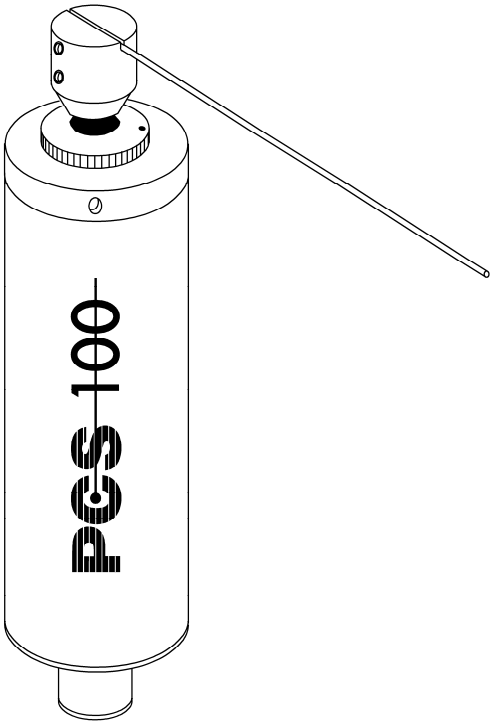
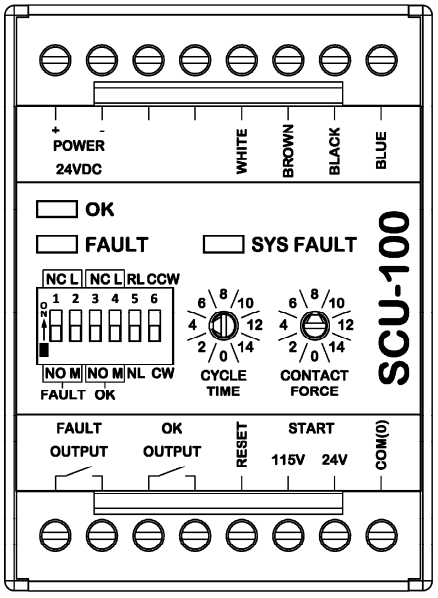
PCS-100 System

Installation Instructions





Made in the USA

PCS-100 System Specifications

SCU-100:
Control

Input:	24VDC, 250mA
Relay Outputs:	2A, 250VAC *general use*
Ambient Temp:	55°C
Wiring Terminals:	18-14AWG *stranded copper wire only, 7 lb/in Torque. One wire per terminal.*
Housing Material:	Polycarb UL94V1
Terminal Material:	Polycarb UL94V2
Mounting:	35mm DIN Rail

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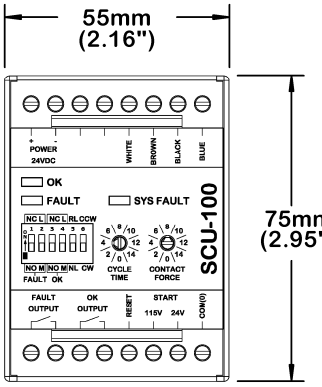
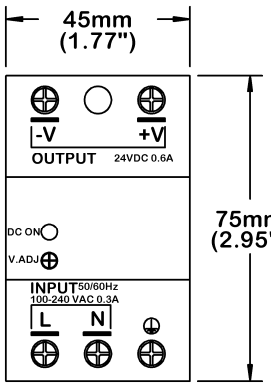
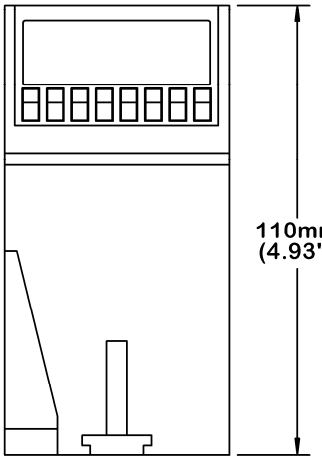
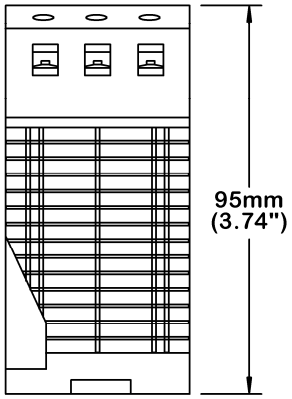




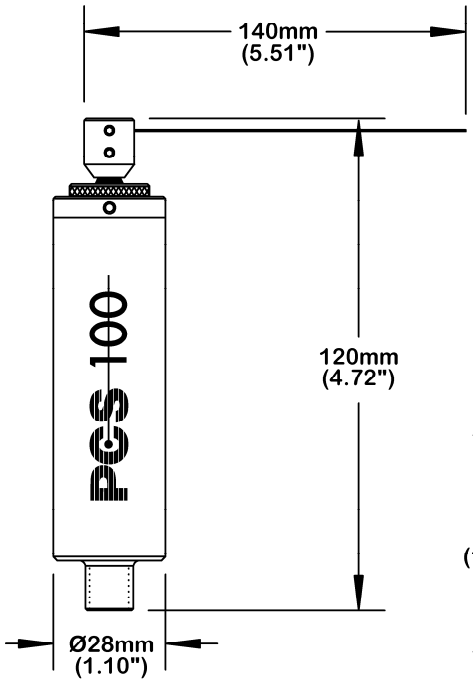




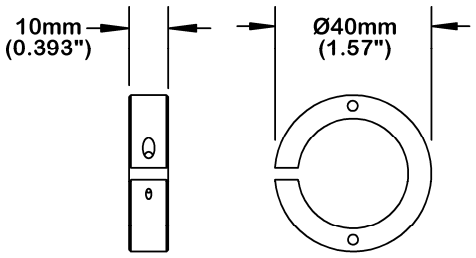
PS-1000:
Power Supply *(optional)*

Input Voltage:	110-240VAC
Output Voltage:	24VDC
Output Power:	15W
Operating Temp:	0-55°C
Mounting:	35mm DIN Rail

