

SOFT TOUCH OPTION 9181-34 SERIES

OPERATOR SAFETY SYSTEM

WARNING!

THE SOFT TOUCH SENSOR BOARD MUST BE ADJUSTED BEFORE USING THIS CONTROL!

IF THIS IS THE FIRST TIME THIS CONTROL IS BEING USED IN YOUR FACILITY, OR THE WELDER IS BEING MOVED FROM ONE LOCATION TO ANOTHER, YOU MUST GO THROUGH THE TUNING PROCEDURE STARTING ON PAGE 8.

THIS MUST BE DONE EVEN IF THE CONTROL WAS TUNED AND TESTED ON YOUR WELDER PRIOR TO SHIPMENT TO YOUR FACILITY.

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SOFT TOUCH

BEFORE STARTING INSTALLATION, locate your welder type on the chart below and verify the correct SOFT TOUCH kit has been provided to match your welder. NOTE: 9181-34G kits do **NOT** have 3-way solenoid valves or flow control valves.

TYPE OF WELDER ▼	ELECTRODES CLOSE SMOOTHLY BY GRAVITY* THEN, FORCE BETWEEN ELECTRODES IS MORE THAN 50LBS	ELECTRODES DO NOT CLOSE SMOOTHLY BY GRAVITY* IF A PRESS WELDER, RAM WEIGHS LESS THAN 50LBS	RAM WEIGHS LESS THAN 50LBS AND FALLS QUICKLY BY GRAVITY*
PRESS OR PROJECTION WITH 4-1/2" DIAMETER OR <u>SMALLER</u> STANDARD CYLINDER	<ol style="list-style-type: none"> 1. Pre-plumbed (recommended for smoother installation) = #9181-34W. This includes all required valves. 2. Parts kit only = #9181-34G. If existing solenoid valve does not have an external pilot, add solenoid valve #9181-34T 	<ol style="list-style-type: none"> 1. Pre-plumbed (recommended for smoother installation) = #9181-34Y. This includes all required valves. 2. Parts kit only = #9181-34G. If the existing solenoid valve does not have an external pilot, add solenoid valve #9181-34T 	#9181-34H . This includes a parts kit that is easily installed.
PRESS OR PROJECTION WITH 5 DIAMETER OR <u>LARGER</u> STANDARD CYLINDER	<ol style="list-style-type: none"> 1. Pre-plumbed (recommended for smoother installation) = #9181-34W + #9181-34D. This includes all required valves. 2. Parts kit only = #9181-34G. If existing solenoid valve does not have an external pilot, add valve #9181-34T 	<ol style="list-style-type: none"> 1. Pre-plumbed (recommended for smoother installation) = #9181-34Y + #9181-34D. This includes all required valves. 2. Parts kit only = #9181-34G + 9181-34D. If existing solenoid valve does not have an external pilot, add valve #9181-34TD 	N/A
ROCKER ARM WITH 4-1/2" DIAMETER OR <u>SMALLER</u> CYLINDER PRESS OR PROJECTION WELDER WITH FIXTURE TYPE CYLINDER (NOT INTENSIFIER)	NA	<ol style="list-style-type: none"> 1. Pre-plumbed (recommended for smoother installation) = #9181-34Y. This includes all required valves. 2. Parts kit only = #9181-34G. If existing solenoid valve does not have an external pilot, add valve #9181-34T 	NA
ROCKER ARM WITH 5" DIAMETER OR <u>LARGER</u> CYLINDER	NA	<ol style="list-style-type: none"> 1. Pre-plumbed (recommended for smoother installation) = #9181-34Y + #9181-34D. This includes all required valves. 2. Parts kit only = #9181-34G + 9181-34D. If existing solenoid valve does not have an external pilot, add valve #9181-34TD 	NA
WELDERS WITH INTENSIFIER CYLINDERS	NA	#9181-34I . Uses existing 4-way and 3-way solenoid valve.	NA

*With air quickly exhausted from welder.

SOFT TOUCH

PURPOSE: To prevent fingers (or other body parts) sustaining permanent injury between moving resistance welder electrodes. This is especially important with welder operations that require small parts to be hand loaded between electrodes that have a clearance of are more than $\frac{1}{4}$ ".

Successful operation of a SOFT TOUCH system requires four things:

1. The SOFT TOUCH kit has to be selected to exactly match the requirements of the particular welder. Use the SOFT TOUCH SELECTION SHEET for this purpose. If you cannot match the welder with the chart, contact Unitrol for assistance.
2. For installation of the HEAVY WEIGHT #9181-34G and #9181-34W options, the system will not operate unless the ram can fall smoothly by gravity when air is removed from the cylinder. This often means adjusting the ram guides or cam rollers and lubricating the welding cylinder. In cases with older cylinders that have not been serviced in a long time (or ever), rebuilding the cylinder might be required to replace very stiff piston and shaft seals.
3. Material that will be welded does not contain coatings that will affect continuity reading. See below for more on this.
4. Once the control has been installed, directions for setting the SOFT TOUCH sensor board must be followed carefully. This only requires the use of a small screwdriver and a digital voltmeter.

FIRST CHECK MATERIAL TO BE WELDED

SOFT TOUCH depends on reading electrical continuity between the electrodes. If the material being welded has a coating that does not easily conduct electricity, the SOFT TOUCH sensor will not consistently see continuity, and the system will not operate successfully.

Material that might cause problem include HOT ROLLED STEEL (that has not been pickled), wire that has a drawing soap or wax coating, metal with oxide coatings, and rusty metal.

If in doubt, submit some sample coupons of the material being welded to Unitrol for evaluation before quoting a system.

SOFT TOUCH FOR OTHER UNITROL CONTROLS

1. **SIMPLICITY:** To specify SOFT TOUCH to be connected to this control, change the first four option numbers from 9181 to 9161. The pneumatic directions are the same, but electrical and tuning is different. See special SIMPLICITY directions.
2. **SOLUTION-2:** One SOFT TOUCH assembly can be used for each welding electrode. Contact Unitrol for assistance.
3. **3Ø FREQUENCY CONVERTER (9380 SERIES CONTROLS):** To specify SOFT TOUCH to be connected to this type of weld control, change the first four option numbers from 9181 to 9381. See 9381-34D and 9381-34C SOFT TOUCH directions.
4. **THREE PHASE DC SECONDARY (9480 SERIES CONTROLS):** To specify SOFT TOUCH to be connected to this type of weld control, change the first four option numbers from 9181 to 9481. See 9481-34W SOFT TOUCH directions.

OLDER UNITROL CONTROLS

SOFT TOUCH can be added to any existing UNITROL control. Contact Unitrol and provide the serial number of the control. We will let you know what cost is involved to add SOFT TOUCH.

SOFT TOUCH

TYPES OF WELDERS: There are **two** groupings of welders. Each requires a different package.

GROUP A:

1. WELDERS WITH RAMS (HEADS) THAT FALL EASILY UNDER GRAVITY AND HAVE MORE THAN 50 LBS BETWEEN THE ELECTRODES WHEN AIR IS REMOVED FROM CYLINDER
2. WELDERS WITH RAMS THAT DO NOT FALL EASILY UNDER GRAVITY
3. ROCKER ARM WELDER
4. FIXTURE CYLINDER WELD HEADS

PNEUMATIC INSTALLATION, LIGHT RAMS USE PRE-PLUMBED KIT 9181-34Y

For press welders with rams that do not fall easily under gravity, rocker arm welders or for welders using non-intensifier cylinders:

For these welders, removing air from the welder will not cause the electrodes to close.

INSTALL pneumatic kit per **drawing #1964B-5**. Be sure that only the components shown on this drawing are installed. Remove any other components such as flow control valves, etc. that may have been originally installed.

Three-way solenoid valve SV0 (or modified original 4-way valve as shown in drawing #1964) will be installed into one input port of a quick exhaust valve. This will be the WELD force solenoid valve. SV1, a 5-way dual-input pressure solenoid valve, will be installed into the other port of the shuttle valve and into the return of the air cylinder. This is the soft advance pressure valve.

ACTION: When 5-way solenoid valve SV1 is energized, air is exhausted from the back side of the cylinder, and low-pressure air is sent to the top of the cylinder to close the electrodes under low force. If the SOFT TOUCH sensor board detects continuity, relay contacts connected to terminals #15 and #16 on the SOLUTION control will close, and SV0 will be energized (SV1 remains energized). This will shift the quick exhaust valve and put full weld force on the electrodes.

See drawing #1964B-5 for directions at the end of this section to adjust these components.

PNEUMATIC INSTALLATION OF INTENSIFIER TYPE CYLINDERS USE KIT 9181-34I

INSTALL pneumatic kit per **drawing #1966**. Be sure that only the components shown on this drawing are installed. Remove any other components such as flow control valves, etc. that may have been originally installed.

ACTION: When the 4-way solenoid valve SV1 is energized, air is exhausted from the return port and pushes fluid from the FLUID RESERVOIR to close electrodes under low force as set on the ADVANCE PRESSURE regulator. Energizing 3-way solenoid valve SV0 intensifies the force using pressure from the existing pressure regulator. See **drawing #1966** to adjust the regulators.

SOFT TOUCH

PNEUMATIC INSTALLATION USE PRE-PLUMBED KIT 9181-34W

For press welders with HEAVY RAMS (weighing 50 lbs or more) that fall easily by their own weight:

For these welders, just the dead weight of the ram (weight when all air is exhausted from the cylinder and the ram falls by gravity) acting on the small surface of an electrode can cause major damage to an operator's finger. This scheme can counterbalance most of the ram's dead weight.

SOFT TOUCH WILL NOT OPERATE PROPERLY IF THE RAM DOES NOT FALL QUICKLY AND SMOOTHLY BY GRAVITY (WHEN AIR HAS BEEN REMOVED FROM THE CYLINDER).

BEFORE INSTALLATION OF THE SOFT TOUCH COMPONENTS, adjust the welder's ram bearings and lubricate as needed for smooth and fast gravity drop. On many older welders the cylinder cup seals and shaft seals have lost elasticity and need to be replaced.

If all is working properly, the ram should "drop like a stone" when air is removed rapidly from the bottom port of the air cylinder.

Do not continue until this has been accomplished!

INSTALL pneumatic kit #9181-34W per drawing #1963A-4. Be sure that only the components shown on this drawing are installed. Remove any other components such as flow control valves, etc. that may have been originally installed.

