Panthera

Anti-intrusion infrared and microwave barrier detection system

User and installation manual
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WARNINGS!

- Observe the minimum distances between the TX and RX barriers (see table on page 16)

- Power the device using the 13.8 Vdc stabilised voltage only

- In order for the barrier to work correctly, ensure the power voltage never falls below 12Vcc.

- We recommend you switch on the temperature control system (24VAC)
Main components

<table>
<thead>
<tr>
<th>Part</th>
<th>Quantity</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Aluminum profile</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>IR polycarbonate cover</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Upper cover</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Lower cover</td>
</tr>
<tr>
<td>5</td>
<td>From 2 to 5</td>
<td>Optical assemblies receiver / transmitter</td>
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Additional components

<table>
<thead>
<tr>
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<tr>
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<td>1</td>
<td>Ground fixing base</td>
</tr>
<tr>
<td>1B</td>
<td>1</td>
<td>Wall fixing base</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Bracket</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Screws with washers</td>
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**Optional**

<table>
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<tr>
<td>4</td>
<td>3</td>
<td>Clamps</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Upper lamp cover</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Lamp holder</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Shade</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Transformer</td>
</tr>
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</table>
General installation instructions

1. After installing the barrier, make sure that it is perfectly closed with the watertight covers supplied.
2. Use the cable clamps supplied to insert the cable in the lower section.
3. Make sure that the path between the sensors is free and that there are no obstacles that could affect the communication between the optical assemblies of the transmitters and receivers (i.e. branches, plants, leaves, etc. that could interfere with the beams).
4. Verify that the optical path of the transmitter used by the receiver barrier is not exposed to direct sunlight at dawn and sunset.
5. Do not use switching power supplies that cause disturbance to power supplies when amplified by optically synchronized systems.

Mounting options

Barriers may be mounted in two ways:

1. With a specific wall mounting base
2. With a specific ground mounting base, which in turn may be fixed in two ways:
   - With clamps, fixing the base to a plinth
   - With fixing gussets

Wall mounting

Drill 4 holes of Ø 8 mm in the wall, level with the base fixing holes.
Insert TE M8 steel gussets (not supplied) and fix the base.
Ground mounting

With clamps, fixing the base to a plinth

This fixing method is the most secure.
It requires a cement base in which to anchor the clamps provided.
Ensure the plinth contains a tube (Ø 20 mm) through which to thread the barrier's power cables.

With fixing gussets

Drill 3 holes of Ø 8 mm in the ground, level with the base fixing holes.
Insert TE M8 steel gussets (not supplied) and fix the base.
Fixing the column to the base

Insert the lower cover into the base guide.

Insert the aluminium profile into the base guide and into the relevant slot in the lower cover.

Insert the connecting bracket between the lower cover and the aluminium profile.

Screw 2 TE M6x20 screws through the bracket and the base and 2 TE M6x25 screws through the bracket and the profile.
Inserting the cover and closing the column

Insert the polycarbonate cover from above, making it slide down as far as the column base and inserting it into the lower cover.

Place the upper cover and screw it to the column by means of 2 O-ring screws (supplied).
Mounting the lamp

Place the specific upper cover that connects to the lamp holder, ensuring the power cables are properly threaded. Screw the cover to the column by means of 2 O-ring screws (supplied).

Connect the wires to the lamp holder terminal.

Fix the lamp holder to the cover using the 2 Allen screws found at the sides (5 mm spanner).

Insert the bulb.

Place the lamp shade on the supporting base and turn it clockwise. Fix it in place using the screw found on the supporting base.
Examples of installation

To be able to monitor the whole perimeter of an area, install the barriers as shown in the figure:

![Diagram of protected area with barriers on all sides]

It is also possible to install the barriers on a single side, when the rest of the perimeter is already protected or inaccessible.

![Diagram of protected area with barriers on one side]
Example of how to protect an independent building

The garden barriers come with crossed beams for maximum protection.

For visibility purposes, the beams in this drawing are linear.

WARNINGS!

