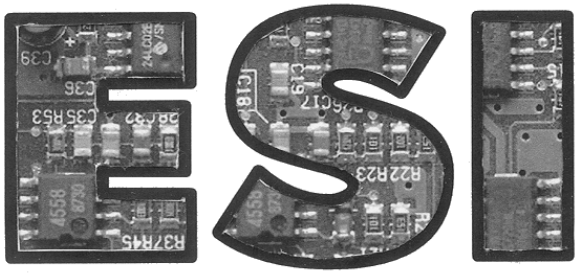


Electronic Solutions Inc.

ES540 Module Installation Instructions

(with software Version 1.20.05)

1.0 Installation

Disconnect all power to the door header. Refer to included wiring diagram 998-3024-4 for connections.

1.0.1 Motor & Module Power

Use a voltmeter or other means to identify the motor lead which is *positive* when the door is opening. Often (but not always), this wire is red. *Make a note of which motor terminal has this wire attached.* This will be referred to as terminal "A." The wire you remove from this terminal will be referred to as lead "A."

Remove the wires from the motor. Locate the supplied six conductor harness with yellow connector, and using wire nuts, splices, or quick connect tabs as appropriate (not supplied), install the ES540 between the motor and everything else (control, close speed adjustment, lockout relay) in the header as follows:

1. Connect the red wire from the six conductor lace to terminal "A" on the motor.
2. Connect the violet wire from the lace to the other side of the motor.
3. Connect the orange wire from the lace to lead "A" that was previously removed from the motor.
4. Connect the white wire from the lace to the remaining lead that was previously removed from the motor.
5. Connect the black wires from the lace to a power supply of 16-24VAC or 24-33VDC. The current requirement is 2A peak and up to 1A continuous if the hold-closed mode is used. Polarity is unimportant.
6. Plug the connector into **CN3** on the ES540 module.

Note that the ES540 must be the **last** device before the motor.

1.0.2 Strike

If a strike is to be used, locate the supplied three conductor harness with yellow connector, and wire it between the door strike and the strike power supply. The strike relay on the ES540 module will engage when the door is to unlock. The maximum lock current should not exceed 3A. Plug the connector into **CN4** on the ES540 module. **Note: Spike protection in the form of a suitable MOV (supplied)** must **be provided across the lock coil!**

1.0.3 Actuating Circuit

Disconnect all actuating devices (push plates, card reader, etc.) from the door control. Locate the supplied six conductor harness with red connector, and wire the *black* and *white* leads from this lace to the actuating switches (polarity is unimportant). Plug the connector into **CN1** on the ES540 module.

Locate the supplied two conductor harness with red connector, and wire the black and red leads from this lace to the "actuate" input on the door control (polarity is unimportant). Plug the connector into **CN2** on the ES540 module.

Note that all *actuating devices* must *be routed through the ES540 module.*

1.0.4 Close Monitor Circuit (optional)

An optional close monitor (door position) switch may be added to Input 2 (red and green leads). This input will be checked immediately after the pre-assist delay and, if closed, will prevent the ES540 from applying power assist close when it is not needed. The switch must *close* when the door is fully closed.

1.0.5 Multifunction Input Options

Input 3 of the module (blue and orange leads) may be used for a variety of different functions. The specific function of this input depends on the setting of Parameter 7 as follows:

- If Parameter 7=0, Input 3 is a *lock monitor switch* input (this is the default function). This switch will speed the system response time when a strike is used. The switch must *close* when the lock has released and the door is free to open.

- If Parameter 7=1, Input 3 is a *threshold recycle detector* input. The threshold detector is used to cancel the assist (if necessary) and recycle the door open if it is triggered at any time *except* when the door is idle. It is ignored when the door is idle.

- If Parameter 7=2, Input 3 is a *threshold manual operation detector* input. In this mode of operation, when the detector trips, the door is released to be opened manually, but the ES540 does not send an open command to the door control unless its actuating input is triggered. The door remains armed for manual walk-throughs until the threshold detector clears, at which time the module begins it normal closing sequence.