ACTION: When 3-way solenoid valve SV1 is energized, pressure on the underside of the cylinder piston will be exhausted until it falls below air pressure as set by the ADVANCE regulator. At this time the quick exhaust valve will shift to prevent the backpressure from going lower. If the ADVANCE regulator is set correctly, this "BUCKING PRESSURE" will almost completely balance the ram weight.

If the SOFT TOUCH sensor board detects continuity, SV0 will be energized (SV1 remains energized) to put full pressure into the top port of the welding cylinder and fully exhaust the back side.

See drawing #1964A-4 for directions at the end of this section to adjust these components.

SOFT TOUCH

GROUP B:

WELDERS WITH RAMS (HEADS) THAT FALL EASILY UNDER GRAVITY AND HAVE LESS THAN 50 LBS BETWEEN THE ELECTRODES WHEN AIR IS REMOVED FROM CYLINDER

Use SOFT TOUCH option #9181-34H for GROUP B type welders.

Option #9181-34H consists of:

1. **#9181-34 SENSOR BOARD**, detects if metal is between electrodes before allowing high welding force to be applied.
2. **#9181-34T 3-way solenoid valve**
3. **#9181-34J Precision regulator with gauge**

PNEUMATIC INSTALLATION

For press welders with LIGHT RAMS (weighing less than 50 lbs) that fall easily by their own weight:

For these welders, just the dead weight of the ram (weight when all air is exhausted from the cylinder and the ram falls by gravity) acting on the small surface of an electrode can cause major damage to an operator's finger. This scheme can counterbalance most of the ram's dead weight.

SOFT TOUCH WILL NOT OPERATE PROPERLY IF THE RAM DOES NOT FALL QUICKLY AND SMOOTHLY BY GRAVITY (WHEN AIR HAS BEEN REMOVED FROM THE CYLINDER).

BEFORE INSTALLATION OF THE SOFT TOUCH COMPONENTS, adjust the welder's ram bearings and lubricate as needed for smooth and fast gravity drop. On many older welders the cylinder cup seals and shaft seals have lost elasticity and need to be replaced.

Do not continue until this has been accomplished!

INSTALL pneumatic kit #9181-34H per drawing #1965A-2. Be sure that only the components shown on this drawing are installed. Remove any other components such as flow control valves, etc. that may have been originally installed.

ACTION: When 3-way solenoid valve SV1 is energized, pressure on the underside of the cylinder piston will be exhausted to let the welder head drop.

If the SOFT TOUCH sensor board detects continuity, SV0 will be energized (SV1 remains energized) to put full pressure into the top port of the welding cylinder.

See drawing #1965A-2 at the end of this section for directions to adjust these components.

SOFT TOUCH

If the SOFT TOUCH option has been factory installed, skip to INSTALLING SENSORS on page 5.

INSTALLATION OF NEW SOFTWARE IN **OLDER** SOLUTION CONTROLS

If your SOLUTION control has a software version that does **not** start with **SC**, consult the Unitrol service department for instructions on required steps to update your control prior to using this function. You can check the software version by pressing: PROGRAM, 86, ENTER.

If your SOLUTION control has SC series software that is **older** was produced before April, 2004, you will require installation of new software. To find the software date code, press: PROGRAM, 86, ENTER and mark down the code shown.

The format is: SCYYMMDD where YY is year, MM is month, and DD is day. The oldest version that will operate this feature is SC051220.

If the SOFT TOUCH kit was ordered for a SOLUTION control that has an older SC software version installed, order a new three-chip set under part #9182-15. Provide the serial number of your control so that the correct functions will be factory set. To install:

1. Locate software chip set in the kit and install in SOLUTION control
 - a. If you are installing in a 9180 series with REMOTE console, remove the blue back plate on the remote console, locate the three program chips (with paper labels) in sockets U107, U111 and U120.
 - b. If you are installing in a 9180M, 9180L, or 9180D SOLUTION (all components in one enclosure), the software chips are located on the front computer board just behind the front white metal faceplate. You will have to remove the top two inner screws holding the boards to the front plate, and unscrew the lower two inner screws about 4 turns. "Clamshell" the face away from the board, and locate the three program chips (with paper labels) in sockets U107, U111 and U120.
2. Remove the old software chips **one at a time** and install the new ones. Chips installed in sockets U111 and U120 have the same pin count. The label on each of these chips must match the socket or permanent damage will be made to these chips. **It is critical that the chips be installed in the correct direction. Be sure that the notch at the end of each chip aligns with the white "notch" printed on the circuit board.**
3. Check to be sure that all legs of the new chips are in the socket. Legs that are not aligned will bend over and not allow the control to operate.
4. Close the back of the remote console, or install all four screws on the L, M, or D series SOLUTION controls.
5. Turn power on, and check to be sure the control goes through the diagnostics. If only the three LED lights turn on but there is no display, turn power off and check carefully to be sure that the chips are in the correct direction and that all legs are fully in the socket.

SOFT TOUCH

INSTALLING SENSORS

This system can operate with one of two sensor groups.

See page 3 of hookup drawing 1463-TS1-R9B for wiring of each sensor group:

SOFT TOUCH BOARD ONLY:

For controls with factory installed SOFT TOUCH sensor boards, skip to step 5 below.

1. If the TOUCH SENSOR board is not already installed in the system, mount it inside the UNITROL control enclosure using the angled bracket mounted to the sensor board in this kit. Find a convenient location along the right edge of the enclosure that will allow adjustment of the potentiometer on the front of the board without being near to high voltage components in the control.
2. This board requires 24VDC for operation. Connect a light wire from terminal #1 (GND) on the SOFT TOUCH board to terminal #1 (RTN) on the power supply board. Connect a second light wire from terminal #2 (24V+) on the TOUCH SENSOR board to any terminal marked CD+ on the power supply board.

Note that on older SOLUTION boards that do not have these terminals, contact the Unitrol service department to have your existing power supply board sent to Unitrol for wiring modification needed to secure this voltage.

3. Connect wires from terminals #6 and #7 on the SOFT TOUCH SENSOR board to terminals #15 and #16 on the power supply board. When the electrodes both touch the part being welded, a relay closes on this board and yellow LED DS5 on the power supply board should glow.
4. Drill a 15/32" diameter hole and mount the TIP DRESS toggle switch in the kit. Mount it so that the switch is CLOSED when the switch handle is pushed DOWN. Install the TIP DRESS label over the switch. Wire the switch to terminals #36 and #38 on the SOLUTION power supply. You will have two wires in #38 so twist the wires, or put one wire in the terminal and use a wire nut to splice the two together.
5. Connect one light wire from terminal #4 on the TOUCH SENSOR board to any convenient point on the upper electrode arm. **The best connection is made right on the transformer pad.** If possible, drill and tap into the transformer pads and use a crimp ring terminal on the wire. Try to make a connection to a point that **does not move** during welding. If this is not possible, Use a hose clamp around the copper arm is often the easiest way to make this connection. Try to find a location that has no movement during welding so that wire life will be maximized.
6. Connect another light wire from terminal #5 on this same board to the **lower transformer pad** in the same way. If this is not possible, mechanically mount the wire at a point closest to the transformer.

SOFT TOUCH

SOFT TOUCH BOARD AND LIMIT SWITCH or PROXIMITY SWITCH:

This system is used to require closing of **both** a positional limit switch as well as detection of metal between the electrodes. It is typically used in applications where the part is not flat prior to welding and closes as electrode pressure is applied. It can also be used to give **redundant protection**.

INSTALLING LIMIT SWITCH or PNP PROXIMITY SWITCH:

1. **LIMIT SWITCH:** A normally open contact on the LIMIT SWITCH is wired to terminals #13 and #14 on the power supply board. If a factory jumper is already installed to these terminals, remove this jumper.
2. **PNP PROXIMITY SWITCH (must be PNP type):**
 - a. Connect the + input wire from the switch to CD+ anywhere on the terminal.
 - b. Connect the 0 wire from the switch to terminal #17 (RTN).
3. Connect the output wire from either of the above switches to terminal #13 (RT1). If a factory jumper is already installed to this terminal, remove this jumper.
4. **ADJUSTMENT:** Adjust the switch so that it will close when the spacing between the electrodes is a maximum of $\frac{1}{4}$ ". When the switch closes, yellow LED DS4 power supply board should glow.

INITIAL TUNING OF #9181-34 TOUCH SENSOR BOARD TS-1

CAUTION: Follow the steps below carefully. Do not operate this welder unless all tests have been successfully completed as shown at the end of this

Before starting this procedure, locate the welder's tap switch and move the selection handle from lowest to highest number 10 times to clean the contacts on this switch.

- a. Locate the multi-turn potentiometer marked R10 (just above the transformer) on this board. This is a 20-turn potentiometer. When making settings below if you run out of range on the potentiometer, you will hear a small click sound each time you try to rotate it.
- b. Check the condition of the blue LED3 just above the red LED1.
 - i. If the blue LED3 is **ON**: Turn potentiometer R10 **counterclockwise** until blue LED3 just turns **OFF**. This is a 20-turn potentiometer and it may take 10 or more turns to get the blue LED3 to turn off. Then turn the same R10 **clockwise** approximately $\frac{1}{4}$ turn.

SOFT TOUCH

- ii. If the blue LED3 is **OFF**: Turn the potentiometer R10 **clockwise** until the blue LED3 just turns **ON**, then $\frac{1}{4}$ turn more. This is a 20-turn potentiometer and it may take 10 or more turns to get the blue LED3 to turn on.
- c. The SOFT TOUCH sensor board should now be calibrated to your welder.
If you are not able to get the blue LED to operate as shown above, see TROUBLE SHOOTING procedure on page 12 and 14. The system will not operate correctly without being properly set.
- d. On most welders, this setting should now work for all transformer tap positions. It is also normal for the blue LED to turn off when shop line voltage shifts lower. In all cases, if the board is not adjusted properly, the SOFT TOUCH system will either not allow the electrodes to close, or will let the electrodes close but will not allow high force to start.
- e. If you are changing the tap switch from this high position to a lower position, it is possible that this board will have to be adjusted again on some welders.
- f. **IMPORTANT: When making the above adjustments, after the welder has been making welds for about 15 minutes repeat adjustment steps a and b above. Some drifting is normal and follows the change in the welder transformer as the windings heat up.**

DRIFTING: If continuous adjustments are required and you are on the same transformer tap that you were in for the original adjustment procedure, rotate the welder's transformer switch from low to high number settings about 10 times to clean the contacts in this switch. Dirty tap switches can cause drifting of values in system.

