AUTOMATIONDIRECT.com

FC-3RLY4 Limit Alarm Module

Hardware User Manual

Manual Number: FC-3RLY4-USER-M

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Hardware User Manual

AUTOMATIONDIRECT.com

Please include the Manual Number and the Manual Issue, both shown below, when communicating with Technical Support regarding this publication.

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Issue	**Date**	**Description of Changes**
1st Edition	04/16	Original Issue

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Chapter 2: Configuration and Programming

Chapter 1
Getting Started

In This Chapter...

Introduction

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The Purpose of this Manual

Thank you for purchasing the **FC-3RLY4 Analog Input, 4-Relay, Limit Alarm** module. This manual describes AutomationDirect.com's FC-3RLY4 modules, their specifications, and provides you with important information for installation, connectivity and setup. This manual shows how to install, wire and use the product.

This user manual contains important information for personnel who will install the Limit Alarm modules, and for the personnel who will be programming them. This information will provide all the information you need to get and keep these modules up and running.

Supplemental Manuals

If you are familiar with industrial control type devices, you may be able to get up and running with just the aide of the Product Guide included with each Limit Alarm module.

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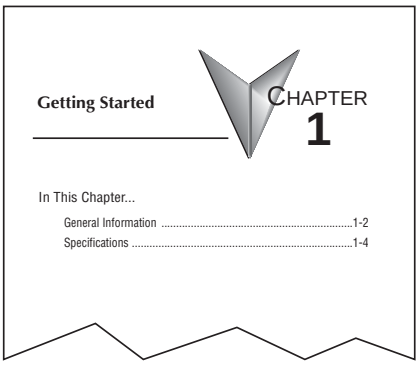
When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a warning. This information could prevent injury, loss of property, or even death (in extreme cases). The word Warning: in boldface will mark the beginning of the text.

Key Topics for Each Chapter

The beginning of each chapter will list the key topics that can be found in that chapter.


Getting Started

CHAPTER 1

In This Chapter...

General Information 1-2

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Product Overview

This is an Analog to Relay Limit Alarm module that is field configurable for a variety of alarm and control applications. The FC-3RLY4 can be powered by 24VAC or 24VDC and accept input signals of 0-15V, 0-30V, or 0-20mA. Configuration and Trip/Release Point programming is accomplished with DIP switches, and a single PGM-pushbutton. LED's provide an indication of operating status and are used during the Trip/Release Point programming. The module can be DIN rail or side mounted.

Specifications

Input Specifications	
Number of Inputs and Type	1, Single Ended (1 common)
Input Ranges	0-15VDC, 0-30VDC, 0-20mA, DIP Switch selectable
Input Impedance	100KΩ voltage input / 250 Ohms current input
External Power Required	* 24VAC or 24VDC @ 100mA ±10%
Low-pass Filtering	-3dB at 100Hz, (-6dB per octave)
Set/Release Point Voltage Repeatability	0.05% of full scale voltage range (constant temperature)
Set/Release Point Current Repeatability	0.1% of full scale current range (constant temperature)

* In order to comply with UL508 Class 2 Standards the supplied power must be less than 26VDC and fused at a maximum of 3 amps.

Output Specifications	
Relay Contacts	4 SPST Normally Open, Form A
Contact Rating	250VAC @ 5A, 30VDC @ 5A (Resistive Load), 380 VAC Max., 30VDC Max.
Relay Operation	DIP Switch selectable
Relay Trip Point Setting	Program mode enabled by pushbutton
Relay Release Point Setting	Program mode enabled by pushbutton
Minimum Relay Dead-band = Trip Point ± Release Point	0-15 VDC range: 1.0% minimum dead-band (150mV); 0-30VDC range: 1.0% minimum dead-band (300mV); 0-20mA range: 3.0% minimum dead-band (600µA)

Specifications (continued)

Terminal Block Specifications	
Field Wiring	Removable Screw Type Terminal Blocks
Number of Terminal Blocks	6-Two Position (Dinkle: EC350V-02P)
Wire Range	28-14AWG Solid or Stranded Conductor
Wire Strip Length	1/4" (6-7mm)
Screw Torque	1.7 inch-pounds (0.19 Nm)
Surrounding Air Temperature	0 to 60°C (32 to 140°F), IEC 60068-2-14 (Test Nb, Thermal Shock)
Storage Temperature	-20 to 70°C (-4 to 158°F) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)
Humidity	5 to 95% (non-condensing) IEC 60068-2-30 (Test Db, Damp Heat)
Environmental Air	No corrosive gases permited EN61131-2 (Pollution degree 1)
Vibration	MIL STD 810C 514.2 IEC 60068-2-6 (Test Fc)
Shock	MIL STD 810C 516.2 IEC 60068-2-27 (Test Ea)
Insulation Resistance	>10MΩ @ 500VDC
Noise Immunity	NEMA ICS3-304 IEC 61000-4-2 (ESD) Impulse 1000V @ 1µS pulse IEC 61000-4-4 (FTB) RFI, (145 MHz, 440 MHz 5W @ 15cm) IEC 61000-4-3 (RFI)
Weight	0.3 lbs
Isolation*	1800VDC Power to Output 1800VDC Input to Output Applied for 1 second (100% Tested)*
Agency Approvals	UL508**, File Number: E157382, CE

* The 0V and COM terminals should be considered the same reference point. There is no isolation between the External Power and Input Terminal blocks.
** In order to comply with UL508 Class 2 Standards the supplied power must be less than 26VDC and fused at a maximum of 3 amps.

