Bulletin 140U Molded Case Circuit Breakers with Instantaneous Maintenance Mode Setting (IMM)

Assisting in Reducing Arc Flash Energy

Features and Benefits

Faster Reaction to Arcing Faults

- Allows less energy under arcing fault conditions
- Results in less potential damage

IMM Can Be Remotely Engaged

- Allows maintenance personnel to enable the protection wearing PPE suitable for the lower energy level
- Results in more productivity by not having to fully suit up (in some applications)

IMM Offers Second Instantaneous Trip Settings

- Provides the ability to adjust the breaker for maintenance conditions
- Provides improved Arc mitigation while adjustability reduces nuisance tripping

Multiple Confirmations Provided from the Module

- Pilot light and separate hard contact provided
- Provides additional confirmation that unit is in maintenance mode both locally and/or through another output device

1200 A Fuse vs 1200 Molded Case Circuit Breaker with IMM

Test – 1200 A Fuse

Brand L-class
1200 A fuses

Result – Fuse tripped at 771 ms, 15.7 kA peak

17.89 calories/cm^2

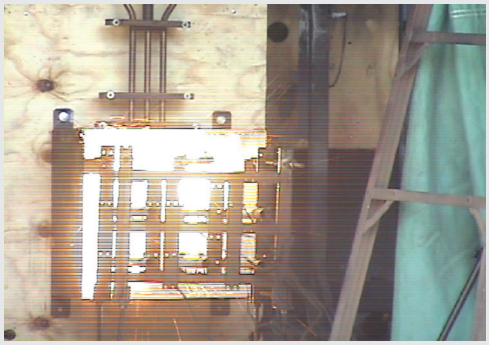
Test – 1200 A MCCB with IMM

Maintenance Mode enabled, I_R = 1220 A,

Maintenance Mode ON

Result – Breaker tripped at 18.7 ms, 16.8 kA peak

0.71 calories/cm^2



Rockwell Automation introduces Molded Case Circuit Breakers (MCCBs) with Instantaneous Maintenance Mode (IMM) settings. These MCCBs with IMM allow users another tool in mitigating the damage associated with Arc Flash in industrial control panels and motor control centers. The IMM provides a separate maintenance mode which can be set to trip the breaker at currents from 2.5 to 4 times the breaker rating. This provides reduced response time to Arcing faults when compared to normal MCCBs adjusted for maximum coordination or to fuses.

In testing done comparing the performance of fuses, MCCBs and MCCBs with IMM enabled under simulated Arcing fault conditions, the IMM functionality showed a measurable reduction in the Arc energy allowed.

In testing using the Arcing fault test as defined under IEEE 1584 tests the results as shown above were obtained simulating an Arcing fault of 9800 A rms at 480V.

Product Specifications

As seen in the pictures and in data the IMM improved performance under these conditions when compared to a fuse or a circuit breaker that would have had normal running settings applied.

What do these results mean?

Test Result Correlation to NFPA 70E Risk Category

	Incident Energy From (cal/cm²)	Incident Energy To (cal/cm²)	Hazard Risk Category	Clothing Description	Clothing Layers	Required Minimum Arc Rating of PPE (cal/cm²)	Notes	Class Color
1	0.0	1.2	0	Untreated Cotton	1	N/A	MCCB with IMM	
2	1.2	4.0	1	FR Shirt & Pants	1	4		
3	4.0	8.0	2	Cotton Underwear + FR Shirt & Pants	1 or 2	8		
4	8.0	25.0	3	Cotton Underwear + FR Shirt & Pants + FR Coverall	2 or 3	25	Standard Class L Fuse	
5	25.0	40.0	4	Cotton Underwear + FR Shirt & Pants + Multi-layer Flashsuit	3 or more	40		

Assembled Circuit Breakers, Electronic Trip Units

Rated Current		Adjustment Range I_r [A]			Breaking Capacity (50 Hz) I_{cu} II_{os} [kA]								Interrupting Rating (60 Hz) [kA]			
Oper. I_n [A]	Instant. Maint. Mode 2.5...4.0 x I_n [A]	Thermal Trip I_r = 0.5...1.0 x I_r	Magnetic Trip I_m = 2...8 x I_n	Protect. Type	220...240V		380...415V		500V		690V		240V	480V	600V	Cat. No.
1200	3000... 4800	600...1200*	1200...10600	LSII ‡	100	100	70	50	50	25	25	13	100	65	35	**140U-N6J3-E12**
				LSIIG‡	100	100	70	50	50	25	25	13	100	65	35	**140U-N6K3-E12**
1200	3000... 4800	600...1200*	1200...10600	LSII ‡	200	100	100	50	65	33	35	18	200	100	50	**140U-N0J3-E12**
				LSIIG‡	200	100	100	50	65	33	35	18	200	100	50	**140U-N0K3-E12**

* Select proper rating plug to cover thermal trip equipment.
‡ Rating plug not required with IMM trip module.

