



**BOSCH**

# Photo Beam 5000/3000 Series Heater BH12T



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Installation Guide



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# 1 Introduction

This document contains information that a trained installer needs to install the BH12T heater onto the Photoelectric Beam Detector.

## 1.1 About documentation

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### **Trademarks**

All hardware and software product names used in this document are likely to be registered trademarks and must be treated accordingly.

## 2 General description

The BH12T heater is a heating device for ISC-FPB1-xxx family Photoelectric Beam Detectors. It helps to prevent frost build-up on beam optical modules and covers to ensure stable performance in harsh environmental conditions. The ceramic heater element automatically maintains constant temperature.



### Notice!

Review the warnings and safety precaution notices in this document to prevent potential injury or product damage.

### Parts list

The BH12T heaters are shipped from the factory with the following parts:

- Heaters (2)
- Heater mounting screws (4)
- Installation instructions

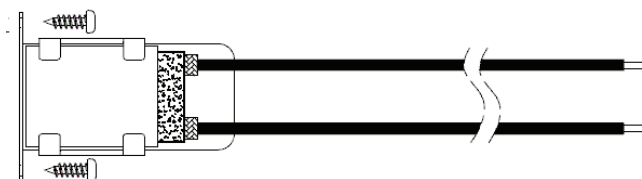


Figure 2.1: Heater components

### 3 Wiring

This section includes wiring procedures and supported wiring lengths. Supported wiring lengths are 0.65 mm to 1.2 mm diameter (22 to 16 AWG).

The following table lists parameters that are calculated based on most common wire types and specifications.



#### Notice!

Distances indicated in the table below are maximum single unit specific values. For example, if you are using a wire diameter of 0.65 mm at 12 VDC, your maximum wiring distance allowed is 10 meters. Divide the given distance by the number of detector sets when more than one set of heaters is connected to the power supply.

Maximum wiring distances for 1 heater			
Metric parameters			
Wire diameter	12 VDC	24 VDC	28 VDC
0.65 mm	10 m	98 m	127 m
0.90 mm	21 m	192 m	249 m
1.29 mm	39 m	351 m	455 m
Imperial Unit parameters			
Wire gauge	12 VDC	24 VDC	28 VDS
22 AWG	33 ft	321 ft	417 ft
19 AWG	69 ft	630 ft	817 ft
16 AWG	128 ft	1151 ft	1492 ft

**Tab. 3.1:** Wiring information

Use separate power supplies for the detector and the heater to avoid the unstable operation caused by dynamic voltage drop during power-up. Use a battery backup type power supply preferably with an adjustable supply voltage level. Use a power supervision relay to indicate AC MAINS fail and/or low battery condition to the security control panel.

Perform the following steps as each installation is different and various cable types have slightly different electrical parameters:

- Measure the impedance of the type of cable you plan to use. It is easiest to use a 100 m or 100 ft wire section for your measurement. Short one end of the wire pair of the cable and measure the total resistance on the other end. Use the measure value as basis to calculate each wire section.



#### Notice!

If the wire is damaged or strained during installation, the impedance of the wire might be higher than calculated or measure when operating current is drawn by the heaters.

When possible, use a cable with at least two extra unused wires in case the resistance value must be reduced. In such case, connect each of the two extra wires in parallel with each of the power supply lines splitting the current on the wires and significantly reduce the resistance and corresponding voltage drop level.

- Apply Kirchhoff's Current Law (KCL) and Voltage Law (KVL) to estimate the voltage drops on each wire section, in case multiple heaters are daisy chained on one cable pair.

**Notice!**

Use caution when the calculated values result in parameters close to minimum voltage levels and/or maximum length and current draw parameters. Over-calculate the results by 15 to 20% when determining the appropriate cable size. This is to eliminate the risk of insufficient power levels due to differences between calculated, simulated and real installation electrical parameters.