1

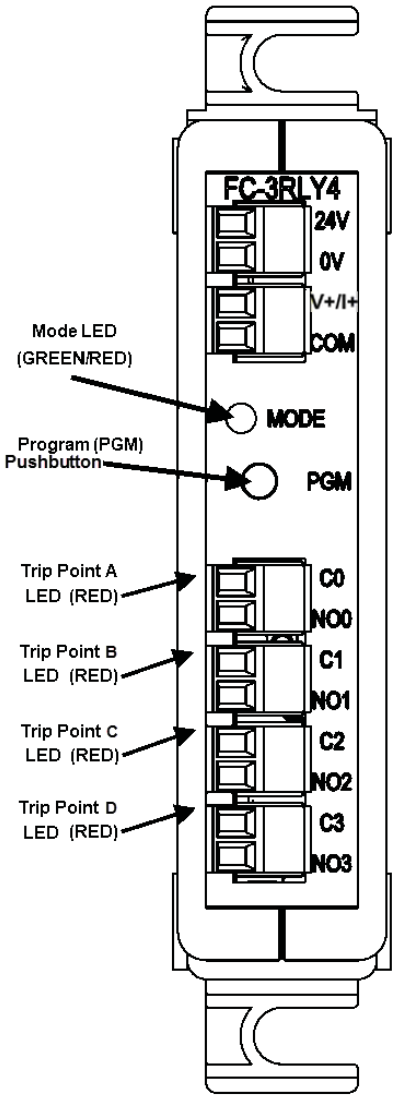
Status Indicators

Mode (Green/Red):

- Green LED is ON when unit is powered.
- Red LED is ON when in Program Mode. This Red LED flashes when setting a Custom Release Point.
- Flashing Red/Green indicates Trip/Release point program error.

Trip Points A, B, C or D:

- Red LED is ON when a Trip Point is tripped.
- Red LED is ON when setting a Trip Point in Program Mode.
- Flashing Red when setting a Release Point in Program Mode.



DIP Switch Settings

Factory settings shown in bold.

	Switch Positions							
DIP Switches	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Input Ranges								
0-30V	**0**	**0**						
0-15V	0	1						
0-20mA	1	1						
Relay Functions								
Trip Point A INC			**0**					
Trip Point A DEC			1					
Trip Point B INC				**0**				
Trip Point B DEC				1				
Trip Point C INC					**0**			
Trip Point C DEC					1			
Trip Point D INC						**0**		
Trip Point D DEC						1		
Independent Relay Control							**0**	
Simultaneous Relay Control							1	
Non-Latching Relays								**0**
Latching Relays								1

NOTE: A Power Cycle, entering programming mode, or a factory reset, is required to read DIP Switch changes. All Trip Points MUST be programmed after any DIP Switch change.
NOTE: In Simultaneous Relay Control mode, Relays A and B are controled by DIP Switch 3. Relays C and D are controled by DIP Switch 4. DIP Switches 5 and 6 are ignored.

Factory Settings

Factory Settings , INC Mode: Dead-band % calculated from full range voltage

Range	Trip Point	Release Point (RP = TP - Deadband)	Dead-band
0-15VDC	7.5V	7.125V	2.5% (0.375V)
0-30VDC	15V	14.25V	2.5% (0.75V)
0-20mA	N/A*	N/A*	7.5% (1.5mA)

Factory Settings, DEC Mode: Dead-band % calculated from full range voltage

Range	Trip Point	Release Point (RP = TP + Deadband)	Dead-band
0-15VDC	7.5V	7.875V	2.5% (0.375V)
0-30VDC	15V	15.75V	2.5% (0.75V)
0-20mA	N/A*	N/A*	7.5% (1.5mA)

* No factory settings for 0-20mA input range.

To return to Factory Settings:

- Hold PGM pushbutton down for 10 seconds. Mode LED will turn RED and then will turn completely OFF.
- Release the PGM pushbutton. The Mode LED will turn GREEN. The unit has been successfully returned to Factory Settings values.
- Factory Reset does not function in Programming Mode.

CONFIGURATION AND PROGRAMMING

In This Chapter...

Input Signal Ranges

Input Ranges	DIP Switches							
	1	2	3	4	5	6	7	8
0-30V	0	0						
0-15V	0	1						
0-20mA	1	1						

