING UP THE DSP FILTER

Follow this procedure to set up the DSP Filter:

1. If the SVS2000 is in Run Mode, press the '7' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

   72 DSP ENABLE

2. Press the Enter Key to access this menu. The display looks like this:

   DSP FILTER *ON

   (Asterisk indicates the current selection.)

   If the displayed menu does not show DSP Filter On, press the Up Arrow Key to display the next page of the menu.

3. When the display shows DSP Filter On, press the Enter Key. The display acknowledges the selection and returns to:

   72 DSP ENABLE

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

   73 DSP STEP

5. Press the Enter Key to access the DSP Step Menu. The display looks like this:

   > 400 lbs

(Units are consistent with Disp Units.)

6. Use the Numeric or Arrow Keys to input a value for DSP Step. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   73 DSP STEP

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

   74 DSP QUALIFY

8. Press the Enter Key to access the DSP Qualify Menu. The display looks like this:

   > 3

9. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   74 DSP QUALIFY

10. Press the Up Arrow Key to proceed to the next menu. The display shows:

    75 DSP FACTOR

11. Press the Enter Key to access the DSP Factor Menu. The display looks like this:

    > 100 %

12. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

    75 DSP FACTOR

13. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

79 DSP STEP MON (MONITOR)

DSP Step Mon monitors the maximum variation in the raw weight while you are in the function. Follow this procedure to view this display:

1. If the SVS2000 is in Run Mode, press the '7' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   79 DSP STEP MON

2. Press the Enter Key to access this menu. The display looks like this:

   > 0 lbs

   (Units are consistent with Disp Units.)

   The number on the display is the maximum difference in the raw weight since the last reset of the monitor.

3. To reset the monitor to zero while remaining in the DSP Step Mon, press the Zero Key. The display acknowledges the entry and shows:

   > 0 lbs

   (Units are consistent with Disp Units.)

4. Press the Enter Key to exit the monitor and return to:

   79 DSP STEP MON

5. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

TRACKING MENU [80]

The Tracking Menu is used to set up and monitor the SVS2000's zero tracking and material tracking functions. This chapter provides explanations of each of the tracking parameters and navigation procedures through the menu tree.

81-85 TRACKING PARAMETERS

Tracking provides the ability to reject sensor drift and other related long-term errors while preserving the displayed and output weight's stability and accuracy. Discrimination between material movement and sensor drift is accomplished by calculating the rate of change of the sensor input signal, and comparing this rate to a user-defined threshold rate. The SVS2000 stops tracking when the rate of change exceeds the threshold rate, indicating that material is actually moving. Additionally, discrimination between slow material loss (such as from a leak in the vessel) or gain and sensor drift is accomplished by comparing the total drift to a user-defined limit. The SVS2000 limits the maximum correction to this user-defined limit, so the tracking function does not mask real material losses or gains. There are two aspects to the tracking function. See Figure 14.

Zero tracking	Establishes a user-defined window around the zero live load. When the raw weight falls inside of the window (usually indicating a negligible amount of material in the vessel) and the rate of change is below the threshold rate, the corrected weight remains constant at zero. The correction is done by the algebraic addition of a correction offset value. If the raw weight falls outside the window on the negative side, the SVS2000 resets the zero calibration point to that raw weight and sets the window around the new zero calibration point.
Material tracking	Establishes a reference when material movement within a vessel has become stable (rate of change is below the threshold) during filling and batching processes. This reference is then used to maintain and hold steady the outputs. When the change in raw weight falls within the drift limit, the corrected weight remains constant. The correction is done by the algebraic addition of a correction offset value. If the accumulated drift exceeds the drift limit threshold, the SVS2000 begins tracking the material movement, which may be caused by a slow leak in the vessel.

Zero and material tracking affect setpoints, current output, and serial output as well as the vessel monitoring display.

Tracking can be used in any of the following combinations:

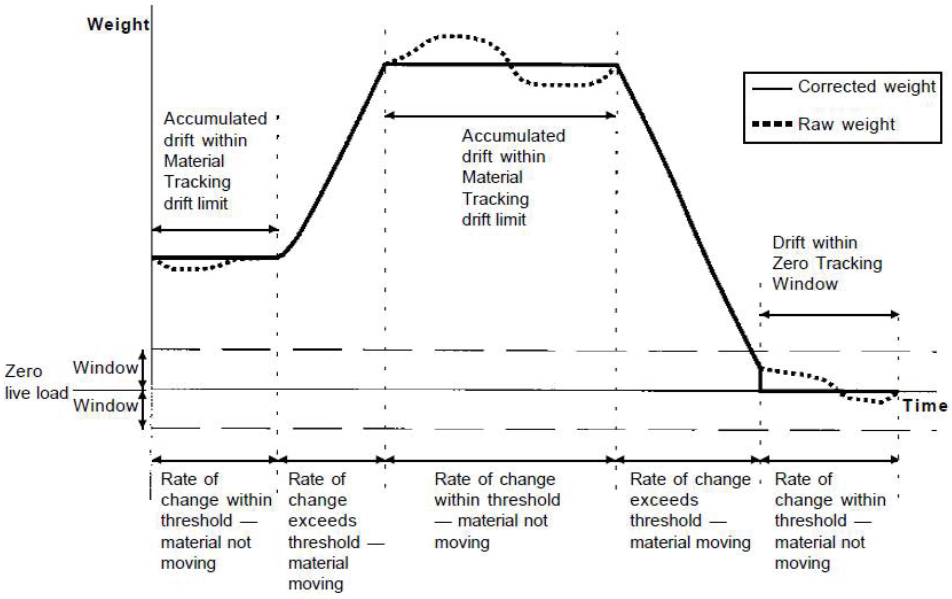
- No zero or material tracking
- Zero tracking only
- Material tracking only
- Zero tracking and material tracking

There are five submenus for setting Tracking parameters:

81 Material Tracking Enable	Turns material tracking on and off. The default is Off.

82 Drift Limit	Sets the maximum plus or minus offset value for material tracking. The drift limit is expressed in Disp Units (for example, lbs). The default is calculated by the SVS2000 based on a voltage limit of ± 5 mV and the initial calibration parameters.
83 Material Flow Threshold	Sets the threshold rate for both zero and material tracking. The rate is expressed in Disp Units/minute (for example, lbs/m). When the rate of change exceeds this value, indicating that material is actually moving, the SVS2000 stops tracking until the rate of change again falls below this value. The default rate is calculated by the SVS2000 based on a voltage rate threshold of ± 10 uV/sec and the initial calibration parameters.
86 Gross Clp Enb	
87 Net Clamp Enb	
88 Zero Clp Win	Sets the maximum plus or minus offset value for zero tracking. Zero Trak Win is expressed in Disp Units (for example, lbs). If the minus offset value is exceeded, the SVS2000 resets the zero calibration point. The default value is 0 —at this value, zero tracking is turned off. Note: The SVS2000 recalculates Zero Trak Win if the system is recalibrated (if Zero Trak Win has a non-zero value).
89 Rate Monitor	Displays the rate of change in weight.

Figure 14. Material and Zero Tracking



SETTING UP TRACKING

Follow this procedure to set up zero and material tracking:

1. If the SVS2000 is in Run Mode, press the '8' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

   83 MAT FLOW THRS

2. Press the Enter Key to access this menu. The display looks like this:

   > 18.0 lbs/m

   (Units are consistent with Disp Units.)

3. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   83 MAT FLOW THRS

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

   82

5. Press the Enter Key to access the Sample Intrvl Menu. The display shows:

   > 10 sec

6. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   82

7. Press the Up Arrow Key to proceed to the next menu. The display shows:

   88 ZERO CLP WIN

8. Press the Enter Key to access the Zero Trak Win Menu. The display looks like this:

   > 0 lbs

   (Units are consistent with Disp Units.)

9. Use the Numeric or Arrow Keys to input a value for Zero Trak Win. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   83 ZERO CLP WIN

10. Press the Down Arrow Key to 82 menu. The display shows:

    82 DRIFT LIMIT

11. Press the Enter Key to access the Drift Limit Menu. The display looks like this:

    > 140.0 lbs

    (Units are consistent with Disp Units.)

12. Use the Numeric or Arrow Keys to input a value. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

    82 DRIFT LIMIT

13. Press the Down Arrow Key to go to the 81 menu. The display shows:

    81 MAT TRACK ENAB

14. Press the Enter Key to access the Mat Trak Enab Menu. The display looks like this:

    TRACKING BY *OFF

    (Asterisk indicates the current selection.)

    If the displayed menu does not show Matrl Track: On, press the Up Arrow Key to display the next page of the

menu:

TRACKING BY RATE

15. When the display shows TRACKING BY BOTH, press the Enter Key. The display acknowledges the selection and returns to:

    81 MAT TRACK ENAB

16. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

RATE MONITOR [89]

This is a monitor only function. It displays the rate of change in the weight. Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '8' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   89 RATE MONITOR

2. Press the Enter Key to access this menu. The display looks like this:

   - 2.0 lbs/m

   (Units are consistent with Disp Units.)

   If the rate of change is greater than Rate Threshld, the bullet is replaced by a rotating line.

3. Press the Enter Key to exit the monitor and return to:

   89 RATE MONITOR

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

SERVICE MENU [90]

The Service Menu is used to set up a user defined access code and user-defined keyboard lockout code, test the keyboard, test the nonvolatile RAM (NVRAM), and reset the NVRAM to default parameters. This section provides explanations of each of the service parameters and navigation procedures through the menu tree.

91 USER ACCESS

The SVS2000 arrives from the factory without a user-defined access code in place, allowing the operator to change any parameters in the system at will. The User Access function allows you to set up and/or change a User Access Code. Once a Code is in place and activated, the operator(s) will be able to go into the menu tree to view parameters, but will not be able to change parameters. If the operator attempts to change a parameter, the SVS2000 prompts the operator to enter the User Access Code. Once the Code is entered, the operator can change any parameter while remaining in the Function Mode (i.e., the Code is entered once per Function Mode session, regardless of the number of parameters changed).

Note: Record the Code and store it in a safe place. If misplaced, call KM for instructions on how to bypass the Code.

INITIAL SETUP OF USER ACCESS CODE

Follow this procedure to set up the User Access Code for the first time:

1. If the SVS2000 is in Run Mode, press the '9' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   91 USER ACCESS

2. Press the Enter Key to access this menu. The display shows:

   NEW CODE? 0000

3. Use the Numeric Keys to enter a one-,two-, three-, or four-digit number. Press the Enter Key to save the Code in memory. The display acknowledges the entry and returns to:

   91 USER ACCESS

4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

Note: The Access Code is 'activated' 3 minutes after you leave Function Mode. If you return to Function Mode after 3 minutes, you will be prompted to enter the code if you attempt to change a parameter. The tare key continues to function without an Access Code.

CHANGE USER ACCESS CODE

Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '9' Key, '1' Key, and Enter Key to access the menu tree. The display shows:

   91 USER ACCESS

2. Press the Enter Key to access this menu. The display shows:

   USER CODE?

3. Use the Numeric Keys to enter the current User Access Code. The number displays as 'XXXX' to prevent anyone else from seeing the Code. Press the Enter Key. The display acknowledges the entry and proceeds to:

   NEW CODE?

4. Use the Numeric Keys to enter a one-, two-, three-, or four-digit number for the new Code. Press the Enter Key to save the Code in memory. The display acknowledges the entry and returns to:

   91 USER ACCESS

5. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

Note: The Access Code is 'activated' 3 minutes after you leave Function Mode. If you return to Function Mode after 3 minutes, you will be prompted to enter the code if you attempt to change a parameter.

92 KEYBOARD LOCK

The SVS2000 arrives from the factory without a Keyboard Lock Code in place, allowing the operator to tare the system, zero the calibration, zero the totalizer, change the Run Mode display, and go into the menu tree at will. The Keyboard Lock function allows you to set up and/or change a Keyboard Lock Code.