- Calculate the maximum overall inrush current of all heaters on the wire and select a power supply which allows the necessary short term high current levels without regulating the voltage level or limiting the output current.
- Measure the maximum voltage level of the power supply unit while the AC MAINS power is connected and the batteries are charging.
- Measure the voltage level of the power supply unit while the AC MAINS power is disconnected and the batteries supply the voltage to the power supply.
- Measure the voltage level of the power supply unit while the AC MAINS power is disconnected and the batteries supply the voltage to the power supply.
- Apply a resistive load that draws approximately the same or similar current as the heaters would on the wire. Let the power supply run for 10 minutes on batteries only. Measure the voltage level of the power supply unit while the AC MAINS power is disconnected and the batteries supply the voltage to the power supply.
  - Some intelligent power supplies up-convert the battery voltage to maintain the required voltage level while the voltage of the individual batteries is gradually decreasing. Such power supplies might provide shorter backup power time to maintain sufficient output power levels.
- Compare the voltage levels measured:
  - When the AC MAINS power is on
  - When the AC MAINS power is momentarily off
  - When the AC MAINS power is off for 10 minutes

These measurements provide a good indication on how the voltage drop changes on the heater power line in case of a power outage. Make sure the cable size calculation allows the heaters to have sufficient power levels while the power supply is running on backup batteries for a longer period of time. These parameters also provide sufficient information to calculate the necessary backup battery capacity.

## 4 Installation

Use the terminal mounting screws to attach the terminal to the beam detector. It is recommended to mount the heaters onto the detector on a flat, horizontal surface before you bring the device to the final mounting location. Observe the orientation of the device on the figures below and make sure the metal plate is facing towards the optical module.

### 4.1 Mounting inside the ISC-FPB1-WxxDS type dual beam detectors

Refer to the following for installation information.

#### Compatible devices

- ISC-FPB1-W30DS
- ISC-FPB1-W60DS
- ISC-FPB1-W90DS

Refer to the following figure for securing the wires under the plastic tabs.

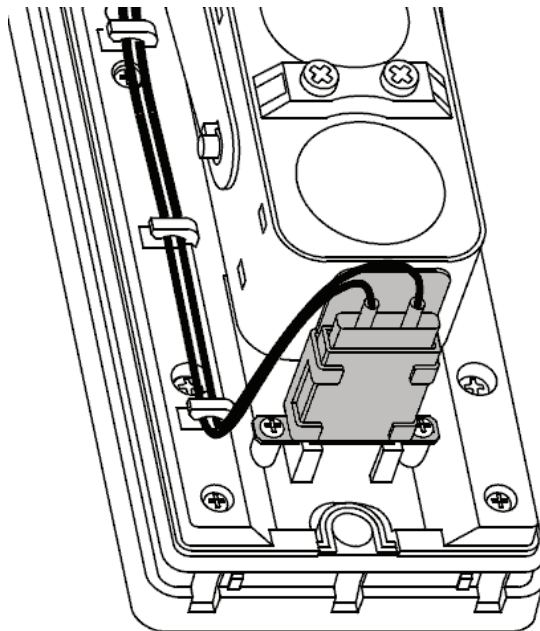


Figure 4.1: Wire insertion under plastic tab

### 4.2 Mounting inside the ISC-FPB1-WxxxQS/QF type quad beam detectors

The heater is mounted directly on the optical unit housing of the quad beam detector. Refer to the installation instructions of the compatible photobeams for installation information.



#### Notice!

If the heater is installed after the beam detector is mounted and operational (retrofit applications), perform an optical alignment procedure to ensure proper functionality.

#### Compatible devices

- ISC-FPB1-W60QS
- ISC-FPB1-W120QS
- ISC-FPB1-W200QS
- ISC-FPB1-W60QF



- ISC-FPB1-W120QF
- ISC-FPB1-W200QF

Refer to the following figure for securing the wires under the plastic tabs.