2. TESTING WITH ELECTRODES CLOSED:

- a. Clean electrodes on welder
- b. Place two thicknesses of metal between the electrodes. This should be the thickest combination that will be welded on the welder.
- c. Close electrodes by turning ON the TIP DRESS switch wired to the SOLUTION control.
- d. Check the RED LED1 on the TOUCH SENSOR board. With the electrodes touching a conductive material, this LED should now be on and the BLUE LED3 will be off.

If you are able to get BLUE LED3 to turn OFF, but the RED LED1 does not turn ON when the electrodes are closed on metal, try turning potentiometer R10 1 or 2 turns counterclockwise until the RED LED1 turns ON (electrodes still closed). BLUE LED3 might not turn ON when the electrodes are open, but the system will still operate as long as RED LED1 turns OFF.

If you want to talk to a Unitrol technician about this problem, it helps if you can check and record the DC voltage between test points TP4(+) and TP5(-) when the electrodes are OPEN and when they are CLOSED on metal. This value should be at least +0.500V when the electrodes are open, and -0.500V or lower when the electrodes are touching metal.

SOFT TOUCH

SETTING THE SOLUTION FOR USE WITH THE SOFT TOUCH FUNCTION

1. Press: **PROGRAM, 87, ENTER, 80**. The display will show the **SVO FUNCTION**.
2. If it is not set for **SENSOR DETECT = 6**, press: 1 to change, and then press: 6 to select **SENSOR DETECT**. This will select the SOFT TOUCH detection function.
3. The display will now alternately show: **SINGLE INPUT, CHANGE 1=YES, 0=NO**.
 - a. If you are using just the SOFT TOUCH SENSOR (without the LIMIT SWITCH), push 0.
 - b. If you are using both a LIMIT SWITCH *and* the SOFT TOUCH SENSOR board, press 1 to change. The display will briefly show **DUAL INPUT**.
4. The display will now show: **MAX DETECT 000CY**. This is the **maximum** time allowed for detecting metal between the electrodes (and reaching the ram limit switch if in **DUAL INPUT** mode). Time is set in CYCLES. A CYCLES is 1/60th of a second. A typical time is 45 cycles (3/4 sec). You can change this time up to 999 cycles (16.5 sec.) as desired. Then press **ENTER**.
5. The display will now show: **DETECT BLANK = 000**. This is the minimum time allowed for the sensor to register. For normal applications leave this number at 015.

This blanking time is used on welders where it is possible for the electrodes to see continuity before they are fully closed. This can happen if:

- a. The part being welded is not flat
 - b. Part of the material being welded can touch top and bottom electrode prior to full closure. This is particularly important when using this function on a transgun welder, or when the moving electrode can have the tendency to brush against a vertical flange on the part.
6. Select a time that will allow the electrodes to close under normal conditions. If continuity is detected **before** the end of this **BLANK** time, the system will just ignore that contact. A typical BLANK TIME is 15 - 25 cycles. The high-pressure valve will only be turned ON if:
 - a. Continuity is detected **after** the **BLANK** time and
 - b. Continuity is detected **before** the end of the **MAX DETECT** time. Note that the **DETECT** time starts when the welder has been initiated and is not affected by the **DETECT BLANK** time.

SOFT TOUCH

OPERATION SEQUENCE

1. Control is initiated

2. FAIL-SAFE STARTING SEQUENCE:

a. SINGLE INPUT:

- i. If SOFT TOUCH SENSOR is connected to the PR2 input (terminal #16) is closed before the electrodes start closing, the display will show: **SENSOR CLOSED**, and reset the system without closing a solenoid valve.

b. DUAL INPUT:

- i. If the limit switch or proximity switch connected RT1 input (terminal #13) is closed before the electrodes start closing, the display will show: **DEPTH SW. CLOSED** and not allow movement. This would indicate that either the adjustment is not correct, or that the LIMIT SWITCH is shorted.
- ii. If the SOFT TOUCH SENSOR board output is closed before the electrodes start closing, the display will show: **SENSOR CLOSED** and not allow movement. This would indicate that either the sensor board is not adjusted properly, or that the board has malfunctioned.
- iii. If **both** inputs are closed before the electrodes start closing, the display will show: **SEN+DEPTH CLOSED** and not allow movement.

3. SEQUENCE AFTER ELECTRODES START TO MOVE:

- a. If the input (or inputs) is open at the time of initiation (normal condition), output SV1 is turned ON to energize the SV1 solenoid valve and allow electrodes to close under low force.
- b. Control waits until inputs are closed
 - i. For SINGLE INPUT, yellow LED5 will glow
 - ii. For DUAL INPUT, both yellow LED4 and LED5 will glow.
- c. If the input or inputs close after the **DETECT BLANK** time and before the end of the customer-set **MAX DETECT** time:
 - i. Output SV0 is turned ON (SV1 remains ON). This will put high welding force on the electrodes.
 - ii. The normal welding sequence will now operate (check TIP FORCE, PRESSURE SWITCH closure, SQUEEZE TIME, WELD TIME, HOLD TIME, etc.)
 - iii. Both solenoid valves will be released to open the electrodes.
 - d. If the input or inputs do **not** close within the **MAX DETECT** time, SV0 will not be turned on (no high force) and:
 - i. SV1 is released to open electrodes
 - ii. Program is reset
 - iii. Display will show: **DETECT TIME OUT** until the next initiation. This requires opening and then closing of initiation before another sequence begins.

SOFT TOUCH

TROUBLE SHOOTING CHART

PROBLEM	SOLUTION
<p>When TIP DRESS switch is closed, electrodes do not close, or they start to close but do not travel all the way</p>	<ol style="list-style-type: none"> 1. For welders with HEAVY WEIGHT rams: <ol style="list-style-type: none"> a. ADVANCE PRESSURE setting is too high resulting in a lifting force greater than the ram weight. Reduce the ADVANCE PRESSURE regulator setting. Normally a setting of 0-4 psi is required for most welders. b. Flow control between quick exhaust and SV1 is open too far. Slowly close this flow control until the lifting force comes in when the electrodes touch. 2. For HEAVY WEIGHT and GRAVITY FALL rams, ram is not falling smoothly under gravity <ol style="list-style-type: none"> a. Ram bearings or slide is not adjusted or lubricated to allow ram to fall easily by gravity when air is removed from cylinder b. Welder cylinder piston cups or shaft seals are not flexible (replace) or need lubrication. 3. For LOW WEIGHT RAMS, ROCKER ARM WELDERS, or FIXTURE CYLINDERS: Not enough air pressure set on ADVANCE pressure regulator
<p>When the foot switch is closed, the electrodes do not fully close, then go back up, and the display shows:</p> <p>DETECT TIME OUT</p> <p>without going through the welding sequence.</p>	<p>The time set in PROGRAM 87/80 for DETECT TIME is too short for the time it takes for the electrodes to close and see continuity through the metal. Increase the MAX. DETECT TIME.</p>

SOFT TOUCH

PROBLEM	SOLUTION
<p>When the foot switch is closed, the electrodes touch, but the display shows:</p> <p>DETECT TIME OUT</p> <p>and the electrodes open up without going through the welding sequence</p>	<ol style="list-style-type: none"> 1. Electrodes are not clean or have picked up a coating from the previous welds. Clean electrodes. 2. The SOFT TOUCH board is not adjusted properly and the red LED on that board is not coming on when the electrodes touch. See the bottom of page 8 for adjustment of the SOFT TOUCH board. 3. If a LIMIT SWITCH or PROXIMITY SWITCH is being used as a second sensor, be sure that this switch is closing when the electrodes are touching. 4. The force between the electrodes is too LOW to make good contact and strong continuity between the electrodes. See page 15 for more details on PROBLEMS WITH LOW ELECTRODE FORCE. 5. The snubber module is faulty. This is the blue cylinder that is wired across the SCR contactor power tangs. Replace this part #9182-57.
<p>RT1 SWITCH OPEN is on display</p>	<p>Install a jumper between terminals #13 and #14</p>
<p>Display shows:</p> <p>DEPTH SW. CLOSED</p> <p>and will not respond to keypad or foot switch.</p>	<p>Control is in the DUAL SENSOR mode.</p> <ol style="list-style-type: none"> 1. If you want to use the continuity and also a limit or proximity switch in the system, check limit switch or proximity switch that is wired to terminal #13. It should be OPEN when the electrodes are more than 1/4" apart. 2. If you do not want to use the continuity and also a limit or proximity switch in the system, temporarily remove the jumper in terminal #13, reset mode in PROGRAM 87/80 to SINGLE mode, and then reinstall the jumper.
<p>Display shows:</p> <p>SENSOR CLOSED</p> <p>and will not respond to keypad or foot switch.</p>	<p>Check red LED on SOFT TOUCH board to see if it is ON. If it is, check section on setting of the SOFT TOUCH sensor board on page 8. The red LED should only be ON when the electrodes are touching metal.</p>

SOFT TOUCH

PROBLEM	SOLUTION
Display shows: SEN+DEPTH CLOSED and will not respond to keypad or foot switch.	Both SOFT TOUCH board and limit switch are closed before the foot switch has been closed. Check both of the faults shown in the two boxes above.
There is a noticeable delay from when the foot switch is closed and when the welder's ram starts to move.	<ol style="list-style-type: none"> 1. The ram is mechanically sticking. Adjust ram bearings or cylinder cup seals and shaft seals. Check lubrication. In older cylinders it is sometimes required to replace the piston seal and the shaft seal. 2. For 9181-34W options, the air pressure on the bottom (lifting side) of the welder cylinder is too high. This requires that a lot of time is needed to exhaust this air before the ram starts to move. Lower the RETURN PRESSURE regulator until it is just able to pick up the ram smoothly.
Not able to read any voltage on SOFT TOUCH sensor board terminals #4 and #5	<ol style="list-style-type: none"> 1. Be sure that the green LED on the SOFT TOUCH sensor board is on. If LED is not on, check input voltage to this board on terminals #1 and #2. It should read 20 – 26VDC. If not, check to be sure that these terminals are connected to CD+ and RTN on the power supply board. 2. Check input AC voltage on test points TP2 and TP3 on this board. This should be at least 20mv. If no voltage or lower voltage is present: <ol style="list-style-type: none"> a. Check for welder insulation problems using information shown on page 16. b. The snubber module is faulty. This is the blue cylinder that is wired across the SCR contactor power tangs. Replace this part #9182-57.
Voltage is read at SOFT TOUCH sensor board test points #4 and #5, but the voltage read from open to closed electrodes does not change, or changes less than a total swing of 1.0V.	Check input signal voltage at terminals TP2 and TP3 on SOFT TOUCH sensor board. If this voltage does not change more than 20mv from open to closed electrodes, see information on insulation problems on page 16.
Voltage readings at test points #4 and #5 with open electrodes change more than 0.500V over time with the transformer on the same tap switch position	Move the transformer tap switch from low to high positions 10 times to clean the contacts.