Ensure no interference is caused by the presence of photocells for automatic gates or microwave sensors, as these may blind the barriers.
Cables and wiring on the terminal board

Receivers board (RX) - fig. 1
Transmitters board (TX) – fig. 2
Aligning the barriers

Note: the pre-alignment of barriers, which is sufficient for the vast majority of installations, is carried out by the manufacturer during the final testing phase.

_initial manual alignment_

To correctly align the barriers after installation, place the optical assemblies of the transmitters and receivers facing one another, moving them manually to adjust them vertically and horizontally. To do this, unscrew the fixing screw using an 8 mm spanner, adjust the position, and fix the screw back in place.

1. Horizontal and vertical orientation
Aligning the instrumentation

Note: Garden barriers are already pre-aligned by the manufacturer. In the event of problems during the alignment, follow the procedure described below.

Aligning the transmitter assembly

1. Connect the tester to one of the main RX expansion boards using the small (red-black) cable supplied.

2. Move the test jumper on the TX base board to position ON.

3. Move the jumper test on the first TX expansion board to position ON.
4. Manually adjust the optics of the first TX expansion board in order to display the maximum voltage value on the tester, i.e. approx. 4 Volts (voltage values beyond 4 Volts are to be considered optimal). Some multimeters might display a voltage that is up to 50% lower. Orient the lenses towards the centre of the receiving barrier (RX) installed frontally.

Note: It is important to ensure all the red LEDs on the RX optics electronics are switched off. In the event of some or all of the LEDs being on, direct the TX optics until they switch off.

5. Remove the jumper test from the first TX expansion board in the lower section.
6. Repeat the alignment operation in the same way for all the remaining TX expansion boards.

Aligning the receiver assembly

1. Move the test jumper on the TX base board to position ON.

2. Move the jumper test on one of the central TX expansion boards to position ON.
3. Connect the tester to the test point of the first **RX expansion board** in the lower section using the small (red-black) cable supplied.

4. Move jumper **MODE** on the **RX expansion board** to position **TEST**.

5. Manually adjust the optics of the first **RX expansion board** in order to display the maximum voltage value on the tester, i.e. **approx. 4 Volt**.

   Some multimeters might display a voltage that is up to 50% lower.

   Orient the lenses towards the centre of the transmitter barrier (**TX**) installed frontally.

6. Repeat the alignment operation in the same way for all the remaining **RX expansion boards**.

7. After completing all the alignment operations, move the jumper of the **base TX board** to position **OFF**.

8. Move all the jumpers of the **TX expansion boards** to position **OFF**.

9. Move all the jumpers of the **RX expansion boards** to position **NORMAL**.

10. Models with two lenses: verify that the barrier generates an alarm signal when each assembly with two lenses is covered.
    Models with one lens: verify that the barrier generates an alarm signal when each assembly with one lens is covered.
Settings and programming

Description of indicators (LEDs)

GARDEN RX boards have 6 indicators (LEDs) used for control purposes, which can be enabled by moving the jumper on the two-pin connector marked as LEDs to position ON. It is generally advisable to move the jumper back to position OFF at the end of the testing phase.

LED S.LOW: Low signal (DISQUALIFICATION)
LED S.LOW switches on to indicate the presence of “Intense Mist”. If intense mist is detected, the barrier does not initially generate an alarm message signalling a missing signal, but switches the S.LOW LED on, issuing signal DISQUALIFICATION on the terminal board (open collector).

LED MASK: Blinding signal
LED MASK switches on and blinks to signal that the infrared signal detected has a modulated intensity above the one of the signal used. N.B.: this LED is generally OFF in ordinary operating conditions. If the LED continues to be lighted or blink, increase the blinding immunity by adjusting trimmer MASK (turn it clockwise to increase sensitivity).

LED DETECT: Beam interruption detection
Regardless of the alarm output resulting from the tripping delay, which can be adjusted with trimmer SPEED, LED DETECT always switches on when the beams of the barriers are obstructed for a long or short period of time. N.B.: this LED is generally OFF in ordinary operating conditions. The LED blinks if one or more transmitter signals are not detected. The LED lights permanently if no signals are detected from all the transmitters or if one or more receivers are blinded or incorrectly aligned.