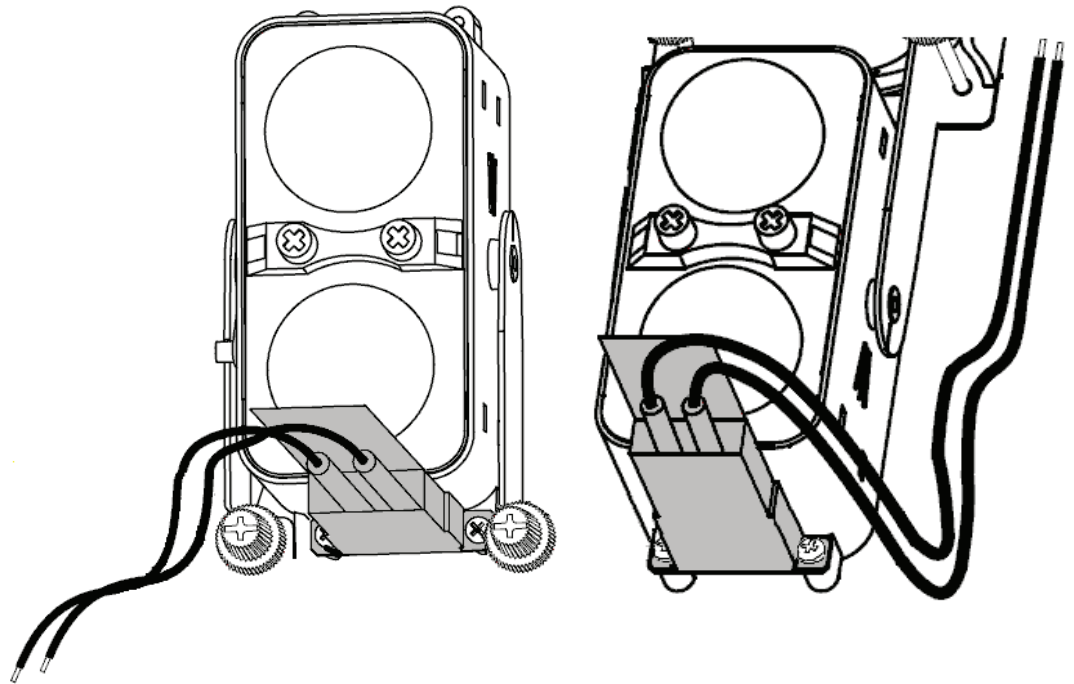


Figure 4.2: Left: upper optical module; right: lower optical module

## 5 Characteristics

Refer to the following information for heater specification information.

### 5.1 12 VDC current draw and temperature characteristics

Supply voltage	Outside temperature	Inrush current	Operating current
12 VDC ===	25°C (77°F)	182 mA	40 mA
	0°C (32°F)	263 mA	90 mA
	-25°C (-13°F)	280 mA	110 mA

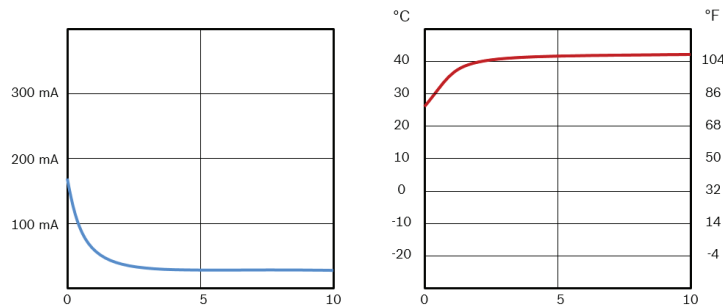


Figure 5.1: Left: 12VDC at 25°C (77°F) with Current Draw over time (in minutes); right: Heater Temperature over time (in minutes)

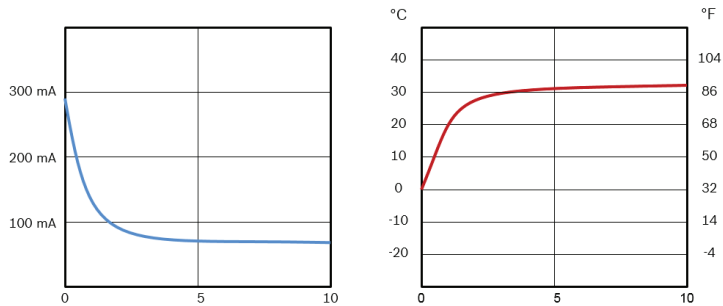


Figure 5.2: Left: 12VDC at 0°C (32°F) with Current Draw over time (in minutes) ; right: Heater Temperature over time (in minutes)

