Motor Start Fuses

Contents

ACLS, BCLS, CLS, HCLS and NCLS Type Fuses

Product Description

Eaton's CLS current limiting fuses are used in conjunction with medium voltage motor starters to provide short-circuit protection for individual motor circuits. Contactors in motor starting equipment protect the equipment from over-currents due to starting, stalling and plugging while current limiting fuses provide short-circuit protection only.

Duty cycles of fuses used in medium voltage motor starters are characterized by the frequent application of high overloads such as motor starting currents. Motor starter fuses, therefore, must be designed to withstand the consequent frequent severe heating and cooling cycles without fatigue failures. CLS type fuses have such a construction. The element designs used are not sensitive to low currents, and have "fatigue proof" features to provide highly uniform flexing of elements during heating cycles.

The mounting possibilities for CLS type current limiting fuses are shown on **Page V14-T3-64**, with disconnect type being the predominant approach.

CLS Features

CLS type current limiting fuses offer a number of advantages over a number of other designs. During the selection process, consider the following:

- **Quiet Safe Operation:** CLS type current limiting fuses are designed for silent operation and elimination of flame discharges when the fuse operates
- **Easy to Identify Operated Fuse:** CLS type current limiting fuses are equipped with an indicator that will protrude indicating when a fuse has operated
- **Space Economy:** Because the design of these fuses has eliminated flame or gas discharge, the need for exhaust control devices, vents and reinforcing is eliminated
- **Complete Protection Provided:** CLS type current limiting fuses ensure positive interruption of high fault currents. The fuse limits the magnitude of the electromechanical stresses in the protected apparatus. They also limit the arc voltage to considerably less than three times the nominal circuit voltage
- **Fatigue Proof:** Controlled "crimping" of the silver elements during fuse manufacture permits CLS type current limiting fuses to withstand severe duty cycling without failure

Construction

CLS type current limiting fuses are of basically inorganic construction. The only organic material used is a high temperature glass-resin outer casing and the plastic indicator. The fuse elements are pure silver and are crimped at controlled locations along the active length to increase the strength of the element, and to uniformly distribute mechanical expansion and prevent fatigue failure due to severe cycling duties. Element design combines maximum load carrying ability with the most favorable short circuit interruption characteristics. These fuses are filled with a high purity silica sand with controlled grain size.

UL® Component Recognition

Underwriters Laboratories has witnessed testing on and recognizes certain styles of 5CLS and 5ACLS fuses. These fuses carry the "reversed UR" designation. CLS type current limiting motor start fuses manufactured prior to 1975 were not identified by an "R" designation. However, these fuses can be used with or replaced by newer fuses with "R" designations as indicated below.

Ratings and Selection

When a decision has been made to use current limiting fuses, the minimum amount of information required to make the proper selection is:

- Voltage rating
- Current rating
- Interrupting rating
- Mounting method
  - Non-disconnect mounting
  - Disconnect mounting
  - Clip-lock mounting
  - Direct bolt-in mounting
  - Live parts only
  - No required mounting

Refer to **Pages V14-T3-52** to **V14-T3-62** for assistance in selecting the correct fuse catalog number.

These types of fuses are used in conjunction with high voltage motor starters to provide short-circuit protection for individual motors. There are specific rules governing the selection of the required fuse continuous rating.

The current limiting fuse application notes earlier in this publication offer additional information about this type of application.

When selecting the appropriate fuse for a new installation, keep in mind that one fuse unit and one compatible mounting is required for each phase.

