DISCOVERY DUO
DISCOVERY DUO/AM
Dual-Technology Microwave/PIR Intrusion Detectors

Installation Instructions

1. FEATURES

- Cylindrical optics improves detection and false alarm immunity.
- True Motion Recognition™ (TMR) algorithm (patented) distinguishes between the true motion of a human body and other disturbances which invariably cause false alarms.
- DRO-stabilized MW microstrip technology (patented).
- MW Motion Simulator simulates the effect of a human body moving in the MW field (for MW self-test - patent pending).
- Range control for adjusting the MW coverage.
- Integral swivel bracket for wall or ceiling installation.
- Sealed chamber protects the pyroelectric element from insects.
- PIR self-test by applying a short heat pulse (DISCOVERY DUO/AM only).
- Programmable motion event counter (1 or 2 events).
- Simple-to-use, two-position vertical adjustment.
- TEST input to enable/disable the walk test LED remotely (per new European standard).
- Open collector trouble output.
- Anti-masking protection (DISCOVERY DUO/AM only).
- White light protection.

2. SPECIFICATIONS

Input Voltage: 9 to 16 VDC
Current Drain: About 28 mA @ 12 VDC

PIR SECTION
Detector: Low noise dual-element pyroelectric sensor
Tripping Indication: LED flashes green for up to 5 seconds
Motion Event Verification Counter: Selectable, 1 or 2 events
Lens Data (No. 105DH - see Figure 2):
  - No. of Beams: 36 in two layers (curtain beams in bottom layer)
  - Max. Coverage: 12 x 12 m (40 x 40 ft) / 90° field of view
Vertical Adjustment: FAR and NEAR, by sliding the circuit board along a two-position scale.

MW SECTION
Oscillator: Microstrip DRO-stabilized Doppler module
Frequency: 10.525 GHz (U.S.A. only) or 2.45 GHz (Europe)
Detection Range: Adjustable from 25% to 100% (3 m to 12 m)
Tripping Indication: LED glows green for up to 5 seconds

ALARM, TAMPER & TROUBLE DATA
Alarm Indication: LED glows red for 1.3 to 5 seconds if both detectors trip
Relay Contacts: N.C., rated at 0.1 A resistive / 30 VDC; 18 Ω resistor in series with contacts
Alarm Duration: 1.3 to 5 seconds
Tamper Switch: N.C., rated at 50 mA resistive / 30 VDC
Trouble Output: Open collector, 100 mA max., with 18Ω resistor in series and 47 kΩ pull-up (see Figure 11)
Masking Detection Delay (AM version only): About 60 seconds
Trouble/ Masking Indication: LED alternately flashes green and red and TRB output pulls LOW until the detector is reset.

3. INSTALLATION

3.1 Installation Hints
To minimize false alarms:

- Do not aim at heat sources
- Mount on solid, stable surfaces
- Do not expose to air drafts
- Do not install outdoors

MOUNTING
Height: Up to 3.6 m (12 ft)
Room Size: 8 - 12 m (24 - 40 ft) in the “FAR” position; 2 - 8 m (6 - 24 ft) in the NEAR position.
Bracket Adjustment: 20° downward, 20° left and right.
Installation Options: Surface or corner (without bracket); surface or ceiling (with bracket).

ENVIRONMENTAL
RFI Protection: >30 V/m up to 1000 MHz.
Operating Temperatures: -10°C to 50°C (14°F to 122°F).
Storage Temperatures: -20°C to 60°C (-4°F to 140°F).

Standards: Complies with Part 15 of the FCC Rules.

This device is designed to comply with the essential requirements and provisions of Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio and telecommunications terminal equipment.

2.45 GHz has no restriction in any EU member state.

To comply with the Canadian standard RSS-210, this device must be operated indoors only to provide maximum shielding and to prevent interference to licensed services.

PHYSICAL
Size (H x W x D): 117 x 65 x 47 mm (4-5/8 x 2-9/16 x 1-7/8 in.).
Weight: 109 g (3.85 oz) w/o bracket, 124 g (4.4 oz) with bracket.

