

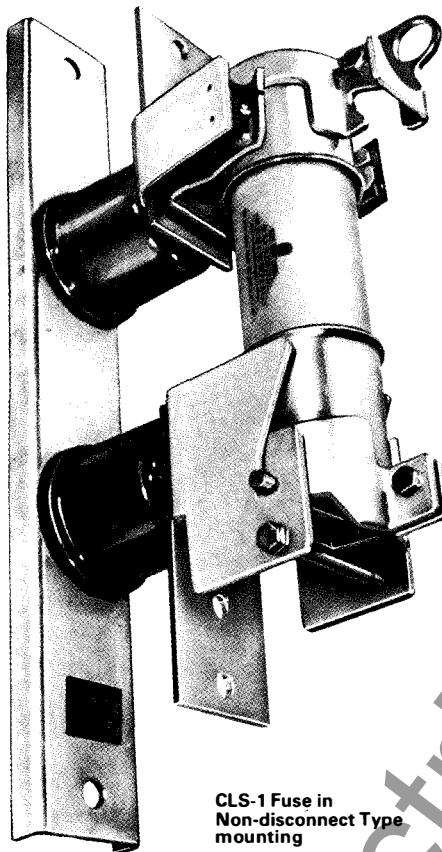


October, 1980
Supersedes DB 36-652
dated August, 1967

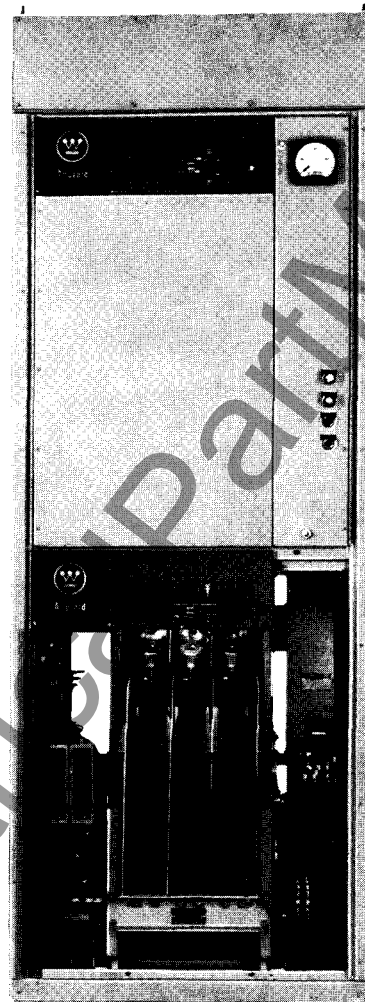
Mailed to: E, D, C/1971/DB

Indoor Motor Starter Type
Current Limiting, 2.4 to 7.2 KV,
15 to 750 Amps, and
Special Types

Type CLS-1, CLS-2 High Voltage Power Fuses



CLS-1 Fuse in
Non-disconnect Type
mounting



CLS-12 Mounted in Ampgard® Starter

Application

Type CLS-1 and CLS-2 current limiting fuses are used in conjunction with high voltage motor starters to provide short circuit protection for individual motors. Contactors in motor starting equipment protect the motor against overcurrents due to starting, stalling and plugging while current limiting fuses furnish short circuit protection only.

The duty of fuses in motor starter is characterized by the frequent application of high overloads such as motor starting currents. Motor starter fuses, therefore must be designed to withstand these frequent severe heating and cooling cycles without fatigue failures. Type CLS fuses are of such construction. They contain no elements sensitive to low currents. The CLS fuses are designed with a "fatigue proof" feature to provide highly uniform flexing of elements during heating cycles.

Advantages

Quiet Safe Operation

Designed for silent operation and elimination of flame discharges when fuse blows.

Easy Identification of Blown Fuse

Indicator will protrude from the bottom end of indicating type fuse providing a visual aid when the fuse has blown.

Space Economy

The fuse being designed for elimination of flame or gas discharges when operated, requires no discharge filters, fire boxes, special vents or reinforcing.

Complete Protection Provided

Current limiting fuses insure positive interruption even on low fault currents. The fuse limits the magnitude of electro-mechanical stresses in the apparatus to be protected. They also control the surge voltage that is produced when the short circuit is limited to less than twice that of the nominal voltage rating.

Fatigue Proof

Bending or crimping of the silver elements prior to assembly permits the current limiting fuse to stand up under the most severe duty cycling without failure.

Construction

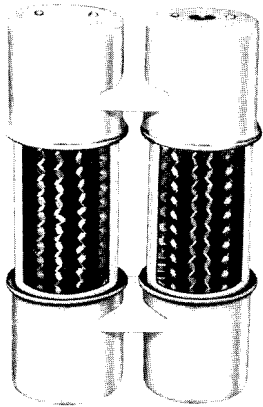


Figure 1: Cutaway view of CLS-2 showing pure silver elements

The CLS fuse is basically of inorganic construction, the only organic material used is glass resin outer casing and the plastic indicator. The fuse elements are pure silver and are crimped or bent at regular intervals to make the element structurally stronger and distribute expansion uniformly preventing failure due to severe duty cycling.

