



SPAN GAS CALIBRATION KIT

MODEL CALKIT-4

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.

ENERAC does not supply calibration span gases that can be easily obtained from companies such as Scott Specialty Gases, Inc. Recommended accuracy for span gases should be at least 2% of value and it is typically indicated on the face of the gas cylinder. For greater accuracy one can purchase Protocol 1 cylinders which, however, are expensive and come in large sizes.

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

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

DESCRIPTION OF APPARATUS

Fig.1 shows a complete calibration kit with a span gas cylinder attached to it,

FIG. 1



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 demand type regulator. The demand regulator is a device that it 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.).

Remember that if you are using a small 75 liter cylinder, 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 demand regulator to 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 custom gas fitting that connects to the analyzer's probe..

The demand regulator functions in such a way that it will supply gas, only if a small negative pressure is detected at its outlet

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 !

Figure 2 below shows calibration of an ENERAC 500.



FIG.2

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.

MODEL 500

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

MODEL 700

In addition to the concentrations listed above, for dual range sensors:

Carbon monoxide	2,000 PPM CO bal. N2 (high range)
Nitric oxide (NO)	1,000 PPM NO, bal. N2 (high range)
Sulfur dioxide	2,000 PPM SO2 bal. N2 (high range)

MODEL 700 (NDIR)

Carbon monoxide	1.5% (minimum) – 5% CO bal. N2
Hydrocarbons	5,000 – 10,000 PPM Propane bal. N2
Carbon dioxide	5% - 12% CO2 bal. air.

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 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 (allow 10 minutes warm up).

To carry out a span calibration follow the steps below:

1. Figure 2 shows the calibration apparatus and also how it is connected to the ENERAC model 500. A similar configuration is used for the model 700, also.

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. Make sure that you are drawing clean ambient air and then 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. (It is actually the temperature inside the unit's case).

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

Open the shut off valve of a suitable gas 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.

4. Follow the instructions in the ENERAC manual for calibrating the sensor.
5. Please wait. At the END of the period of gas feeding set by the analyzer's options, 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, following the procedure outlined above.