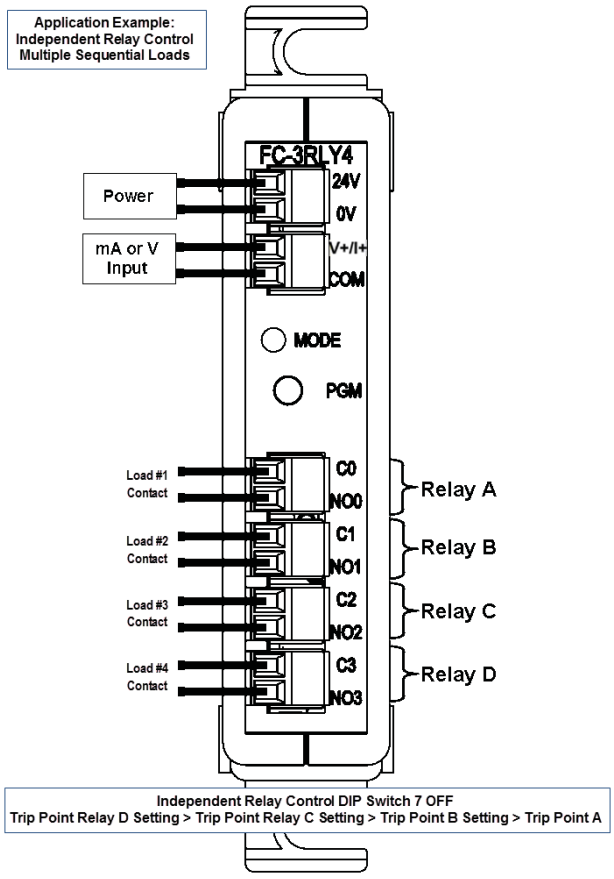
Modes of Operation

Independent and Simultaneous Relay Control Modes

Independent Relay Control Mode [DIP Switch 7 OFF]

Relays A, B, C and D are controlled with independent Trip Points and Release Points for each relay. All relays can be independently set to operate in Increasing or Decreasing mode (see next section). This mode can be used to control multiple loads in sequence, or monitor for multilevel alarm conditions.

Relay Control Mode	DIP Switches							
	1	2	3	4	5	6	7	8
Independent Relay Control							0	



Simultaneous Relay Control Mode [DIP Switch 7 ON]

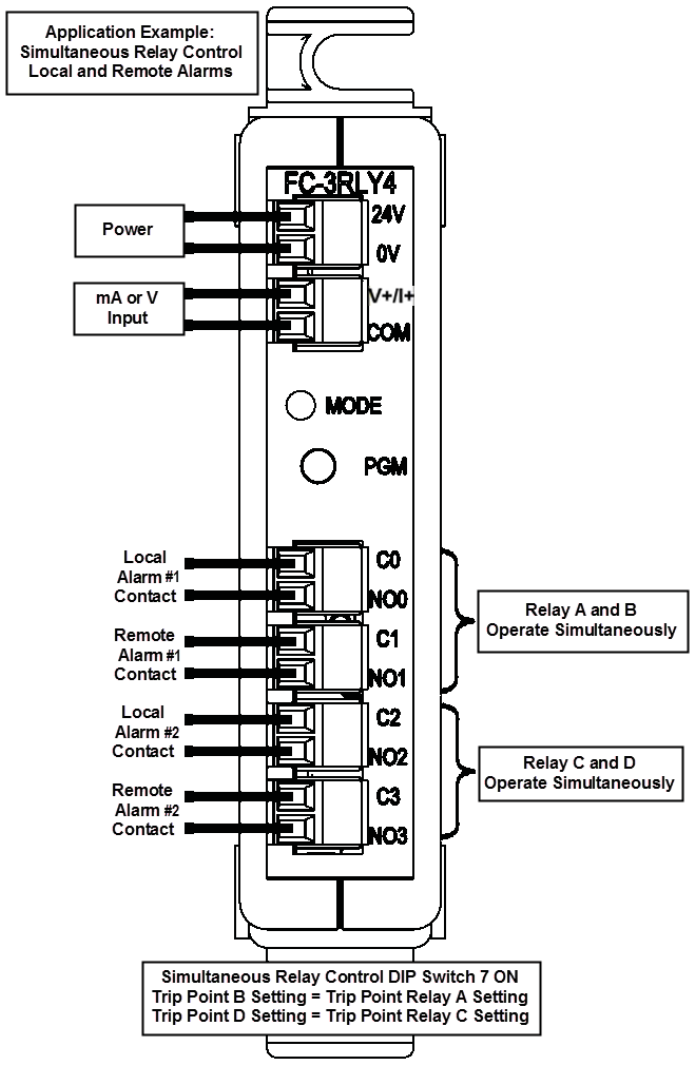
Relays A and B operate simultaneously, both controlled by Trip Point A and Release Point A settings. Both relays operate in Increasing or Decreasing mode (see next section) as set by DIP Switch 3.

Relays C and D operate simultaneously, both controlled by Trip Point B and Release Point B settings. Both relays operate in Increasing or Decreasing mode (see next section) as set by DIP Switch 4.

DIP Switches 5 and 6 are ignored in Simultaneous Relay Control Mode.

This mode can be used where it is desired to have two relays controlled by common Trip and Release Points such as using one relay for local alarm indication with a horn or strobe and the other relay for remote alarm monitoring by a PLC.

Relay Control Mode	DIP Switches							
	1	2	3	4	5	6	7	8
Simultaneous Relay Control							1	



Relay Trip Point / Release Point Control Modes

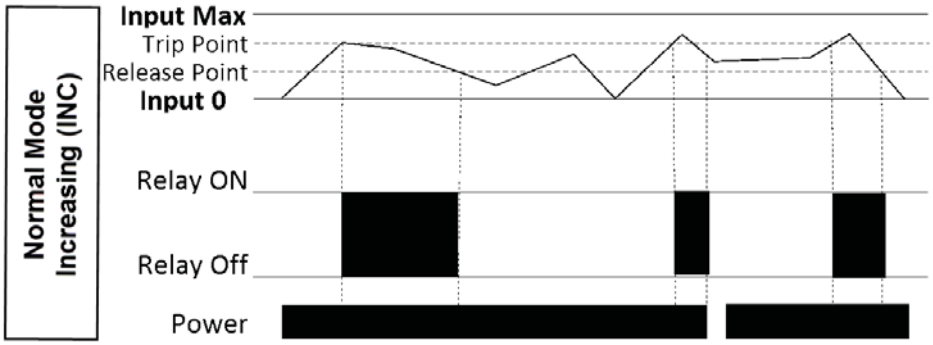
Increasing (INC) Mode

Relay A: DIP Switch 3 OFF; Relay B: DIP Switch 4 OFF; Relay C: DIP Switch 5 OFF; Relay D: Dip Switch 6 OFF

The relay will turn ON when the input signal increases to the programmed Trip Point. The relay will remain ON until the input signal decreases below the Release Point. In INC mode, the Trip Point must always be greater than the Release Point (TP > RP).