The design of the element combines maximum load carrying ability with the most favorable short circuit interruption characteristics. CLS fuses are filled with a high purity silica sand of controlled grain size.

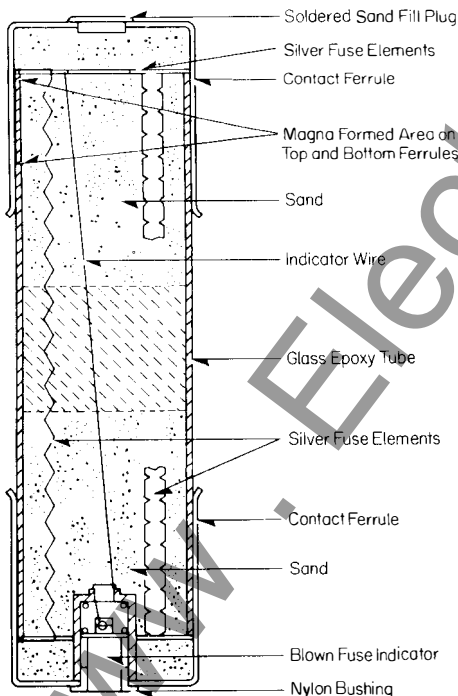


Figure 2: Cross-section drawing showing component parts of a type CLS-1 fuse unit

Nine types of CLS fuses are offered for 2400, 4800 and 7200 volt applications for use with high voltage starters.

1. CLS-1 is a single barrel design with ratings from 25 to 230 amps. The fuse has a 3" ferrule diameter with a fuse clip center of 7" for 2400 volts and 14" for 4800 volts. To supplement the CLS-1 for higher currents of 390 to 450 amps the CLS-2 is provided. It is made with two single barrel fuse units that have been brazed together.

2. CLS-15 and CLS-25 for 2400 volt applications have the same ratings (except 30 amps) and physical parameters as the CLS-1 and CLS-2 except they are made with a hookeye and are for use on Ampgard® starters.

3. CLS-12 and CLS-22 for 2400/4800 volt applications have the same current ratings as the CLS-15 and CLS-25 plus a 480 amp rating. They also have a hookeye and are for use on Ampgard® starters, but differ in that the CLS-12 and CLS-22 have a 12" clip center and are used in both 2400 and 4800 volt applications.

4. CLS-14 and CLS-24 for 2400/4800 volt applications are identical to the CLS-12 and CLS-22 except they don't have hookeyes and do not have a 480 amp rating.

5. CLS-700 for 2400/4800 volt applications is a special design for current values of 600 to 750 amps. The fuses are double barrel with a 4" ferrule diameter. There are two types available: 1. with a hookeye for use on Ampgard® starters, 2. with a terminal pad incorporated in the fuse which is used with a special mounting.

6. CLS-18 and CLS-28 for 7200 volt applications have a 3" ferrule diameter and a 14" clip center. The CLS-18 offers ratings from 15 to 125 amps. The double barrel CLS-28 offers ratings of 150, 200 and 225 amps. These fuses also have hookeyes.

7. CLSS-18 and CLSS-28 for 7200 volt application have a 3" ferrule diameter and 12" clip center. The CLSS-18 offers ratings from 70 to 230 amps. The double barrel CLSS-28 offers one rating at 390 amps. These fuses also have hookeyes.

8. CLS-13 and CLS-23 can be provided for Class #1, Group D, Division 2 hazardous locations. These fuses are identical in all aspects to the CLS-1 and CLS-2, but have been hermetically sealed and have a clear plastic cover cemented over the indicator providing a means of viewing the indicator under the above mentioned conditions.

9. HCLS-15 and HCLS-25 also can be provided for Class #1, Group D, Division 2 hazardous locations. They have the same hermetical seal as the CLS-13 and CLS-23, and the same ratings and physical parameters as the CLS-15 and CLS-25.

10. HCLS-12 and HCLS-22 are also provided for Class #1, Group D, Division 2 hazardous locations. They have the same hermetical seal as the CLS-13 and CLS-23, and the same ratings and physical parameters as the CLS-12 and CLS-22.

UL Recognized Label

Underwriters Laboratories has tested and now recognizes certain styles of the CLS-12, CLS-22, CLS-14, and CLS-24 fuses. Each fuse that has been recognized carries the "UL recognized" stamp as shown in Figure 3. Refer to Technical Data 36-691 for those styles which are UL listed.

