Sensym Application Dept.

INTRODUCTION

The SCX series sensors are high precision calibrated and temperature compensated pressure sensors. However, to achieve optimum performance, they must be properly installed. This application note will discuss recommended package mounting, electrical connection and pressure connecting techniques to achieve optimum performance.

MOUNTING

When mounting any sensor, the two most important considerations are the physical package location and mounting technique. The location of the sensor is very important from a reliability standpoint. For example, if a sensor is connected to a compressed air line that contains water and oil vapor from the compressor, the sensor should never be installed at the lowest point in the line as any water that has condensed in the line would flow into the sensor and be trapped. However, if the sensor is mounted at the highest point in the line, the liquid would be forced to flow uphill in order to get into the sensor. This results in less condensation at the sensor which generally increases overall reliability. For installations where it is impossible to mount the sensor at the highest point, a loop or filter should be put in the line. A number of companies make filters which can be used to protect the sensors from moisture.

They include:

Del Tech Engineering	Balston Filter Products
New Castle, Delaware	Lexington, Massachusetts
(302) 328-1345	(800) 343-4048

The mechanical mounting of the package can also induce stress and effect the sensors' performance, particularly in low pressure differential measurements. As shown in figure 1 the actual integrated circuit sensor chip is mounted in Sensym's standard chip carrier (an SX sensor package) and this carrier package is then sealed into the overall SCX package with RTV seals.

These soft mounts help absorb stress and minimize sensitivity of the sensor to stresses on the outer package. However, squeezing or bending the outer package can still cause offset voltage errors equivalent to 0.1 to 0.2 inches of water column change in high sensitivity parts, such as the SCX01DN. Therefore, in precision low pressure (less than 1 psi) applications, the package should be mounted in such a way as to minimize external package stresses. For PC board mounting it is fairly easy to limit the package stresses with proper mounting. The simplest recommended PC board mounting technique is to use “xmas tree” clips as fasteners. This technique is illustrated in figure II. The xmas tree clip has a lower insertion force than removal force, with a ratio as high as four to one. By clamping to the inside of the 0.16 inch mounting hole of the SCX package, this clip secures the SCX device to the board and gives a minimum package stress even over temperature. We recommend a Fastex xmas tree clip:

Fastex
Des Plaines, Illinois
Part no. 345-156001-00-2099
(342) 299-2222

If the sensor is not mounted on a panel or PC board but on a pipe or manifold, 6 - 32 screws can be used to secure the package. Care must however be taken not to over-tighten the screws as this will torque the package and can induce offset errors.

The package can also be stressed through the pressure ports where rigid or semi-rigid tubing is used for pressure connection. The differential configuration is the most susceptible to package stress form the pressure ports as the two tubes can generate substantial stresses when pushed together or pulled apart. Therefore, if rigid tubing is used, spacers should be used to keep the two tubes parallel and lined up with the pressure ports.

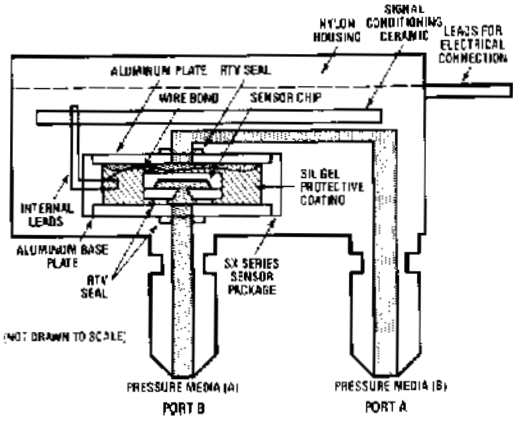


FIGURE I
SCX Physical construction diagram (cutaway view)

