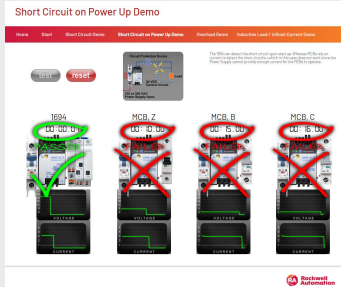


# Bulletin 1694 Modular Electronic Circuit Protectors



To learn more about electronic circuit protection and compare the actual trip times of 1694 electronic circuit protection with equivalent thermo-magnetic circuit breakers under a variety of conditions, see our online demonstration at [ab.rockwellautomation.com/Circuit-and-Load-Protection/1694-Electronic-Circuit-Protection-Module](http://ab.rockwellautomation.com/Circuit-and-Load-Protection/1694-Electronic-Circuit-Protection-Module)



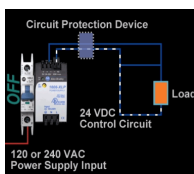
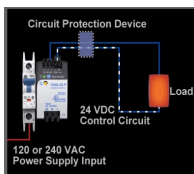
The next generation Bulletin 1694 Modular Electronic Circuit Protection products are designed to provide an excellent solution to the challenges of protecting 24V DC control circuits. The option to add IO-Link communications can add extensive information about the status of your control circuits and enable early detection of developing faults.

The option of adding IO-Link to this systems means you can now monitor current and voltage levels on any circuit protected by the system. You can trigger a threshold warning at any level you chose, and reset a tripped module remotely, through your control system.

Because of the characteristics of the switch mode power supplies that energize these systems, there are unique challenges to using thermomagnetic circuit breakers. Since the power supply is constrained as to its capacity to provide current, overloads can result in voltage drops and overcurrent conditions that don't trip a traditional circuit breaker before equipment is damaged or wiring overheats.

There are two situations where the limitations of traditional thermomagnetic circuit protection are more likely to occur:

- 1) **A condition where the circuit is experiencing an overload of between 100 and 130 percent of the circuit breaker's current**  
In this situation, it often takes an extended amount of time before the breaker trips. Meanwhile, wiring can overheat and equipment can be damaged due to overcurrent.
- 2) **When the circuit is shorted at power-up**  
Thermal-magnetic circuit breakers are effective at tripping when a circuit is shorted while under power. However, if the short is present before power is applied, it can take several minutes for the circuit breaker to trip – again because of the limitation of the power supplied to supply current.



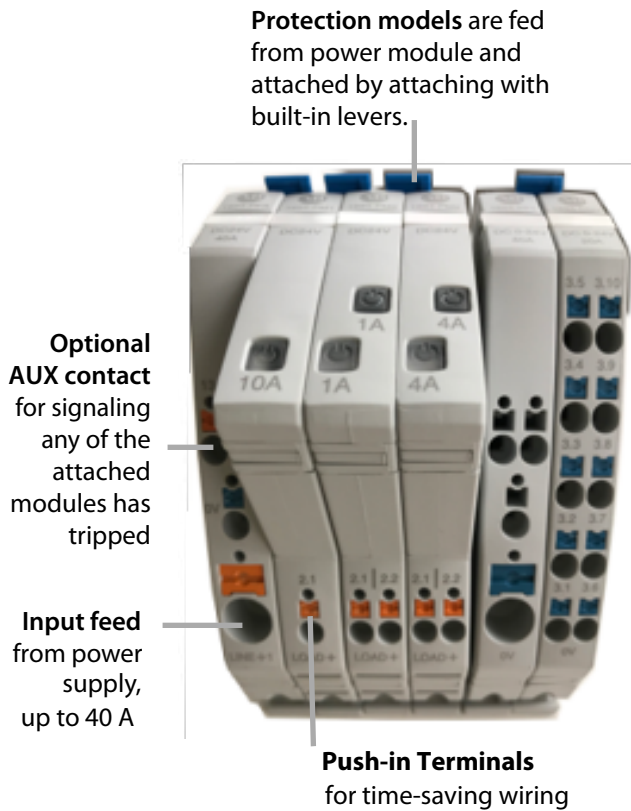
Another limitation of thermal-magnetic circuit breakers occurs with capacitive or inductive loads. In these cases, normal current inrush can cause nuisance tripping when these devices are energized.

The Bulletin 1694 Electronic Circuit Protection system solves these problems. It has a tripping threshold of 105 percent of the rated current, at which point it trips in three seconds. A traditional circuit breaker can take well over ten minutes to trip at up to 120 percent overload.



This is a modular system, which enables you to configure protection to match your application needs.

## 1694 Modular Electronic Circuit Protection Features



### Power feed modules

- Take power in (up to 40 A) from the 24V DC power supply and distribute it to attached protection modules
- Left-feed (standard) / center- and right-feed option

### Protection modules

- One channel or two channels in the same compact (12.5 mm width) housing
- Current rating from 1 A...10 A fix current
- Available in Class 2 (1 A...4 A)

### Distribution modules

- Plus and GND distribution for connecting multiple loads per channel

## Multicolor LED Options



### Green LED Indicator

- Loads are connected



### Green / Amber Blinking LED Indicator

- 90% load warning of nominal current is reached. In case given  $I_{Nominal} = 1 A$
- Load is still connected—this is a warning



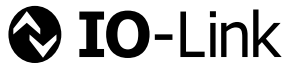
### Not Illuminated LED Indicator

- Manually switched off by built-in micro switch (built-in in LED)
- Individual load on 1 A channel is disconnected



### Red LED Indicator

- Device has tripped due to overload or short circuit
- Individual load at 1 A channel is disconnected
- Tripping on one channel does not affect remaining loads in assembly



With over 16 million nodes deployed world-wide, IO-Link is a bi-directional, point-to-point network. By selecting IO-Link enabled power feed and protection modules, you can connect to any IO-Link master via unshielded three-conductor wiring, and feed circuit voltage and current information into you control system and network.



