

Power Assist Close Primer

Application Note AN-004

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This document describes power assist close for swing doors. It includes notes on types of power assist close, typical applications, advantages, and disadvantages, with a special focus on our own ES540 “swing door problem solver” accessory module.

What Is Power Assist Close?

Power assist close (hereafter shortened to PAC) is utilized when you have a swing door that cannot completely close using spring force alone. Barring a mechanical problem with the operator or the installation, the two main causes of failure to close are (1) stack pressure within a facility, resulting in positive pressure wind flow, and (2) heavy or excessive weatherstrip. Both of these problems typically prevent the door from closing the last 10-20° of travel.

How Does It Work?

A small amount of power is applied to the motor in the closing direction to assist the spring in closing the door. Depending on the manufacturer of the PAC, this power may either be applied an adjustable time *after the control releases the door to close*, or, for more sophisticated units such as the ES540, an adjustable time *after the door stalls during closing*. The latter method has the advantage of delaying power assist until it is actually needed and is preferred. Our nomenclature for this adjustment is “pre-assist delay.”

Once the pre-assist delay expires, the PAC takes control of the motor and applies additional closing force for an adjustable time delay. We call this the “assist delay.”

Timed Cutoff Versus Hold Closed

In most PAC applications, it is not necessary to continue applying additional closing force once the door has closed. When “timed cutoff” is used, after the assist delay expires, closing power is removed and the door remains closed by spring pressure alone.

In extreme conditions, it may be necessary to use “hold closed” mode. In this case, power continues to be applied to the motor to aid the spring in holding the door closed against the stack pressure. *Hold closed creates considerable extra hardship on the motor, the operator, and the electronics of the PAC unit* and is not recommended except as a last resort. It also delays the response of the

door, as the PAC must disable the hold power and relinquish motor control to the door operator before the door can open.

Both timed cutoff and hold closed are supported with the ES540. An adjustment is provided to limit the amount of torque the motor will be allowed to supply during the assist delay.

What Are the Disadvantages?

Manual Operation Issues

Combining PAC with manual operation presents its own unique set of problems. Installers frequently neglect these additional considerations and end up with an unhappy customer, or worse, a hazardous installation.

Keep in mind that the PAC alone has no way of knowing whether it is stack pressure or a pedestrian that is keeping the door open. This is not normally a problem with fully automatic operation, as the approach and safety sensors used in such an application will detect the approaching pedestrian and take appropriate action. If *manual* operation is anticipated, the problem becomes much worse. *It is entirely possible for a pedestrian to attempt to enter the door just as the PAC energizes. In this case, it will be virtually impossible to utilize the door until the PAC cycle has finished.*

Additional problems with manual operation occur if the door is deliberately held open by the pedestrian. Remember, without auxiliary sensors, the PAC has no way of “knowing” the cause of the obstruction or, indeed, whether it has yet been removed. *It will therefore eventually begin trying to overcome the pedestrian with the assist routine. When the obstacle finally clears, the door operator can build up a significant amount of kinetic energy before the door (suddenly) encounters the jamb.*

There are a variety of partial fixes available for these problems. However, the *safest* way to improve functionality with doors that are used manually is to add a threshold detector and, for two-way traffic, an additional sensor beyond the swing area of the door. Provided that the PAC supports such sensors, these may be used to delay an impending PAC cycle (or cancel one that is already in progress) when a pedestrian approaches, once again rendering the door usable for manual traffic. It is optionally possible, depending upon customer requirements, to use the added detector to actually recycle the door open automatically.

The ES540 includes auxiliary inputs which may be used with one or more supplemental sensor(s) in a variety of configurations to properly support manual door operation. See “Other ES540 Features” below for further details.

To summarize, if manual operation is anticipated, additional protective sensors *must* be used. Without such protection, *never* install an ES540 or any other PAC. There are simply too many additional hazards and limitations.

Close Recycle Issues

Some door controls, particularly those designed for low energy operation, offer a feature that automatically recycles the door open if an obstruction is detected during closing. Horton's Touch Stop™ is an example. Again, since the PAC has no way of knowing whether the door has stalled due to an obstruction or a pedestrian blocking it, such features *no longer operate* when an external PAC module is installed.

Other ES540 Features

Strike Interface

The ES540 includes a full featured strike interface with built in lock control relay as part of its functionality.

Multifunction Inputs

The ES540 includes two additional inputs which may be configured to support various combinations of the following features:

- **Close Monitor Switch.** When this door position switch is used, if the ES540 discovers that the door is already closed following the pre-assist delay, no assist is applied.
- **Assist Zone Switch.** This door position switch will prevent the ES540 from ever applying assist unless the door is positioned within the installer's specified zone.
- **Lock Monitor Switch.** This switch speeds door response by canceling the unlock delay early when the ES540 detects that the lock is out of the way and the door can be opened.
- **Knowing Act Sensor.** A threshold detector input which, when triggered, holds the door open if it is open, and recycles the door if it is closing. A pending or ongoing assist is automatically canceled to recycle the door open. The input is ignored when the door is closed.
- **Assist Pause Sensor.** A threshold detector input which is used only during closing. When triggered, it cancels any assist in progress and returns the ES540 to its pre-assist delay. The module will not begin counting down the pre-assist delay condition until this input clears.

- **Manual Operation Sensor.** A threshold detector input which, when triggered, unlocks the door to open manually, but does not send an open command to the door control unless the actuating circuit triggers. A pending or ongoing assist is automatically canceled. The door remains armed for manual walk-throughs until the input clears, at which time the ES540 begins its normal closing sequence.

For the reasons stated above, any one of the last three options (Knowing Act Sensor, Assist Pause Sensor, or Manual Operation Sensor) is *required* when the ES540 is used in a door which may be operated manually.

Unjam Sequencing

Often, excessive weatherstrip can present a problem for electrified strikes or other locking devices. The ES540 can help with such problems by applying a brief “unjam pulse” of close power prior to opening the door. If this option is used, when the actuating contact is received the PAC simultaneously triggers the lock relay to release the door to open *and* applies closing force to unjam the lock. After an adjustable delay, closing force is removed from the door and the door control is triggered to send it open. If the optional lock monitor input is used, it will further improve door operation, as the unjam delay will be shortened to the minimum value required to move the lock out of the way.