NOTE: After programming the TP and RP for each relay the FC-3RLY4 will verify the TP > RP. If the TP < RP the MODE LED will alternately flash green and red. If this occurs simply press and hold the PGM-button for 3 seconds until the MODE LED turns ON red and reprogram the TP and RP for that relay.

Relay Control Mode	DIP Switches							
	1	2	3	4	5	6	7	8
Trip Point A INC			0					
Trip Point B INC				0				
Trip Point C INC					0			
Trip Point D INC						0		



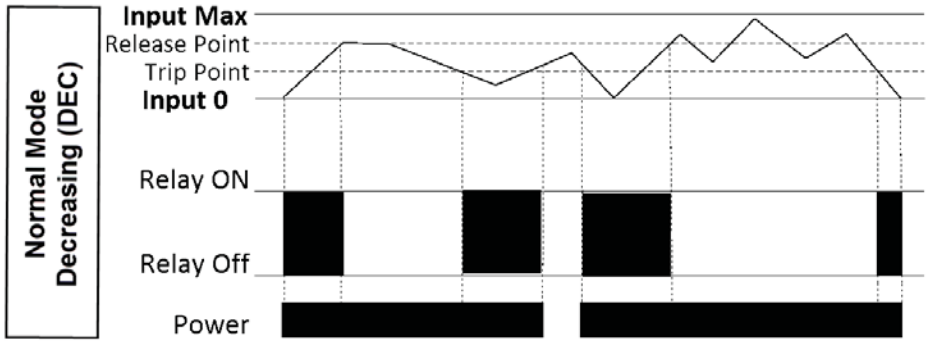
Decreasing (DEC) Mode

Relay A: DIP Switch 3 ON; Relay B: DIP Switch 4 ON; Relay C: DIP Switch 5 ON; Relay D: DIP Switch 6 ON

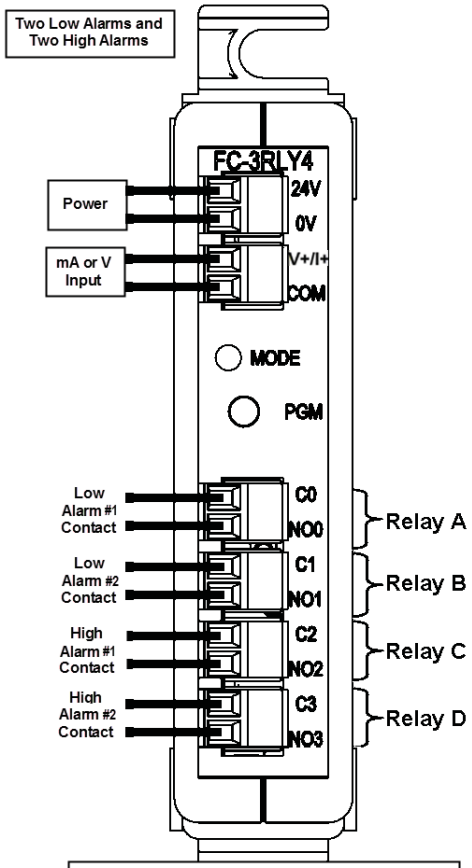
The relay will turn on when the input signal decreases below the programmed trip point. The relay will remain on until the input signal increases above the release point. In DEC mode, the Trip Point must always be less than the release point (TP < RP).

NOTE: After programming the TP and RP for each relay the FC-3RLY4 will verify the TP < RP. If the TP > RP the MODE LED will alternately flash green and red. If this occurs simply press and hold the PGM-button for 3 seconds until the MODE LED turns ON red and reprogram the TP and RP for that relay.

Relay Control Mode	DIP Switches							
	1	2	3	4	5	6	7	8
Trip Point A DEC			1					
Trip Point B DEC				1				
Trip Point C DEC					1			
Trip Point D DEC						1		