Catalog Number Selection

CLS Fuse Units

15 CLS 200E

Maximum kV	Type	Continuos Amperes
2 = 2.75 kV	ACLS	25A, 2R–44R
4 = 4.3 kV	BCLS	
5 = 5.5 kV	CLS	
8 = 8.3 kV	HCLS	
15 = 15.5 kV		

CLS Type Current Limiting Fuses, continued

Max. Design Voltage (kV)	Current Rating (A)	"R" Designation	Catalog Number	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter (Inches)	Clip Center (Inches)	Length (Inches)	Approx. Shipping Weight (Lbs)	Catalog Number: Live Parts ①	Catalog Number: End Fittings ②	Performance Curves: Minimum Melting Time	Performance Curves: Total Clearing Time	Performance Curves: Peak Let-Through Current
5.5	30	—	**5CLS-30**	1	50	3	12	15.9	8	**CLE-NL-D CLE-DL-D**	— **CLE-DF-D**	TC66690602	TC66690702	TC66700203
	70	2R	**5CLS-2R**	1	50	3	12	15.9	8					
	100	3R	**5CLS-3R**	1	50	3	12	15.9	8					
	130	4R	**5CLS-4R**	1	50	3	12	15.9	8					
	150	5R	**5CLS-5R**	1	50	3	12	15.9	8					
	170	6R	**5CLS-6R**	1	50	3	12	15.9	8					
	200	9R	**5CLS-9R**	1	50	3	12	15.9	8					
	230	12R	**5CLS-12R**	1	50	3	12	15.9	8					
	390	18R	**5CLS-18R**	2	50	3	12	15.9	17	**CLE-NL-E CLE-DL-E**	— **CLE-DF-E**	TC66690602	TC66690702	TC66700203
	450	24R	**5CLS-24R**	2	50	3	12	15.9	17					
5.08	30	—	**5ACLS-30**	1	50	3	—	15.9	8	—		TC66690602	TC66690702	TC66700203
	70	2R	**5ACLS-2R**	1	50	3	—	15.9	8					
	100	3R	**5ACLS-3R**	1	50	3	—	15.9	8					
	130	4R	**5ACLS-4R**	1	50	3	—	15.9	8					
	150	5R	**5ACLS-5R**	1	50	3	—	15.9	8					
	170	6R	**5ACLS-6R**	1	50	3	—	15.9	8					
	200	9R	**5ACLS-9R**	1	50	3	—	15.9	8					
	230	12R	**5ACLS-12R**	1	50	3	—	15.9	8					
	390	18R	**5ACLS-18R**	2	50	3	—	15.9	17					
	450	24R	**5ACLS-24R**	2	50	3	—	15.9	17					
4.3	480	26R	**4ACLS-26R**	2	50	3	—	15.9	17					
5.08	30	—	**5BCLS-30**	1	50	3	—	—	8	—		TC66690602	TC66690702	TC66700203
	70	2R	**5BCLS-2R**	1	50	3	—	—	8					
	100	3R	**5BCLS-3R**	1	50	3	—	—	8					
	130	4R	**5BCLS-4R**	1	50	3	—	—	8					
	150	5R	**5BCLS-5R**	1	50	3	—	—	8					
	170	6R	**5BCLS-6R**	1	50	3	—	—	8					
	200	9R	**5BCLS-9R**	1	50	3	—	—	8					
	230	12R	**5BCLS-12R**	1	50	3	—	—	8					
	390	18R	**5BCLS-18R**	2	50	3	—	—	17					
	450	24R	**5BCLS-24R**	2	50	3	—	—	17					
4.3	480	26R	**4BCLS-26R**	2	50	3	—	—	17					
5.08	30	—	**5HCLS-30**	1	50	3	—	15.9	8	—		TC66690602	TC66690702	TC66700203
	70	2R	**5HCLS-2R**	1	50	3	—	15.9	8					
	100	3R	**5HCLS-3R**	1	50	3	—	15.9	8					
	130	4R	**5HCLS-4R**	1	50	3	—	15.9	8					
	150	5R	**5HCLS-5R**	1	50	3	—	15.9	8					
	170	6R	**5HCLS-6R**	1	50	3	—	15.9	8					
	200	9R	**5HCLS-9R**	1	50	3	—	15.9	8					
	230	12R	**5HCLS-12R**	1	50	3	—	15.9	8					
	390	18R	**5HCLS-18R**	2	50	3	—	15.9	17					
	450	24R	**5HCLS-24R**	2	50	3	—	15.9	17					

Notes

① Includes end fittings.
② Disconnect only.