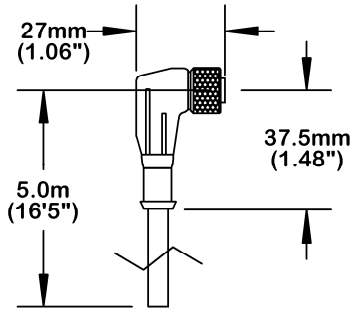
Note: The PS-1000 is available for customers with 110-240VAC applications, and it is sold separately.



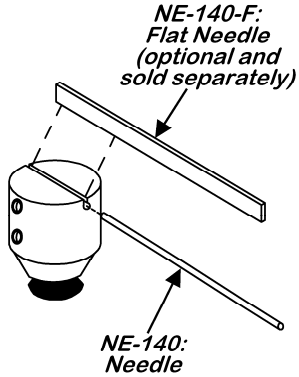
PCS-100:
Sensor



CS-6000:
Clamping Sleeve



SC-0500:
Sensor Cable



SA-5000:
Swing Arm Assembly

1. General use / description

The PCS-100 System consists of two main components; a PCS-100 "Sensor" (Positive Contact Sensor) and an SCU-100 "Control" (Sensor Control Unit). The Sensor is mounted in close proximity to the tool which is to be monitored, while the Control is mounted in the machine electrical cabinet.

The Sensor monitors tool presence by light physical contact of the tool with the Needle in the Swing Arm Assembly. If the tool is present, the Needle will contact the tool and return to its start position. This condition will be interpreted as an Ok condition, and the machine cycle will be allowed to continue.

Conversely, if the tool is broken, the Needle will swing past the broken tool to the swing angle end position. This condition will immediately be interpreted as a Fault condition, and the Control will send the appropriate stop output to the machine.

2. Determine the mounting position

Determine where you will mount the Sensor. This will depend on the space available and the tooling configuration of your machine. Some of the variables are listed below:

a) Preference for clockwise (CW) or counter clockwise (CCW) swing direction.

b) Swing angle – the amount of angular travel of the Swing Arm Assembly. The most common swing angle selection is 90°, as shown in Figure 1. The maximum swing angle is 175° in either CW or CCW swing direction.

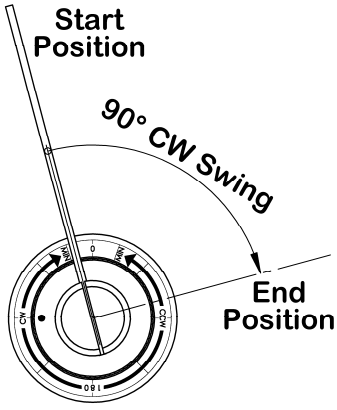


Figure 1: 90° CW swing angle

c) You will need to fabricate a mounting bracket to hold the Sensor in place. Should you choose to mount the Sensor using the CS-6000 Clamping Sleeve provided with each PCS-100 System, drill holes in your bracket per Figure 2.

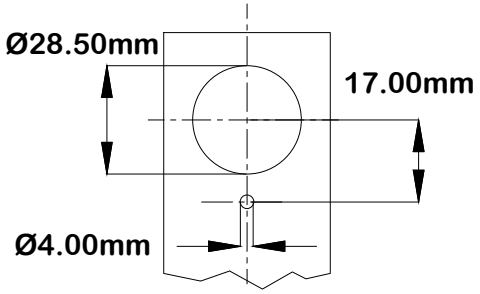


Figure 2: Hole diagram

d) You may keep the standard Needle length (as shown in Figure 3), shorten the Needle, or purchase a longer Needle (up to 8").

e) If a straight Needle does not suit your needs, the Needle may be bent into any desired configuration (ex: to swing past an obstruction). Two examples are shown in Figure 4.

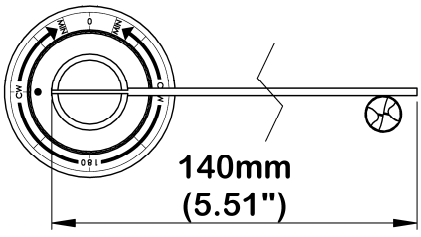


Figure 3: Needle length

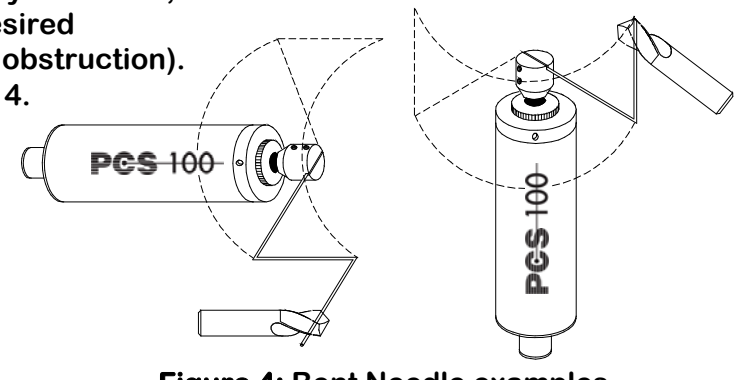


Figure 4: Bent Needle examples

3. Install the mounting bracket and mount the Clamping Sleeve

The Clamping Sleeve is used to hold the Sensor, and allows for attachment to the mounting bracket fabricated by the customer. Each Clamping Sleeve is packaged with a screw and nut which can be used to mount the Clamping Sleeve to the mounting bracket. Figure 5 illustrates a typical mounting example.