The Code operates with a 3-minute timer. After 3 minutes has elapsed since the last time a key was pressed in Run Mode, the Keyboard Lock activates. Once a Code is in place and activated, the SVS2000 will not respond to the

pressing of any keys on the keypad while in Run Mode until the Code is entered. Note: Record the Code and store it in a safe place. If misplaced, call KM for instructions on how to bypass the Code.

SETUP/CHANGEKEYBOARD LOCK CODE

Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '9' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

   92 KEYBOARD LOCK
2. Press the Enter Key to access this menu. The display shows:

   NEW CODE?
3. Use the Numeric Keys to enter a one-, two-, three-, or four-digit number. Press the Enter Key to save the Code in memory. The display acknowledges the entry and returns to:

   92 KEYBOARD LOCK
4. Press an Arrow Key to scroll to another menu or press the Gross or Net Key to return to Run Mode.

Note: The Keyboard Lock Code is 'activated' in Run Mode, 3 minutes after the last key press. After 3 minutes, the SVS2000 will not respond to the pressing of any keys until the Code is entered.

UNLOCKING KEYBOARD WITH KEYBOARD LOCK CODE

Follow this procedure:

1. While the SVS2000 is in lockout in the Run Mode, press any key. The display shows:

   KEY CODE?
2. Enter the Keyboard Lock Code. When the Code has been completely entered, press the Enter Key. The display briefly shows:

   KEYS UNLOCKED
3. The display then returns to the Run Mode display screen.

93 KEYBOARD TEST

This function displays the last key that was pressed, to test for proper keyboard functioning. Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '9' Key, '3' Key, and Enter Key to access the menu tree. The display shows:

   93 KEYBOARD TEST
2. Press the Enter Key to access this menu. The display shows:

   KEY:ENTER
3. To test the keypad, press any key except for the Gross or Net Key. For example, if you press the Tare Key, the display shows:

   KEY:TARE

Note: If you press the Gross or Net Key while in the Keyboard Test function, the display briefly shows Key:Gross or Key:Net and then returns to Run Mode.

4. Repeat Step 3 as desired to test all the keys.
5. When the test is complete, press the Gross or Net Key to return to Run Mode.

94 DEFAULT SYSTM (SYSTEM)

This function defaults the non-volatile RAM (NVRAM) on the Microprocessor/Display PCB. This resets all parameters to the factory-set default values (i.e., calibration parameters, setpoint parameters, display parameters, etc.). The SVS2000 requests verification before it defaults the NVRAM, to prevent accidental reset. Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '9' Key, '4' Key, and Enter Key to access the menu tree. The display shows:

   94 DEFAULT SYSTM
2. Press the Enter Key to access this menu. The display shows:

   DEFAULT NVRAM?
3. Respond to the verification request:
   - To prevent the SVS2000 from continuing with the default, press the Gross or Net Key to exit this function and return to the Run Mode.
   - To continue with the default, press the Enter Key. The display shows:

   ARE YOU SURE?
4. Respond to the second verification request:
   - To prevent the SVS2000 from continuing with the default, press the Gross or Net Key to exit this function and return to Run Mode.
   - To continue with the default, press the Enter Key. The SVS2000 resets all parameters to default values. The display acknowledges the entry and the SVS2000 starts the Quick Config procedure.

99 DIAGNOSTICS

This function performs an internal, nondestructive test on the NVRAM on the Microprocessor/ Display PCB. This test does not reset any parameters. Follow this procedure:

1. If the SVS2000 is in Run Mode, press the '9' Key, '9' Key, and Enter Key to access the menu tree. The display shows:

   99 DIAGNOSTICS
2. Press the Enter Key to access this menu. Upon completion of the test, the display should briefly show:

   DIAGNOSTC PASSED

   If it does not, contact Kistler Morse. The display then returns to:

   99 DIAGNOSTICS
4. Press the Gross or Net Key to return to Run Mode

SERIAL COMMANDS

This section contains the serial commands and protocol syntax used for serial communications between the host or Master (ROPE, PC, MVS, etc.) and the SVS 2000. Detailed explanations and examples of the commands are included.

HEX	ASCII	Function	Send (to SVS2000)	Receive (from SVS2000)
23	#	KM product identification number	>aa#ssr	Addssr (A4064r for SVS2000)
57	W	Request engineering units (gross)	>aaWssr	A+ddddddssr
42	B	Request engineering units (net)	>aaBssr	A+ddddddssr
54	T	Tare vessel	>aaTssr	Ar
75,31	u1	Request raw counts	>aau1ssr	Addddddssr

Table below defines each character used in the send and receive messages.

Character	Definition
>	Start of message character
aa	Two-digit ASCII HEX character address of channel
d	One-digit ASCII decimal number data
dd	Two-digit ASCII decimal number data
dd..	Two-digit or more ASCII decimal number data
dd..dd	Multiple ASCII decimal numbers
hh	Two-digit ASCII HEX number, upper nibble, lower nibble
hh..hh	Multiple two-digit ASCII HEX numbers
ss	Two-digit ASCII HEX checksum of characters added between '>' or 'A' and checksum characters. See Checksum Calculation in this chapter for an explanation of how checksum is calculated. Note that the '?' character in place of the checksum characters is a wildcard and therefore ignores the checksum.
r	Carriage return (0x0D)
A	Acknowledge character (0x41)
N	Not acknowledge character (0x4E)
±	Normally indicates polarity. If an error is present, an 'X' displays with an error code (ASCII character) immediately following. Possible error codes and definitions are listed below: 1 — Unit disabled 6 — ADC overrange error 7 — Net or gross engineering unit overflow

CHECKSUM CALCULATION

The one-byte checksum is calculated by adding the Hex values of all ASCII characters between the start of message character '>' or acknowledge character 'A' and the checksum character 'ss.' Overflows from the addition are ignored.

