

SPAN GAS CALIBRATION KIT

MODEL CALKIT-3

INSTRUCTION MANUAL

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The purpose of the span gas calibration kit is to check the performance and provide an accurate span calibration apparatus for all toxic gas & combustibles sensors used in the instruments manufactured by ENERAC.

NOTE:

Using certified calibration gas (2% accuracy) is the most accurate and reliable method to ensure data integrity for emissions measurements.

The use of "pre calibrated sensors" is not reliable because electrochemical sensors are known to drift with time, temperature and exposure to gas.

The use of "dilution systems" provides under the best conditions a 5% accuracy.

EPA protocol 1 gases are not available in small transportable cylinders.

The portable gas calibration kit supplied by ENERAC is designed to supply the required span gas at the exact flow rate required by the instrument and at approximately ambient pressure. This is important for proper sensor calibration, because electrochemical sensors are sensitive to pressure fluctuations.

The span gas or gases supplied, depend on the type of instrument being used. All gases are certified to have an accuracy of plus/minus 2% of the value indicated on the face of the gas cylinder. If greater accuracy is required, you may disconnect one of the transportable cylinders and connect a Protocol 1 cylinder to the calibration kit.

If any gas cylinders have been supplied with the calibration kit, these are small transportable units containing approximately 74 liters of the span gas at approximately 500 PSI.

All instruments require approximately a minimum of 4 minutes of span gas to carry out a single calibration (NO₂ & SO₂ require 8 minutes) . Consequently, any small transportable cylinder typically contains sufficient gas for 12-15 calibrations.

NOTE:

The model 3000E will normally require 2-3 additional minutes to reach 99% of full scale when feeding NO₂ or SO₂ span gas.

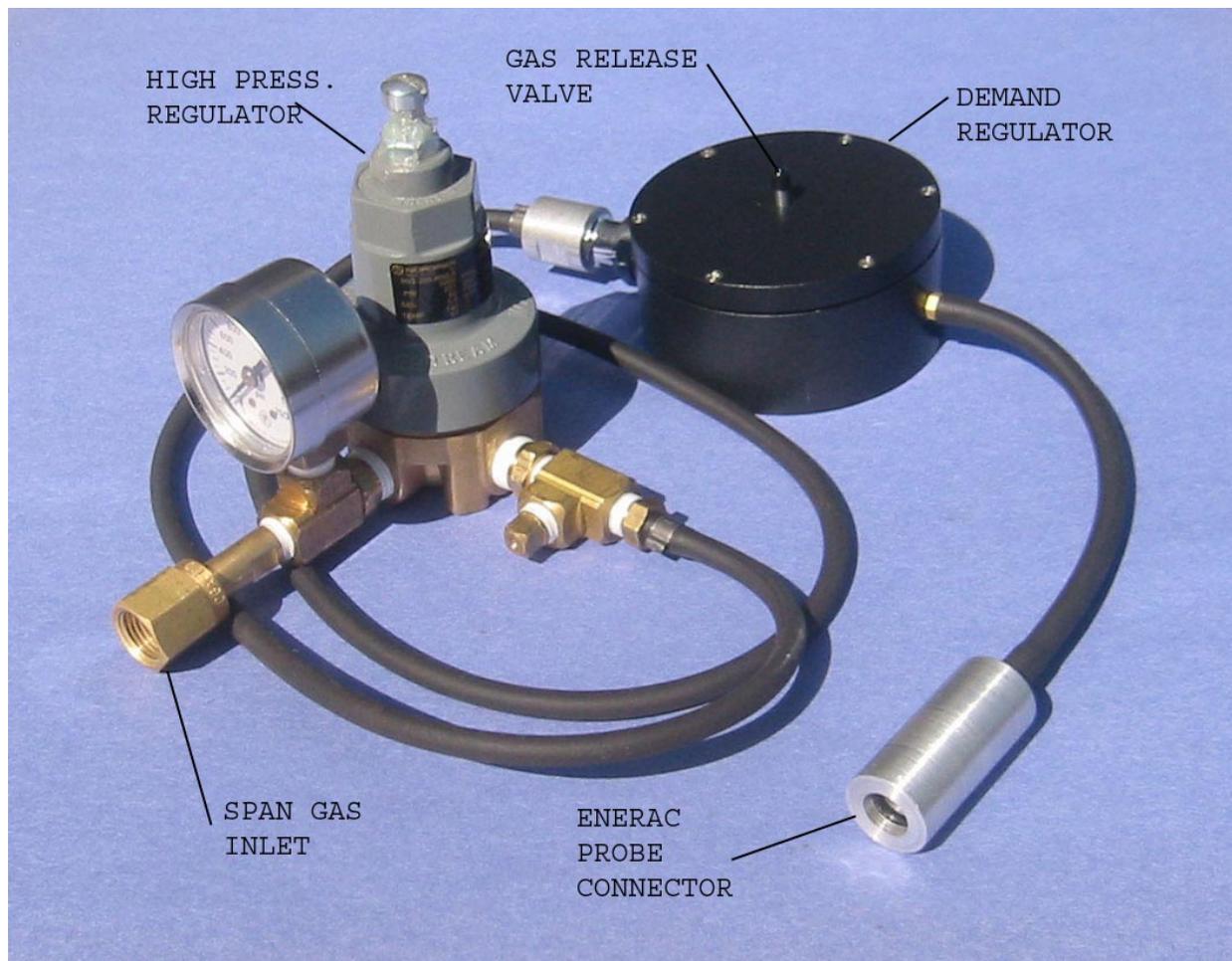
When the span gas is exhausted, the cylinder should be disposed properly. **THESE SMALL CYLINDERS CANNOT BE REFILLED!**

WARNINGS:

1. Carry out span calibrations in a well ventilated area. Avoid inhaling the gas.
2. Handle the gas cylinders carefully. Do not expose them to heat or shock. Do not attempt to fill the cylinders. Do not use them for any other than the intended purpose.
3. Make sure the shutoff valves are shut tightly, before disconnecting any cylinders.
4. Do not attempt to remove the shutoff valves.
5. Do not touch the primary regulator setting.