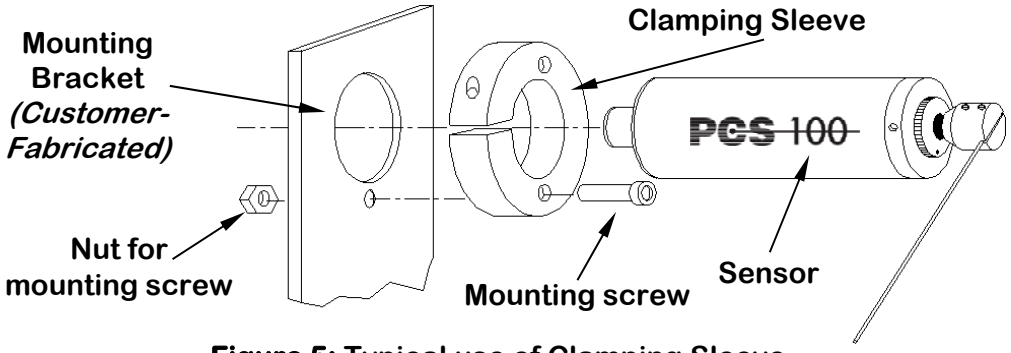


Figure 5: Typical use of Clamping Sleeve

4. Loosen and remove the Swing Arm Assembly

If you have already mounted the Swing Arm Assembly, we recommend removing it at this point. Use a 1.5mm hex key to loosen the two opposing set screws on the Swing Arm Assembly (indicated "A" in Figure 6) and slide the Swing Arm Assembly off the Sensor.

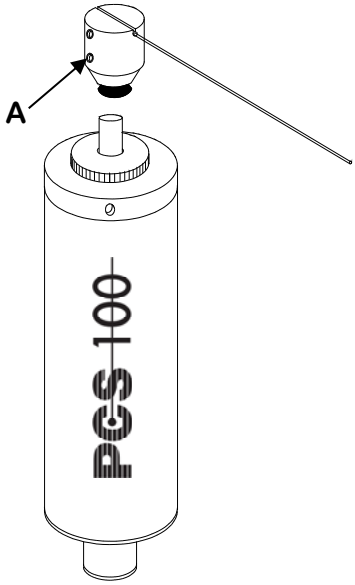
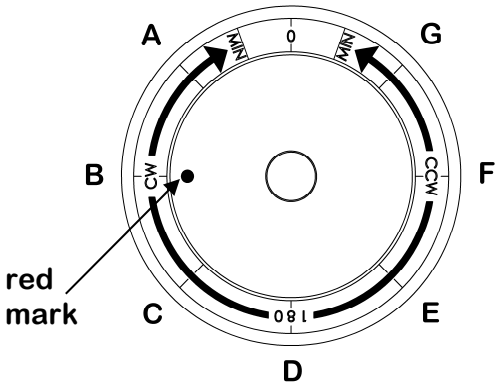


Figure 6: Swing Arm set screws

5. Set swing direction and swing angle

The PCS-100 Sensor features an adjustable swing angle which can be set between 5° and 175° in either a CW or CCW direction. The Sensor can be preset at the factory to your specifications. If you did not specify a swing direction and swing angle in your order, the Sensor is set to 90° CW (as shown in Figure 7). Swing direction and swing angle are established by referencing the red mark on the knurled adjusting ring while looking at the shaft of the Sensor straight on. There are lines indicating each 45° increment as illustrated in Figure 7.



A = CW 45°
B = CW 90°
C = CW 135°
D = CW/CCW 180°
E = CCW 135°
F = CCW 90°
G = CCW 45°

Figure 7: Swing direction and angle selection

To change the swing direction or swing angle, loosen the set screw (indicated "A" in Figure 8) until the knurled adjusting ring (indicated "B" in Figure 8) can be manually rotated.

Turn the adjusting ring to the desired swing angle in either the CW or CCW field. If you are changing swing direction (CW/CCW) always move away from the "zero zone" indicated in Figure 9, and **PAST** the 180° mark (by at least 5°). Once you have passed the 180° mark, the Sensor will operate in the CW or CCW field it is in. **The adjusting ring will not move through the "zero zone".** Once the desired swing direction and swing angle are set, tighten set screw "A".

