3-033-R002
SF_6 Leak Detector
Owner's Manual

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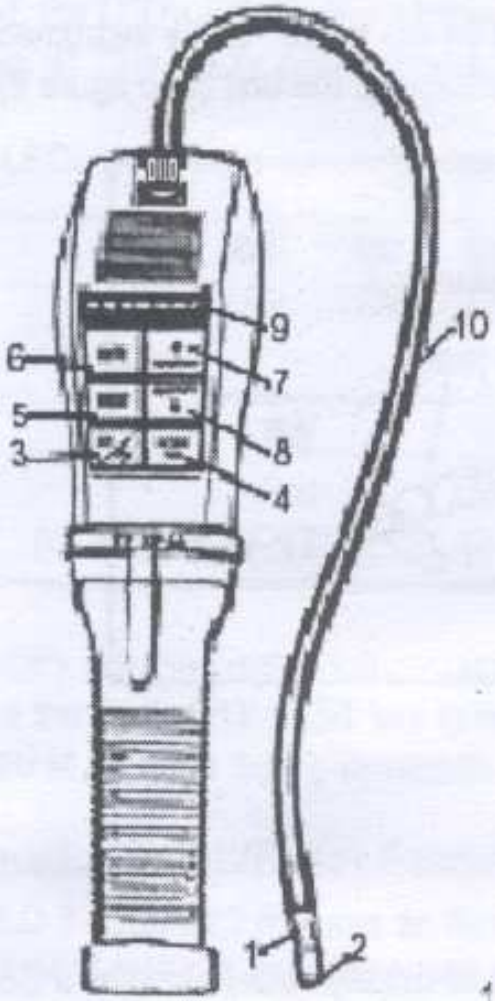
GENERAL INFORMATION

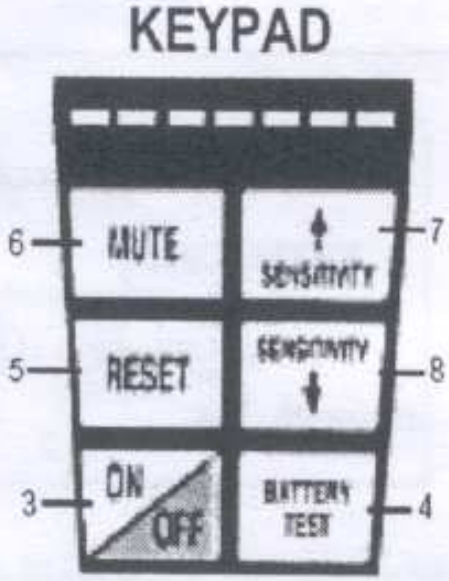
The DILO 3-033-R002 is the culmination of over 30 years of Leak Detector manufacturing experience. DILO is proud to present this tool as the most stable and sensitive negative corona leak detector ever made. We have incorporated all of our experience, and years of customer feedback into this product, in the hope of providing our valued customers with the best of everything; price, performance and reliability.
An advanced microprocessor is the heart of this unit. Its Digital Signal Processing permits better management of the circuitry and sensing tip signal than ever before possible. Additionally, the number of components used in the circuit is reduced nearly 40%, increasing reliability and performance. The microprocessor monitors the sensing tip and battery voltage levels 2000 times per second, compensating for even the most minor fluctuations in signal. This translates into a stable and dependable tool in almost any environment.
Convenience features have been added to enhance the usability of the 3-033-R002. Seven levels of sensitivity provide an increase of 64 times from level 1 to level 7. Unique Tri-Color LED's show a progressive and wide ranging leak size indication, communicate the sensitivity level, and provide a true voltage indication of battery power level. A tactile keypad controls all functions of operation. A revolutionary new case design gives the user grip and control, and places the visual indicators in direct sight during use.

FEATURES

- Microprocessor control, with Advanced Digital Signal Processing
- Tricolor visual display
- Seven (7) levels of sensitivity provide an increase of up to 64x
- Tactile Keypad controls
- Real time sensitivity adjustment
- Battery Test function
- Battery voltage indication
- Certified to SAE J1627 for R134a, R12, R22
- Detects SF_6 and ALL Halogenated Refrigerants
- True mechanical pumping provides positive airflow through sensing tip
- Mute feature included
- Cordless and Portable, operates on 2 "C"-cell batteries
- Carrying case included
- 14" (35.5cm) flexible, stainless probe
- Optional Carrying Holster
- Optional Reference Leak Source

PARTS & CONTROLS





1. Sensing Tip
2. Tip Protector
3. Power On/OFF
4. Battery Test
5. Reset Button
6. Audio Mute
7. Sensitivity Up
8. Sensitivity Down
9. LED Leak Indicators
10. Flexible Probe

GETTING STARTED

Installing Batteries

Remove the battery compartment door located on the bottom of the instrument by as shown below. Install batteries, Positive Polarity towards the unit (See figure 2).