- If Parameter 7=3, Input 3 is an *assist zone switch* input. When used in this mode, if Input 3 is triggered at any time, power assist will *not* be applied until the input releases. This allows the use of an “assist zone” microswitch to prevent assist from being applied at all unless the door is within the desired “assist zone,” that is, close to the door jamb.

Other values of Parameter 7 are reserved for future use and disable Input 3 if selected.

If the optional switches are not used, cap or cut off the red, green, blue, and orange leads.

This concludes the installation phase.

1.1 Setup

Note: To save energy and prolong component life, the display on the ES540 will be blanked after approximately 60 seconds if no button is pushed. To reactivate it for another 60 seconds, simply press any of the buttons.

Note: *For proper operation of the ES540, any control feature that recycles the door when it encounters an obstruction during closing* must *be disabled! This feature may be referred to by a variety of manufacturer’s designations such as “Touch-Stop” or “Soft Touch.” Refer to the instruction manual for the door control and* disable *such a feature, if it exists.*

When power is first applied, the display on the ES540 module will quickly flash the installed software version number in six digits, as in **1.20.05**. After a brief delay, the display should switch **I** (**I**dle). The module is now ready for operation.

Refer to section **1.2**, **Parameter Adjustment**, for information on how to change delays and make other adjustments.

The module may be tested by pressing the DOWN button during normal operation. This button simulates an “activate” signal.

During normal operation, the display shows the status of the ES540. The possible codes are as follows:

I	**I**dle
U	**U**nlock timer running
u	**u**nlock timer running, with **u**njam power applied
L	Latched open without latch timeout (latch operation)
L.	Latched open with latch timeout enabled (latch operation)
O	**O**pen timer running (momentary operation)
d	**d**elay (ES540 is waiting for door to begin closing)
C	**C**losing (ES540 is waiting for door to finish closing)
P	**P**re-Assist timer running
A	**A**ssist power on, assisting door closed, assist timer running
H	**H**old power on, holding door closed
S (wink)	data (parameters) **S**aved to permanent memory
F (wink)	data **F**ailure detected (replace module)
S then **u**	**S**et**u**p (all factory settings restored)

1.1.2 Strike Interface Adjustments

If a strike is *not* present, set Parameter 8 (Strike Present) to "0." The ES540 will function as a power assist close only.

If a strike *is* present, leave Parameter 8 at its factory default of "1." Parameter 0 (Unlock Delay), can usually be left at one second. Parameter 1 (Strike-to-Door Delay), may be left at the factory default of 0.8 seconds for magnetic locks; however, this delay may optionally be decreased for some mortise strikes which can release in as little as 0.5 seconds. If Parameter 1 is set too short, the door will jam. Note that if a lock monitor (bolt position) switch is in use, the ES540 will open the door as soon as the switch trips, improving system response time.

The strike is normally held released throughout the entire cycle of the door. This results in the quietest door operation and is not a problem for magnetic locks. However, to prevent buzzing or burnout of inexpensive mortise strikes, it may be necessary to release the strike while the door is open. If this is the case, set Parameter 9 (Strike Hold) to "0." When Parameter 9 is "0", the strike will be pulled to release the door, and after the Unlock Delay, it will be released for the duration of the door's cycle. If Parameter 9 is set to "0" and the lock must be pulled again to get it out of the way during door closing, set Parameter d (Unlock Before Closing) to "1." The lock will be pulled again (to get it out of the way) just before the door begins closing, and will re-lock the door following the power assist cycle. *Note that Parameter d has no effect if Parameter 9 is set to "1," since the lock is being held in the unlocked position for the entire cycle of the door.*

Set Parameter 2 (Open Delay) to the desired open (dwell) time of the door. The time delay on the door control itself should preferably be set at minimum, and any additional dwell time inserted using Parameter 2. The factory default for Parameter 2 is 1 second.