SOFT TOUCH

TROUBLE SHOOTING SENSOR VOLTAGE PROBLEMS

HOW THE SENSOR WORKS

The SOFT TOUCH sensor board is designed to sense **continuity** between the welding electrodes. This is done by having a small voltage present between the open electrodes. When the electrodes close on metal, impedance of the welder secondary drops to a very low value. This will "short out" the small voltage between the electrodes. The SOFT TOUCH sensor board conditions and amplifies this voltage and "knows" when metal is in contact between the electrodes.

This whole affect depends on the welder secondary being properly insulated and finding a conductive path from the upper electrode to the lower electrode.

PROBLEMS WITH LOW ELECTRODE FORCE

Because operation of the SOFT TOUCH sensor board depends on detection of continuity between the electrodes, a reasonable force must exist where the electrodes touch the metal on both sides for good continuity to be measured. If the red LED on the SOFT TOUCH sensor board does not turn on consistently, try increasing the electrode force during the SOFT TOUCH sequence. The force between the electrodes when the TIP DRESS switch is closed should be low enough to prevent indentation of a wood pencil of no more than 1/32".

On **HEAVY RAM (9181-34W)** systems, **decrease** the ADVANCE PRESSURE regulator slightly.

On **LIGHT WEIGHT (9181-34Y, 9181-34I)** ram systems, **increase** the ADVANCE PRESSURE regulator slightly.

PROBLEMS WITH COATED METAL

If metal between the electrodes is coated with an insulating material, the electrodes will not see continuity and the SOFT TOUCH system will not operate. This is just reality of continuity testing. Some materials that have had problem with this system have included metal with various oxide coatings (titanium oxide, silicon oxide, etc.) as well as polished material that has a thick wax finish. Problems are also found trying to use hot rolled steel that has not had the scale properly removed.

During normal spot welding without the SOFT TOUCH system, the high force of the electrodes is usually enough to break the oxide surface coating and make contact through the electrodes. These materials typically have a lot of expulsion when welded confirming that the surface must be "blown away" at the early part of each weld.

But the low voltage and low force of the SOFT TOUCH process will not always be able to establish a continuity path between the electrodes to let this function work.

ALTERNATIVE SENSOR INSTALLATION: Where these partially insulated materials are welded on this machine, the only way the system will operate is with the use of a LIMIT SWITCH or PROXIMITY SWITCH as the main sensor. The limit or prox switch will be mounted and adjusted in such a way that it will close when the electrodes are less than 1/4" apart. While this is not as elegant as the continuity sensing of the SOFT TOUCH board, it will still provide protection in the pinch point area between the electrodes if set up correctly. Note that if the limit

SOFT TOUCH

or prox switch is closed before the welding electrodes start to close, the system will not allow any movement and will display the fault.

A keylock selector switch can be installed to switch between the SOFT TOUCH sensor board on conductive material, and limit switch operation on poor conductive material. A SOFT TOUCH BYPASS KIT #9181-34BP is also available the will maintain the low-pressure advance but not utilize the continuity testing when working with insulated material. It can be used when welding problem material, and switched back for regular metal. The option has indicator lights showing when the continuity system is active or bypassed. Contact the Unitrol service department for more information on these two choices.

TROUBLE SHOOTING INSULATION FAULTS WITHIN WELDER

On all resistance welders, either the top or bottom electrode arm or holder is insulated from the welder frame. This is done using fiber sheets between plates, and fiber tubes and washers on bolts that connect the insulated components. If one of these insulators is missing or has metal chips or powder bridging the conductive parts, the secondary of the welder will be shorted, and the SOFT TOUCH system will **not** see the required change in voltage when the electrodes close on metal.

If these voltage changes are not seen by the SOFT TOUCH sensor board, **the SOFT TOUCH system will not be able to be used.**

Because the welder transformer secondary is essentially one copper strip, putting a meter from electrode to electrode will not tell if the insulators are not properly installed. To do this, you will have to unbolt the flexible conductor that connects to the moving part of the welder secondary back to the welding transformer pad. On a press welder this is usually a stack of copper laminations. On some welders, this flexible connection consists of one or more flexible copper cables.

Remove the flexible connection and check from top to bottom electrode for continuity. If the welder is properly insulated, the resistance measured should be zero (totally open). If continuity is measured, check and repair insulation as needed so that the continuity reading shows fully open (no resistance).

Once this has been accomplished, reconnect the flexible components and go through the voltage testing procedure. You should now see a good strong usable swing of voltage from positive to negative with open and then closed electrodes.

DRIFTING VALUES: If you have successfully set the SOFT TOUCH voltages, and then a while later you have to readjust the board, it might also indicate a dirty tap switch on the welder's transformer. Because this system is conducting millivolts and milliamps of current during the continuity detection sequence, bad transformer tap switch contacts can cause large changes of voltage present at the welder secondary and cause the SOFT TOUCH sensor board to have greatly changing values when the electrodes are open.

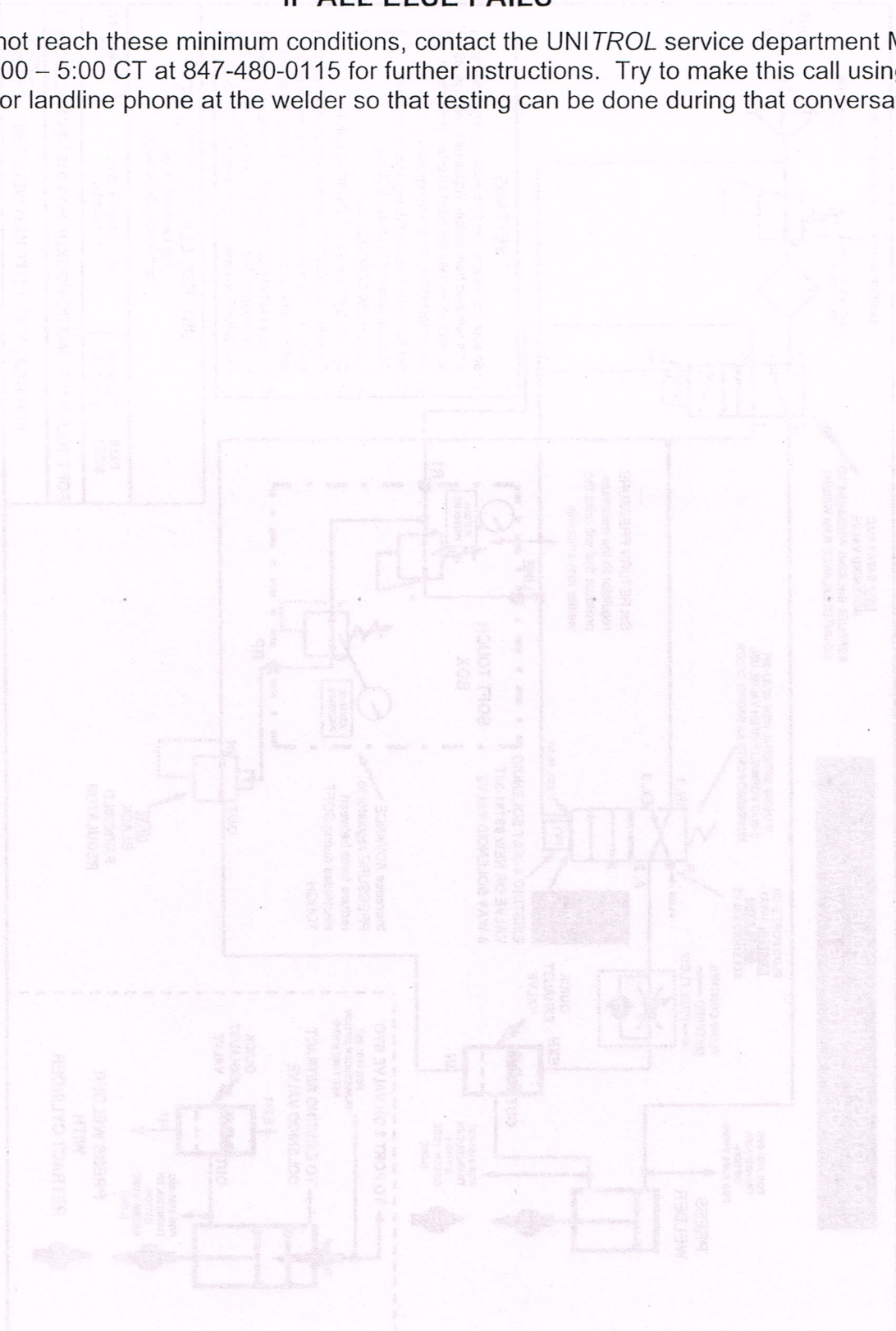
In this case, voltages read at test points #4 and #5 with open electrodes will change more than 0.5V (500 mv).

To eliminate this problem, rotate the welder's transformer switch from low to high number setting about 10 times to clean the contacts in this switch.