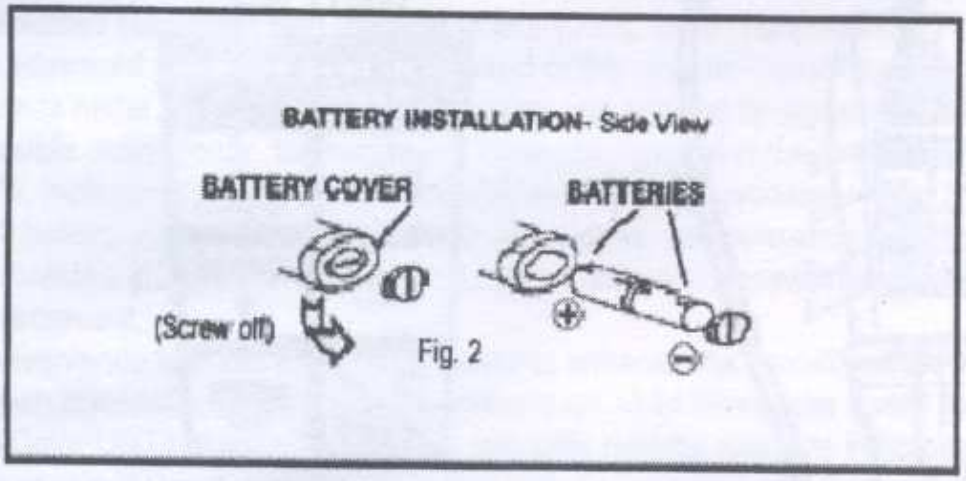


Fig. 2

OPERATING FEATURES

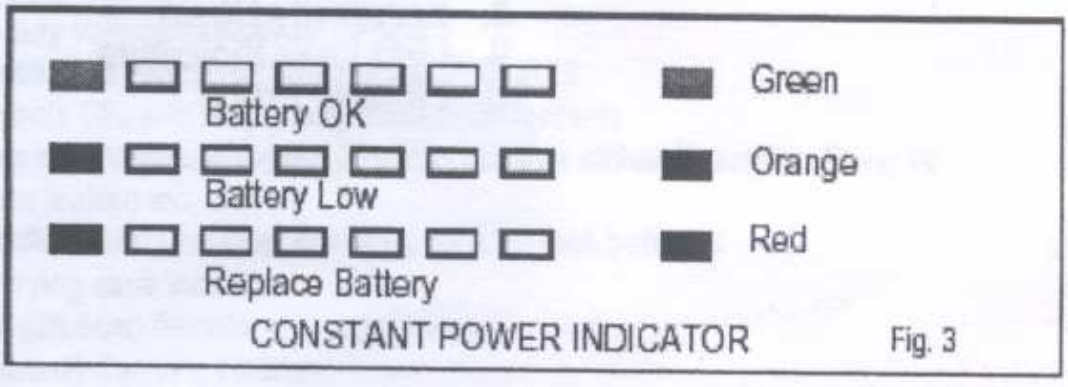
Power Indication/Battery Test

The DILO 3-033-R002 provides two indications of battery voltage status; a Constant Power indicator (leftmost LED) and a Battery Test function. The Constant Power indicator allows the user to see the battery level at all times. The LED will remain on whenever the unit is powered on. It may appear as one of three colors (See Fig 3):

GREEN Battery voltage is normal, sufficient for proper operation.

ORANGE Battery voltage is approaching the lower threshold for operation, replace as soon as possible.

RED Battery voltage is below acceptable operating level.

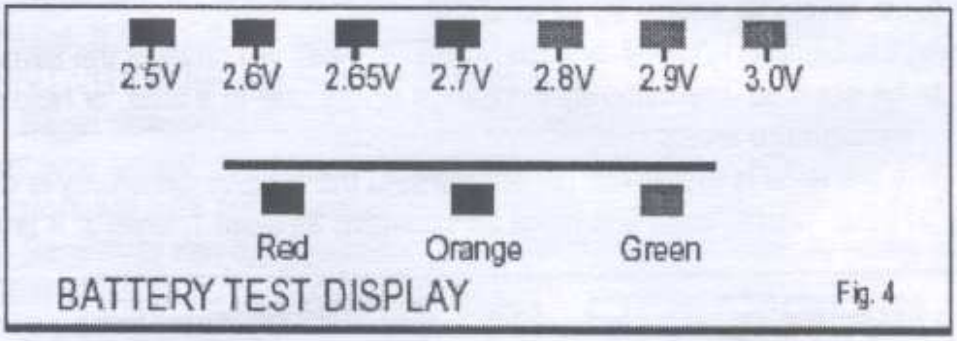


CONSTANT POWER INDICATOR Fig. 3

OPERATING FEATURES

Battery Test Function: This feature is activated by pressing the Battery Test key. When pressed, the LED's will display a three color bar graph indication of true battery voltage (See Fig. 4). The LED's correspond to voltage as shown in the figure.