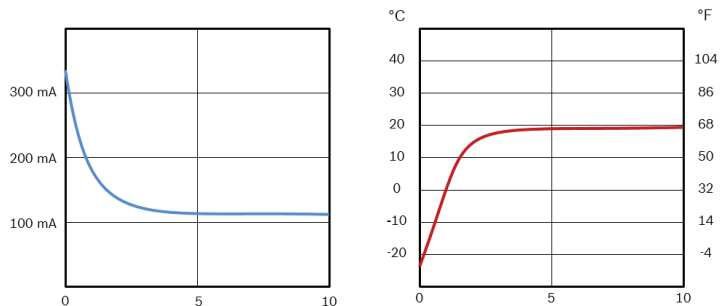

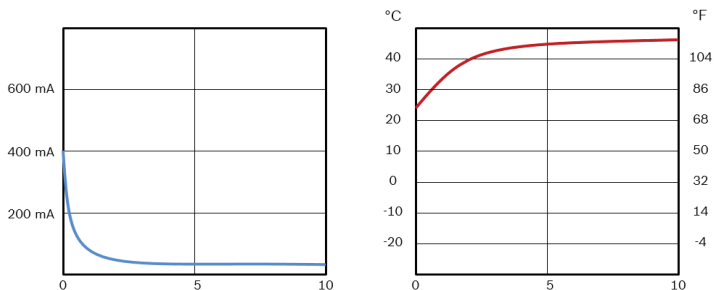


Figure 5.3: Left: 12VDC at -25°C (-13°F) with Current Draw over time (in minutes) ; right: Heater Temperature over time (in minutes)

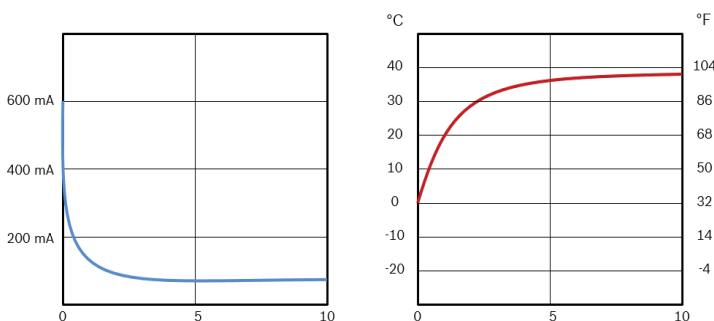
### 5.2 24 VDC current draw and temperature characteristics

Supply voltage	Outside temperature	Inrush current	Operating current
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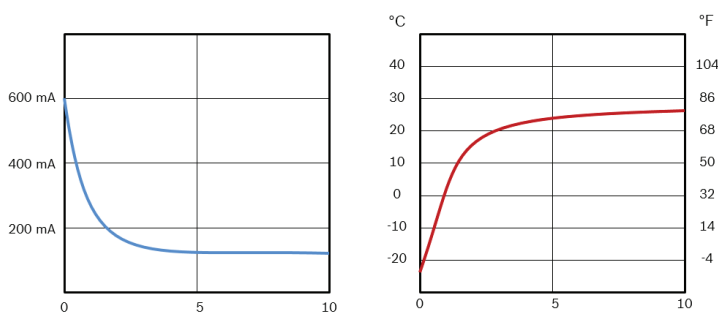
24 VDC 	25°C (77°F)	407 mA	30 mA
	0°C (32°F)	600 mA	60 mA
	-25°C (-13°F)	600 mA	90 mA



**Figure 5.4: Left: 24 VDC at 25°C (77°F) with Current Draw over time (in minutes); right: Heater Temperature over time (in minutes)**



**Figure 5.5: Left: 24 VDC at 0°C (32°F) with Current Draw over time (in minutes); right: Heater Temperature over time (in minutes)**



**Figure 5.6: Left: 24 VDC at -25°C (-13°F) with Current Draw over time (in minutes); right: Heater Temperature over time (in minutes)**



**Bosch Security Systems, Inc.**

130 Perinton Parkway  
Fairport, NY 14450  
USA

**[www.boschsecurity.com](http://www.boschsecurity.com)**

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**Bosch Sicherheitssysteme GmbH**

Robert-Bosch-Ring 5  
85630 Grasbrunn  
Germany