

## **Treadmill Equipment**

Industry: Personal Fitness

Application: Treadmill

*Application Note*

## **Treadmill Equipment**

### **Background**

Treadmills are becoming a common household appliance. They are an easy and convenient way to exercise regularly and enjoy the benefits of a fitness program. The increased popularity of the treadmill has manufacturers looking for ways to differentiate their products from the competition. One way in which manufacturers distinguish their products is to offer new capabilities and features to the consumer. In this scenario, consumers demand more for their money, and manufacturers add features to their treadmills.

Thus, treadmill manufacturers compete in a commodity marketplace. At the same time as they add sophisticated features to their treadmills, they try to reduce the cost of the product in order to increase profit margins.

This application note highlights Honeywell's complete line of sensing solutions that offer cost effective reliability and precision when used as treadmill components.

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### Application

#### User Interface

The user interface hardware conveys information to the user via the interface and inputs this information into the treadmill. The user interface is comprised of several possible components.

- **Display**  
The display indicates the speed, distance, calories burned, heart rate, incline, or any other data to the user. The manufacturer determines what data the user can access.
- **Track Speed Control**  
A dial or up/down buttons comprise the speed control. The speed control enables the user to set the speed of the track. The speed control is commonly given in miles per hour or minutes per mile.
- **Emergency Interlock**  
The emergency interlock is a very important feature of modern treadmills. This device stops the track if the user falls or wishes to stop the track quickly. A tether attached to the user and a large pushbutton on the display comprises an emergency lock.
- **Heart Rate Monitor**  
The heart rate monitor uses a variety of technologies. On some treadmills, the user wears a transmitter contact that sends the user's heart rate to the microprocessor via a wireless transmitter. Other treadmills have contacts on the display that the user must touch for the device to take a reading.

#### Motor

Most of today's treadmills have DC motors. However, treadmill motors can vary from inexpensive A/C motors to high torque D/C motors on high-end equipment.

#### Track/Deck

The track is the moving surface on which the user runs or walks. The deck is the support structure under the track. Treadmill track lengths and widths vary, as do deck suspension methods that cushion the ride.

#### Microprocessor

The microprocessor is the control unit of the treadmill. The microprocessor contains and executes the software necessary to handle all of the functions of the device.

#### Incline Mechanism

The incline mechanism alters the angle of the track to simulate hills. On low-end treadmills, the user manually adjusts the angle before using. On high-end machines, the microprocessor has full control of the angle and can change it from user input on the fly. In addition, the incline can be preprogrammed and combined with speed variations, by using the heart rate monitor to keep the user's heart rate within a target range.

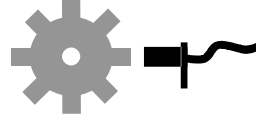
## Honeywell Solutions to Customer Needs

### Track Speed Control

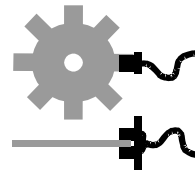
Honeywell offers a full line of high quality sensors and switches that can be integrated into treadmills to offer cost savings while also ensuring reliable and precise performance.

Precise measurement of track speed can be achieved by several methods:

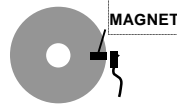
- Place a toothed gear on the track roller and count the teeth with a gear tooth sensor ([GT1](#)).



- Attach a stamped, sheet metal toothed vane to the roller and detect it with a Hall effect or infrared vane sensor ([SR16/17](#), [HOA](#)).

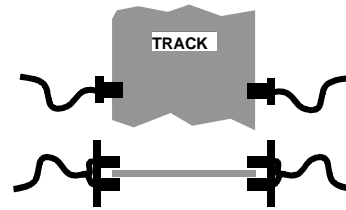


- Place a magnet on the track roller and detect it with a Hall effect sensor. ([SR13/15](#)).



### Track Centering

Two infrared transmitter sensors ([HOA1877](#)) can be used to center the track on the rollers. Place one on either edge of the track and, when the track wanders away from a sensor, a small motor can adjust the roller angle to center it once again.



### Emergency Stop

Due to safety concerns, the stop function must be very reliable. In a panel-mount "panic" button, a long life basic switch ([V3/V7](#), [SM/SX](#)) is necessary. A continuity "key" is a common feature and consists of a card that fits into a control panel slot. A cord attaches this card to the user and when the user falls or steps off the track the card is pulled from the slot and the track stops. A basic switch ([V3/V7](#), [SM/SX](#)), a Hall effect sensor ([SR13](#)), or an infrared sensor ([HOA](#)) can be used to sense the card.

### Incline Mechanism

The incline mechanism is adjustable on nearly all treadmills and the high-end versions have a motor in place for powered or microprocessor controlled adjustments. This angle can be sensed with a linear Hall effect sensor ([SS49/SS490](#))/magnet combination mounted near the pivot-point of the track. Low-end treadmills have a mechanical latching mechanism with two or three levels of incline. These levels can be sensed with a basic switch ([V3/V7](#), [SM/SX](#)) or digital Hall effect sensor ([SR13](#)).

## WARRANTY/REMEDY

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