Not all LEDs will always be on; the number of LEDs on, indicate the voltage level.



The battery voltage display will remain as long as the BATTERY TEST key is depressed. Release the BATTERY TEST key to return to normal operation. This function may be activated at any time during operation, and does not interrupt alarm signals.

Automatic Circuit/Reset Feature

The DILO 3-033-R002 features an Automatic circuit and a Reset function key that set the unit to ignore ambient concentrations of SF_6.

- AUTOMATIC CIRCUIT - Upon initial power on, the unit automatically sets itself to ignore the level of SF_6 present at the tip. Only a level, or concentration, greater than this will cause an alarm. CAUTION: Be aware that this feature will cause the unit to ignore any SF6 present at turn on. In other words, with the unit off, if you place the tip up to a known leak and switch the unit on, no leak will be indicated!
- RESET FEATURE - Pressing the RESET key during operation performs a similar function. When the RESET key is pressed it programs the circuit to ignore the level of SF6 present at the tip. This allows the user to 'home-in' on the source of the leak (higher concentration). Similarly, the unit can be moved to fresh air and reset for maximum sensitivity. Resetting the unit with no SF6 present (fresh air) causes any level above zero to be detected. Whenever the unit is reset, the LED's (except the leftmost power indicator) will turn Orange for 1 second. This provides a visual confirmation of the reset action.

Sensitivity Adjustment

The DILO 3-033-R002 provides seven levels of sensitivity. The sensitivity level is indicated on the visual display when either the SENSITIVITY ⇧ or SENSITIVITY ⇩ keys are pressed. The base beeping tone is also an indication of sensitivity level.

OPERATING FEATURES

When the unit is switched on, it is set to sensitivity level 5.

1. To adjust the sensitivity, press the SENSITIVITY ⇧ or SENSITIVITY ⇩ key. When the key is pressed, the visual display will show the LED's red. The number of LED's lit, indicates the level (See Fig 5). Level one (lowest sensitivity) is shown by the leftmost LED. Counting from left, levels 2 through 7 are indicated by the corresponding number of red LED's; i.e. level 7 is shown by all LED's lit.
2. Pressing the SENSITIVITY ⇧ or SENSITIVITY ⇩key will change the sensitivity. The keys can be pressed intermittently to change levels one at a time, or held down to move quickly through the levels.
3. Each time the level is increased (or decreased) the relative sensitivity is doubled (or halved). In other words, level 2 is twice as sensitive as level 1, level 3, 4 times as

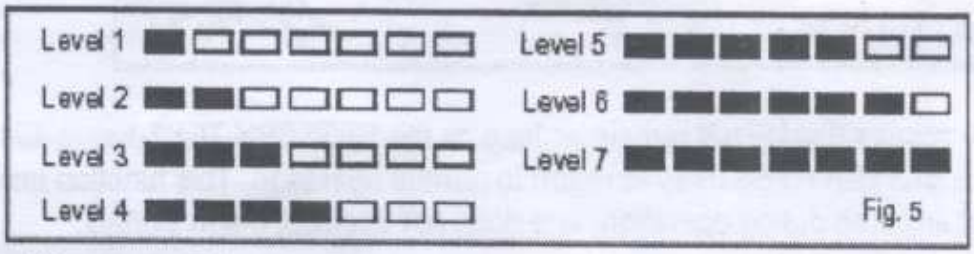


Fig. 5

sensitive, etc... This allows sensitivity to be increased as much as 64 times!