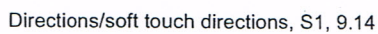
SOFT TOUCH

IF ALL ELSE FAILS

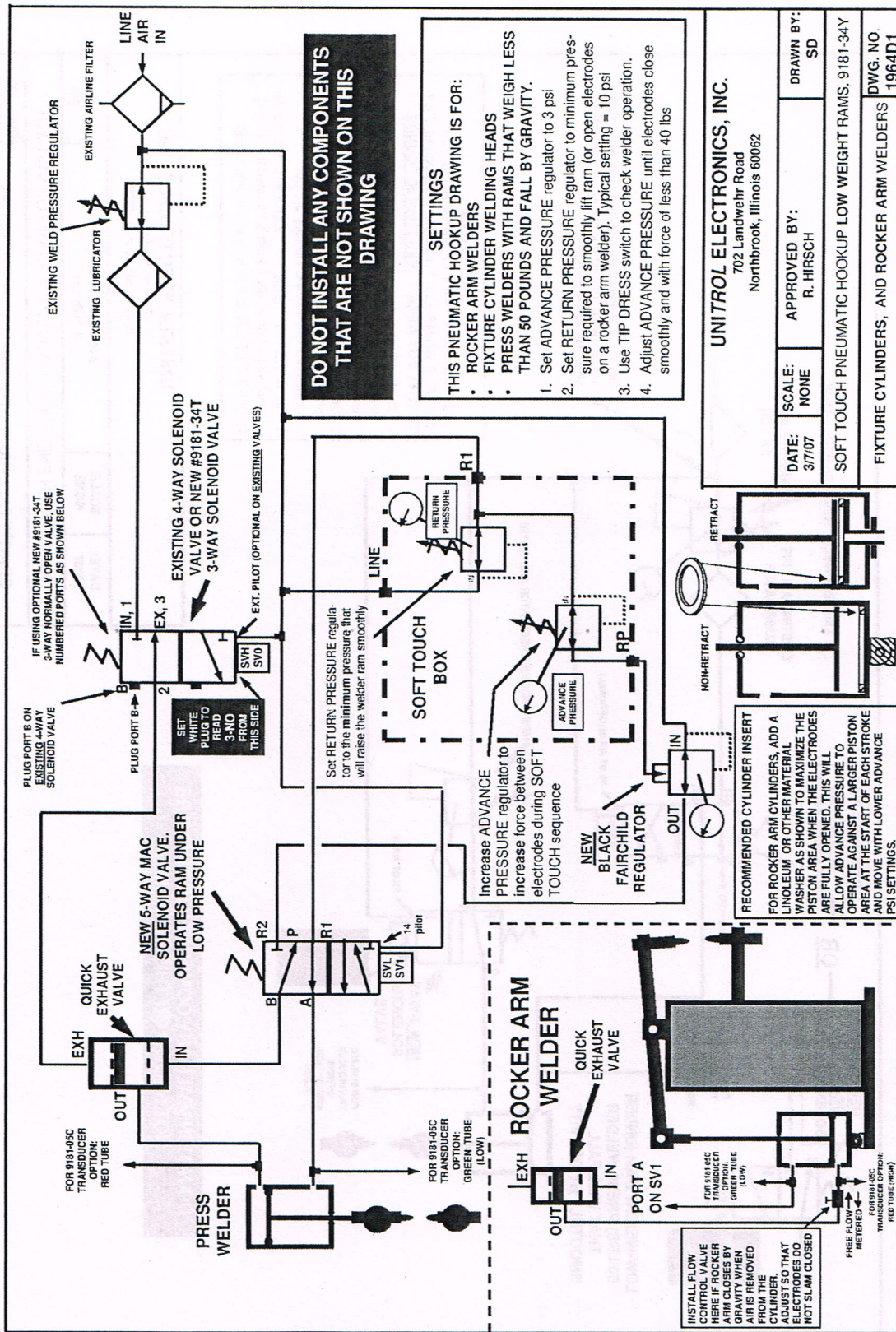
If you cannot reach these minimum conditions, contact the **UNITROL** service department M-F between 9:00 – 5:00 CT at 847-480-0115 for further instructions. Try to make this call using a cell phone or landline phone at the welder so that testing can be done during that conversation.



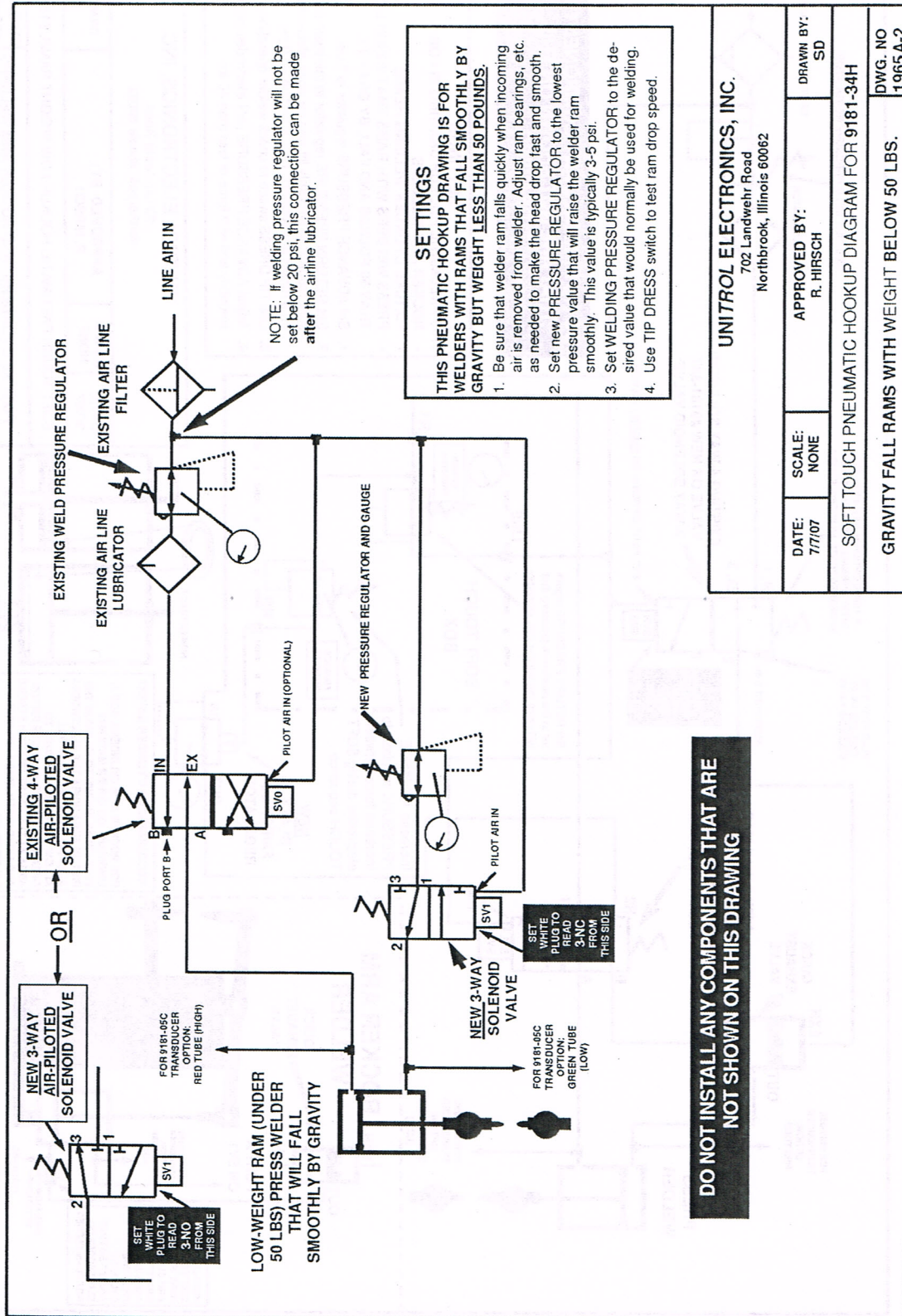
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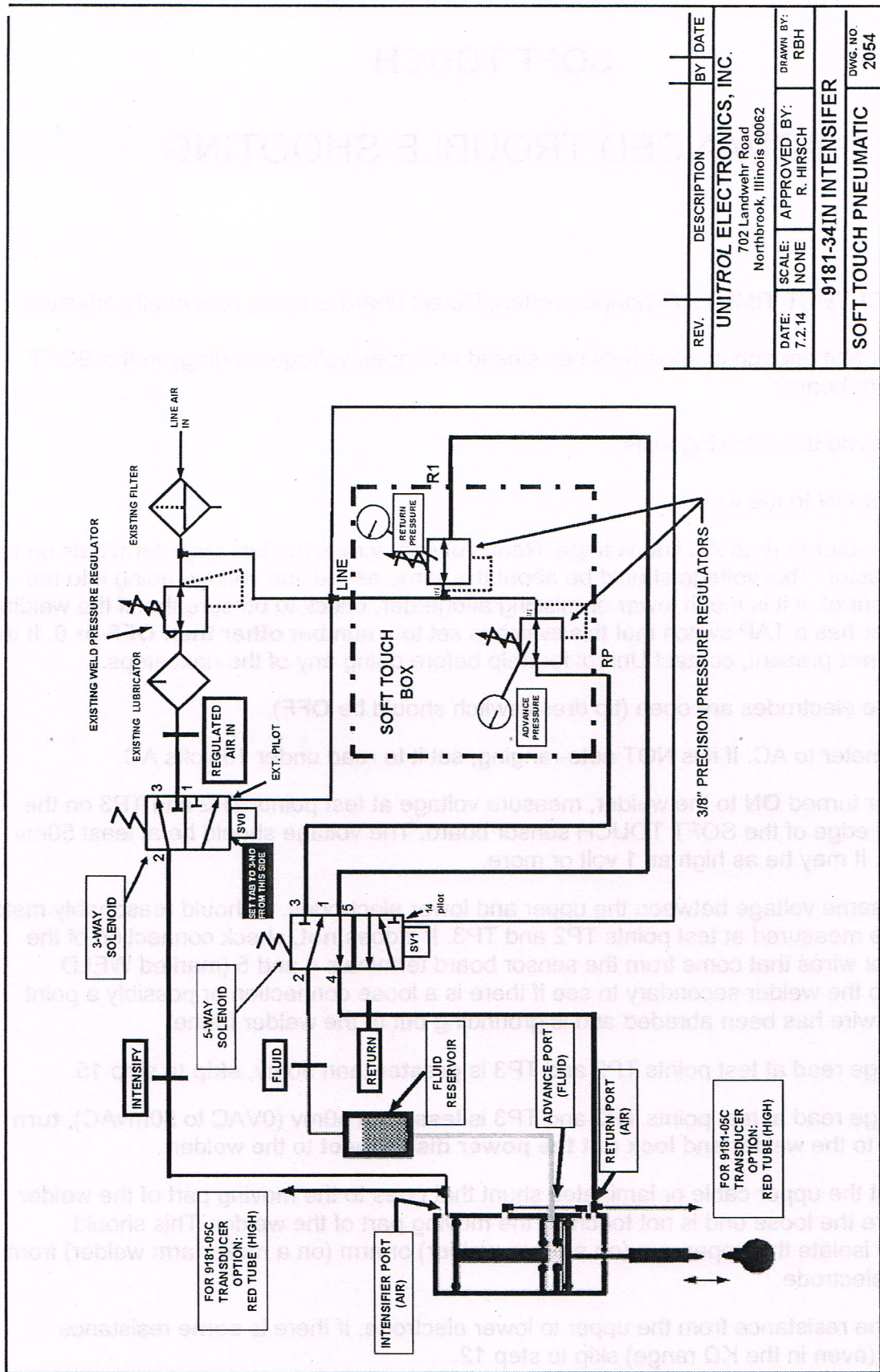


SOFT TOUCH



SOFT TOUCH





REV.	DESCRIPTION	BY	DATE
	UNITROL ELECTRONICS, INC. 702 Landwehr Road Northbrook, Illinois 60062		
DATE:	SCALE:	APPROVED BY:	DRAWN BY:
7.2.14	NONE	R. HIRSCH	RBH
9181-34IN INTENSIFIER			
SOFT TOUCH PNEUMATIC			DWG NO 2054

SOFT TOUCH

ADVANCED TROUBLE SHOOTING

PROBLEM: DETECT TIME OUT happens often. Detect board is being continually adjusted.