Application Example

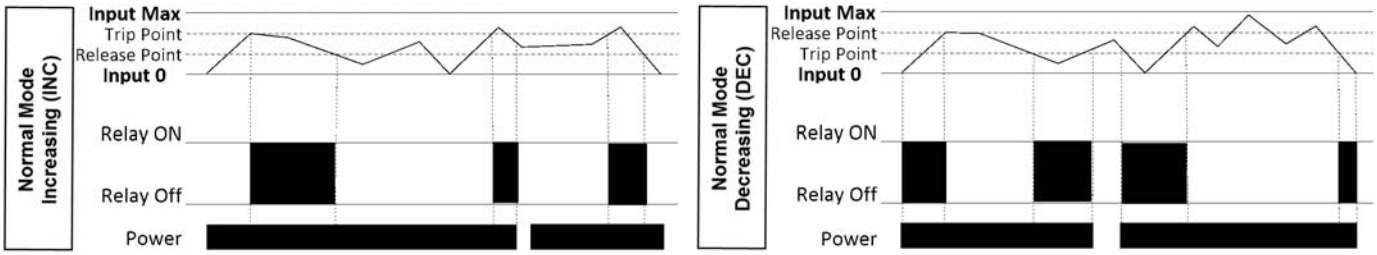


Independent Relay Control DIP Switch 7 OFF
Trip Point Relay A DEC DIP Switch 3 ON
Trip Point Relay B DEC DIP Switch 4 ON
Trip Point Relay C INC DIP Switch 5 OFF
Trip Point Relay D INC DIP Switch 6 OFF
Trip Point Relay A Setting < Trip Point Relay B Setting
Trip Point Relay C Setting < Trip Point Relay D Setting

Non-Latching and Latching Relay Control Modes

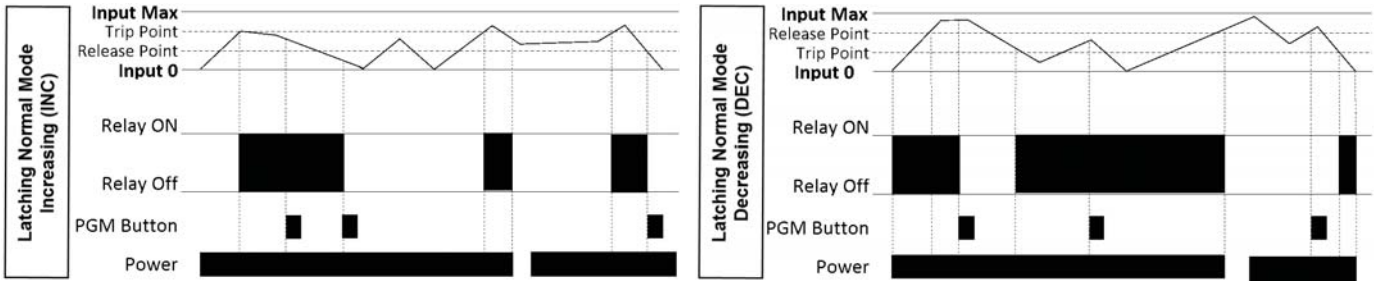
Non-Latching Relay Control Mode [DIP Switch 8 OFF]

All relays operate automatically at the Trip and Release Point settings.



Latching Relay Control Mode [DIP Switch 8 ON]

All relays operate automatically at the Latch Trip Point settings and remain **electrically** latched until the input signal reaches the Manual Release Point. The FC-3RLY4 relays can be manually reset by pressing the PGM-pushbutton as shown in the following diagrams.



WARNING: Relays are ELECTRICALLY (not mechanically) latched. Any energized relays and connected loads will de-energize if power is removed from the FC-3RLY4 and may re-energize when power is re-applied.

Custom Trip Point Programming with Factory Release Point Dead-band

If your application requires Custom Release Points refer to next section

NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply press the PGM pushbutton repeatedly until the MODE LED turns green.

Programming Worksheet

Input Signal_____

Increasing (INC) or Decreasing (DEC)_____

Non-latching or Latching Mode_____

Independent or Simultaneous Mode_____

Relay A Trip Point _____

Relay A Factory Deadband (2.5% ∗ Voltage Input Range or 1.5mA)_____

Relay A Release Point if Increasing (INC) Mode RP=TP-DB _____

Relay A Release Point if Decreasing (DEC) Mode RP=TP+DB _____

Relay B Trip Point _____

Relay B Factory Deadband (2.5% ∗ Voltage Input Range or 1.5mA)_____

Relay B Release Point if Increasing (INC) Mode RP=TP-DB _____

Relay B Release Point if Decreasing (DEC) Mode RP=TP+DB _____

NOTE: In Simultaneous Mode Relays A and B are both controlled by Trip Point and Release Point A settings.