1.1.3 Strike Unjam

If the strike intermittently becomes jammed due to stack pressure or tight weatherseals, set Parameter b (Unjam Power) to "1." When an actuate signal is received, the ES540 will now apply assist force in the close direction, in an attempt to unjam the strike. The duration of the unjam power is determined by Parameter 1 (Strike-to-Door Delay), unless the lock indicates that it has cleared early via the optional lock monitor (bolt position) switch. The display will show **u** (**u**nlock with **u**njam) during the strike unjam sequence.

1.1.4 Power Assist Adjustments

Set Parameter 3 (Pre-Assist Delay) to the length of time the door must be stalled before power assist begins. The ES540 display shows **P** (**P**re-Assist Delay) during this time. NOTE: in most low energy

operators, this delay will begin when the operator trips the latch check microswitch. In some high energy operators, the delay will not begin until the door actually arrives at the jamb. Either situation is acceptable. If the pre-assist delay comes on when the operator trips the latch check switch, be sure Parameter 3 is set long enough to allow the door to close completely *under normal conditions.* The factory default is 5 seconds.

Set Parameter 4 (Assist Delay) for the duration of the power assist to be applied. The ES540 display shows **A** (**A**ssist Power on) while the door is being assisted. Set Parameter 4 long enough to allow the door to close completely under the worst conditions routinely encountered. The factory default is 5 seconds.

Adjust ASSIST FORCE pot R11 to the desired power assist force. Clockwise is maximum force.

If the door will remain closed without any additional assist after it has finished closing, leave Parameter A (Assist Mode) at "0." The ES540 will assist the door closed, then ramp down to zero assist power and reconnect the motor to the regular door control.

If spring force is not sufficient to hold the door closed due to stack pressure, set Parameter A to "1." The ES540 will assist the door closed as above, then the display will switch to **H** (**H**old Closed). Adjust HOLD FORCE pot R21 to the minimum power required to keep the door closed. Clockwise is maximum force. *Note that manual operation is difficult to impossible while hold closed power is applied. Timed cutoff is always preferred, if possible.*

This concludes the adjustment procedure.

1.2 Parameter Adjustment & Defaults

1.2.1 Parameter Adjustment

To change settings, enter the setup mode by quickly pressing the SET button twice. The decimal point on the display will begin blinking. Use the UP and DOWN buttons to select the parameter (0-F) you wish to change. When you've found it, press and hold the SET button. The display will change to the current value of the parameter. While holding the SET button, press UP or DOWN to adjust the value. When finished, release the SET button. The table below may be used to convert the values shown on the display to their equivalent delay settings.

After all changes are entered, quickly press the SET button twice again. The decimal point will stop blinking and the ES540 module will return to normal operation.

Always remember to save any changes you make before leaving the jobsite! To save the information, the module must be idle (display is showing the function number). Press and hold the SET button until the display briefly winks **S** (data **S**aved). Your changes are now saved in permanent memory.