Example:

REQUEST

To request gross engineering units (such as weight) from a SVS 2000, the command is:

>aaWssr

If the SVS 2000's address is '3', the command is:

>03Wssr

Calculating the checksum 'ss' as the sum of the Hex values of all characters between '>' and 'ss':

03W ASCII = 30 Hex + 33 Hex + 57 hex = BA Hex

'0' '3' 'W'

Therefore, the ASCII string transmitted to the SVS 2000 is:

>	0	3	W	B	A	CR	
3E	30	33	57	42	41	0D	Hex

RESPONSE

The response to a request for gross engineering units is:

A±ddddddssr

If the weight is +6384, the response is:

A+0006384ssr

Calculating the checksum 'ss' as the sum of the Hex values of all characters between 'A' and 'ss':

+0006384 ASCII = 2B Hex+30 Hex+30 Hex+30 Hex+36 Hex+33 Hex+38 Hex+34 Hex = 190 Hex

'+' '0' '0' '0' '6' '3' '8' '4'

Ignoring the overflow, the checksum is 90 Hex. Therefore, the ASCII string transmitted back to the master is:

A	+	0	0	0	6	3	8	4	9	0	CR	
41	2B	30	30	30	36	33	38	34	39	30	0D	Hex

Note	Command	Send Format	Send Example	Receive Format	Receive Example
1	'#' - KM Product Identification Number	>aa#ssr	>01#84r	Addssr	A4064r
2	'W' - Engineering Units (gross)	>aaWssr	>01WB8r	A±ddddddssr	A+000710386r
3	'B' - Engineering Units (net)	>aaBssr	>01BA3r	A±ddddddssr	A-000446691r
4	'T' - Tare Addressed Vessel	>aaTssr	>01TB5r	Ar	Ar
5	'u1' - Request Raw Counts	>aau1ssr	>01u107r	Addddddssr	A114722667r

Notes:

1. The master requests the code from an SVS 2000 at address 01, which returns a code of 40 and a checksum of

64.

2. The master requests the gross weight from an SVS 2000 at address 01, which returns a gross weight of +7103 and a checksum of 86.
3. The master requests the net weight from an SVS 2000 at address 01, which returns a net weight of -4466 and a checksum of 91.
4. The master requests the tare for an SVS 2000 at address 01.
5. The master requests the raw counts from an SVS 2000 at address 01, which returns a raw count of 1147226 and a checksum of 67.

CALCULATION OF MANUAL CALIBRATION PARAMETERS

For manual calibration, you calculate and directly input the scale factor weight, scale factor counts, and the zero counts. There are three reasons for performing a manual calibration with the SVS 2000:

1. Refining the Calibration — After performing an Auto calibration, you kept an accurate record of actual material weight and indicated material weight. You want to use this information now to 'refine' the calibration.
2. Stainless Steel, Aluminum, or 2-inch Microcells — Your application is for Microcells installed on stainless steel or aluminum or uses 2-inch Microcells. However, the calibration parameters resulting from Quick Config are based on 3-inch Microcells installed on carbon steel. The scale factor counts (Scale Factor Cts) should be modified to reflect the actual sensitivity of the application.
3. Re-entering Calibration Data — You want to re-enter data from a previous calibration that provided better accuracy than the current calibration. This section explains and provides an example of the calculation of Manual Cal parameters for items 1 and 2 above.

REFINING THE CALIBRATION

While moving material into the vessel, you kept an accurate record of the actual material weight and the indicated material weight (from the SVS 2000). Now you want to use this information to refine the calibration. Follow this procedure to refine the calibration:

1. Define the recorded material weights as Indicated High Load, Indicated Low Load, Actual High Load, and Actual Low Load (Actual Low Load is 0, because you started with an empty vessel). Calculate the change in indicated and actual weight:

   IW = Change in Indicated Weight = Indicated High Load - Indicated Low Load

   AW = Change in Actual Weight = Actual High Load - Actual Low Load
2. If the SVS 2000 is in Run Mode, press the '2' Key, '2' Key, and Enter Key to access the menu tree. The display shows:

   22 MANUAL CAL
3. Press the Enter Key to access this menu. The display shows:

   SCALE FACTOR WGT
4. Press the Up Arrow Key to proceed to the next menu. The display shows:

   SCALE FACTOR CTS
5. Press the Enter Key to access the Scale Factor Cts Menu. The display looks like this:

   > 123456 cnts

6. Calculate Corrected Scale Factor Cts: Corrected Scale Factor Cts = Old Scale Factor Cts x (IW ÷ AW)
7. Use the Numeric or Arrow Keys to input the Corrected Scale Factor Cts. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   SCALE FACTOR CTS
8. Press the Gross or Net Key to return to Run Mode.
9. Enter the current actual weight as the Display Value Correction. See Refining the Calibration with the Display Value Correction for details.

Example: When the vessel was empty, the display indicated 500 lbs. You added 9,000 lbs of material, and noted the display indicated 10,000 lbs in the vessel. You want to refine the calibration. You go to the Manual Cal Menu and write down the existing scale factor counts. Summarizing the data:

Indicated High Load = 10,000 lbs
Indicated Low Load = 500 lbs
Actual High Load = 9,000 lbs
Actual Low Load = 0 lbs
ScfCnt = 250,000

Calculate the change in indicated and actual weight:

IW = Change in Indicated Weight = Indicated High Load - Indicated Low Load = 10,000 lbs - 500 lbs = 9,500 lbs
AW = Change in Actual Weight = Actual High Load - Actual Low Load = 9,000 lbs - 0 lbs = 9,000 lbs

Calculate the corrected Scale Factor Cts: Corrected Scale Factor Cts = Old Scale Factor Cts x (IW ÷ AW) = 250,000 counts x (9,500 lbs ÷ 9,000 lbs) = 263,889 counts

Disp Val Correct = Current Actual Load = 9,000 lbs

STAINLESS STEEL, ALUMINUM, OR 2-INCH MICROCELLS

Your application is for KM Microcells installed on stainless steel or aluminum or uses 2-inch Microcells. However, the calibration parameters resulting from Quick Config are based on 3-inch Microcells installed on carbon steel. Modify the scale factor counts (Scale Factor Cts) to reflect the actual sensitivity of the installed Microcells.