Relay C Trip Point _____

Relay C Factory Deadband (2.5% ∗ Voltage Input Range or 1.5mA)_____

Relay C Release Point if Increasing (INC) Mode RP=TP-DB _____

Relay C Release Point if Decreasing (DEC) Mode RP=TP+DB _____

Relay D Trip Point _____

Relay D Factory Deadband (2.5% ∗ Voltage Input Range or 1.5mA)_____

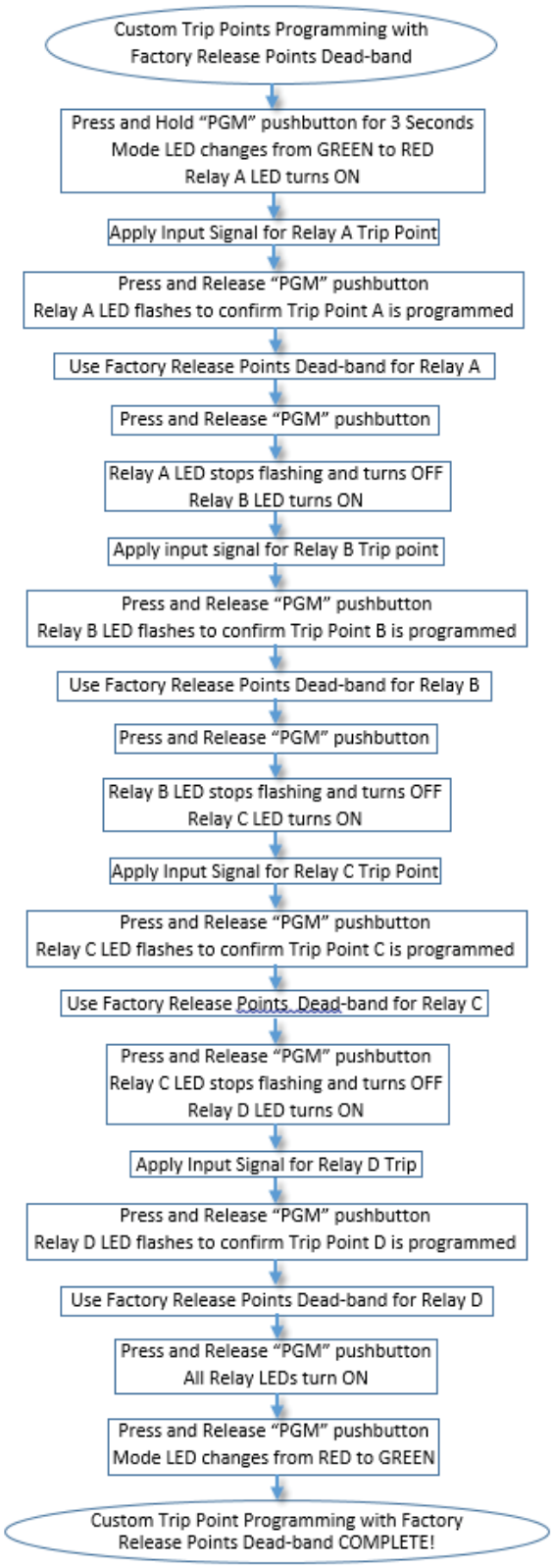
Relay D Release Point if Increasing (INC) Mode RP=TP-DB _____

Relay D Release Point if Decreasing (DEC) Mode RP=TP+DB _____

NOTE: In Simultaneous Mode Relays C and D are both controlled by Trip Point and Release Point B settings.

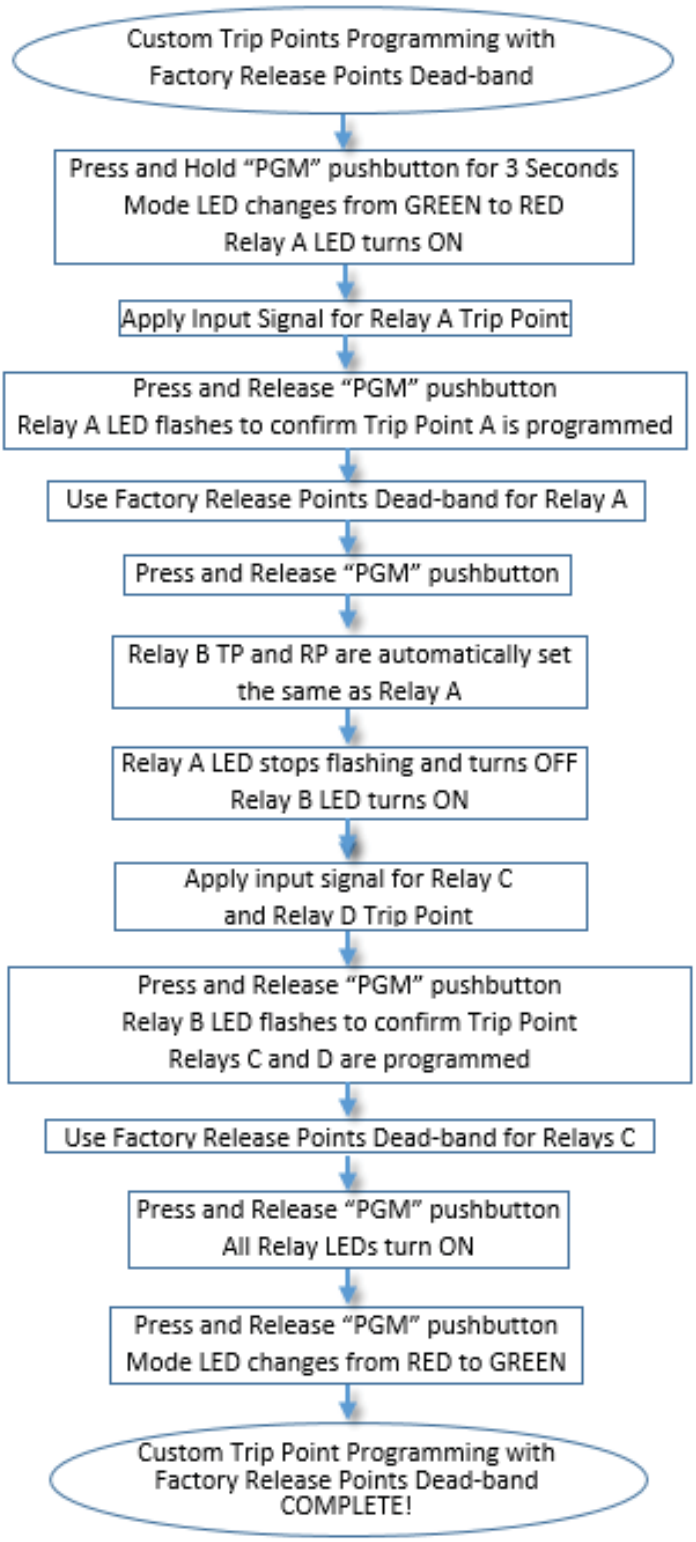
WARNING: Disconnect all loads from the output relays BEFORE programming. Output relays can turn ON and OFF during programming causing potentially unsafe conditions if loads are connected!!!