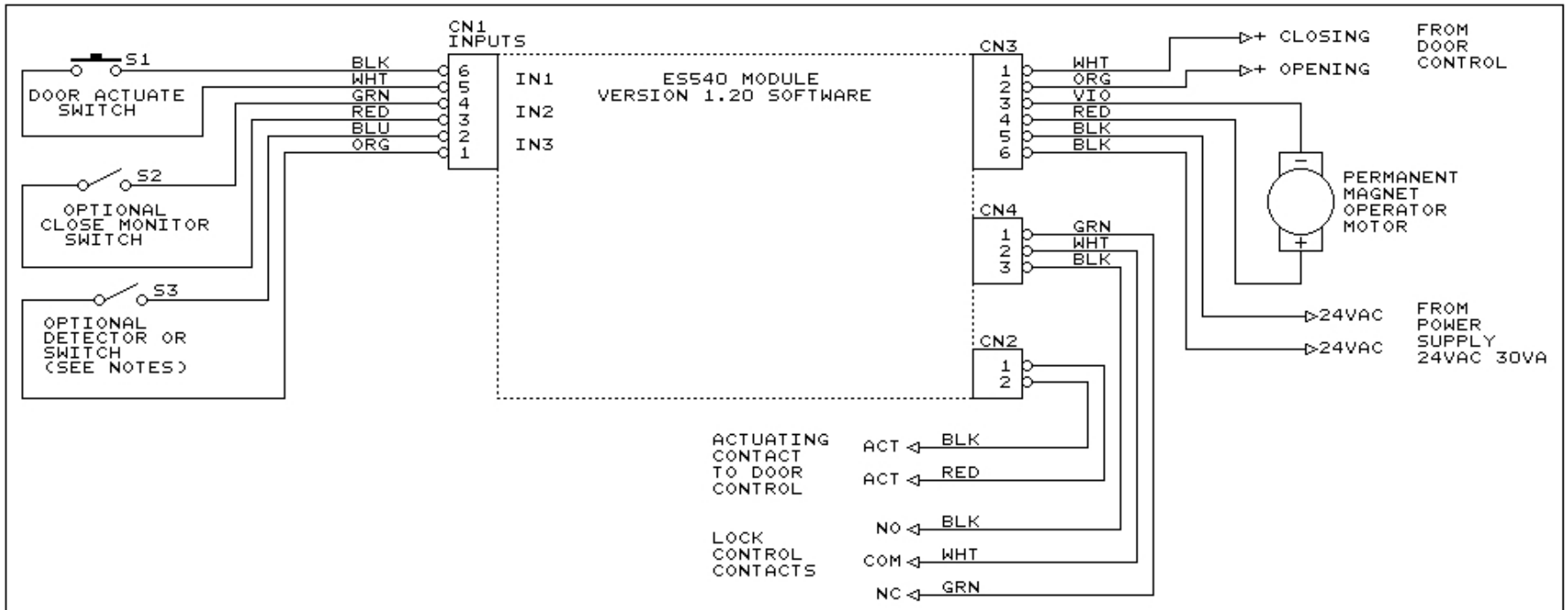
Display Conversion Chart			
(seconds or 1/10 seconds)			
Display	Value	Display	Value
1	1	**9**	9
2	2	**A**	10
3	3	**b**	15
4	4	**C**	20
5	5	**d**	30
6	6	**E**	45
7	7	**F**	60
8	8	**0**	90

1.2.2 Parameter List & Defaults

Parameter	Function	Factory Default
0	Unlock Delay	1 second
1	Strike-to-Door Delay	0.8 second
2	Open Delay	1 second
3	Pre-Assist Delay	5 second
4	Assist Time	5 seconds
5	Latch Timeout	1 minute*
6	(Reserved)	1
7	Input 3 Function	0 (Input 3 is lock monitor switch)
8	Strike Present	1 (strike is present)
9	Strike Hold	1 (hold strike during open cycle)
A	Assist Type	0 (timed cutoff)
b	Unjam Lock	0 (unjam not needed)
C	(Reserved)	0
d	Unlock before closing	0 (unlock not needed prior to closing door)
E	(Reserved)	0
F	(Reserved)	0
H	(Reserved)	0
J	(Reserved)	0
L	Latch (Ratchet) Mode	0 (time delay operation)
n	Latch Timeout Enable	0 (latch does not time out)
P	(Reserved)	0
r	(Reserved)	0
t	(Reserved)	0
U	(Reserved)	0

* Parameter n must be *on* for Parameter 5 to have any effect.

To restore factory defaults, hold the SET button while powering up the ES540. The display will flash the version number, followed by **S** then **u** (**S**et**u**p). All factory settings are now restored.



NOTES:

Pin 2 of CN3 MUST be connected to control wire which is positive (+) when door is opening.

Pin 4 of CN3 MUST be connected to motor wire which is positive (+) when door is opening.

Actuate output rated 1A, 30VDC maximum.

Lock output rated 3A, 30VDC maximum.

Spike protection in the form of a suitable MOV or varistor MUST be provided across the lock coil.

Optional close monitor switch is CLOSED when the door is closed.

Input 3 may be used for a variety of functions. Refer to installation instructions for details.

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