

◀Reliability▶ Measurement with soft sensor for soft plane → air and soft bag → The influence on contact surface is extremely little and reproducibility is good.

This contact surface pressure measuring system is a system to measure a surface pressure of a soft material to which the sensor of this system is in contact and to correct errors in the reading to be brought about by a thermal change in the environment. This system has been approved by patent authorities in several countries in the world as a unique system to be able to effect a reliable measurement of a contact pressure of soft materials with a high reproducibility. This system does not require any special preliminary correction for the reading to be usually made before use. This system can also make a continual measurement sequentially.

Air-pack method

An air is enclosed between two contacted surfaces and the pressure of that enclosed air is measured externally from the contacted surface. Into a flat bag made with a flexible film of a least possible elasticity, an air is enclosed in the thickness of 1mm.

Feature

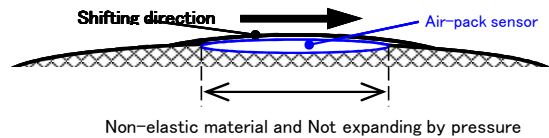
(1) It is easy to stick each part of the living body and between ruggedness of the cloth and reproducibility is good in 20mm (standard) diameter. The center part of the bag comes in contact with the point when it is too large and the situation is changeable and reproducibility worsens partial pressure it. For example, only the center of the air pack comes in contact in the ankle that the ruggedness is 30mm in diameter.

(2) The influence of the air pack that infuse some air in 1mm in thickness becomes thinner because of pressure sinks softly of the living body and the clothes is extremely little. However, when infusing in 1.5mm in thickness and measuring it in the cylinder of $\phi 100$, the value about 1.3 times 1mm in thickness was confirmed.

(3) The circle shape mounted to body part easily. The result change by the direction when designed besides the circle. For example, the top becomes the mean value of the lowering area high in surroundings in the measurement with the hemisphere.

(4) In piping in the tube of 1mm that doesn't collapse, it is unaffected in the piping situation catching the transformation of the bag of the air pack (alteration in volume). The result change for a soft material such as silicon rubber in the piping situation.

Section



Each error in measurement

①Permissible error+②Measuring area error+③Position error+④Restoration of tools material+⑤Attitude error

①Permissible error: Describes in the specification.

②Measuring area error: The difference of the characteristic the mounted position, the figure and the softness of the air pack sensor is caused.

③Position error: The value changes partially in how like hitching and a horizontal gap to match it when setting it to the measurement site when tools are installed. The error is somewhat caused though putting the sign and the line in tools in detail, and improving accuracy are necessary.

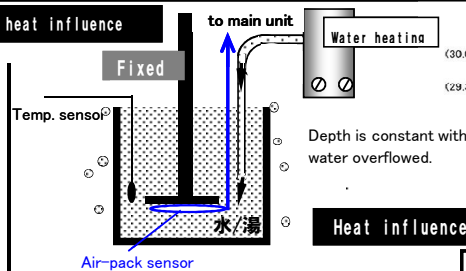
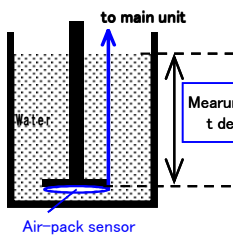
④Restoration of tools material: The difference of the restoration is caused by the sweat, the expansion in the rig frequency.

⑤Attitude error: It influences pressure in transmission and the weight shift of the material tension because of the difference among the posture angle, arm and the head position.

Note: In the measurement of body pressure to know the distribution pressure is important. However, the method of paving the seat sensor in the distribution pressure measurement and the calling contact surface and the measurements has the anxiety in reproducibility and the measurement accuracy. Non-elastic film seat enclosed between two contacted surfaces and A flexible characteristic and the contact friction are completely changed and it is not easy to call body pressure.

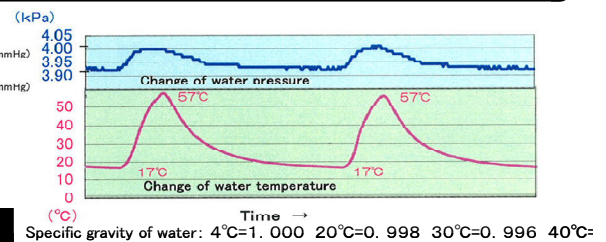
Calibration for contact pressure and heat influence

The plane pressure can be calibrate by mounting the air pack to horizontal plate. The contact surface is hardness for horizontal plate and softness (living body) for water side.



Water thermally controlled by a water heating apparatus is poured into a vessel and is held at a constant water level. The Air-Pack is fixed horizontally in water in the depth of 400 mm.

[Result]
change 40°C is shown to be 0.1 kPa

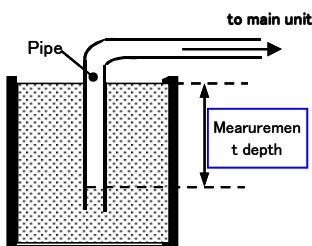


<The reasons why a thermal effect is so small are as follows>

- ① Although a thermal expansion factor of air is $1/(273+\text{atmospheric temperature})$, a voluminal swell of the Air-Pack to thickness direction is only a little because its shape is flat.
- ② Because an amount of the enclosed air is smaller than the maximum voluminal capacity of the Air-pack, there is a sufficient remaining capacity inside the Air-pack to be able to absorb a swell of the enclosed air.
- ③ In actual measurement, a swell to the thickness direction of the

Calibration for pressure sensor and output

A pressure on horizontal plane corresponding to the water pressure can be got by measuring the water depth.



SI unit		Former unit			Model	AM13037-2, 5S, 10	A0101 / A0905	
hPa	kPa	(gf/cm ²)	(mmH ₂ O)	(mmHg)	DC output	DC output	DC output	
10	1	10.2	102	7.5	DC V	DCmV	DC V	DCmV
0.98	0.098	1	10	0.736	0.100	100	0.010	10
0.098	0.0098	0.1	1	0.074	0.010	9.8	0.001	0.98
1.333	0.1333	1.36	13.6	1	0.001	0.98	0.0001	0.1
					0.013	13.3	0.0013	1.3

Purpose of use for pressure measuring device

The measurement accuracy and reproducibility are confirmed the reproduction of a flexible plane contact environment. Error margin confirmation of secular distortion and confirmation of unexpected value when measuring it. It is not necessary to calibration before each measurement. * Because the standard of the contact pressure (ISO and JIS, etc.) in soft respect is not decided, the proofreading examination such as the inspecting agencies cannot be done under the present situation.