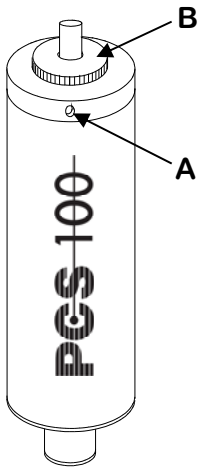


Figure 8: Swing angle adjustment

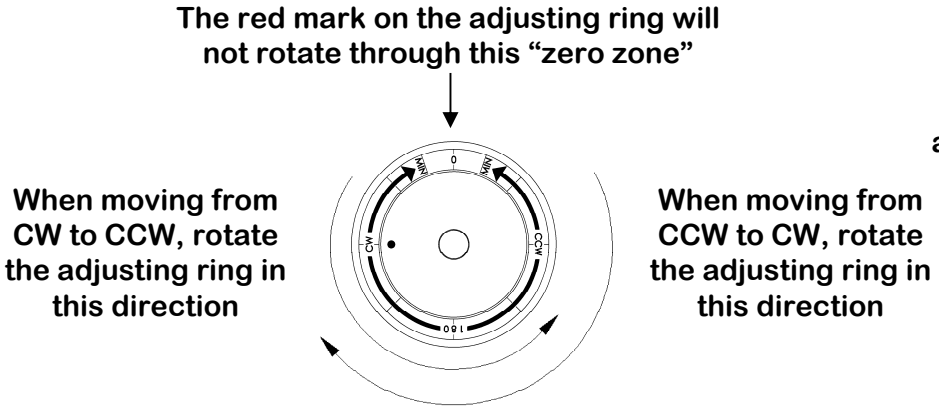


Figure 9: Adjusting ring movement

6. Mount the Sensor in the Clamping Sleeve and connect the Sensor Cable

Slip the Sensor into and through the Clamping Sleeve. Connect the Sensor Cable to the Sensor and then rotate the Sensor in the Clamping Sleeve so the connector points in the desired direction. Be sure the Sensor Cable is properly positioned to avoid any interference with the machine operation. Note: If the Sensor Cable needs to be re-positioned while attached to the Sensor, rotate the entire Sensor to avoid damage to the connector.

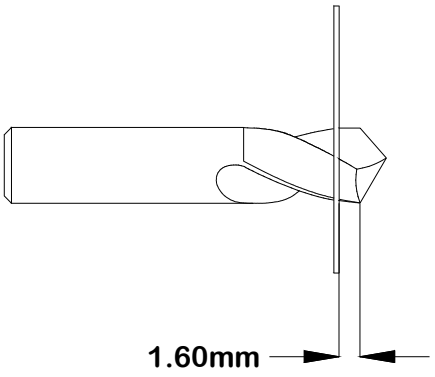


Figure 10: Needle alignment

Temporarily reinstall the Swing Arm Assembly. Move the Sensor forward or backward to position the Needle so that it will contact the tool as shown in Figure 10. Once the Needle is properly located, tighten the Clamping Sleeve fastener to secure the Sensor to the Clamping Sleeve and mounting bracket.

Verify that Needle extends past the centerline of the tool. If this is not the case, you may need to: reposition the needle in the swing arm assembly, choose a different location for the Sensor, or purchase a longer needle.

Once the needle is in the correct location, remove the Swing Arm Assembly.

7. Install the Control

Mount the SCU-100 Control in the electrical cabinet using either the 35mm DIN Rail mount or with two screws/bolts through the two holes on the bottom of the Control. Make the appropriate electrical connections, referencing Page 6 for Terminal Descriptions and Page 8 for Sample Wiring Diagrams. Should your installation use a supply voltage of 110-240VAC, the use of a separate power supply will be necessary. Our optional PS-1000 (sold separately) can be used to provide the required 24VDC to the Control.

8. Set CW or CCW switch on the Control

Set the CW/CCW switch on the Control to the setting that corresponds with the swing direction selected during the Sensor set-up.

9. Power-on the Control

Once power has been supplied to the Control, the Sensor will rotate to its start position and await a Start Input.

10. Re-install the Swing Arm Assembly

Re-install and fasten the Swing Arm Assembly such that the Needle will contact the tool anywhere between the start position of the Needle and the end position of the Needle as illustrated in Figure 11. It is important to stay at least 5° away from the end position.

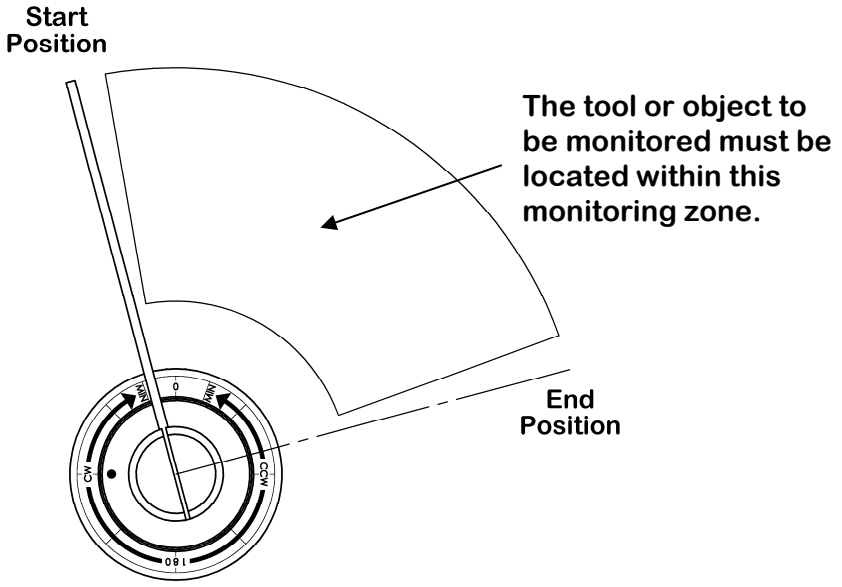


Figure 11: Example of monitoring zone with a 90° CW swing

11. Check your installation

Provide a Start Input to the Control to start a sensing cycle. If the Swing Arm Assembly was installed properly and an adequate swing angle was selected, the Needle will contact the tool and return to its start position (the green OK LED on the Control will illuminate). Next simulate a broken tool by removing the tool and providing another Start Input. The Needle will travel through its full swing angle to the end position (the red FAULT LED on the Control will illuminate).

