

3.6.04-01/15 Stirling engine



Set-up of experiment P2360415 with Cobra3

- First and second law of thermodynamics
- Reversible cycles
- Isochoric and isothermal changes
- Gas laws
- Efficiency
- Stirling engine
- Conversion of heat
- Thermal pump

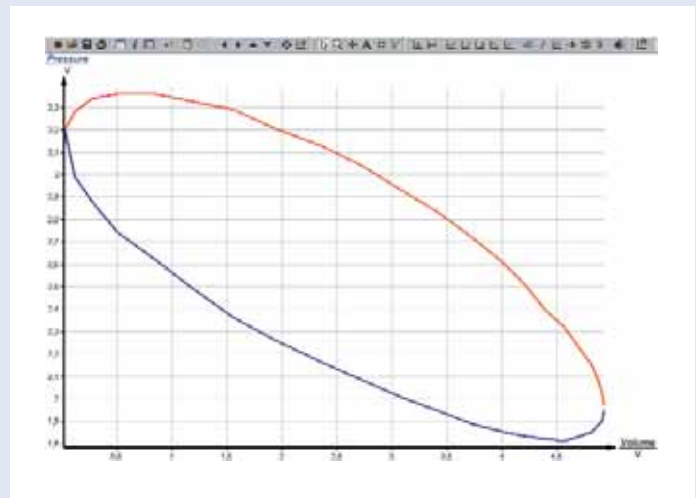
Principle:

The Stirling engine is submitted to a load by means of an adjustable torque meter, or by a coupled generator. Rotation frequency and temperature changes of the Stirling engine are observed. Effective mechanical energy and power, as well as effective electrical power, are assessed as a function of rotation frequency. The amount of energy converted to work per cycle can be

What you need:**Experiment P2360415 with Cobra3****Experiment P2360401 with oscilloscope**

Stirling motor, transparent	04372.00	1	1
Motor/Generator unit	04372.01	1	1
Torque meter	04372.02	1	1
Chimney for Stirling engine	04372.04	1	1
Meter for Stirling engine, pVnT	04371.97	1	1
Sensor unit pVn for Stirling engine	04371.00	1	1
Syringe 20 ml, Luer, 10 pcs	02591.03	1	
Rheostats, 330 Ω, 1.0 A	06116.02	1	
Digital multimeter 2010	07128.00	2	
Connecting cable, 4 mm plug, 32 A, red, $l = 50$ cm	07361.01	2	
Connecting cable, 4 mm plug, 32 A, blue, $l = 50$ cm	07361.04	3	
Oscilloscope 30 MHz, 2 channels	11459.95	1	
Screened cable, BNC, $l = 750$ mm	07542.11	2	2
Thermocouple NiCr-Ni, sheathed	13615.01	2	2
Cylinder, PP, 50 ml	36628.01	1	
Denatured alcohol (Spirit forburning), 1000 ml	31150.70	1	1
Adapter BNC socket/4 mm plug pair	07542.27	2	
Cobra3 BASIC-UNIT	12150.00	1	
Power supply 12V/2A	12151.99	1	
Data cable 2 x SUB-D, plug/socket, 9 pole	14602.00	1	
Software Cobra3 Universal recorder	14504.61	1	
PC, Windows® 95 or higher			
<i>Optional accessories for solar motor work</i>			
Accessories f. solar motor work	04372.03	1	
Support base -PASS-	02005.55	1	
Extension coupling, hinged	02045.00	1	
Support rod, stainl. steel, $l = 500$ mm	02032.00	1	
<i>Optional accessories for heat pump work</i>			
Power supply	13505.93	1	

Complete Equipment Set, Manual on CD-ROM included
Stirling engine P23604 01/15



Pressure as a function of Volume for the Stirling process.

determined with the assistance of the p_V diagram. The efficiency of the Stirling engine can be estimated.

Tasks:

1. Determination of the burner's thermal efficiency
2. Calibration of the sensor unit
3. Calculation of the total energy produced by the engine through determination of the cycle area on the oscilloscope screen, using transparent paper and coordinate paper.
4. Assessment of the mechanical work per revolution, and calculation of the mechanical power output as a function of the rotation frequency, with the assistance of the torque meter.
5. Assessment of the electric power output as a function of the rotation frequency.
6. Efficiency assessment.