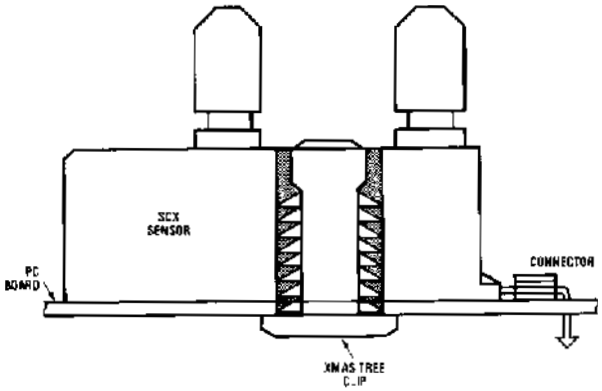


FIGURE II
Recommended PC board mounting technique for the SCX sensor up to 30 psi

ELECTRICAL CONNECTIONS

Connectors

The leads on the SCX series sensors are 0.025 inch square leads on 0.1 inch centers. This is a standard configuration in the industry and a variety of mating connectors are available including:

Samtec	Methode
New Albany, Indiana	Rolling Meadows, Illinois
6 pin right angle	6 pin right angle
Part no. SSW-106-02-TSRA	Part no. 9000-106-302
(812) 944-6733	(312) 392-3500

The recommended mounting technique using these connectors is shown in figure II, and dimensions for PC board layout are shown in figure III. We generally recommend the use of these connectors as it allows the devices to be easily inserted and removed without inducing any stress related errors. Using these connectors in combination with the xmas tree clips for PC board mounting provides reliable and stress-free mounting for optimum overall performance.

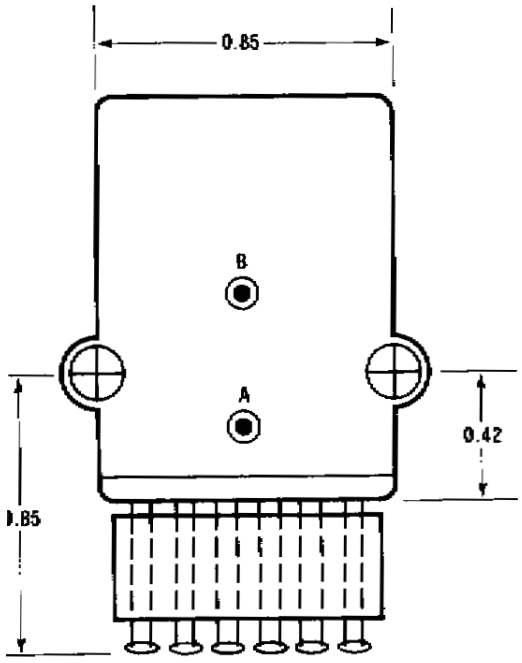
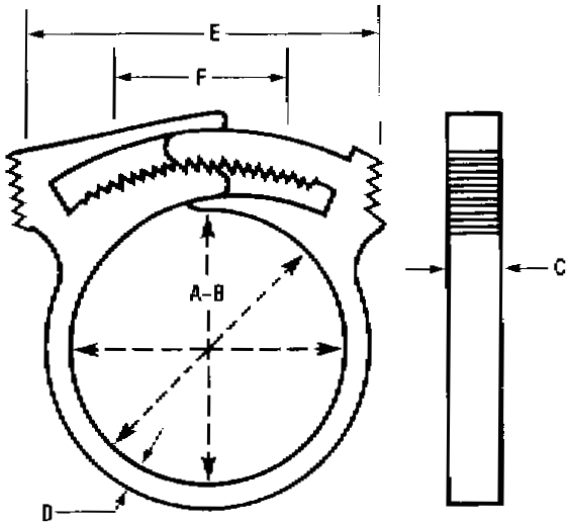


FIGURE III
SCX package and
Samtec SSW-106-02-TRSA connector

Soldering

The leads can also be bent 90° and soldered into the PC board. During the bending operation, the leads should be clamped next to the housing to ensure that no stresses are transferred to the internal compensation ceramic or plastic package.