SCU-100 Terminal Descriptions

Terminals 1 & 2: 24VDC input – used to power the SCU-100 Control. Note that terminal 1 is positive (+) and terminal 2 is negative (-). A minimum supply of 250mA is required. When powering the Control with an existing 24VDC power supply, confirm that the power supply is capable of the additional output capacity required to power the Control.

Terminals 3 & 4: Not used.

Terminals 5, 6, 7 & 8: Sensor Cable connection - colors indicated correspond to wire colors of Sensor Cable. The preferred method is to connect the Sensor Cable directly from the Sensor to the Control. If the Sensor and Control need to be connected via external junction box, avoid wiring near electromagnetic or high current devices.

DO NOT connect the braided shield in the supplied Sensor Cable to the machine ground!

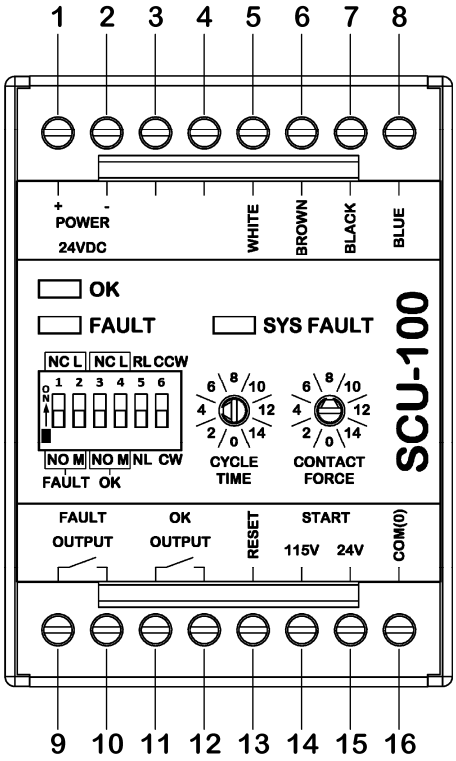


Figure 12: Terminal numbers

Terminals 9 & 10: Fault Output - dry contacts (internal relay) capable of switching up to 2A @ 250VAC. The contact operation can be configured (NO/NC and Momentary/Latch), thereby eliminating the need for peripheral devices for interfacing with the Control (see Relay Control Switches, page 7).

Terminals 11 & 12: Ok Output - dry contacts (internal relay) capable of switching up to 2A @ 250VAC. The contact operation can be configured (NO/NC and Momentary/Latch), thereby eliminating the need for peripheral devices for interfacing with the Control (see Relay Control Switches, page 7).

Terminal 13: Reset Input *(optional)* - used to reset the Control after a Fault or System Fault condition has been detected. The required input is + 24VDC (referenced to terminal 16, common) for a minimum of 100ms.

Note about Reset: The Start Input can also be used as a Reset function. After the error condition has been corrected (replace broken tool), applying a Start Input will cause the Sensor to begin the sensing cycle; touching and confirming that the tool has been replaced, thus resetting the Fault or System Fault condition.

Terminals 14, 15 & 16: Start Input - used to activate the sensing cycle. Terminal 16 is the common for either a 115VAC start signal (terminal 14) or a 24VDC start signal (terminal 15). The Control recognizes a change of state in the circuit to activate the sensing cycle. A minimum duration of 100ms is required regardless of the of the signal utilized: (high-low-high) or (low-high-low).

Note about Inputs: Certain solid state devices may output a small amount of current in their off (low) state. Depending on the operating characteristics of these devices, the Control may not recognize a change of state. If this condition occurs in your application you may need to incorporate an external relay to activate the Start/Reset Inputs.

SCU-100 LEDs and Switches

OK LED: Illuminates green to indicate power-on. Upon receiving a Start Input, the OK LED will momentarily turn off. At the end of the sensing cycle, the OK LED illuminates to indicate an Ok condition (unbroken tool) has been detected.

FAULT LED: Illuminates red to indicate a Fault (or broken tool) condition has been detected.

SYS FAULT LED: Flashes red to indicate a System Fault. This is an error condition of the Control, Sensor, and/or Sensor Cable which must be remedied prior to correct operation of the PCS-100 System.

Default Settings: The default switch settings of all 6 dip-switches down/off, Cycle Time setting 4 and Contact Force setting 8 (as shown in Figure 13) are appropriate for the vast majority of installations. The following describes the function of these switches should your installation require deviation from the default settings.

Relay Control Switches: Configure the Fault Output and Ok Output (NO/NC and Momentary/Latch). Switches 1 & 2 control the Fault Output and switches 3 & 4 control the Ok Output of the Control as follows:
- NC = Normally Closed
- NO = Normally Open
- L = Latched
- M = Momentary

NL / RL Switch: Selects the operating mode and logic of the Control as follows:
- RL = Reverse logic (free space monitoring)
- NL = Normal logic (object monitoring)

CW / CCW Switch: Selects the rotation that the Sensor swings towards the tool during the sensing cycle. This setting **MUST** correspond with the swing direction set on the Sensor.