Note: Do not modify scale factor counts if you already performed a live load calibration (Auto Cal). A live load calibration is more accurate. The scale factor count correction follows:

1. See Table 6. Select the Sensitivity Factor that matches your installation.
2. If the SVS 2000 is in Run Mode, press the‘2’ Key, ‘2’ Key, and Enter Key to access the menu tree. The display shows:

   22 MANUAL CAL
3. Press the Enter Key to access this menu. The display shows:

   SCALE FACTOR WGT

4. Press the Up Arrow Key to proceed to the next menu. The display shows:

   SCALE FACTOR CTS

5. Press the Enter Key to access the Scale Factor Cts Menu. The display looks like this:

   > 123456 cnts

6. Calculate the corrected Scale Factor Cts as follows: Corrected Scale Factor Cts = Scale Factor Cts x Sensitivity Factor
7. Use the Numeric or Arrow Keys to input the Corrected Scale Factor Cts. Press the Enter Key to save the value in memory. The display acknowledges the entry and returns to:

   SCALE FACTOR CTS

8. Press the Gross or Net Key to return to Run Mode.

Example: The application uses Microcells installed on stainless steel. You performed Quick Config and need to modify the scale factor counts to match the application. Looking at Table 6, the Sensitivity Factor for Microcells on stainless steel is 0.83. You go to the Scale Factor Cts Menu and record the existing scale factor counts, which is 100,000 for this example. Summarizing the data:

Scale Factor Cts = 100,000
Sensitivity Factor = 0.83

Calculate and input the corrected scale factor counts: Corrected Scale Factor Cts

= Scale Factor Cts x Sensitivity Factor
= 100,000 x 0.83 = 83,000 counts

Table 6. Microcell Sensitivity Factors

Installation Type	Sensitivity Factor
3-inch Microcell	
Aluminum	2.2
Stainless Steel	0.83
2-inch Microcell	0.80

VIII. TROUBLESHOOTING

For each error message:

- Information is provided on whether fail-safe conditions go into effect when the error message appears. (Fail-safe conditions affect setpoints and current outputs.)
- One or more possible explanations and suggested solutions are provided. The solutions start with the easiest to check for or the most likely to correct the problem. Work through the solutions in the order given.

ERROR CODE	DESCRIPTION	FAIL SAFE APPLIES	SOLUTION
1. Warning: Add Or Subtract More Material...	While performing *Auto Cal*, the material moved into or out of vessel produced a change of less than 10,000 counts. SVS2000 calibrates with entered values, but larger change in counts/ movement of material is recommended for good accuracy. To exit the scrolling message, press any key.	No.	Verify correct amount of material was actually moved. Recalibrate when possible with a larger movement of material.
2. Are You Sure? (in *Auto Cal*)	While performing *Auto Cal*, you entered a *Hi Span Cal* weight that is less than the existing *Lo Span Cal* weight or a *Lo Span Cal* weight that is greater than the existing *Hi Span Cal* weight. This could be an error, or you could be recalibrating the system in a range that does not overlap with the existing calibration. The SVS2000 flashes *Are You Sure?* to request verification and returns to the input screen to allow you to try again.	No	Verify number on the input screen display is correct weight: • If it is incorrect, reenter weight or press Gross or Net Key to abort re-calibration and return to Run Mode. • If it is correct, press Enter Key again. SVS2000 will scroll error message 3 or 4, as applicable.
3. Warning: Ambiguous Error... Hi Span Will Be Entered... Need New Lo Span	While performing *Auto Cal,* you entered a *Hi Span Cal* weight that is less than the *Lo Span Cal* weight or SVS2000 calculates that Hi Span counts are less than Lo Span counts. SVS2000 accepts the new *Hi Span Cal* and blanks out the *Lo Span Cal*. SVS2000 continues to operate with the previous values for scale factor counts and scale factor weight until you complete calibration by performing another *Lo Span Cal*. To exit the scrolling message, press any key.	No	• Verify that you entered correct weight for *Hi Span Cal* and reenter *Hi Span Cal* if necessary, and • Remove material from vessel and perform a *Lo Span Cal* to complete calibration.
4. Warning: Ambiguous Error... Lo Span Will Be Entered... Need New Hi Span	While performing *Auto Cal*, you entered a *Lo Span Cal* weight that is higher than the *Hi Span Cal* weight or SVS2000 calculates that Lo Span counts are greater than Hi Span counts. SVS2000 accepts the new *Lo Span Cal* and blanks out the *Hi Span Cal*. SVS2000 continues to operate with the previous values for scale factor counts and scale factor weight until you complete calibration by performing another *Hi Span Cal*. To exit the scrolling message, press any key.	No	• Verify that you entered correct weight for *Lo Span Cal* and reenter *Lo Span Cal* if necessary, and • Add material to vessel and perform a *Hi Span Cal* to complete calibration.
5. Gross Units Over	Calculated gross weight (or selected engineering unit) exceeds seven active digits (9999999).	Yes	Note: Write down all existing system parameters before you change *Disp Format* or *Disp Units*. If you change *Disp Format* or *Disp Units*, you must adjust system parameters to correspond to new *Disp Format* or *Disp Units*. 1. Check *Disp Format* [11]. Ensure format is consistent with maximum expected value. For example, xxxx.xx format yields maximum value of 99999.99, while xxxxxx00 format yields maximum value of 999999900. 2. Check *Disp Units* [13]. Ensure units are consistent with maximum expected value. For example, a number in tons represents 2000 times more weight than the same number in pounds; a number in barrels represents 42 times more volume than the same number in gallons. 3. Check calibration. Recalibrate if required.