PATENTS
U.S. Patents: 5,237,330 and 5,693,943 (other patents pending)
In addition, a few important rules must be observed while selecting a mounting location:
1. Microwave radiation passes through glass and non-metallic walls. Be sure to adjust the MW range so that it does not exceed the room limits, or else motion in the next room or moving traffic along the outer side of the wall will cause the MW detector to trip.
2. Large reflecting objects (especially metals) in the coverage area can distort the microwave detector's coverage pattern.
3. If two DISCOVERY DUO units are installed in the same room or on opposite sides of a shared wall, they should not face each other and must be mounted at least 2 meters apart.
4. Do not install the DISCOVERY DUO in places where one of the two detector circuits alarms constantly or intermittently, due to environmental interference.

NOTE: DISCOVERY DUO-AM users are advised to mount the unit in locations where inadvertent approach to less than 1 m (3 ft) from the detector is unlikely to occur.

3.2 Mounting without Swivel Bracket
1. Remove the front cover as shown in Figure 3.
2. Loosen the vertical adjustment screw, slide the PCB down and remove it via the “keyhole” (see Figure 4).
3. Pull the PCB straight out and put it aside until required again.
4. Refer to Figure 5 and punch out the mounting knockouts at the rear wall of the base (for surface mounting) or at the angled sides (for corner mounting).
5. Punch out any one of the wiring knockouts shown in Figure 5.
6. Hold the base against the wall at the selected installation location, mark the points for drilling and drill the holes (insert the plastic dowels supplied if necessary).
7. Pass the wires through the wiring inlets into the base and attach the base to the wall using the screws supplied.
8. Return the PCB to its place within the base.
9. Proceed to wire the terminal block as instructed in Para. 3.4.

3.3 Mounting with Swivel Bracket
1. Remove the front cover as shown in Figure 3.
2. Remove the PCB (see Figure 4) and put it temporarily aside.
3. Punch out the large knockout in the round bulge at the top part of the base (see Figure 6).
4. Assemble the bracket as shown in Figure 6.
5. Rotate the bracket to the desired position (refer to Figure 7) but do not yet tighten the screw fully.
6. Punch out the selected wiring knockouts in the bracket base (see Fig. 8).
7. Press the bracket against the mounting surface and mark the points for drilling. Drill out the holes and insert plastic dowels, if necessary. Attach to the wall with the 2 screws.
8. Route the cable through the bracket and into the detector as shown in Figure 9.
9. Attach the bracket to the mounting surface using the two screws supplied.
10. Tilt down or swivel the detector to face the desired direction. Fig. 10 shows the various possibilities of tilting and swiveling.
3.4 Wiring

Refer to Figure 11 and connect wires to the terminal block in the following order:

Terminal: TAMP (tamper switch)
Connect to: Normally closed 24-hour tamper zone of the control panel.
Details: Upon removal of the cover, the tamper contacts will open.

Terminal: TRB (trouble output)
Connect to: 24-hour trouble zone
Details: The TRB output will pul to ground and will remain grounded until

3.5 The Power-up Process

After connecting the (+) and (-) terminals to the power source, the DISCOVERY DUO starts a 60-second warm-up period, indicated by alternate flashing of the green and red lights.

Caution: If the alternate flashing of the red and green lights does not stop within 60 seconds, a failure has been detected by the self-test circuitry, or, if you are dealing with the DISCOVERY DUO/AM, the unit may be masked (refer to Para. 3.6).

3.6 What Happens in Case of Masking?

If an attempt is made to stick masking material over the lens or put a masking object close to the lens (DISCOVERY DUO/AM only), a trouble alert will result about 60 seconds after masking:

- The LED will flash red and green alternately;
- The TRB output will pull to ground and will remain grounded until the detector is reset (see Para. 3.14 for procedure).

3.7 Visual Indications

The dual color LED is used to signal various alarm and trouble messages as shown in Table 1 below:

**Table 1. Interpreting the Visual Indications**

<table>
<thead>
<tr>
<th>Visual Indication</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>No detection</td>
</tr>
<tr>
<td>Steady green (5 s)</td>
<td>MW walk-test detection</td>
</tr>
<tr>
<td>Flashing green</td>
<td>PIR walk-test detection</td>
</tr>
<tr>
<td>Steady red (5 s)</td>
<td>Alarm: MW + PIR detection</td>
</tr>
<tr>
<td>Flashing red and green</td>
<td>1. Trouble or masking is being detected by the self-test circuitry</td>
</tr>
<tr>
<td>(alternately)</td>
<td>2. Initial warm-up routine (stops 60 seconds after power up)</td>
</tr>
</tbody>
</table>

3.8 Mode Selector

The DIP switch mode selector is mounted on the unit's PC board (see Figure 5). It controls four functions as demonstrated in Figure 12 and as detailed in Table 2.