Alarm Indications

The 3-033-R002 features 18 alarm levels. This permits a clear indication of relative leak size and strength. The progressive indicators can be used to home-in on a leak; as the increasing alarm levels indicate that the source (highest concentration) is being

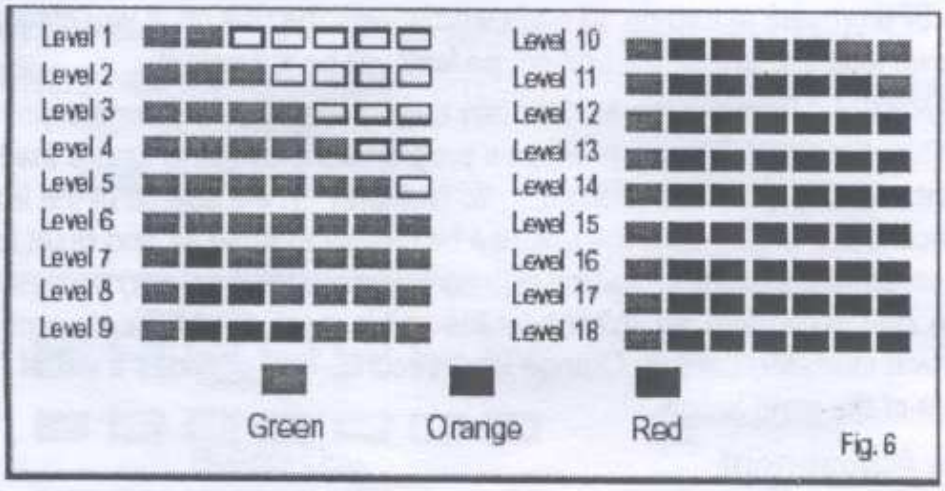


Fig. 6

approached. Each level is indicated by additional LED's in one of three colors, Green, Orange or Red (See Fig 6).

At first the display will light Green, from left to right. Then, the LED's will light Orange, from left to right, replacing the Green one at a time. Finally, the LED's will light Red, from left to right, replacing the Orange, one at a time.

OPERATING INSTRUCTIONS

OPERATION:

1. Switch the unit on by pressing the ON/OFF key. The display will illuminate with the reset indication (Left LED green, all others Orange) for 2 seconds.
2. Verify the battery level by observing the constant power indicator (see above).
3. Upon turn on, the unit is set to sensitivity level 5. A rapid, but steady beep rate will be heard. If desired, the sensitivity can be adjusted by pressing the SENSITIVITY ⇧ or SENSITIVITY ⇩ key, as described above.
4. Begin searching for leaks. When SF_6 is detected, the audible tone will change to a 'siren' type sound, distinctly different from the base beep rate. Additionally, the visual indicators will light progressively as described in the Alarm Indications section.
5. Sensitivity can be adjusted at any time during operation by using SENSITIVITY ⇧ or SENSITIVITY ⇩ key. This adjustment will not interrupt detection.
6. If a full alarm occurs before the leak is pinpointed, press the RESET key to reset the circuit to a zero reference as described above.

OPERATING TIPS

The following section includes several general operating tips, and the SAE J1628 recommended procedure for leak detection.

1. Adjust the sensitivity up, only when a leak cannot be found. Adjust the sensitivity down only when resetting the unit does not allow you to 'home in' on the leak.
2. In areas that are heavily contaminated with SF_6, the unit may be reset to block out ambient concentrations of gas. The probe should not be moved while the unit is being reset. The unit can be reset as many times as needed.
3. In windy areas, even a large leak can be difficult to find. Under these conditions, it is best to shield the potential leak area with tape or plastic bags.
4. Be aware that the detector may alarm if the sensing tip comes in contact with moisture and/or solvents. Therefore, avoid contact with these when leak checking.

Recommended Procedure

1. The system containing SF_6 should be charged with sufficient gas to have a gauge pressure of at least 50 PSIG.
2. Take care not to contaminate the detector probe tip if the part being tested is contaminated. If the part is particularly dirty, or condensate (moisture) is present, it should be wiped off with a dry towel or blown off with compressed dry air. No cleaners or solvents should be used, since the detector may be sensitive to their ingredients.

OPERATING TIPS

3. Visually trace the entire system, and look for signs of damage or corrosion on all lines, flanges, fittings, rupture disks, bushings and other components. Each questionable area should be carefully checked with the detector probe.
4. At each area checked, the probe should be moved around the location, at a rate no more than 25 to 50 mm/second (1-2 in/second), and no more than 5 mm (1/4 in) from the surface, completely around the position. Slower and closer movement of the probe greatly improves the likelihood of finding a leak. Any increase in beep rate is indicative of a leak.
5. An apparent leak shall be verified at least once as follows:
   a) Blow compressed air into the area of the suspected leak, if necessary, and repeat the check of the area. In cases of very large leaks, blowing out the area with air often helps locate the exact position of the leak.
   b) First move the probe to fresh air and reset. Then hold the probe tip a close as possible to the indicated leak source and slowly move around it until the leak is confirmed.