6. Net Units Over	Calculated net weight (or selected engineering unit) exceeds seven active digits (9999999).	Yes	Note: Write down all existing system parameters before you change ***Disp Format*** or ***Disp Units***. If you change ***Disp Format*** or ***Disp Units***, you must adjust system parameters to correspond to new ***Disp Format*** or ***Disp Units***. 1. Check ***Disp Format*** [11]. Ensure format is consistent with maximum expected value. For example, xxxx.xx format yields maximum value of 99999.99, while xxxxxx00 format yields maximum value of 999999900. 2. Check ***Disp Units*** [13]. Ensure units are consistent with maximum expected value. For example, a number in tons represents 2000 times more weight than the same number in pounds; a number in barrels represents 42 times more volume than the same number in gallons. 3. Check calibration. Recalibrate if required.
7. Grs Under Range	Calculated gross weight (or selected engineering unit) is negative and exceeds four active digits (9999).	Yes	1. Check calibration. Recalibrate if required. 2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.
8. ADC Overrange +	Sensor input is causing counts to go above 2,097,151.	Yes	1. Check wiring of sensors to junction box and junction box to SVS2000. Correct loose, damaged (shorted), or incorrect wiring. 2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required. 3. Check power supply by measuring across +Ex and -Ex on Power Supply PCB. • If SVS2000 is wired to KM half-bridge sensors with no IS Barriers, verify voltage is approximately 12 V. • If SVS2000 is wired to foil-gage sensors, verify voltage meets sensor manufacturer's requirements. If voltage is incorrect, replace Power Supply PCB. Note: If system includes IS Barriers, check power supply by measuring across +Sense and -Sense. 4. Measure voltage across +Sig and –Sig terminals on Power Supply PCB. This reading is actual signal coming back from sensor. For K-M sensors, reading should be less than 1 V: • If reading is less than 1 V, verify that Sensor Gain [63] is set as described in Chapter 10, Sensor Menu. If Sensor Gain is set correctly, A/D converter may be damaged. Contact KM. • If reading is greater than 1 V, recheck wiring, sensors, and power supply as described in Steps 1 through 3.

9. ADC Overrange -	Sensor input is causing counts to go to 0.	Yes	1. Check wiring of sensors to junction box and junction box to SVS2000. Correct loose, damaged (shorted), or incorrect wiring. 2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required. 3. Check power supply by measuring across +Ex and -Ex on Power Supply PCB. • If SVS2000 is wired to KM half-bridge sensors with no IS Barriers, verify voltage is approximately 12 V. • If SVS2000 is wired to foil-gage sensors, verify voltage meets sensor manufacturer's requirements. If voltage is incorrect, Power Supply PCB may be damaged — contact KM. Note: If system includes IS Barriers, check power supply by measuring across+Sense and -Sense.
10. NVRAM Failed #1	Non-volatile RAM on Microprocessor/Display PCB failed 'wake-up' test at power-up of SVS2000.	NA	NVRAM may be damaged — contact K-M.
11. NVRAM Failed #2	Non-volatile RAM on Microprocessor/Display PCB failed 'read/write' test at power-up of SVS2000.	NA	NVRAM may be damaged — contact KM.
12. Com Error #1	Communication with setpoint controller or PLC PCB in SVS2000 has failed.	Yes for current output. NA for setpoints — setpoints not operational because com-munication has failed.	Contact KM after identifying the damaged PCB as described below: 1. Disconnect ribbon cable between PLC PCB Module and Power Supply PCB. If error message disappears, PLC PCB Module may be damaged. 2. Setpoint controller chip on Power Supply PCB may be damaged.
13. Com Error #2	Communication with PLC PCB Module in SVS2000 has failed.	No	1. Check ribbon cable connection between PLC PCB Module and Power Supply PCB. Correct a loose or incorrect connection. 2. PLC PCB Module may be damaged — contact KM.
14. Voltage Error #1	AC input voltage is too low.	Yes	1. Verify that AC input switch on Power Supply PCB is set in correct position. 2. Check AC input voltage (115/230 VAC) and verify it is within specifications.
15. Voltage Error #2	A PCB is damaged.	Yes	Contact KM after identifying damaged PCB as described below: 1. Disconnect ribbon cable between the Power Supply PCB and optional PCBs. If there is no error message, an optional PCB may be damaged. If there are multiple optional PCBs in SVS2000: A. Disconnect ribbon cables between optional PCBs. B. Reconnect ribbon cable between Power Supply PCB and one optional PCB. If there is an error message, this is damaged optional PCB. C. Repeat Step B for other optional PCB until damaged PCB is identified. Troubleshooting. Error Messages F-4 2. Disconnect ribbon cable between Power Supply PCB and optional PCBs. Disconnect ribbon cable between Microprocessor/Display PCB and Power Supply PCB. Check voltage from bottom pin of J2 on Power Supply PCB: • If voltage is less than 11.5 V or greater than 12.5 V, Power Supply PCB may be damaged. • If voltage is between 11.5 V and 12.5 V, Microprocessor/ Display PCB may be damaged.
16. Voltage Error #3	A/D converter circuit reference voltage is out of tolerance.	Yes	1. Check ribbon cable connection between Power Supply PCB and Microprocessor/Display PCB. Correct a loose or incorrect connection. 2. Power Supply PCB may be damaged — contact KM.