LED ALM: Alarm acknowledgement
This LED is normally OFF and switches on to signal the presence of an alarm. The alarms of GARDEN barriers depend on the tripping delay set on trimmer SPEED, which can range from a minimum of 50 mSec to 500 mSec (turn the trimmer clockwise to increase the delay).

LED HTR: Heating system enabling acknowledgement
GARDEN barriers have an automatic heating system with electronic control that guarantees a minimum internal temperature of 17°C in all environmental conditions. If the LED is on, the heating system is working correctly.

POWER: Power supply
The POWER LED is the only one that is permanently on in ordinary operating conditions. It is used to indicate that the board is correctly powered.
**Description of characteristics and jumper settings**

GARDEN RX boards can be programmed in different configurations by means of the jumpers.

**RX BOARD BEAM (preset by manufacturer)**
Use all the jumpers that correspond to the number of receivers fitted on the barrier (if the barrier has 4 double or single lenses, move jumpers to positions 3 and 4).

**TX BOARD BEAM (preset by manufacturer)**
Enable only the jumper that refers to the TX optics fitted on the barrier (for example if the barrier has 4 beams, move the jumper to position 4).

**AND**
The selection of the ON mode enables the random AND of two beams to be attained, which means that an alarm is generated only if at least two beams generate an alarm. This applies to all the beams used both on transmitters and receivers. This function can also be programmed remotely through the 0 Volt terminal board.

**SPEED TRIMMER**
Trimmer for the adjustment of the tripping time (50 msec - 500 sec).

**MASK TRIMMER**
Trimmer to adjust the sensitivity of the anti-blinding device (generally preset by manufacturer).

**LEDS**
If moved to position ON, this jumper enables the LEDs.

**NOISE (RX)**
This jumper has to be programmed if interference from transformers, inverters, etc. is detected.

**S. LOW: low signal (DISQUALIFICATION)**
This jumper has to be programmed if intense mist is detected.

Note: The S. LOW and MASK outputs provide a transistor NPN that is normally open and closes towards 0V when the output is active.
Installation and operation of microwave detector

The current manual uses the following abbreviations:

PS - power supply;
RC - remote control;
DZ - detection zone;
SAP - set of assembly parts;
CPS - computer programme for set-up;
DB - distribution box (optional, available separately);
TU - transmitting unit;
RU - receiving unit;
RCD - receiving – controlling device;
IA - interlocking apron;
SA - signal apron.

The principle of operation of the detector.

TU and RU are placed at the opposite ends of the guarded area. TU (Transmitter Unit) emits electromagnetic waves in the direction of RU (Receiver Unit). RU receives these waves, processes them into an electric signal and analyses this signal.

The person who crosses the DZ, triggers the modulation of the signal at the entry of the RU. The depth of the modulation and the form of signal depend on the size and mass of the person, the place where the area is crossed, the relief of the land and the speed of movement.

If the person moves close to the antenna (closer than 15 ... 20 m), the signal comes with the release of a one-off, unpleasant emission of very deep modulation.

If the person moves on to a distance of more than 15 ... 20 m from the antenna, the signal comes with several sequentially alternating positive and negative emission of low depth modulation and with this the interval between the neighbouring positive and negative emissions and the duration thereof depend on the speed of the person’s movement. The analysis of the temporary and amplitude characteristics of the signal is contained in the algorithm of processing. The evaluation of the modulation level of the input signal is made according to three threshold levels:

- basic threshold – is surpassed when the signal is increased;
- low threshold – the first control level, overcome when the signal is decreased;
- high threshold – the second control level, overcome when the signal is decreased.

When a person crosses the area near the antenna, the high threshold is overcome,
generating a signal about the alarm.

When a person crosses the area far from the antenna, the depth of the negative modulation is decreased and the high threshold is not overcome but then the basic and low thresholds are continually overcome. If the temporary intervals between these events correspond to the calculated temporary thresholds, an alarm signal is generated, too.

