



*Electric Monitoring and Power Transfer Hardware –
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Brief History of Electric Power Transfer, Hinges, Pivots, and other Hardware

The history of electric monitoring and power transfer started in approximately the late 1960s. Architects and designers had a need first of all to monitor openings, to determine when someone passed through an opening, so users would know whether this was an authorized passage or a violation of a protected space.

The first monitoring of openings using builder's hardware materials was with an exposed monitoring switch mounted to a full mortise hinge. When the hinge was closed, the switch was depressed. When the door was operated, the switch was released and an alarm would sound indicating someone had used the opening.

Then these same architects and designers asked the manufacturers if they could transfer power from the frame into a door. The first attempt to accomplish this was again through exposed contacts mounted to the face of full mortise hinges. When the door was closed, the contacts actually touched one another, transferring electric power through the contacts. This power would operate an electric strike mounted in a pair of doors.

As these products progressed, again the architects came to manufacturers and said they now needed to provide additional security for their clients. They said, "We don't want to see the exposed contacts and switches on the face of the hinge, security is breached when people know that the openings are monitored or transferring power. Can we have hinges modified so that they would not show or reveal these modifications?"

Manufacturers again went back to their R & D departments and asked the same questions that the architects and designers asked their sales representatives. Now the challenge was to conceal the monitoring and power transfer features so those individuals not familiar with the security of openings would not know that the products were electrically controlled or monitored.

The manufacturers and suppliers to this industry have developed many new and innovative products that serve the needs and desires of their clients. The vast majority of these products are considered Low Voltage, or according to the National Electrical Code, 50 Volts or less. Most, but not all of our industry's products are in the 12 and 24 Volt range. Keep this point in mind when you are selecting electrical hardware for openings.

This article concentrates on only one area of these products, primarily hanging devices. Let's look at how these monitoring and power transfer devices are made and how they operate to provide the service that assists in maintaining a secure building.

Features:

Monitoring –

The monitoring feature of an electrified hanging device is for the purpose of controlling the traffic flow through an opening. The owner or occupant needs to know when someone has used or violated an opening.

Types of Monitoring Hinges –

There are two different types of monitoring. The first type is the exposed monitoring switch on the face of the hinge leaf. This manner of modifying a hinge has become less acceptable in the past few years. Since the switch itself is exposed on the face of the hinge, personnel and the general public using the building can see this modification and be aware that the opening is monitored or electrically controlled for some reason or another. When security is a factor, this may be the less desirable practice to monitor an opening.

The second type of monitoring is to conceal the monitoring switch through two varied methods:

Magnetic Monitoring
Mechanical Monitoring

Magnetic Monitoring provides a magnet and reed switch, usually a Single Pole Double Throw (SPDT) switch. This SPDT switch allows for both normally open or normally closed switch capabilities thus allowing flexibility of wiring method at the project site. The magnet is usually mounted on the back of the hinge leaf and is concealed when the hinge is installed in the mortise. The corresponding reed switch which provides the means for the switch to change status is mounted on the opposite hinge leaf and is activated when the door leaf moves. The movement of the door is what changes the status of the switch from open to closed or closed to open. This in turn provides the monitoring capabilities.

Mechanical Monitoring provides a switch, again mounted to the back of the hinge leaf. The mechanical switch is operated by movement of the hinge pin in conjunction with additional pins internally embedded under the surface of the hinge leaf. Again, the movement of the door is what changes the status of the switch from open to closed or closed to open. This in turn provides the monitoring capabilities.

Hinges are not the only door hanging hardware that can provide monitoring. Pivots, continuous geared hinges, and continuous piano or pinned style hinges may also provide monitored security.

Power Transfer –

The power transfer feature allows power to transfer from the frame, through a hanging device, and into the door for the purpose of supplying power for operation of a lock, exit device, or electric strike.

Types of Power Transfer Hinges –

Again, there are basically two different types of power transfer methods for hinges. We will also discuss several other methods of power transfer, which are not incorporated into the hanging method of the opening.

The first type of power transfer is the exposed method. Exposed contacts are applied to the face of the hinge leaf. When the hinge leaves are closed, the contacts make physical contact with each other and transfer the power from the frame into the door, locking or unlocking the electrified device.

The second type of power transfer is the concealed version. With this method, holes are drilled through the hinge leaves and into the knuckle and wires are routed through the hinge from the frame leaf to the door leaf, transferring power to operate a locking device.

It should be mentioned that the power transferred is low voltage. The fact that low voltage is used inside a door and frame is a requirement of the National Electrical Code. This Code states that the voltage in a door unit shall be 50 Volts or less. The standard working voltages in our industry are 6, 12, 24, and 48 volts, AC or DC. High voltage (120 V) is allowable only under special conditions. Please consult with the particular manufacturer's sales or engineering staffs when this requirement is necessary.

Each manufacturer has various methods of protecting the wires as they travel through the hinge and exit the back of the leaf on each side. Select the manufacturer that provides the most protection based on your needs or desires.

Again, hinges are not the only door hanging hardware that can provide power transfer capabilities. Pivots, continuous geared hinges, continuous piano or pinned style hinges, and power transfer units may also provide power to locking devices. Power transfer units are technically not a piece of operating hardware, but they do provide a means of transferring electrical power from the frame side of the door into the door itself. Door and frame preparation must be coordinated closely in the use of these products, so be sure to consult with the manufacturer for detailed instructions and templating.

Other products that are sometimes used are door loops or door cords. These are not as secure as the other products listed. They are also vulnerable to children and vandals damaging the product causing field calls for replacement and aggravation to the end user.

Another product that is frequently needed but not well known is the Air Transfer Hinge. This product will transfer 80 to 120 pound of compressed air to operate pneumatic controlled locking devices. In several industries, such as the pharmaceuticals and chemical and munitions manufacturing, it is imperative that there be no sparking caused by electrical wires or static electricity. In these industries, they use pneumatic power for this type of security features. At least one manufacturer in our industry provides a product that will meet these pneumatic power transfer requirements.

Power Transfer with Monitoring –

The purpose of a power transfer with monitoring in the same device is to provide both power for operation and the capabilities of monitoring an opening at the same time.

The process that is followed here is to take the monitoring and the power-transfer functions as explained above and incorporate both modifications into the same hanging device. All of the criteria that pertain to the modifications hold true with the combination of features.

Standard practice is to use 24 to 28 gauge, stranded, insulated, and U/L listed wire. This type is recognized as the acceptable method of wiring for low voltage application. This wire is used on both the switches as well as for the power transfer wires. In the Power Transfer Units, heavier wire is often employed, either 18 or 20 gauge, but it is still stranded, insulated, and U/L listed.

Type of products:

For Monitoring –

Hinges:

- Full Mortise
- Exposed
- Concealed

Pivots:

- Intermediate

Continuous Hinges:

- Geared
- Pinned

Monitoring Switches

For Power Transfer –

Hinges:

- Full Mortise
- Exposed
- Concealed

Pivots:

- Intermediate

Continuous Hinges:

- Geared
- Pinned

Power Transfers Units:

- Door Loops
- Door Cords

For Power Transfer and Monitoring –

Hinges:

- Full Mortise
- Exposed
- Concealed

Pivots:

- Intermediate

Continuous Hinges:

- Geared
- Pinned