Programming Flowchart: Custom Trip Points with Factory Release Points Dead-band Independent Relay Control [DIP Switch 7 OFF]



NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply press the PGM pushbutton repeatedly until the MODE LED turns green.

Programming Flowchart: Custom Trip Points with Factory Release Points Dead-band Simultaneous Relay Control [DIP Switch 7 ON]



NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply press the PGM pushbutton repeatedly until the MODE LED turns green.

Custom Trip Point Programming with Custom Release Points

If your application does not require Custom Release Points refer to previous section

NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply pressing the PGM-pushbutton repeatedly until the MODE LED turns green.

Programming Worksheet

Input Signal_____

Normal or Failsafe Mode_____

Increasing (INC) or Decreasing (DEC)_____

Non-latching or Latching Mode_____

Independent or Simultaneous Mode_____

Relay A Trip Point _____

Relay A Release Point (must be <TP if Increasing Mode (INC), must be >TP if Decreasing Mode (DEC)) _____

Relay B Trip Point _____

Relay B Release Point (must be <TP if Increasing Mode (INC), must be >TP if Decreasing Mode (DEC)) _____

NOTE: In Simultaneous Mode Relays A and B are both controlled by Trip Point and Release Point A settings.

Relay C Trip Point _____

Relay C Release Point (must be <TP if Increasing Mode (INC), must be >TP if Decreasing Mode (DEC)) _____

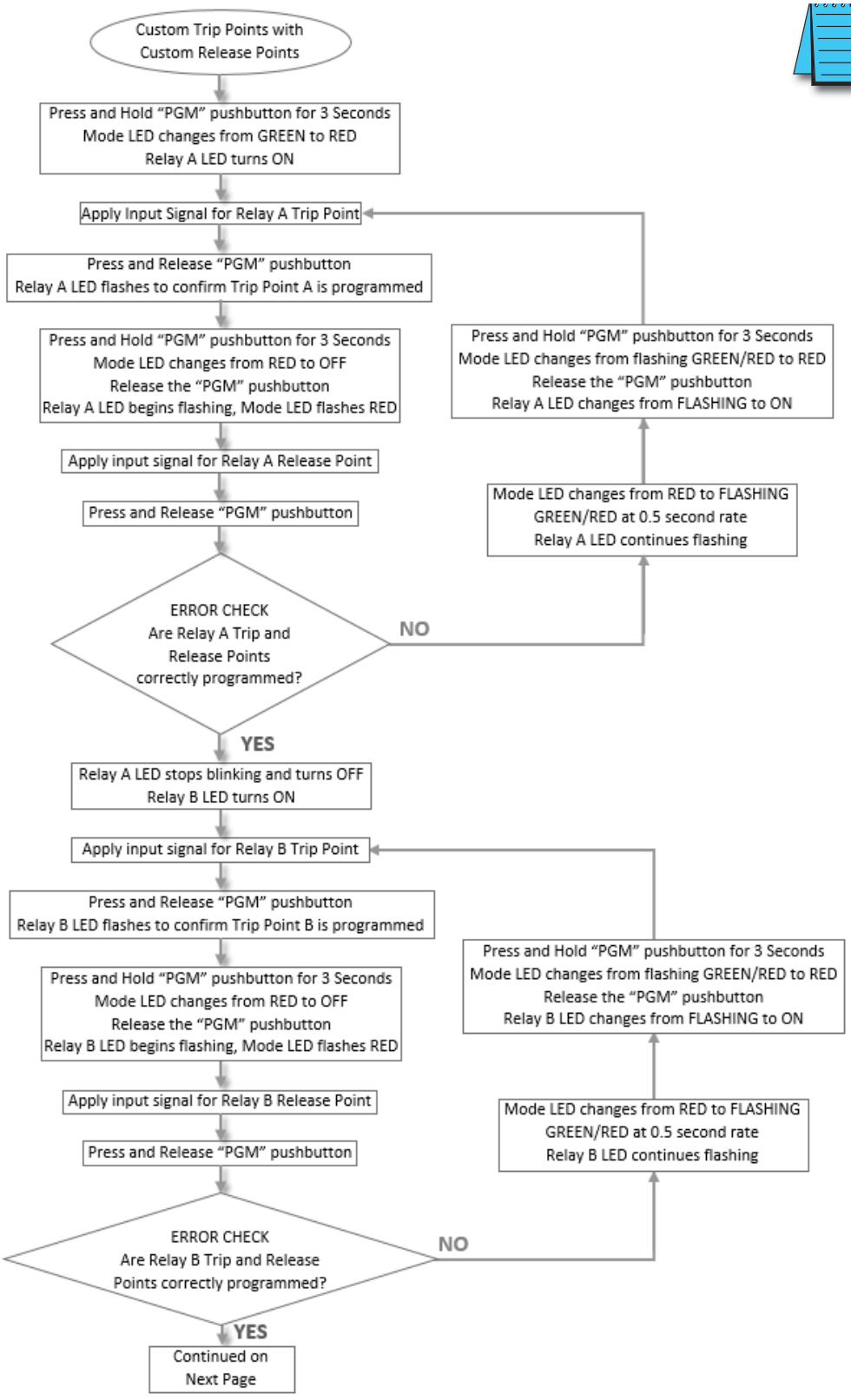
Relay D Trip Point _____

Relay D Release Point (must be <TP if Increasing Mode (INC), must be >TP if Decreasing Mode (DEC)) _____

NOTE: In Simultaneous Mode Relays C and D are both controlled by Trip Point and Release Point B settings.