CAUSED BY: Not enough change between closed and open voltage readings in the SOFT TOUCH sensor board.

To confirm this do the following tests:

1. Turn power **ON** to the welder.
2. Set a volt meter to read AC line voltage. Read voltage across the two large terminals on the SCR contactor. This voltage should be about the same as the line voltage going into the welding control. If it is much lower or missing altogether, check to be sure that if the welding transformer has a TAP switch that this switch is set to a number **other than OFF or 0**. If this voltage is **not** present, contact Unitrol for help before doing any of the next steps.
3. Be sure the electrodes are open (tip dress switch should be **OFF**).
4. Set a voltmeter to AC. If it is NOT auto-ranging, set it to read under 10 volts AC.
5. With power turned **ON** to the welder, measure voltage at test points TP2 and TP3 on the lower right edge of the SOFT TOUCH sensor board. The voltage should be at least 50mv (.05 volts). It may be as high as 1 volt or more.
6. Read the same voltage between the upper and lower electrodes. It should reasonably match the voltage measured at test points TP2 and TP3. If it does **not**, check connection of the blue sensor wires that come from the sensor board terminals 4 and 5 (marked WELD ELECT.) to the welder secondary to see if there is a loose connection or possibly a point where the wire has been abraded and is grounding out to the welder frame.
7. If the voltage read at test points TP2 and TP3 is **greater** than 50mv, **skip** to step 15.
8. If the voltage read at test points TP2 and TP3 is **less** than 50mv (0VAC to 50mvAC), **turn power off** to the welder and **lock out the power disconnect** to the welder.
9. Disconnect the upper cable or laminated shunt that goes to the moving part of the welder and be sure the loose end is not touching the moving part of the welder. This should electrically isolate the upper ram (on a press welder) or arm (on a rocker arm welder) from the lower electrode.
10. Measure the resistance from the upper to lower electrode. If there is **some** resistance measured (even in the K Ω range) skip to step 12.

SOFT TOUCH

ADVANCED TROUBLE SHOOTING

11. If it is totally open (infinite resistance – meter does not move) then the moving part of the welder is properly insulated. In this case

- a. Reconnect the cable or laminated shunt to the moving part of the welder
- b. Install a second blue snubber (blue cylinder with two wire leads on one end marked STRC) **across** the SCR main terminals to increase the voltage signal measured with open electrodes. Leave the original snubber in place. There are 6-32 tapped holes in the SCR switch tangs for this purpose.
 - i. Note that if the voltage read in step 6 above was 0VAC, this would indicate a bad snubber. In this case, remove the original snubber and install a new one.
- c. Turn power to the welder **ON**.
- d. Measure AC voltage between test points TP2 and TP3. The voltage should be about double the original measurement before the new snubber was added.
- e. Skip to step 13.

12. If it is **not totally open** and has some reading, even in the K Ω range, then there is some conductive path that will cause SOFT TOUCH readings to be very low and make the system very sensitive requiring constant adjustments of the sensor board. You have to find what is causing this conductive path and remove it so that the SOFT TOUCH system will work properly. Check the following:

- a. Check all points of connection to the moving part of the welder to see if an insulator is missing, cracked, or if there is a build-up of metal powder or shavings that bridge the insulation.
 - i. Note that in some rocker arm welder designs the upper rocker arm is the path to ground, and the lower fixed arm is insulated from the frame.
- b. See if there is a buildup of grease that has some metal powder covering the insulated connection.
- c. Check to see if some component is attached to the moving part and the fixed part of the welder. This can be a metallic cable, an electrical wire, a steel wire of any kind, etc.
- d. On some press welders the upper crown is insulated from the frame to insulate the upper electrode from the welder frame. If an electrical component is mounted on the insulated upper frame, and the enclosure of this frame is connected to ground by wire or metallic cable (BX, etc.), this will establish a partial path to cause the problem with SOFT TOUCH. In this case this enclosure has to be insulated from the upper frame.

SOFT TOUCH

ADVANCED TROUBLE SHOOTING

- e. If a Grounding Reactor is installed across the welder secondary, remove one wire to the Grounding Reactor and see if this eliminates the resistance read earlier. If it does, contact Roger Hirsch at Unitrol.
 13. Once the problems above have been fixed, turn power back **ON** to the welder and measure again at test points TP2 and TP3 with the meter set to **AC**.
 14. With the electrodes open you should be reading a minimum of 50mv.
 15. Turn **ON** the TIP DRESS switch and this reading should go to almost 0V.
 16. If readings of step 12 and 13 are good, **the SOFT TOUCH board should be adjusted as normally done.**
 17. Set volt meter to read DC voltage.
 18. Connect the + lead to TP4 and the – lead to TP5.
 19. Read the voltage with the electrodes OPEN. It should be around +1VDC.
 20. Now turn the TIP DRESS switch to **ON** to close the electrodes on themselves (no metal between electrodes). Be sure that the electrodes are reasonably clean.
 21. Take another reading between TP4 and TP5. It should be at least -1.5VDC and could be as low as -3.5VDC. This is a normal swing.
 22. Turn the TIP DRESS switch to **OFF** to open the electrodes.
 23. Put typical metal parts that you would weld between the electrodes and turn the TIP DRESS switch to **ON** to clamp the part.
 24. Read voltage again between TP4 and TP5. This reading should be at least -1.5VDC (note this is a negative reading)
 25. If readings in step 21 and 24 are correct the system should be ready for operation.
- NOTE:** The voltages read at all test points will rise and fall with the changes in incoming line voltage. This is normal. **That is why the blue LED will not always stay on. This is normal as long as DC voltage read at TP4 and TP5 are a solid positive value with open electrodes and a solid negative value when the electrodes are closed on the work piece.**
26. Contact Unitrol if you cannot get the minimum voltages shown in the steps of these directions.

UNITROL ELECTRONICS, INC.

702 LANDWEHR ROAD

NORTHBROOK, IL 60062

847-480-0115

support@unitrol-electronics.com

SPECIAL OPTIONS

SOLUTION OPTION #9181-16

ELECTRONIC PRESSURE REGULATOR SYSTEM

PAGE 1 OF 3

HARDWARE:

This system consists of one $\frac{3}{4}$ " pressure regulator that uses a proportional 0-5VDC control signal to provide 0-99psi or 0-6.82bar (field selectable).

One voltage control board is supplied to operate this regulator. This control board is factory mounted inside the control box, and a cable is provided through the control wall to connect to the regulator.

An arrow is molded on each side of the regulator to indicate the proper direction, with the line pressure on the input of the arrow, and the line going to the solenoid valves on the output side of the arrow.

A digital readout is provided in each regulator.

OPERATION:

1. Before starting, be sure that this function is operating on your control. To do this, press: PROGRAM, 87, ENTER, 51. The display will show: VIP IS ON. Then it will show lines about SPAN. Just push the 0 for each question and exit out of this program.
2. Each welding program (1 – 75) in the SOLUTION's memory has an entry position for TIP FORCE. The SOLUTION control first subtracts HEAD WEIGHT (program 79) if any, and then divides the remainder by the LB/PSI (program 79). The result will be the required psi to achieve the selected TIP FORCE.
3. Enter a TIP FORCE number to represent about $\frac{1}{2}$ the maximum range of the welder. To do this, multiply the LB/PSI value entered by 50.
4. After data has been entered in a program and the SINGLE, NO WELD or REPEAT button has been pushed, the SOLUTION computer will calculate and display the required air pressure required to reach the selected TIP FORCE in that program.
5. The computer now sends a pulse width signal to the PULSE WIDTH TO VOLTAGE converter board (9180-PWC-2) mounted inside the control cabinet for each of the two channels.
 - a. You will see a red LED briefly light up on each board.
 - b. The signal length is: 10ms = 0 psi or 0 bar, 500ms = 99psi or 6.82 bar.
6. This pulse width signal is converted to a 0-5VDC output control signal that is sent to the outside proportional pressure regulators. This reference voltage controls the pressure output of the regulators, and the selected pressure can be shown on the readout.
 - a. For systems using a 4-20ma signal for the pressure regulator, the output of this board is sent to a module that converts 0-5VDC to 4-20ma.

ACCURACY: This system should have an accuracy of +/- .5psi or +/-0.4 bar.

SOLUTION OPTION #9181-16 ELECTRONIC PRESSURE REGULATOR SYSTEM

PAGE 2 OF 3

ADJUSTMENT OF SYSTEM:

The entire control has been calibrated prior to shipment from Unitrol. If it is desired to check the settings, first enter the desired TIP FORCE in the program. Then press the NO WELD button. The display will show the computed pressure, and then will send the PWM signal to the 9181-PWC-2 board.

The result will be displayed on the pressure regulator. If the readings are out of the accuracy range requested, the following calibration can be done:

Press: PROGRAM, 87, ENTER, 51. The display will show:

VIP IS ON
SPAN = #.## CHANGE1=YES,0=NO

This is the span adjustment to reach the desired reading on the regulator. The factory setting is typically 1.03.

If the pressure setting is LOWER than requested, INCREASE this setting .01 at a time.

If the pressure setting is HIGHER than requested, DECREASE this setting .01 at a time.

Press ENTER.

Repeat this procedure until the desired reading is shown on the pressure regulator.

USE WITH A 9181-05C DIFFERENTIAL PRESSURE TRANSDUCER: if a model 9181-05C pressure transducer has been furnished in this control, the two instruments have to work together to allow welding.

After the pressure regulator is adjusted for accuracy, press: PROGRAM, 96, ENTER. The display will show:

TRANSDUCER IS ON

Press STEP twice and the display will show:

CHECK INPUT?

PRESS 1=YES,0=NO

Press 1 to check the air pressure. The display will show:

PLEASE INITIATE

Press the foot pedal of the welder and the electrodes will close. If SOFT TOUCH is installed on this control, there will be a short delay before the full air pressure is put on the electrodes.

SOLUTION OPTION #9181-16

ELECTRONIC PRESSURE REGULATOR SYSTEM

PAGE 3 OF 3

Read the air pressure on the display. It should be 1psi **higher** than the requested number shown in step #4 on the previous page. This will allow the welder to operate without waiting for the last puff of air to enter the welding cylinder.