Stock Number	Unit of Measure	Min. A Dia.	Max. B Dia.	C	D	E	F	Number G of Teeth
SCXSNP1	in.	.228	.256	.148	.040	.451	.320	12
	mm	5.8	6.5	3.8	1.0	11.5	8.1	12
SCXSNP1.5	in.	.307	.342	.146	.054	.587	.410	12
	mm	7.8	8.7	3.7	1.4	14.9	10.4	12
SCXSNP2	in.	.351	.394	.231	.067	.672	.472	12
	mm	8.9	10.0	5.9	1.7	17.1	12.0	12

FIGURE IV
Tyton Snappers-Clamps
pressure hose onto port

PRESSURE CONNECTORS

All SCX series sensors have two 0.190 inch outside diameter pressure ports for applying the pressure media (see SCX data sheet). In low pressure applications (15 psi and below), silicon tubing is recommended for pressure connection as it is easy to work with and quite flexible so package stresses are minimized. For 30 and 100 psi ranges, stronger Tygon tubing with Tyton clamps around the tubing is recommended. Over 100 psi, 0.25 inch outside diameter and 0.0035 wall thickness Tygon tubing and Tyton snapper hose clamps are recommended. Snapper clamps are available in acetal copolym for general purpose applications and in heat stabilized glass fiber compound for high temperature applications (see figure IV). For more information contact:

Tyton Corporation
Milwaukee, Wisconsin
Snapper - SNP-1
(414) 355-1130

CONCLUSION

The SCX series sensor will provide a high precision solution for pressure applications in the 1 to 100 psi pressure range. However, to get the maximum reliability and performance from the sensor, proper installation techniques must be followed.

In 100 psi / 150 psi applications with alternating pressure and high pressure cycle rates the mounting technique shall be different to the methode shown in figure II. Instead of using the xmas tree clips metal screws, holding a port B support plate (Sensortechnics order number ZA000710) should be used (see figure V).

ORDERING INFORMATION

Sensortechnics is stocking and will sell quantities of the following SCX accessory parts:

Samtec 6 pin right angle socket	Tyton (SNP-1) clamp	Fastex xmas tree clips
Order part number SCXCNCT	Order part number SCXSNPI	Order part number SCXCLIP

For OEM quantities contact the various manufactures directly.

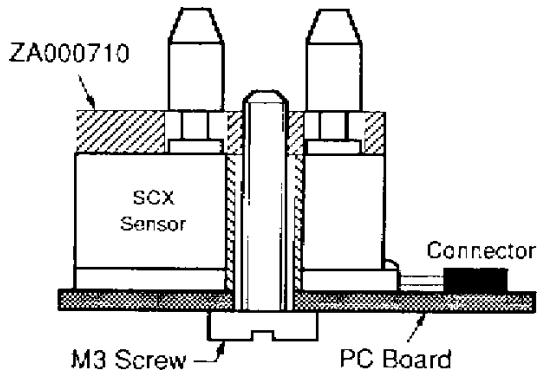


FIGURE V
Recommended PC board mounting technique for the SCX100D and SCX150DN sensors

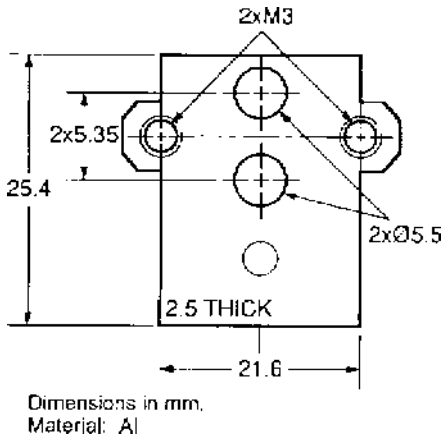


FIGURE VI
Recommended "B-port" protection plate for SCX100 D and SCX150D sensors