The detector has two systems for the regulation of thresholds: “automatic” and “manual”. In the automatic system, the processor provides the optimal characteristics for the detection of persons, crossing the DZ on the ground surface. In the manual system the negative threshold as it becomes more and more significant is set up by the operator. As a rule, the need for manual regulation arises in case of change in the operating conditions specified by this manual.

It is worth mentioning that in the automatic system the threshold is determined in dB in relation to the average level of the radio signal received. To this end, the detector adapts itself to the slow changes in the level as determined by the weather conditions.

An important feature of the detecting algorithm of the detector is the facility to set up the upper detecting speed at which the trespasser overcomes the border. The selection of the particular parameter is made by the user depending on the usage conditions of the detector.

Three values for the highest speed can be set up in the alarm system: 0.5 m/s; 2 m/s; 10 m/s. Recommendations for the selection of the particular parameter are presented in the table.

<table>
<thead>
<tr>
<th>Usage conditions of the detector</th>
<th>Recommended value for the upper detecting speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open space without any engineering facilities, hindering the movement of the trespasser</td>
<td>“high” (~10 m/s)</td>
</tr>
<tr>
<td>Inadequately guarded border (small fence, space near the buildings and walls, shrubby obstructions and so on)</td>
<td>“average” (~2 m/s)</td>
</tr>
<tr>
<td>Properly guarded border (the top or the wall of a high fence where the movement speed of the trespasser is limited significantly)</td>
<td>low” (~0.5 m/s)</td>
</tr>
</tbody>
</table>
Selecting the right value allows to reduce substantially the probability of false responses of the alarm system, generated by flying birds and other disturbing factors.

The detector has 251 independent frequency channels (from 0 through 250). The difference in frequency between two neighbouring channels makes up 1 MHz. The complete range of all channels extends from 24.00 to 24.25 GHz. The released frequency of channel 0 is 24.000 GHz, and that of channel 10 is 24.010 GHz and that of channel 250 is 24.250 GHz. The selection of the frequency channel is made with the help of tuning software. It is essential for the normal operation of the detector to set up the same frequency channels in the TU and in the RU.

It is worth taking into account that there are exceptions from the general rules. Specifically, it is possible to organise the normal working of the detector in case the number of the frequency channel of the transmitter is by 6 numbers more than the frequency channel of the receiver. It means that if 10 channels are used in the TU, its signals will be detected by the RU with 10 as well as 4 channels. The particular circumstance must be considered in case of parallel connection of several detectors.

Apart from this, the RU indicator indicates in the initial and constantly switched on system of the indications of the detector:

- alarm signal for 5 seconds;
- signal about the fault, namely: lack of signal at the entry of the RU, outage of the TU or RU, flashing of the RU by powerful sources of radio noise and in several other cases for more than 30 s;
- The order of using these controls is described additionally in the corresponding points of subsection “Regulating and testing of the operation of the detector”.

Special feature of the construction, ensuring the original functional properties of the detector is the very narrow diagram of the direction of the antennas. This feature ensures increased resistance to the moving objects within the direct vicinity of the DZ axis. The relatively high working frequency also determines a small width of the DZ.

A sample view of the DZ form for a 100 m long land is shown on drawing 1.1.
Drawing 1.1 – Sample view of the DZ form

General requirements as to the place of assembly:
- no water flow from the roofs is allowed in the direct vicinity of the detector units (in the direction of the emission at a distance up to 5 m and up to 0.25 m from sideways);
- it is necessary to provide an exclusion zone where the presence of bushes and branches of trees as well as of big, immovable objects and building structures is not allowed. Movement of tractors, people and animals is not allowed. The width of the exclusion zone for various application versions is shown below;
- the borders of car roads and railways, big, immovable objects and structures, forest sections have to be outside of the zone at a distance twice as big as the exclusion zone. In the event the detector units or the adjacent structures are exposed to the vibrations of passing traffic, the indicated distance has to be specified accurately by way of experimenting.