DESCRIPTION OF APPARATUS

Fig.1 shows a complete calibration kit without a span gas cylinder attached to it,



When the gas cylinder is exhausted use a wrench to disconnect it at the CGA connector as shown in fig. 1.

The other end of the CGA connector is connected directly to a high pressure regulator, whose outlet pressure is fixed at approximately 10 PSI.

Remember that there will be approximately a 30 PSI drop in the cylinder used following every calibration. Thus, you can estimate the number of calibrations left by observing the pressure on the gauge when the cylinder valve is open.

A 24" length of Viton hose connects the outlet of the high pressure regulator to the inlet of the "demand" regulator. The demand regulator is a device that is designed to supply automatically the span gas at the exact flow rate required by whatever instrument is being calibrated. It does this with a minimum of pressure drop (typically less than 4" W.C.).

NOTE:

The use of the demand regulator yields a savings of 30-40% in the span gas used, when compared with the by pass flow and flow meter method of earlier calibration kits, while maintaining feed pressure near ambient.

The demand regulator functions in such a way that it will supply gas, only if a small negative pressure is detected at its outlet. However, sometimes it may be desired to supply gas at a positive pressure. A small pushbutton valve (gas release valve in Fig. 1) located on top of the demand regulator will supply span gas, irrespective of the outlet pressure.

The outlet of the demand regulator is connected to a special fitting that can accommodate the 3/8" OD probes of any instruments manufactured by ENERAC.

To feed the desired span gas to the instrument turn the unit on, insert the tip of the probe to the probe fitting of the calibration kit and open the cylinder's shutoff valve.

To turn the gas on or off use the shut off valve !

SPAN CALIBRATION OF THE ENERACS

The following list describes the span gases that are typically used with the calibration kit to calibrate the ENERACS at the factory.

Carbon monoxide	200 PPM CO bal. N2 (low range) 2,000 PPM CO bal. N2 (high range)
Combustibles	1% CH4 bal N2
Nitric oxide (NO)	200 PPM NO, bal N2
Nitrogen dioxide (NO2)	100 PPM NO2, bal N2
Sulfur dioxide	200 PPM SO2, bal N2

You can carry out all span calibrations in sequence, or just one only, if you wish.

NOTE:

Toxic sensor span calibration should be carried out in the order that they appear on the display during span calibration. (CO > NO > SO2 > NO2). This is important for the mathematical cancellation of any residual cross sensitivities.

Feed the span gas to the instrument for TWO MINUTES (for the model 3000 wait 3-4 minutes) prior to carrying out the span calibration, to make sure that steady state conditions will have been reached by the end of the calibration period.

1. SPAN GAS CALIBRATION

The sequence of the span gas calibrations that will appear on the ENERAC 3000 display is as follows:

1. Combustibles
2. Carbon monoxide
3. Nitric oxide (NO)
4. Sulfur dioxide
5. Nitrogen dioxide (NO2)

6. Ambient temperature.

NOTE:

The model 3000 executes the "ENERAC CALIBRATION PROTOCOL", every time it is calibrated for CO, NO NO2 and SO2. For information on this protocol, please consult your instruction manual.

To carry out a span calibration follow the steps below:

1. Figure 1 shows the calibration apparatus and also how it is connected to the ENERAC.

Do not connect the calibration kit to the Enerac yet.

2. Connect the ENERAC's probe to the instrument and turn the unit on. Make sure the battery is OK. Press the ENTER key to autozero the unit.

At the end of the AUTOZERO check the sensor readouts to make sure they are all reading zero, except for oxygen that should read 20.9%. The stack temperature indicated should be approximately the room temperature

3. Assuming that you wish to execute the combustibles calibration first, proceed as follows:

Open the shut off valve of an appropriate cylinder having a concentration of typically 0.5%-2% methane balance nitrogen. Check the pressure gauge of the calibration kit to make sure that you have at least 30 PSI remaining in the cylinder.

Push the tip of the probe firmly into the cylindrical fitting that is located at the end of the calibration apparatus. Make sure the fitting's O-ring is properly seated to avoid an air leak.

Observe the value of the oxygen on the ENERAC's display and make sure it is dropping towards zero (i.e. this ensures that span gas is being introduced into the instrument). The "demand" regulator should be supplying gas to the instrument automatically. Do not depress the "gas release" valve of the regulator, unless you suspect that there is no flow!

4. Follow the instructions in the ENERAC manual for calibrating the sensor.
5. Please wait. At the END of the four minute calibration period the unit will, at that instant, record and store the combustibles sensor output and define it as the value that you set earlier on the display.

NOTE :

To make sure that the instrument registered properly the span gas, press the appropriate key to exit the setup mode. Read the combustibles value. Make sure that the display reading is steady. If it appears to be climbing, it implies that the time allowed for calibration was insufficient. In that case allow the span gas to flow into the instrument for a full minute before carrying out the span calibration. This observation is valid for all gas tests that follow.

6. Proceed with the remaining gas calibrations