**Table 2. Mode Selector Switch functions**

<table>
<thead>
<tr>
<th>Switch State</th>
<th>Function</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>One motion event trips the PIR</td>
<td>ON</td>
</tr>
<tr>
<td>ON</td>
<td>Two motion events trip the PIR</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>The walk-test LED is disabled*</td>
<td>ON</td>
</tr>
<tr>
<td>ON</td>
<td>The walk-test LED is enabled</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>Ground potential (–) enables the LED; floating terminal disables the LED</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>Floating terminal (or +12VDC) enables the LED; ground potential disables test</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>Output relay opens upon alarm</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>Output relay opens upon alarm and also when trouble is detected</td>
<td>OFF</td>
</tr>
</tbody>
</table>

* The LED may be enabled remotely with a test switch connected to the TST input as shown in Figure 11.

3.9 Vertical Adjustment

The vertical adjustment scale for the PIR detector is located at the lower right edge of the PC board (refer to Figure 5). Two positions are available - FAR and NEAR. All new DISCOVERY DUO units are set to the FAR position. To adjust, loosen the vertical adjustment screw, slide the PC board along the vertical slot until the pointer indicates the required position on the scale (see Figure 13). When done, tighten the adjustment screw firmly.

**Figure 13. Vertical Adjustment**

<table>
<thead>
<tr>
<th>Scale Position</th>
<th>Resultant Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAR</td>
<td>Mounting height: 2.0 - 2.6 m (6.5 - 8.5 ft)</td>
</tr>
<tr>
<td>NEAR</td>
<td>Mounting height: 2.0 - 2.6 m (6.5 - 8.5 ft)</td>
</tr>
</tbody>
</table>
3.10 Setting the Motion Event Counter
If you wish to set the PIR detector for maximum false alarm immunity, shift DIP switch No. 1 (SW-1) to ON. In this position, two consecutive motion events are required to trip the PIR detector. For false alarm protection, shift SW-1 to OFF. In this position, only one motion event is required to trip the PIR detector.

3.11 PIR Walk Test
A. Rotate the MW RANGE control fully counterclockwise to MIN.
B. Verify that DIP switch SW-2 is set to ON (the LED is enabled).
C. Mount the front cover in place.
D. Walk into the detector's field of view at the expected far edge of the coverage area. The green light should flash for up to 5 seconds each time your motion is detected.

Note: If the green light glows steadily for up to 5 seconds, your motion has been detected by the MW detector.
E. If PIR detection is not obtained at the far end of the coverage area, remove the front cover and re-adjust the vertical position. Replace the cover and retest.

3.12 MW Walk Test
A. Remove the front cover.
B. Verify that the MW RANGE control is set fully counterclockwise to MIN and that DIP switch SW-2 is set to ON (LED is enabled).
C. Start by moving into the coverage area at the far edge. The LED should light green for up to 5 seconds each time your motion is detected.
D. If your motion was not detected at the far edge, advance the MW RANGE control slightly clockwise toward MAX and try again until your motion is detected reliably at the far edge.

Caution! The MW detection range must not exceed the far edge of the desired coverage area.
E. Walk across the coverage area at various ranges and verify that your motion is consistently detected.

3.13 Alarm Walk Test
A. Set DIP switch SW-2 to ON (the LED is enabled).
B. Install the front cover in place.
C. Walk across the detector's field of view in different directions, at various distances from the detector, and verify proper alarming throughout the detector's coverage area (the red light glows for 1.3 to 5 seconds).
D. When done, remove the cover and set DIP switch SW-2 to OFF to prevent unauthorized tracing of the coverage pattern.
E. Remount the cover and fasten it to the base using the small screw at the bottom.

Attention! To assure proper function of the detector, the range and coverage area should be checked at least twice a year. Furthermore, it is recommended that users perform a walk test at the far end of the coverage pattern to assure an alarm signal prior to each time the alarm system is armed.