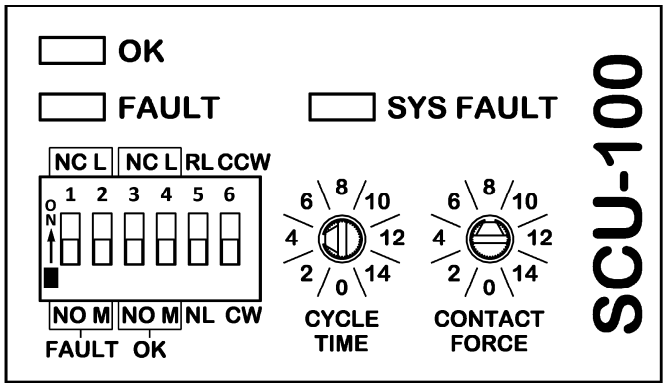


Figure 13: LEDs and switches

Cycle Time Switch (Rotary): Varies the amount of time the Needle is allowed to rotate during a sensing cycle. There are 15 discrete Cycle Time settings, as well as a 0 position which does not function (indicated by a System Fault). Choosing Cycle Time setting 1 enables the shortest time, and the length of time increases with each higher setting, up to the longest time enabled by choosing setting 15.

As the swing angle is increased and/or the Contact Force setting is decreased, the Needle will require more time to reach the end position. These are just two examples of situations needing a higher Cycle Time setting.

When adjusting the Cycle Time setting, the best practice is to select at least one higher Cycle Time setting than the minimum required to produce a Fault condition (with the tool removed). This provides a cushion to accommodate minor changes in machine environment and swing angle.

Contact Force Switch (Rotary): Varies the amount of Contact Force the Needle has with the tool during a sensing cycle. There are 15 discrete Contact Force settings, as well as a 0 position which does not function (indicated by a System Fault). Choosing Contact Force setting 1 enables the lowest Contact Force, and the Contact Force increases with each higher setting, up to the highest Contact Force enabled by choosing setting 15. **NOTE**: depending on your specific set-up, the lowest Contact Force settings may not provide adequate force to produce a Fault condition with the tool removed – it is imperative to check this condition with your specific set-up at the time of installation and again during production.

The Contact Force settings have been tuned as follows:
- Settings 1-6 are specifically tuned for Micro Tools
- Setting 7 has been tuned for applications requiring less Contact Force than usual
- Setting 8 has been tuned for the typical application
- Settings 9-12 have been tuned for applications requiring more Contact Force than usual
- Settings 13-15 have been tuned for extreme situations (such as sticky coolant, extremely long needles swinging “up-hill”, etc.)

When adjusting the Contact Force setting, the best practice is to select at least one higher Contact Force setting than the minimum required to produce a Fault condition (with the tool removed). This provides a cushion to accommodate minor changes in machine environment and swing angle.

SCU-100 Sample Wiring Diagrams

Figures 14 and 15 illustrate basic wiring diagrams for two common machine voltages.

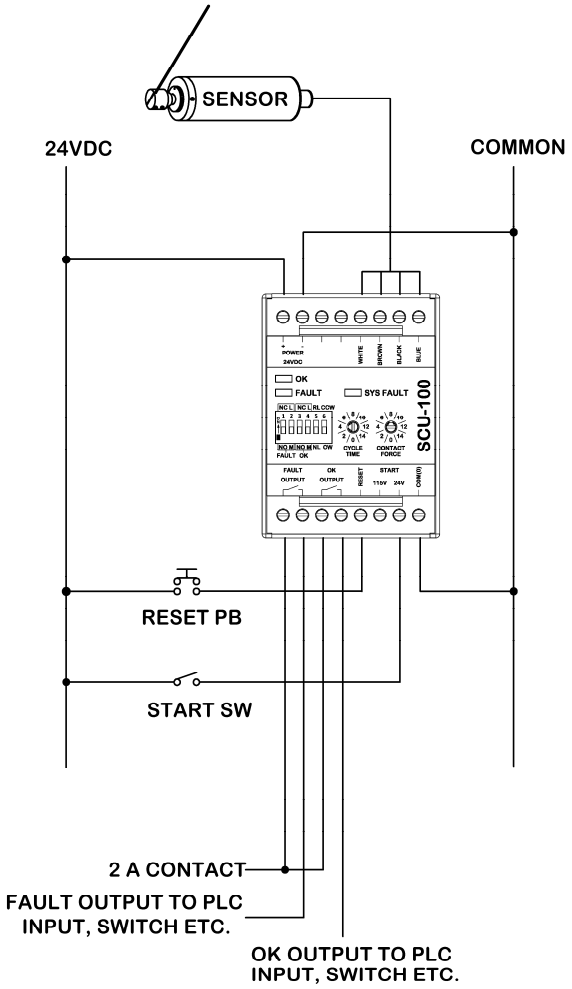


Figure 14: Wiring diagram (24VDC)

