# 3B SCIENTIFIC® PHYSICS

## Relative Pressure Sensor FW, ±1000 hPa   1021533

**Instruction sheet**

07/21 SD/ GH



## 1. Safety instructions

- To avoid permanent damage to the internal semiconductor sensor, the maximum permitted relative pressure of 4000 hPa must never be exceeded.

Only suitable for use with non-corrosive gases such as air, helium or nitrogen.

- Do not exceed the maximum temperature of the measured medium of 100°C!

- Do not allow the sensor element to come into contact with water.

## 2. Description

Relative pressure sensor with a measurement range up to 1000 hPa, suitable for measuring the pressure on the piston of the transparent Stirling engine 1002594 (for a pV diagram).

For two-port measurement using the sensor, hose connections are provided for two inputs.

The sensor box is designed to be detected automatically by the CMA interfaces distributed by 3B.

## 3. Equipment supplied

1 Sensor box
1 Silicone hose, internal Ø 2mm, 1mm long
1 PVC hose, internal Ø 3.5mm, 1mm long

**Additionally required:**

1 Sensor cable 1021514

## 4. Technical data

| | |
|---|---|
| Measurement range: | ± 1000 hPa |
| Sensor type: | Semiconductor sensor |
| Accuracy: | ± 1 % |
| Resolution: | ± 1 hPa |
| Connections: | 2 hose connections, 4.8 mm diameter |

## 5. Instructions

- Cut the silicone hose into sections of the required length.
- Using the lengths of hose, make the pressure connections between the sensor box and the Stirling engine.
- Note the "positive" and "negative" labelling of the hose connections - connect the hoses correctly according to the effective direction of the pressure.
- During the experiment, check that no elastic expansion of the hose is occurring – this can cause the pressure reading to be lower than the correct value.

## 6. Example experiment

**Recording a pV diagram for a G-model Stirling motor using WiLab and Coach 7**

Required equipment:

| | |
|---|---|
| 1 Stirling Engine G | 1002594 |
| 1 WiLab | 1022284 |
| 1 Displacement Sensor FW | 1021534 |
| 1 Relative Pressure Sensor FW ±1000 hPa | 1021533 |
| 2 Sensor Cable | 1021514 |
| 1 Sensor Holder for Stirling Engine G | 1008500 |
| 1 DC Power Supply 0 – 20 V, 0 – 5 A @ 115 V or | 1003311 |
| 1 DC Power Supply 0 – 20 V, 0 – 5 A @ 230 V | 1003312 |
| 1 set of experiment leads | 1002843 |
| 1 Coach 7 License | |

Set up the experiment as in Fig. 1.

Wrap the thread around the displacement sensor's pulley as in Fig. 2.

Connect WiLab to the computer, start the Coach 7 software and load an activity suitable for the Stirling engine G.

Connect the Stirling engine's DC motor to the DC power supply and set an output voltage of 6 V so that the Stirling engine operates at medium speed.

Only allow the Stirling motor to operate at high-speed for short periods so as not to overstress the displacement sensor.

## 7. Disposal

- The packaging should be disposed of at local recycling points.
- Should you need to dispose of the equipment itself, never throw it away in normal domestic waste. Local regulations for the disposal of electrical equipment will apply.
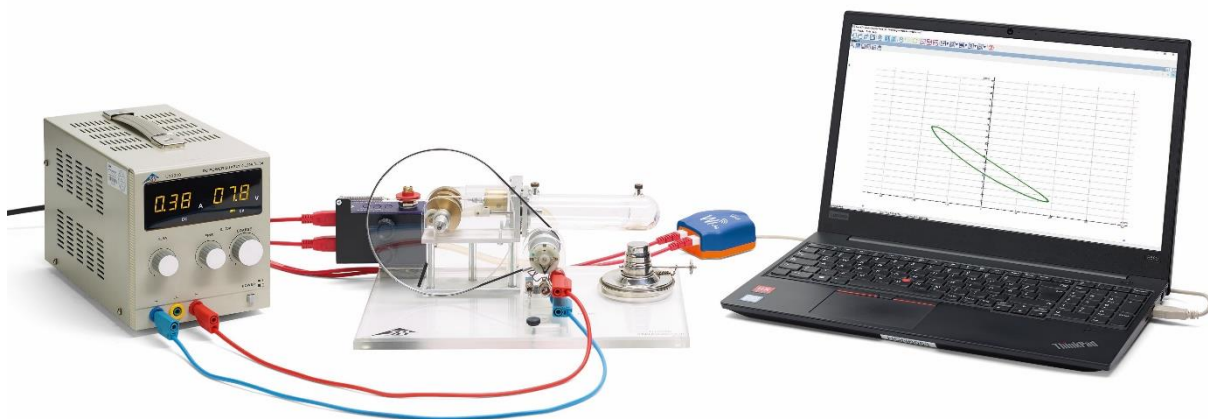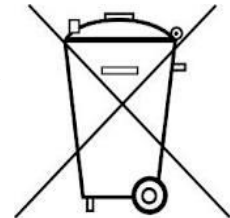


Fig. 1  Experiment set-up for recording the pV diagram of a G-model Stirling engine

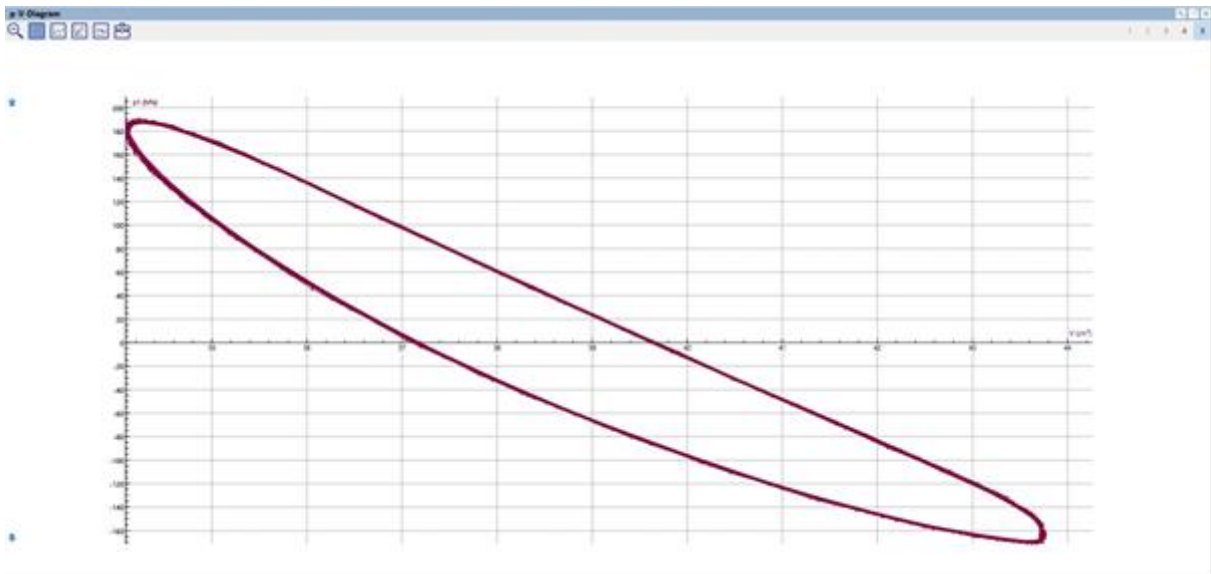Fig. 2  Attachment of the thread to displacement sensor pulley



Fig. 3  Graph of pV diagram for Stirling engine G using WiLab and Coach 7.