CLS Type Current Limiting Fuses—Mounting, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Catalog Number	Mounting (Includes Live Parts, End Fittings) Type	Voltage (BIL) kV	Catalog Number Porcelain	Glass-Polyester
5.5	390	18R	**5CLS-18R**	Non-disconnect	60	**5HLE-PNM-E**	**5HLE-GNM-E**
	450	24R	**5CLS-24R**	Disconnect	60	**5HLE-PDME**	**5HLE-GDM-E**
5.08	30	—	**5ACLS-30**	For use with Ampgard 400A motor starters			
	70	2R	**5ACLS-2R**				
	100	3R	**5ACLS-3R**				
	130	4R	**5ACLS-4R**				
	150	5R	**5ACLS-5R**				
	170	6R	**5ACLS-6R**				
	200	9R	**5ACLS-9R**				
	230	12R	**5ACLS-12R**				
	390	18R	**5ACLS-18R**				
	450	24R	**5ACLS-24R**				
4.3	480	26R	**4ACLS-26R**				
5.08	30	—	**5BCLS-30**	Bolt-in			
	70	2R	**5BCLS-2R**				
	100	3R	**5BCLS-3R**				
	130	4R	**5BCLS-4R**				
	150	5R	**5BCLS-5R**				
	170	6R	**5BCLS-6R**				
	200	9R	**5BCLS-9R**				
	230	12R	**5BCLS-12R**				
	390	18R	**5BCLS-18R**				
	450	24R	**5BCLS-24R**				
4.3	480	26R	**4BCLS-26R**				
5.08	30	—	**5HCLS-30**	Hermetically sealed for use with Ampgard 400A motor starters			
	70	2R	**5HCLS-2R**				
	100	3R	**5HCLS-3R**				
	130	4R	**5HCLS-4R**				
	150	5R	**5HCLS-5R**				
	170	6R	**5HCLS-6R**				
	200	9R	**5HCLS-9R**				
	230	12R	**5HCLS-12R**				
	390	18R	**5HCLS-18R**				
	450	24R	**5HCLS-24R**				
	70	2R	**5CLS70-2R**	For use with Ampgard 800A motor starters			
	100	3R	**5CLS70-3R**				
	130	4R	**5CLS70-4R**				
	150	5R	**5CLS70-5R**				
	170	6R	**5CLS70-6R**				
	200	9R	**5CLS70-9R**				
	230	12R	**5CLS70-12R**				
	390	18R	**5CLS70-18R**				
	450	24R	**5CLS70-24R**				
	600	32R	**5CLS70-32R**				
	650	36R	**5CLS70-36R**				
	700	44R	**5CLS70-44R**				

CLS Type Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			
					Approximate Dimensions in Inches (mm)				Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	Catalog Number
5.08	30	—	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-30
	70	2R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-2R
	100	3R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-3R
	130	4R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-4R
	150	5R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-5R
	170	6R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-6R
	200	9R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-9R
	230	12R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5CLS-12R
	390	18R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5CLS-18R
	450	24R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5CLS-24R
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-30
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-2R
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-3R
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-4R
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-5R
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-6R
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-9R
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5ACLS-12R
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5ACLS-18R
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5ACLS-24R
4.3	480	26R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	4ACLS-26R
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-30
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-2R
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-3R
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-4R
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-5R
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-6R
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-9R
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5BCLS-12R
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5BCLS-18R
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5BCLS-24R
4.3	480	26R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	4BCLS-26R
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-30
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-2R
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-3R
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-4R
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-5R
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-6R
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-9R
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	TC66690602	TC66690702	TC66700203	5HCLS-12R
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5HCLS-18R
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	TC66690602	TC66690702	TC66700203	5HCLS-24R