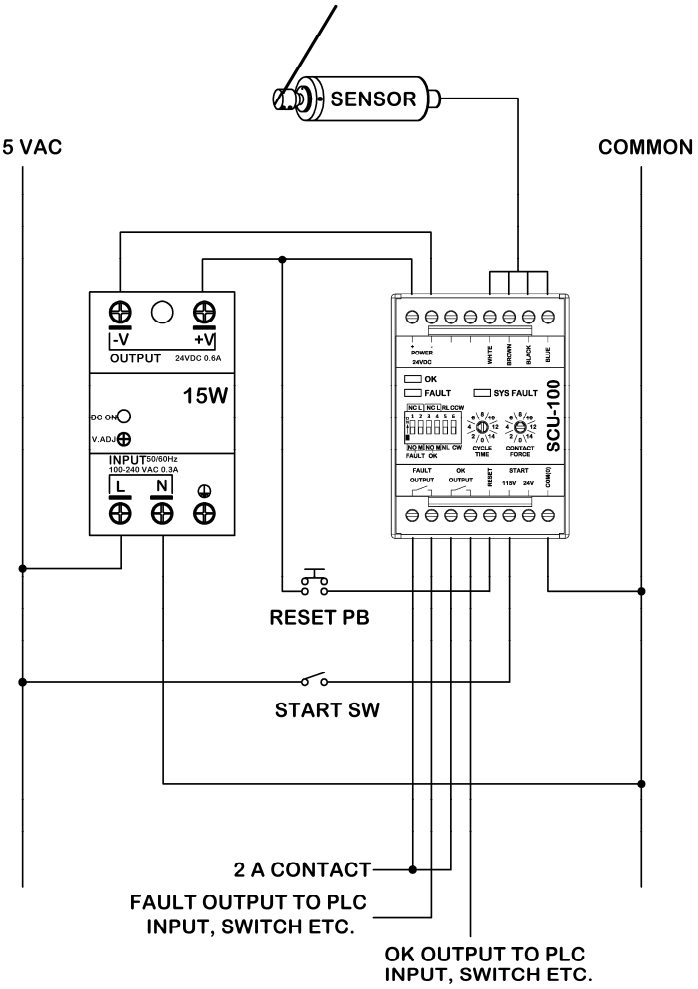


Figure 15: Wiring diagram (115VAC)

ESD/EMF PROTECTION: The SCU-100 Control is a microprocessor based unit. When mounting the Control in an electrical cabinet, avoid placing the Control near sources which might produce ESD (electro static discharge) or EMF (electro magnetic frequencies), such as large motor starters or high current devices. ESD/EMF may interfere with the proper operation of the Control.

The Sensor Cable supplied with the PCS-100 System is fully shielded. The preferred installation method is to connect the wires in the Sensor Cable directly to the appropriate terminals of the Control. If your installation requires connecting the Sensor to the Control via a junction box/terminal strip, avoid wiring near ESD/EMF sources.

The distance of the Sensor connection to the Control should not exceed 50m (165').

Longer, or special length shielded Sensor Cables are available upon request.

Please contact Allora International (www.alloraintl.com, info@alloraintl.com, 855.866.5911) or your local distributor with any questions or for installation assistance.

PCS-100 System Troubleshooting Guide

Please refer to the section that best describes the problem you are having. Determine if you can answer YES to all of the questions. If not, attempt to correct the condition. If you have any questions, please contact our Technical Support department at 1.855.TOOL.911 (855.866.5911), or info@alloraintl.com.

System Fault: (SYS FAULT LED flashing)
- Are Cycle Time and Contact Force switches set to a setting *other than* "0" on the SCU-100?
- Is the PCS-100 swing direction set in the same direction as the CW/CCW switch on the SCU-100?
- Is the swing angle setting on the PCS-100 ***at least 5°***, but ***not more than 175°***?
- Is the Needle returning to its start position at the end of each sensing cycle?
  - Color coded wires of the Sensor Cable should be attached to the correct terminals on the SCU-100
  - The inside of the PCS-100 connector and the Sensor Cable connector should be dry
  - Sensor Cable should be screwed tight to the PCS-100
- Manually move the Needle away from the start position. Does the Needle return to the start position on its own?
  - Is there approximately 3.7VDC across terminals 7 & 8 (Blue and Black) on the SCU-100? (The PCS-100 must remain connected to the SCU-100 for this measurement)
  - Is there 24VDC across terminals 1 & 2 (Power "+" & "-") on the SCU-100? Is the polarity correct?
    - If not, see **No Power to SCU-100**

SCU-100 Will Not Start: (LEDs remain steady, Needle does not swing when a Start Input is applied)
- Is the Start Input being applied to the correct terminals?
  - Terminals 15 & 16 are for a 24V Start Input
  - Terminals 14 & 16 are for a 115V Start Input
- Is the Start Input being correctly applied?
  - The input can be AC or DC voltage (polarity does not matter)
  - The SCU-100 can be started with a *low-high-low* sequence or *a high-low-high* sequence. The SCU-100 will always start on the transition from *low* to *high*
  - Is the *high* condition 24V if using terminal 15, or 115V if using terminal 14?
  - Is the *low* condition 0 V?
    - The *low* condition ***must be 0 V***. If the *low* condition is not an absolute 0 V, the SCU-100 may not recognize it
  - Is each change in condition being held for at least 100ms?
  - In an environment with a lot of electrical noise, (ie: large motors or motor starters), the *high-low-high* sequence will block any noise from accidentally starting the SCU-100
- Is the Start Input being applied ***after*** the SCU-100 has completely finished its last sensing cycle (as indicated by a Fault or Ok Output)?