3.14 Resetting after Trouble (DISCOVERY DUO/AM)
In case of trouble, proceed as follows:
- Search for masking material on the lens or a masking object in front of the lens and remove them, if found.
- Reset the detector by walking across its field of view at the far end, causing it to alarm several times.
- If masking is not moved, the LED should stop flashing, and the TRB output should revert to the open-circuit state (dis-connected from the ground).

Note: If walk testing does not cause the trouble alert to stop, recheck for masking. Once masking is ruled out, the trouble is probably due to defective PIR or MW circuitry. Replacing the detector unit will solve this problem.

4. MISCELLANEOUS COMMENTS
This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause such interference, which can be verified by turning the device off and on, the user is encouraged to eliminate the interference by one or more of the following measures:
- Re-orient or re-locate the receiving antenna.
- Increase the distance between the device and the receiver.
- Connect the device to a circuit different from the one which supplies power to the receiver.
- Consult the dealer or an experienced radio/TV technician.

WARRANTY
Visonic Limited (the "Manufacturer") warrants this product only (the "Product") to the original purchaser only (the "Purchaser") against defective workmanship and materials under normal use of the Product for a period of twelve (12) months from the date of shipment by the Manufacturer. This Warranty is absolutely conditionally upon the Product having been properly installed, maintained and operated under conditions of normal use in accordance with the Manufacturers recommended installation and operational instructions. Products which have become defective for any other reason, according to the Manufacturers discretion, such as improper installation, failure to follow recommended installation and operational instructions, neglect, willful damage, misuse or vandalism, accidental damage, alteration or tampering, or repair by anyone other than the manufacturer, are not covered by this Warranty.

The Manufacturer does not represent that this Product may not be compromised and/or circumvented or that the Product will prevent any death and/or personal injury and/or damage to property resulting from burglary, robbery, fire or otherwise, or that the Product will in all cases provide adequate warning or protection. The Product, properly installed and maintained, only reduces the risk of such events without warning and it is not a guarantee that such events will not occur.

The possibility of exposure to RF fields is not expressly in lieu of all other warranties, obligations or liabilities, whether written, oral, express or implied, including any warranty of merchantability or fitness for a particular purpose, or otherwise. In no case shall the Manufacturer be liable to anyone for any consequential or incidental damages for any breach of any warranties whatsoever, as aforesaid. The Manufacturer shall in no event be liable for any special, indirect, incidental, consequential or punitive damages or for loss, damage, or expense, including loss of profits, goodwill, directly or indirectly arising from the Products use or inability to use the Product, or for loss or destruction of other property or from any other cause, even if Manufacturer has been advised of the possibility of such damage. The Manufacturer shall have no liability for any death, personal and/or bodily injury and/or damage to property or other loss whether direct, indirect, incidental, consequential or otherwise, based on a claim that the product failed to function.

However, if the Manufacturer is held liable, whether directly or indirectly, for any loss or damage arising under this limited warranty, THE MANUFACTURER'S MAXIMUM LIABILITY (IF ANY) SHALL NOT IN ANY CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT, which shall be fixed as liquidated damages and not as a penalty, and shall be the complete and exclusive remedy against the Manufacturer.

When accepting the delivery of the Product, the Purchaser agrees to the said conditions of sale and warranty and he recognizes having been informed of.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so these limitations may not apply under certain circumstances.

The Manufacturer shall be under no liability whatsoever arising out of the corruption and/or malfunctioning of any telecommunication or electronic equipment or any programs. The Manufacturers obligations under this Warranty are limited solely to repair and/or replace at the Manufacturers discretion any Product or part thereof that may prove defective. Any repair and/or replacement shall not extend the original warranty period. The Manufacturer shall not be liable for any restorations costs. To exercise this Warranty the Product must be returned to the Manufacturer freight pre-paid and insured.

This Warranty is in addition to and does not affect your legal rights. Any provision in this warranty which is contrary to the Law in the state or country were the Product is supplied shall not apply.

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Warning: The user must follow the Manufacturers installation and operational instructions including testing the Product and its whole system at least once a week and to take all necessary precautions for his/her safety and the protection of his/her property.