17. Current Error #1	There is an excitation short circuit.	Yes	1. Check wiring of sensors to junction box and junction box to SVS2000. Correct loose, damaged (shorted), or incorrect wiring. 2. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.
18. Current Error #2	Excitation current is too high.	Yes	1. Check for shorts between White and Black or White and Red on the sensor wiring to the SVS2000. 2. Check sensor specifications and the number of sensors to verify that total current draw is within SVS2000's specifications. 3. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required.
19. Excite Error #1	Excitation voltage is too high and sense voltage is out of tolerance.	Yes	1. If not using Sense lines, verify that -Sense and +Sense jumpers are in place on J3 and J4 on Power Supply PCB. 2. If using Sense lines: A. Check +Sense wiring. Correct loose, damaged (shorted), or incorrect wiring. B. Check -Sense wiring. Correct loose, damaged (shorted), or incorrect wiring.
20. Excite Error #2	Excitation voltage is too low and sense voltage is normal	Yes	1. If not using Sense lines, verify that -Sense and +Sense jumpers are in place on J3 and J4 on the Power Supply PCB. 2. If using Sense lines: A. Check -Sense wiring. Correct loose, damaged (shorted), or incorrect wiring. B. Check +Sense wiring. Correct loose, damaged (shorted), or incorrect wiring.
21. Excite Error #3	Excitation voltage is out of tolerance.	Yes	1. Excitation settings may be out of tolerance. Write down all existing system parameters. Default SVS2000 to reset excitation settings. Reenter all other system parameters. 2. Power Supply PCB may be damaged — contact KM.
22. Excite Error #4	There was a sudden shift in excitation current.	Yes	1. One or more sensors may be damaged. Follow troubleshooting procedures detailed in sensor manual to locate damaged sensor(s). Replace if required. 2. Check wiring of sensors to junction box and junction box to SVS2000. Correct loose, damaged (shorted), or incorrect wiring. Note: Turn power off and then on again to clear this error message after problem is fixed. Do not cycle power until problem is fixed; the problem, which is probably causing errors in output, does not disappear even though error message is gone.
23. Excite Error #5	Excitation voltage is too high and sense voltage is too low.	Yes	Check Sense wiring. +Sense and –Sense wires may be reversed.
24. High Temp Error	SVS2000 is sensing a temperature inside enclosure that is above SVS2000's specified operating temperature	Yes	1. Check temperature just outside the enclosure. If temperature is greater than 122° F (50° C), application does not meet the SVS2000's specifications. 2. Check inside enclosure to see if a component failed and is dissipating heat. If component failure is causing error message you may notice an unusual smell, a hot component, and/or a charred component. Contact KM. 3. If temperature inside and outside unit meet specifications, temperature sensor on Microprocessor/ Display PCB in SVS2000 may be damaged — contact KM. CAUTION Turn off power to SVS2000 and let it cool down.

HOT KEYS

Following is a summary of the keyboard functions (hot keys) used in Run Mode:

Switch from Run Mode to Function Mode (menu tree)	Press the Func Key
Switch from Run Mode to a particular menu item in Function Mode	Press the two-digit function number and then press the Enter Key.
Switch from Function Mode to Run Mode	Press the Gross or Net Key
Scroll through the Run Mode display screens (gross, net, total, and relay status)	Press the Up Arrow or Down Arrow Key
Switch from Gross to Net Weight	Press the Net Key
Switch from Net to Gross Weight	Press the Gross Key.
Switch from gross weight Numerical display to Bar Graph display or vice versa	Press the Enter Key while on the gross weight display to toggle between numerical and bar graph display.
Zero Gross Weight	(Refine the calibration when the vessel is empty) — Press the Zero Key while on the gross weight display. When the display requests verification that you want to zero the gross weight, press the Enter Key. Press any other key to abort the operation.
Zero Total Weight	Press the Zero Key while on the total weight display. When the display requests verification that you want to zero the total weight, press the Enter Key. Press any other key to abort the operation.
Display Number of Tares	Press the Enter Key while on the total weight display. The display briefly shows the number of tares that have occurred since the total weight was zeroed.
Tare Vessel	Press the Tare Key for 1 second, until the display flashes Tare Implemented.
Display SVS2000 Serial Address in hexadecimal form	Press the '-' Key and then the '1' Key.
Display Current SVS2000 Software Revision letter and Date of Release	Press the '-' Key and then the '2' Key

SVS DISPLAY TREE

10 Display Menu

11 Disp Format

xxxxxx xxxxx.x xxxx.xx xxx.xxx

xx.xxxx xxxxxxo xxxxxxoo

12 Disp Countby

1 2 5 10 20 50 100 200

500 1000 5000 10,000

13 Disp Units

lbs kg CWT tns gal Ltr bbl

bu % ft m mV (none)

14 Bargraph Span

20 Cal Menu

21 Auto Cal

Lo Span Cal

Hi Span Cal

Disp Val Correct

22 Manual Cal

- Scale Factor Wgt
- Scale Factor Cts
- Zero Counts

23 Linearization

- Linearize Set
- Linearize Enable
- Linearize Off
- Linearize On

24 Zero Tolrance

29 Cal Display

- Cnt/mV
- ScfWgt
- ScfCnt
- ZeroCnt
- DispVCW
- HiSpanW
- LoSpanW
- HiSpanC
- LoSpanC
- 0mV_Cnt

30 Setpoint Menu

31 Slct Relay #1

- Relay1 Value

Relay1 Deadband

Relay1 Hi/Lo

Hi Lo

Relay1 Track

Grs Net

Tot Flt

Relay1 Fail-Safe

On Off NC

Relay1 Preact

32 Slct Relay #2

(submenus similar to relay 1)

33 Slct Digtl #1

DigOut1 Value

DigOut1 Deadband

DigOut1 Hi/Lo

Hi Lo

DigOut1 Track

Grs Net

Tot Flt

DigOut1 Failsafe

On Off NC

DigOut1 Preact

34 Slct Digtl #2

(submenus similar to digital output 1)

35 Slct Digtl #3

(submenus similar to digital output 1)

36 Slct Digtl #4

(submenus similar to digital output 1)

37 Slct Digtl #5

(submenus similar to digital output 1)

38 Slct Digtl #6

(submenus similar to digital output 1)

39 Digtl Status

Setpoint Test (1)

Select Relay #1

Off On

Select Relay #2

Off On

Select Digtl #1

Off On

Select Digtl #2

Off On

Select Digtl #3

Off On

Select Digtl #4

Off On

Select Digtl #5

Off On

Select Digtl #6

Off On

40 I-Output Menu

41 IOut Range

4-20mA 0-20mA

42 IOut: 4/0mA

43 IOut: 20mA

44 IOut Track

Grs Net

45 IOut Failsafe

Hi Lo NC

46 IOut Enable

On Off

48 Current Adjst

0 mA Point

4 mA Point

20 mA Point

49 Test Current

4/0mA 6/2mA 8/4mA

10/6mA 12/8mA 14/10mA

16/12mA 18/14mA 20/16mA

–/18mA –/20mA

50 Com Menu

51 Serial Addres

52 Serial Baud

1200 2400 4800 9600 19200

53 PLC Menu (2)

A-B RIO Menu

DeviceNet Menu (release 1st quarter 1999)