Comment – No requirements are shown in respect of the area for the limits of non-radio transparent (metal, ferroconcrete and so on) walls and barriers.
In case of installation near electric wires, the installation places of the units have to be moved to a distance of at least 5 m from the wires up to 35 kV and 10 m at voltages up to 500 kV. It is recommended to build the trace lines of the external connection in a subterraneous way where they are located close to the electric wire.
Where several detectors are set up consecutively to exclude trespassing of the DZ under or above the places of the units, it is recommended to ensure the overlapping of adjacent sections at a distance of at least 3 m. In this case the units of the same name (TU or RU) have to be placed side by side. Set up examples are presented on drawing 2.1
value of „not less than”: 3m
The horizontal distance from the DZ axis to the border of the exclusion zone has to make up:
- at least 1.2 m for a section with a length up to 50 m,
- at least 1.5 m for a section with a length from 50 to 100 m,
- at least 2.0 m for a section with a length from 100 to 200 m,
- at least 2.5 m for a section with a length from 200 to 300 m,
- at least 3.0 m for a section with a length from 300 to 400 m.

In the exclusion zone the maximum height of the unevenness of the ground and the snow and grass cover shall not exceed 0.3 m.

Comment – The use of the detector is allowed in case the snow cover exceeds the indicated value where it has to be taken into account that the detector may not detect a person moving within the snow cover. In such a case it is necessary to change the height of the setup of the units.

In case the abovementioned requirements are not complied with, the tactical characteristics of the detector may deteriorate. In such cases the question about the permissibility of the use of the detector under the particular conditions is determined by the usage experienced.

General recommendations
The installation of the detector must provide free access to the controls and the fastening elements. It is recommended to establish the connecting cables under the ground.

Setting up the detector

In places where the height of the snow cover may exceed 0.5 m, the length of such parts of the posts (supports) for the fastening of the detector units as are above the ground shall not be less than 1.5 m. In areas with little snow it is allowed to reduce to 1.1 m the length of such parts as are above the ground.

There has to be provided the facility to shift the detector units along the support simply in case of seasonal adjustments. The initial height at which the units of the detector are set up is 0.8 m from the ground surface to the centre of the unit. The bracket has to be oriented on the support so that the directions of the emissions of the units were set one at the other.

It is recommended to use a metal pipe for support, with diameter from 50 to 90 mm. Where pipes of asbestos cement are applied, it is necessary to replace the regular collars. On soft soils, the support has to be set up on a foundation. The type and dimensions of the foundation are determined in view of the type of the soil and the weather conditions for the given region in order to prevent damage to the adjustment in carrying out the subsequent application.
Connecting the microwave detector

+ – Power supply
- – Power supply
A – RS485 A
B – RS485 B
GND – RS485 GND
ALARM – Relay output (on receiver)
ALARM – Relay output (on receiver)
## Technical specifications

<table>
<thead>
<tr>
<th>Panthera infrared barrier with optional microwave detector</th>
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<tbody>
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<td>Max. operating range outdoors</td>
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<tr>
<td>Minimum distance</td>
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<tr>
<td>Synchronization</td>
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<tr>
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<td>Total number of beams(max.)</td>
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<td>Vertical alignment angle</td>
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<td>Anti-blindingsystem</td>
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<td>Tripping time</td>
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<td>Alarm output</td>
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<td>Tamper output</td>
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<td>LED indicators</td>
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<td>IR signal</td>
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<td>Microwave detector:</td>
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<tr>
<td>Number of MW detector</td>
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<tr>
<td>Minimum required level of the signal received at the maximum length of the DZ</td>
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<td>Minimum DZ height along an area of 300 metres</td>
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<td>Range of detection speeds, m/s</td>
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<td>Range of working supply voltage</td>
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<td>Maximum recovery time of the stand-by system after notification of an alarm</td>
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<td>Minimum signal duration</td>
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<td>Operating frequency</td>
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<td>Max. absorption of columns (infrared beams/microwave)</td>
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<td>Maximum absorption of column heaters</td>
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<td>Operating temperature</td>
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<td>Class of protection</td>
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<tr>
<td>Accessories: ground- or wall- mounting bracket kit.</td>
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<td>Full warranty</td>
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</table>

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