LEAKING CASTINGS

While still a rare occurrence, it is possible for SF_6 to leak directly through the porous aluminum castings found on many of today's single-pressure "puffer" circuit breakers and gas insulated bus. Because the leak rates are usually extremely slow, and not in an obvious locations (such as a seam, crack, or weld), traditional leak detection methods have a difficult time finding the actual leak.

To find casting leaks, cut a standard plastic garbage bag into small square patches (6" to 12"). Using duct tape or masking tape, randomly tape the squares all over the interrupter tanks. After allow the equipment to sit for several hours, tear a small hole in the plastic, and insert the detector probe. If any patch alerts, the casting has a leak.

Please note that there is currently no permanent fix to leaking castings. Breaker manufacturers recommend the replacement of the interrupter tank. Contact the manufacturer for more information.

APPLICATIONS

The 3-033-R002 Leak Detector may also be used to:

- Detect leaks in other systems and storage/recovery containers. In addition to SF6, it will also respond to ALL halogenated (contains Chlorine or Fluorine) refrigerants. This includes, but is not limited to:
  - CFCs e.g. R12,R11,R500,R503 etc...
  - HCFCs e.g. R22,R123,R124,R502 etc...
  - HFCs e.g. R134a, R404a, R125 etc...
  - Blends such as AZ-50, HP62, MP39 etc...
- Detect Ethylene Oxide gas leaks in hospital sterilizing equipment (it will detect the halogenated carrier gas)
- Detect most gases that contain Chlorine, Fluorine and Bromine (halogen gases)
- Detect cleaning agents used in dry cleaning applications such as perchloroethylene
- Detect Halon gases in fire extinguishing systems

MAINTENANCE

Proper maintenance of your Leak Detector is very important. Carefully following the instructions, outlined below, will reduce performance problems and increase the life expectancy of the unit.

WARNING: TURN UNIT OFF BEFORE REPLACING THE SENSING TIP. FAILURE TO DO SO MAY RESULT IN A MILD ELECTRICAL SHOCK!

Keep the sensing tip clean: Prevent dust, moisture and grease build-up by utilizing the provided tip protector. Never use the unit without the protector in place.

Before using the unit, always inspect the tip and protector to see that they are free of dirt and/or grease. To clean:

1. Remove protector by grasping and pulling off tip.
2. Clean protector with shop towel and/or compressed air.
3. If the tip itself is dirty it can be cleaned by immersing in a mild solvent, such as alcohol, for a few seconds, and then using compressed air and/or a shop towel to clean.

NOTE: Never use solvents such as gasoline, turpentine, mineral spirits, etc., as these will leave a detectable residue – desensitizing your unit.

MAINTENANCE

Sensing tip replacement: The tip will eventually wear out and require replacement. It is difficult to predict exactly when this will occur since tip longevity is directly related to the conditions and frequency of use. The tip should be replaced whenever the alarm sounds or becomes erratic, in a clean, pure, air environment.

To replace the tip:

1. Make sure the unit is OFF.
2. Remove the old tip by unscrewing counter-clockwise.
3. Use the supplied replacement tip, located in the carrying case. Replace by screwing on clockwise.

REPLACEMENT PARTS

Standard Equipment

Your SF_6 Leak Detector comes equipped with one Carrying Case, one Owner's Manual, 2 "C" cell batteries and one replacement Sensing Tip and Protector. To purchase replacement parts for your leak detector please contact your local DILO representative. To ensure that you obtain the correct parts it is best to reference the part number when placing your order.

Replacement Parts:

DILOXP-2 Maintenance Kit (3 Sensing Tips & 3 Tip Protectors)
DILOXP-4A Blow Molded Carrying Case
DILO5201 Leak Source

SPECIFICATION

Power Supply: 3V DC; two "C" cell Alkaline batteries
Maximum Sensitivity:.. Certified for SF_6 @ 0.5 oz/yr. (14gr/yr)
Ultimate sensitivity: .... less than 0.1 oz/yr (3 gr/yr) for all Halogen based refrigerants and SF_6.
Operating Temperature: 30° to 125° F (0°to 52° C)
Battery Life: ..... Approximately 30 hours normal use
Duty Cycle: ..... Continuous, no limitation
Response Time:..... Instantaneous
Reset Time:..... One second
Warm-Up Time:..... Approximately 2 Seconds
Unit Weight: ..... 1.2 lbs (560 grams)
Unit Dimensions:..... 9" x 2.5" x 2.5" (22.9 cm x 6.5cm x 6.5cm)
Fixed Probe Length:.... 14" (35.5 cm)