Assembled Circuit Breakers, Electronic Trip Units

Rated Current I_n [A]	Rated Current Instant. Maint. Mode 2.5...4.0 x I_n [A]	Thermal Trip I_r = 0.5...1.0 x I_r	Protection Type	Breaking Capacity/ Interrupting Rating [kA]*		Cat. No.	Breaking Capacity/ Interrupting Rating [kA]*		Cat. No.
				400V	480V		400V	480V	
250	750...1000	100...250	LSII‡	45	35	**140U-L3J3-D25**	70	65	**140U-L6J3-D25**
			LSIIG‡	45	35	**140U-L3K3-D25**	70	65	**140U-L6K3-D25**
400[1]	1000...1600	600...1200	LSII‡	45	35	**140U-L3J3-D40**	70	65	**140U-L6J3-D40**
			LSIIG‡	45	35	**140U-L3K3-D40**	70	65	**140U-L6K3-D40**
600	1500...2400	240...600	LSII‡	45	35	**140U-L3J3-D60**	70	65	**140U-L6J3-D60**
			LSIIG‡	45	35	**140U-L3K3-D60**	70	65	**140U-L6K3-D60**

* Note: interrupt ratings shown are for 400V and 480V, respectively.
[1] Shunt trips or undervoltage releases cannot be added to the L-frame.
‡ Rating plug not required with IMM trip module.

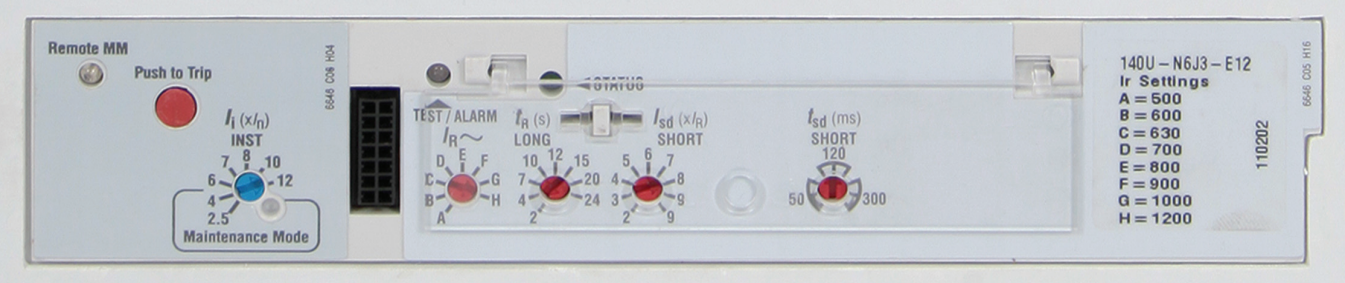
Electronic

Rated Current I_n [A]	Rated Current Instant. Maint. Mode 2.5...4.0 x I_n [A]	Adjustment Range [A] Thermal Trip I_r = 0.5...1.0 x I_r	Adjustment Range [A] Magnetic Trip I_m = 2...10 x I_n	Protection Type	Cat. No.
250	750...1000	600...1200	1200...10600	LSII	**140U-LTJ3-D25**
				LSIIG	**140U-LTK3-D25**
400	1000...1600	600...1200	1200...10600	LSII	**140U-LTJ3-D40**
				LSIIG	**140U-LTK3-D40**
600	1500...2400	240...600	480...6000	LSII	**140U-LTJ3-D60**
				LSIIG	**140U-LTK3-D60**

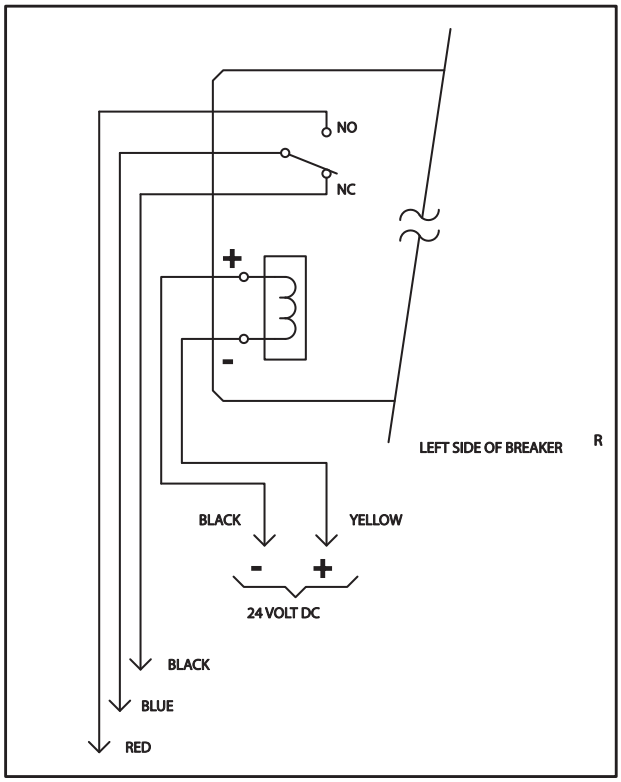
Setting the IMM

A second instantaneous trip setting is used in maintenance mode. When IMM is enabled the breaker can be adjusted to trip at 2.5 to 4 times the breaker rating. In IMM the standard Instantaneous settings are bypassed and a special analog circuit trips the breaker in 30 msec or less when sensed current exceeds the setting current.

Additionally, when set, a blue indicator appears in the setting window next to the setting dial. When enabled, a blue LED illuminates on the front of the breaker and provides visual indication at the MCCB that the breaker is now in maintenance mode.



In addition to the LED indication a dedicated contact within the breaker closes to allow an external indication the MCCB is in Maintenance Mode.



Wiring the L Frame IMM module.

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