**Preventive maintenance**

Real-time voltage and current monitoring allow for trend analysis. Trip counter enables predictability. These features help enhance machine dependability.

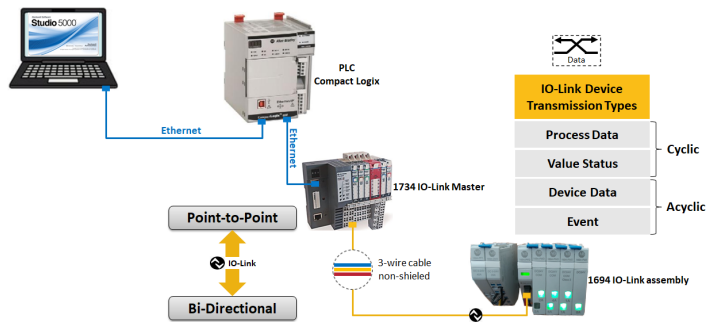
**Adjustability**

Adjustable current protection module can be used in standard, non-communicating and IO-Link assemblies. The current threshold can be set via IO-Link or manually (on the device). There is no dial or potentiometer on the module. This reduces the risk of unwanted manipulation and is tamper-proof.

**Communication**

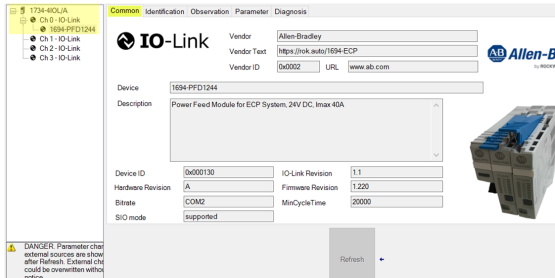
The protection modules allow for remote reset via IO-Link. IO-Link communication is widely spread, over 16 Million nodes (data source: io-link.com), and accepted in the field.

**1694 – Sample System IO-Link**



IO-Link enabled ECP modules can be used with any IO-Link Master, control system and software.

**1694 – IO-Link Common Tab**



Programming and set-up is integrated into the Studio 5000 Logix Designer® programming environment

# Product Selection

## Power Feed Modules

Mounting Position	Supply Voltage	Max Current	Aux Contact	Pkg. Qty.	Cat. No.
Left	24V DC	40 A	No	1	1694-PF1244
	24V DC	40 A	Yes	1	1694-PFA1244
	0V Ground	40 A	No	1	1694-PF164
Middle	24V DC	40 A Line Separated	No	1	1694-PF2L4S
Middle or Right	24V DC	40 A Line Connected	No	1	1694-PF3L4C
	0V Ground	40 A	No	1	1694-PF3G4

## Protection Modules

Number of Channels	Fixed or Adjustable Current	Current	Class 2	Pkg. Qty.	Cat. No.
1	Fixed	1 A	—	4	1694-PM11
			Yes	4	1694-PM11-CL2
		2 A	—	4	1694-PM12
			Yes	4	1694-PM12-CL2
		3 A	—	4	1694-PM13
			Yes	4	1694-PM13-CL2
		4 A	—	4	1694-PM14
			Yes	4	1694-PM14-CL2
		6 A	—	4	1694-PM16
		8 A	—	4	1694-PM18
10 A	—	4	1694-PM110		
2	Fixed	1 A	—	4	1694-PM211
			Yes	4	1694-PM211-CL2
		2 A	—	4	1694-PM222
			Yes	4	1694-PM222-CL2
		3 A	—	4	1694-PM233
			Yes	4	1694-PM233-CL2
		4 A	—	4	1694-PM244
			Yes	4	1694-PM244-CL2
		6 A	—	4	1694-PM266

## Distribution Modules

Description	Pkg. Qty.	Cat. No.
10 Terminals, 1xLINE, 9xLOAD, I <sub>max</sub> 20A	1	1694-DM1L2
10 Terminals, 2xLINE, 4xLOAD, I <sub>max</sub> 20A	1	1694-DM2L2
10 Terminals, Ground, I <sub>max</sub> 20A	1	1694-DM3G2







## Power Feed Module +24V DC (Line)

Mounting Position	Supply Voltage	Max Current	Aux Contact	Pkg. Qty.	Cat. No.
Left	24V DC	40 A	No	1	1694-PFD1244

## Protection Modules

Number of Channels	Fixed or Adjustable Current	Current	Class 2	Pkg. Qty.	Cat. No.
1	Fixed	8 A	–	4	1694-PMD18
		10 A	–	4	1694-PMD110
1 A		–	4	1694-PMD211	
		Yes	4	1694-PMD211-CL2	
2 A		–	4	1694-PMD222	
		Yes	4	1694-PMD222-CL2	
2		3 A	–	4	1694-PMD233
			Yes	4	1694-PMD233-CL2
		4 A	–	4	1694-PMD244
			Yes	4	1694-PMD244-CL2
6 A	–	4	1694-PMD266		
	Adjustable	1...10 A	–	4	1694-PMD2A10

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