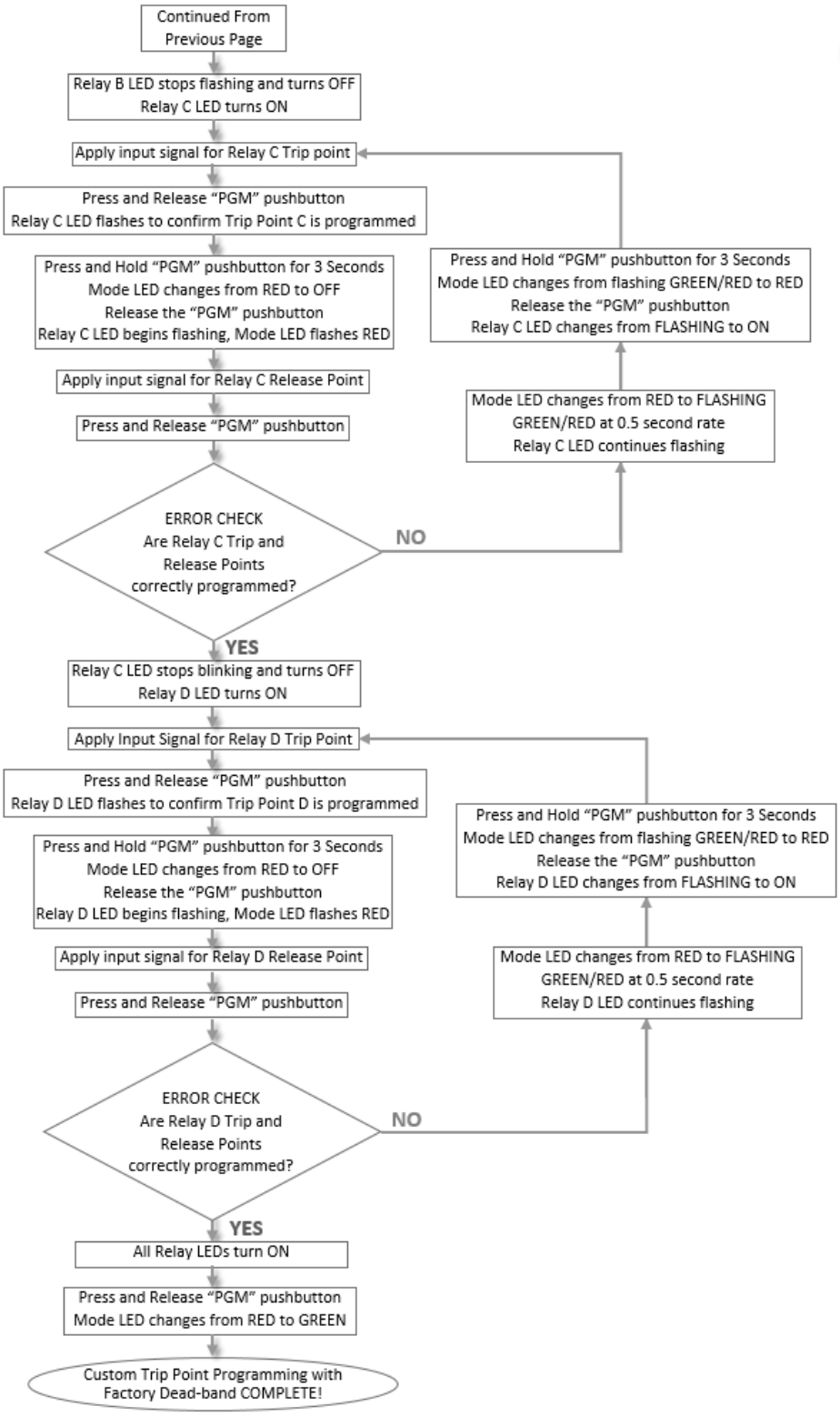
WARNING: Disconnect all loads from the output relays BEFORE programming. Output relays can turn ON and OFF during programming causing potentially unsafe conditions if loads are connected!!!

Programming Flowchart: Custom Trip Points with Custom Release Points Independent Relay Control [DIP Switch 7 OFF]



NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply press the PGM pushbutton repeatedly until the MODE LED turns green.

Programming Flowchart: Custom Trip Points with Custom Release Points (continued) Independent Relay Control [DIP Switch 7 OFF]



NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply press the PGM pushbutton repeatedly until the MODE LED turns green.

Programming Flowchart: Custom Trip Points with Custom Release Points Simultaneous Relay Control [DIP Switch 7 ON]

NOTE: If you make a mistake while in programming mode you can quickly exit and start over by cycling power to the FC-3RLY4 or simply press the PGM pushbutton repeatedly until the MODE LED turns green.