If the value read on the display is not reasonably within the +1psi reading, adjust the SPAN multi-turn potentiometer on the pressure transducer board until the value is reached.

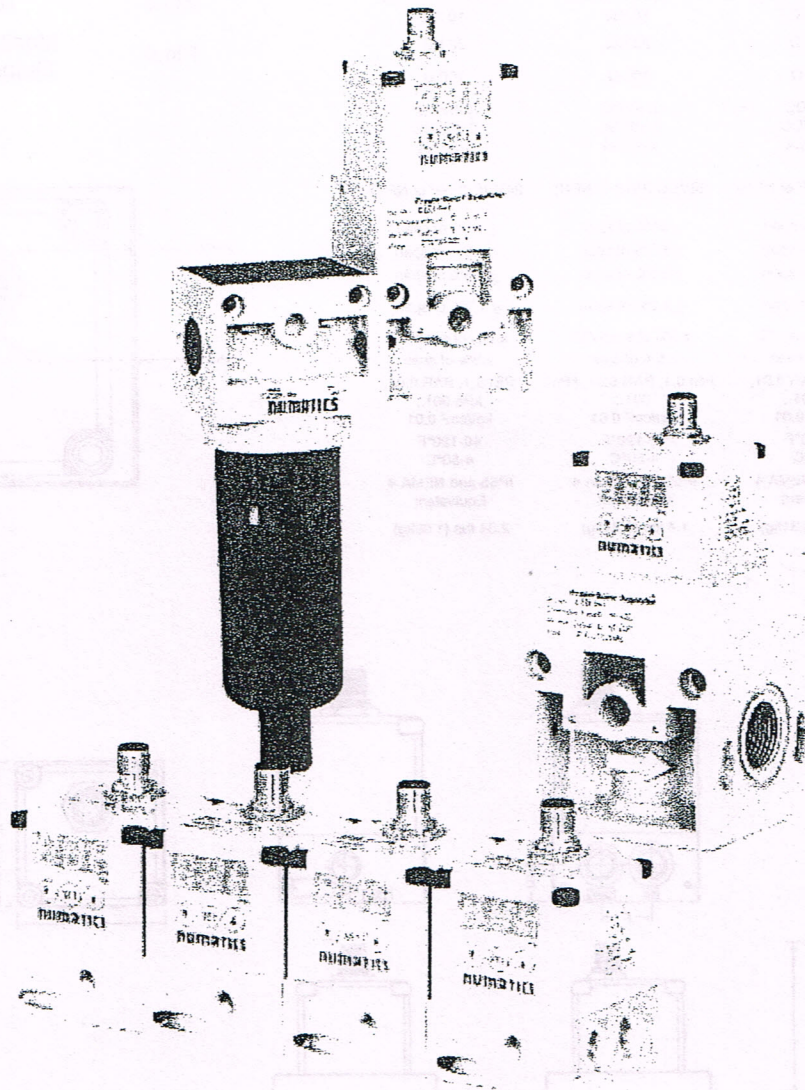
Check the reasonable accuracy at 5psi (TIP FORCE = 5 X LB/PSI), and 80psi (TIP FORCE = 80 X LB/PSI). Be sure that the electrodes and holders are strong enough for 80 psi. If not, use the highest value possible.

If the results are not acceptable, check the Unitrol web site: www.unitrol-electronics.com, click on the DOWNLOADS, and check the section on field calibrations for the transducer adjustment.

If you cannot regulate the system properly, contact the Unitrol service department for phone assistance.

E02/E22/E32 Series

Operation Manual



numatics

www.numatics.com

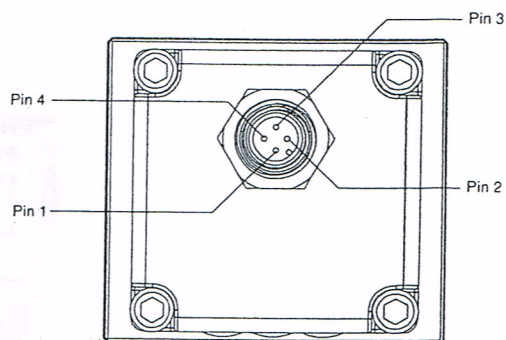
Specifications:

	E02	E22	E32
Minimum Supply Pressure	Set Pressure + 15 PSI (1 BAR)	Set Pressure + 15 PSI (1 BAR)	Set Pressure + 15 PSI (1 BAR)
Maximum Supply Pressure	Standard Pressure: 150 PSI (10 BAR) High Pressure: 190 PSI (13 BAR)	Standard Pressure: 150 PSI (10 BAR) High Pressure: 190 PSI (13 BAR)	Standard Pressure: 150 PSI (10 BAR) High Pressure: 190 PSI (13 BAR)
Regulating Pressure Ranges	Standard Pressure: 0-100 PSI (0-6.9 BAR) High Pressure: 0-150 PSI (0-10.2 BAR)	Standard Pressure: 0-100 PSI (0-6.9 BAR) High Pressure: 0-150 PSI (0-10.2 BAR)	Standard Pressure: 0-100 PSI (0-6.9 BAR) High Pressure: 0-150 PSI (0-10.2 BAR)
Power Supply	Voltage 24VDC $\pm 10\%$	Voltage 24VDC $\pm 10\%$	Voltage 24VDC $\pm 10\%$
Current Consumption	0.04 A	0.04 A	0.04 A
Input Signal	Current 4-20mA	Current 4-20mA	Current 4-20mA
Voltage	0-5VDC, 0-10VDC	0-5VDC, 0-10VDC	0-5VDC, 0-10VDC
Input Impedance	10 K Ω	10 K Ω	10 K Ω
0-10 VDC	20 K Ω	20 K Ω	20 K Ω
4-20 mA	100 Ω	100 Ω	100 Ω
Output Signal	Analog 0-5VDC 0-10VDC 4-20mA	Analog 0-5VDC 0-10VDC 4-20mA	Analog 0-5VDC 0-10VDC 4-20mA
Switch Output	24VDC (PNP or NPN)	24VDC (PNP or NPN)	24VDC (PNP or NPN)
Linearity	$\leq \pm 1\%$ of span	$\leq \pm 1\%$ of span	$\leq \pm 1\%$ of span
Hysteresis	$\leq \pm 0.5\%$ of span	$\leq \pm 0.5\%$ of span	$\leq \pm 0.5\%$ of span
Repeatability	$\leq \pm 0.5\%$ of span	$\leq \pm 0.5\%$ of span	$\leq \pm 0.5\%$ of span
Sensitivity	$\leq \pm 0.2\%$ of span	$\leq \pm 0.2\%$ of span	$\leq \pm 0.2\%$ of span
Temp Characteristics	$\pm 0.5\%$ of span / $^{\circ}\text{C}$	$\pm 0.5\%$ of span / $^{\circ}\text{C}$	$\pm 0.5\%$ of span / $^{\circ}\text{C}$
Accuracy	$\pm 0.5\%$ of span	$\pm 0.5\%$ of span	$\pm 0.5\%$ of span
Output Display	PSI 0.1, BAR 0.01, kPa 001., kgf/cm 2 0.01	PSI 0.1, BAR 0.01, kPa 001., kgf/cm 2 0.01	PSI 0.1, BAR 0.01, kPa 001., kgf/cm 2 0.01
Minimum unit			
Temperature Range	40-120 $^{\circ}\text{F}$ 4-50 $^{\circ}\text{C}$	40-120 $^{\circ}\text{F}$ 4-50 $^{\circ}\text{C}$	40-120 $^{\circ}\text{F}$ 4-50 $^{\circ}\text{C}$
Enclosure	IP65 and NEMA 4 Equivalent	IP65 and NEMA 4 Equivalent	IP65 and NEMA 4 Equivalent
Weight	0.68 lbs (0.31kg)	1.4 lbs (0.64kg)	2.34 lbs (1.06kg)

Pin Configuration:

Pin Configuration

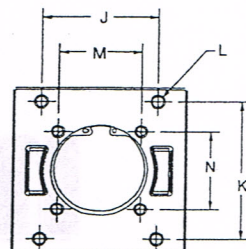
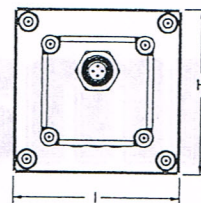
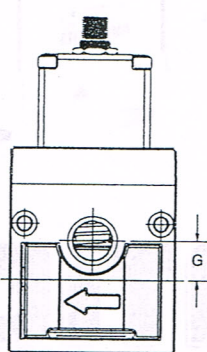
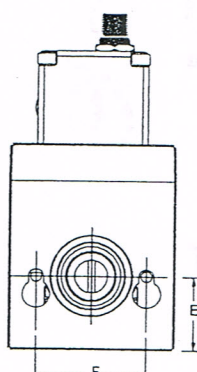
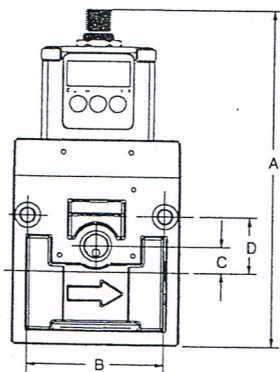
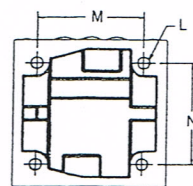
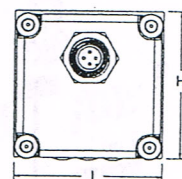
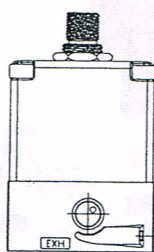
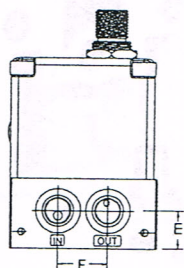
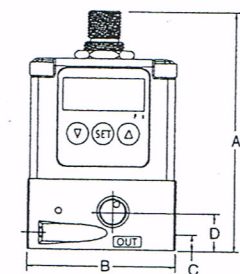
	Command Signal	Digital
Pin 1	+24VDC	
Pin 2	Command Signal	Input Signal 1
Pin 3	+0VDC common	
Pin 4	Monitor Output	Input Signal 2



1

2

Dimensions:



Dimensions	A	B	C	D	E	F	G	H	I	J	K	L	M	N
E02	3.33 (85)	2.05 (52)	0.23 (6)	0.53 (13)	0.53 (13)	0.70 (18)	NA	2.05 (52)	2.05 (52)	NA	NA	0.80 (20)	1.42 (36)	1
E22	5.57 (141)	1.83 (46)	0.29 (7)	.70 (18)	1.00 (25)	1.58 (40)	0.70 (18)	2.17 (55)	2.38 (60)	1.70 (43)	1.80 (46)	0.19 (5)	1.42 (36)	1.42 (36)
E32	6.09 (155)	2.45 (62)	0.47 (12)	1.01 (26)	1.35 (34)	2.00 (51)	0.71 (18)	3.00 (76)	3.00 (76)	2.00 (51)	2.50 (64)	0.19 (5)	1.42 (36)	1.42 (36)

Analog

Initial Settings Mode

Hold SET for 3 sec)

Units:

P= PSI

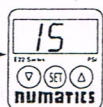
B= BAR

A = Kpa

F = Kg/cm²

Zero Setting

Span Setting

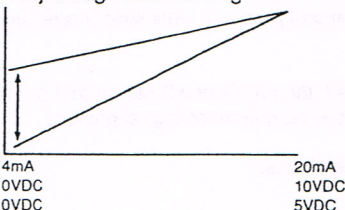


U-P

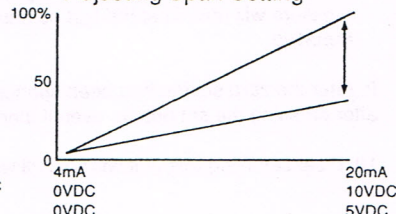
0

SP

Adjusting Zero Setting



Adjusting Span Setting



Advanced Settings Mode

(Hold SET for 10 sec)

Operation Mode:

S= Standard

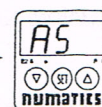
F= Fast

A= Accurate

Reverse Function:

0= off

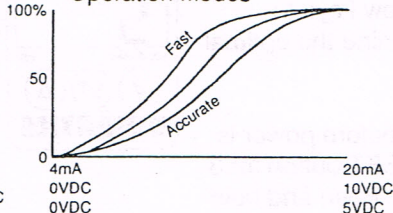
1= on



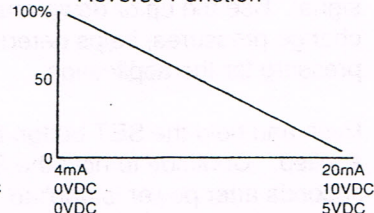
0-5

ro0

Operation Modes



Reverse Function



Hold the set button for 3 seconds or until "15" is displayed. Once the set button is released the unit of measure is displayed as "U-P". To select the desired unit, scroll using the up or down arrow buttons. Once the appropriate unit is displayed, press the set button, which prompts the zero setting. This is shown by flashing between a left justified zero and a right justified setting. Use the up or down arrow buttons to select the desired minimum pressure. Press the set button to store the zero setting and prompts the span setting shown by flashing between "SP" and the setting. Use the up or down arrow buttons to select the span setting. Finally press the set button to store the span setting and return to normal operation.

4

Hold the set button for 10 seconds or until "AS" is displayed. Once the set button is released the operation mode is displayed as "0-5". Use the up or down arrow buttons, to select the optimal operation mode. The best mode will be determined by the application. Generally, the accurate mode should be used when response time is less critical than accuracy and the fast mode should be used when the response time is more critical than accuracy. Press the set button to store the appropriate operation mode and prompts the reverse function, displayed as "ro0". Use the up or down arrow buttons to turn the reverse function on or off. Finally, press the set button to store the reverse function and return to normal operation.

5

Digital

Initial Settings Mode

(Hold SET for 3 sec)

Units:

P= PSI

B= BAR

A = Kpa

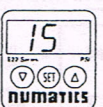
F = Kg/cm²

P1 Setting

P2 Setting

P3 Setting

P4 Setting



U-P

P1

P2

P3

P4

Pressure	P1	P2	P3	P4
Pin 2				
Input Signal 1	OFF	ON	OFF	ON
Pin 4				
Input Signal 2	OFF	OFF	ON	ON

Advanced Settings Mode

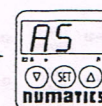
(Hold SET for 10 sec)

Operation Mode:

S= Standard

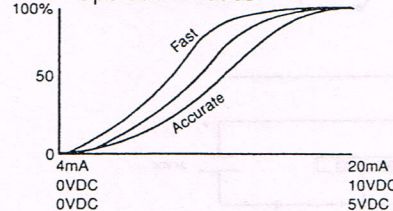
F= Fast

A= Accurate



0-5

Operation Modes



Hold the set button for 3 seconds or until "15" is displayed. Once the set button is released the unit of measure is displayed as "U-P". To select the desired unit, scroll using the up or down arrow buttons. Once the appropriate unit is displayed, press the set button, which prompts the first pressure point settings. The prompt is shown by flashing between a left justified "P1" and the right justified setting. Use the up or down arrow buttons to select the desired pressure set point. Press the set button to store the "P1" setting and prompts the next pressure set point. Use the same procedure to set the remaining three pressure set points. After "P4" is set, pressing the set button will store the setting and return to the normal operation mode.

6

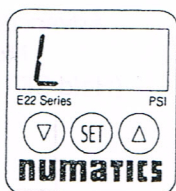
Hold the set button for 10 seconds or until "AS" is displayed. Once the set button is released the operation mode is displayed as "0-5". Use the up or down arrow buttons, to select the optimal operation mode. The best mode will be determined by the application. Generally, the accurate mode should be used when response time is less critical than accuracy and the fast mode should be used when the response time is more critical than accuracy. Press the set button to store the appropriate operation mode and returns to normal operation.

7

Locked Mode

Prevents any unintentional changes in the settings

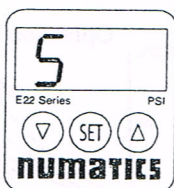
Press and hold the up and down arrow buttons for 10 seconds to activate the locked mode with "L" will be displayed by a "L". To unlock the display, press and hold the up and down arrow buttons for 10 seconds until the "U" is displayed.



Self-Test Mode

Allows for manual operation without a control signal. Use the up or down arrow keys to change pressures, helps determine the optimal pressure for the application.

Push and hold the SET button before power is applied. Continue to hold the SET button for 3 seconds after power is applied. Push and hold the UP and DOWN buttons for 10 seconds.



Notes:

1. This product is not intended to be used as a safety device to protect life or prevent injury.
2. Misapplication of this product could result in injury or equipment damage.
3. Supply air must be filtered to 5µ or less and free of moisture and lubricants.
4. Before installation, flush piping to insure that it is free of oil, pipe scale, rust, etc.
5. When using sealing tape, leave 1 ½ or 2 threads bare to prevent contamination.
6. Operating device without supply pressure for prolonged periods of time could result in internal damage.
7. When the monitor output is not used, use proper shielding to protect the contacts.
8. Unless otherwise specified, when power is removed from the unit, output pressure will remain at the last commanded pressure, until supply pressure is removed.
9. After the zero setting has been changed, the regulator will output that pressure after pressing the set button, even if there is no command signal present.
10. Disassembling this unit will void all warranties.

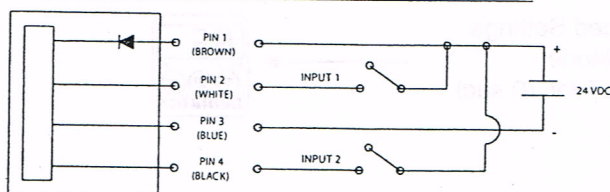


Attention Self-Test Mode will cause output pressure to change without a command signal. This may cause unexpected motion and/or unsafe conditions

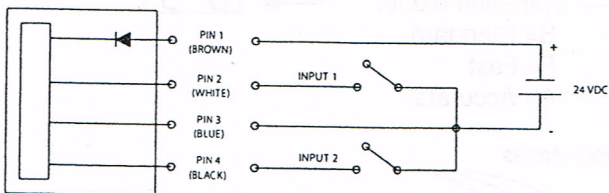
8

Wiring Diagrams:

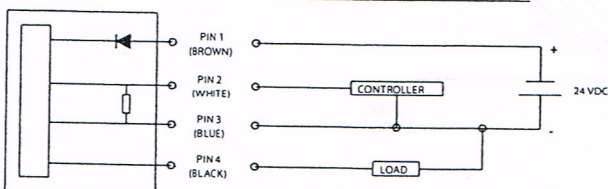
2 BIT, 4 PRESSURE SELECT WITH PNP INPUTS



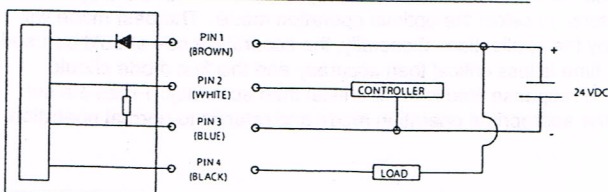
2 BIT, 4 PRESSURE SELECT WITH NPN INPUTS



ANALOG INPUTS WITH A PNP OUTPUT



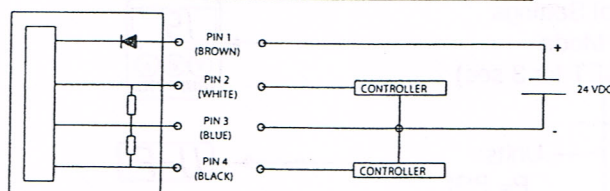
ANALOG INPUTS WITH A NPN OUTPUT



10

9

ANALOG INPUTS WITH ANALOG OUTPUTS



How to Order:

E 22 3 - 04 3 H

Series
 02 = 02 Series
 22 = 22 Series
 32 = 32 Series

Input Signal
 1 = 4 - 20mA
 2 = 0 - 5VDC
 3 = 0 - 10VDC
 9 = 2 bit, 4 pressure select (PNP sourcing)
 0 = 2 bit, 4 pressure select (NPN sinking)

Thread Types
 - = NPTF
 G = GTAP (BSPP)
 R = PT (BSPT)

Options
 H = 0 - 150 PSI (10 BAR) regulating pressure range (For 0-100 PSI standard unit no suffix necessary)

Feedback Signal
 1 = 4 - 20mA
 2 = 0 - 5VDC
 3 = 0 - 10VDC
 8 = 24VDC Switched (PNP)
 9 = 24VDC Switched (NPN)
 0 = use with 2 bit, 4 pressure select (type 9 or 0 input signal)

Port Tap Size
 01 = 1/8 (E02 Series Only)
 02 = 1/4 (E22 Series Only)
 03 = 3/8 (E22 Series Only)
 04 = 1/2 (E22 & E32 Series Only)
 06 = 3/4 (E32 Series Only)

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