Fault Signal When Tool is Ok: (Given an Ok condition, SCU-100 gives Fault Output)
- Is the PCS-100 Sensor set to swing in the correct direction to contact the tool?
- Is the tool within the PCS-100's swing angle?
  - The Needle of the PCS-100 should be set to swing at least 5° past the tool for the best results
  - The Needle's tip should extend over the tool's centerline
  - The Needle should contact the tool at least 1.6mm from the tool's tip
- Is the set screw for the swing angle adjusting ring on the PCS-100 tight?
- Is the Clamping Sleeve tight on the PCS-100, and tight on the mounting bracket?
- Is the Swing Arm Assembly tight on the PCS-100?
- Is the PCS-100 connected properly?
  - Color coded wires of the Sensor Cable should be attached to the correct terminals on the SCU-100
  - The inside of the PCS-100 connector and the Sensor Cable connector should be dry
  - Sensor Cable should be screwed tight to the PCS-100
- Is the Needle supplied by Allora being used?

PCS-100 System Troubleshooting Guide
(continued)

No Fault Signal When Tool is Broken: (Given a Fault condition, SCU-100 continues to give Ok Output)
- Are Cycle Time and Contact Force switches set high enough for the Needle to reach its full swing angle?
- Are any objects obstructing the swing of the Needle between the start position and tool?
- Is the Clamping Sleeve tight on the PCS-100, and tight on the mounting bracket?
- Is the Swing Arm Assembly tight on the PCS-100?
- Is the set screw for the swing angle adjusting ring on the PCS-100 tight? (see page 4 for more details)
- With the input power removed from the SCU-100 (terminals 1 and 2), or the Sensor Cable disconnected from the PCS-100, can the Swing Arm Assembly be freely rotated without any binding?
  - Look for metal chips between the Swing Arm Assembly and PCS-100.
  - Look for large chip "bird's nests" that may be obstructing the swing of the Needle.
- Is the PCS-100 swing direction set in the same direction as the CW/CCW switch on the SCU-100?
- Is the swing angle setting on the PCS-100 ***at least 5°***, but ***not more than 175°***?
- Is the PCS-100 connected properly?
  - Color coded wires of the Sensor Cable should be attached to the correct terminals on the SCU-100
  - The inside of the PCS-100 connector and the Sensor Cable connector should be dry
  - Sensor Cable should be screwed tight to the PCS-100

No Power to SCU-100: (No LEDs illuminate on SCU-100 at power-on and no power to PCS-100)
- Is there a clean 24VDC being supplied across terminals 1 & 2 (Power "+" & "-") on the SCU-100?
  - Is the polarity correct?
- If 110-240VAC, is the PS-1000 power supply supplied by Allora being used?
  - Is there 110-240VAC being supplied to the power supply?
  - Is there no more than one SCU-100 running per PS-1000?

No Output from SCU-100: (Machine doesn't receive Ok or Fault signal after applying Start Input)
- Is the SYS FAULT LED off?
  - If not, see **System Fault**
- Does the Needle on the PCS-100 swing when the SCU-100 is given a Start Input?
  - If not, see **SCU-100 Will Not Start**
- Is the OK LED or FAULT LED illuminated and at its normal intensity?
  - If not, see **No Power to SCU-100**
- The Outputs from the SCU-100 are momentary (500ms). Is this adequate time for your application?
  - The Outputs from the SCU-100 can be set to latch (refer to Page 7)
- With tool present, give the SCU-100 a Start Input. Do terminals 11 & 12 (Ok Output) close (or open if NC switch for Ok Output is selected)?
  - This same check can be done for the Fault Output by removing the tool. Do terminals 9 & 10 (Fault Output) close (or open if NC switch for Fault Output is selected)?

No Power to PCS-100 (Sensor): (Sensor does not swing or return to the start position)
- Are one or more LEDs on the SCU-100 illuminated?
  - If not, see **No Power to SCU-100**
- Is the PCS-100 connected properly?
  - Color coded wires of the Sensor Cable should be attached to the correct terminals on the SCU-100
  - The inside of the PCS-100 connector and the Sensor Cable connector should be dry
  - Sensor Cable should be screwed tight to the PCS-100
- Manually move the Needle away from the start position. Does the Needle return to the start position on its own?
  - Is there approximately 3.7VDC across terminals 7 & 8 (Blue and Black) on the SCU-100? (The PCS-100 must remain connected to the SCU-100 for this measurement)
  - Is there 24VDC across terminals 1 & 2 (Power "+" & "-") on the SCU-100? Is the polarity correct?
    - If not, see **No Power to SCU-100**

CE

Positive Contact Control Units conform with the EEC directive EMC 89/336/EEC as amended by 92/31/EEC and 93/68/EEC.

In compliance with the directive, the EC Declaration of Conformity and related Technical Documentation is maintained at the following address for inspection by the appropriate officials:

Allora International, LLC
1825 Dolphin Dr., Unit B
Waukesha, WI 53186
United States of America

RoHS Compliant

Positive Contact – Hazardous Materials

All **Positive Contact** products and packaging are manufactured with RoHS compliant materials. They are free of Bromide Halogens (PBB, PBDE), Mercury, Cadmium, and Chrome 6+.
All **Positive Contact** products are Lead Free.
All **Positive Contact** products comply with current EU environmental standards, including directive amendments regarding the use of perfluorooctane sulfonates, (PFOS).
All **Positive Contact** products and packaging are free of any material containing Asbestos.
All **Positive Contac**t foam packaging is free of CFC's, HCFC's or HFC's. The foam and its ash is non-toxic, landfill safe and recyclable.