Profibus Menu (release in 1999)

Modbus Menu (release in 1999)

60 Sensor Menu

61 Sensor Adj Ex

13V 12V 11V 10V 9V 8V 7V 6V 5V

62 Resolution

16bt 17bt 18bt 19bt 20bt 21bt

63 Sensor Gain

1 2 4 8 16 32 64 128

69 Sensor Disply

Raw Weight

Ftr Weight

Out Weight

Raw Counts

Ftr Counts

Sensout

70 Filter Menu

71 Averaging

72 DSP Enable

On Off

73 DSP Step

74 DSP Qualify

75 DSP Factor

79 DSP Step Mon

80 Tracking Menu

81 Rate Threshld

82 Sample Intrvl

83 Zero Trak Win

84 Drift Limit

85 Mat Trak Enab

On Off

89 Rate Monitor

90 Service Menu

91 User Access

92 Keyboard Lock

93 Keyboard Test

94 Default Systm

99 Diagnostics

Notes:

(1) Setpoint Test is at the same menu level as 31-39, but does not have a menu number.

(2) Submenus are functional for PLC Menu only if your

SVS 2000 includes a PLC interface PCB.

See the applicable manual for detailed information: A-B RIO Interface Manual for SVS 2000,

DeviceNet Interface Manual for SVS 2000, Profibus Interface Manual for SVS 2000, or Modbus

Interface Manual for SVS 2000.

SETUP TABLE

10 Display Menu

- 11 Disp Format
- 12 Disp Countby
- 13 Disp Units
- 14 Bargraph Span

20 Cal Menu

- 21 Auto Cal
  - Lo Span Cal
  - Hi Span Cal
  - Disp Val Correct
- 22 Manual Cal
  - Scale Factor Wgt
  - Scale Factor Cts
  - Zero Counts1
- 23 Linearization
  - Linearize Set
  - 1In
  - 2In
  - 3In
  - 4In
  - 5In
  - Linearize Enable
- 24 Zero Tolrance2 — 100

30 Setpoint Menu - See Table

40 I-Output Menu

- 41 IOut Range
- 42 IOut:
- 43 IOut:
- 44 IOut Track
- 45 IOut Failsafe
- 46 IOut Enable
- 48 Current Adjst
  - 0mA Point
  - 4mA Point
  - 20mA Point

50 Com Menu

- 51 Serial Addres
- 52 Serial Baud

60 Sensor Menu

- 61 Sensor Adj Ex1
- 62 Resolution
- 63 Sensor Gain

70 Filter Menu

- 71 Averaging
- 72 DSP Enable
- 73 DSP Step2
- 74 DSP Qualify
- 75 DSP Factor

80 Tracking Menu

- 81 Rate Threshld
- 82 Sample Intrvl
- 83 Zero Trak Win2
- 84 Drift Limit2

85 Mat Trak Enab

90 Service Menu

91 User Access

92 Keyboard Lock

PARAMETER DEFAULT

10 Display Menu

11 Disp Format1 — xxxxxx

12 Disp Countby1 — 1

13 Disp Units1 — (none)

14 Bargraph Span1, 2 — 9999

20 Cal Menu

21 Auto Cal

Lo Span Cal — ---- (no value)

Hi Span Cal — ---- (no value)

Disp Val Correct — ---- (no value)

22 Manual Cal

Scale Factor Wgt1,2 — 9999

Scale Factor Cts1 — 250,000

Zero Counts1 — 1,048,576

23 Linearization

Linearize Set2 —

1In — 0 1Ot — 0

2In — 2,500 2Ot — 2,500

3In — 5,000 3Ot — 5,000

4In — 7,500 4Ot — 7,500

5In — 10,000 5Ot — 10,000

Linearize Enable — OFF

24 Zero Tolrance2 — 100

30 Setpoint Menu

31-38

Relay #1 and #2,

Digital Outputs #1 through #6

Value — 0

Deadband2 — 10

Hi/Lo — Lo

Track — Grs

Fail-Safe — Off

Preact — 0

40 I-Output Menu

41 IOut Range — 4-20mA

42 IOut: 4/0mA2 — 0

43 IOut: 20mA1, 2 — 9999

44 IOut Track — Grs

45 IOut Failsafe — Lo

46 IOut Enable — Off

48 Current Adjst

0mA Point — 910 cts

4mA Point — 3,600 cts

20mA Point — 14,516 cts

50 Com Menu

51 Serial Addres — 255 decimal/FF hex

52 Serial Baud — 9600

60 Sensor Menu

61 Sensor Adj Ex1 — 12 V

62 Resolution — 21bt

63 Sensor Gain1 — 2

70 Filter Menu

71 Averaging — 1

72 DSP Enable — On

73 DSP Step2 — (based on 10,000 counts)

74 DSP Qualify — 3

75 DSP Factor — 100%

80 Tracking Menu

81 Rate Threshld2 — (based on ±10 uV/sec)

82 Sample Intrvl — 10 seconds

83 Zero Trak Win2 — 0

84 Drift Limit2 — (based on ±5 mV)

85 Mat Trak Enab — Off

90 Service Menu

91 User Access — (no code needed)

92 Keyboard Lock — (no code needed)

Notes:

1 Values for these parameters may have changed as a result of Quick Config entries and/or internal calculations based on those entries.

2 Values for these parameters are consistent with Disp Format. For example, if Disp Format is xxxxxx, Zero Tolrance is 100. If Disp Format is xxxxxx00, Zero Tolrance is 10,000. If Disp Format is xxxxx.x, Zero Tolrance is 10.0.

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