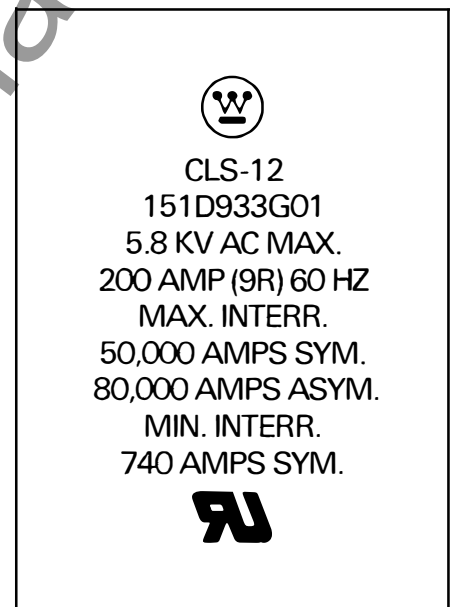


Figure 3: CLS-12 Fuse Identification with UL listing

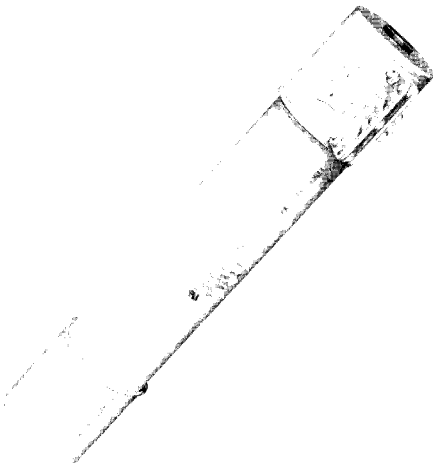


Figure 4: CLS-12 Ampgard® Showing Hookeye

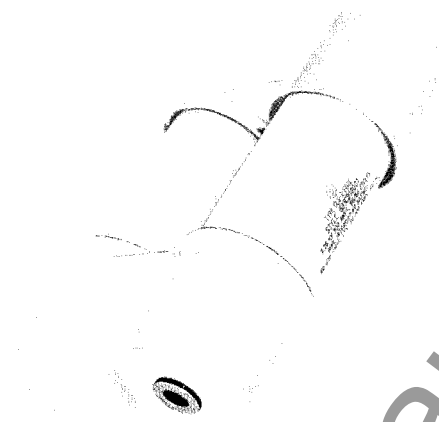


Figure 5: CLS-2, 2.4 KV

Fuse Mountings

There are two types of mountings available.

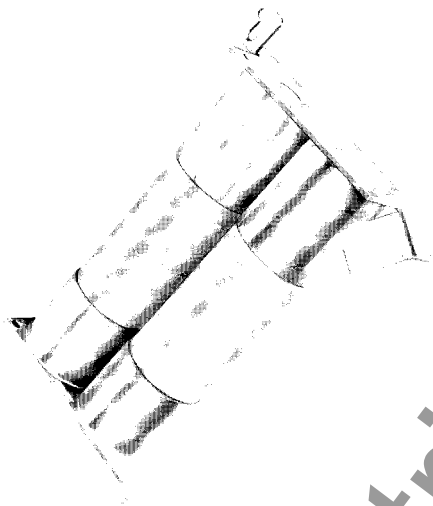


Figure 6: CLS-700 for use with Ampgard® starter

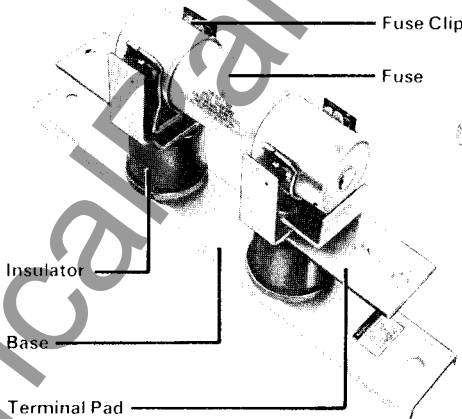


Figure 7: Standard non-disconnecting type fuse mounting

Live Parts Above Insulator

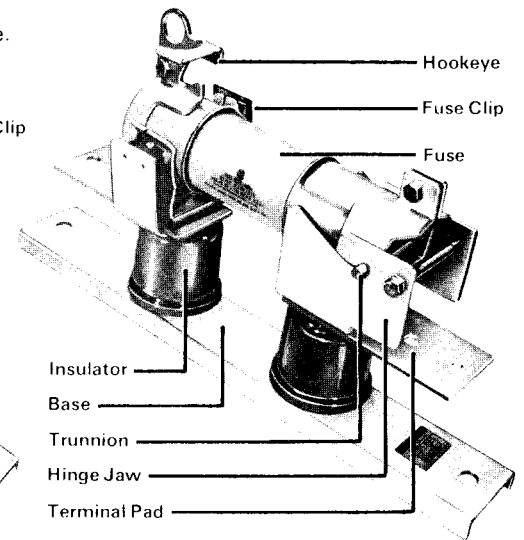


Figure 8: Standard disconnecting type fuse mounting

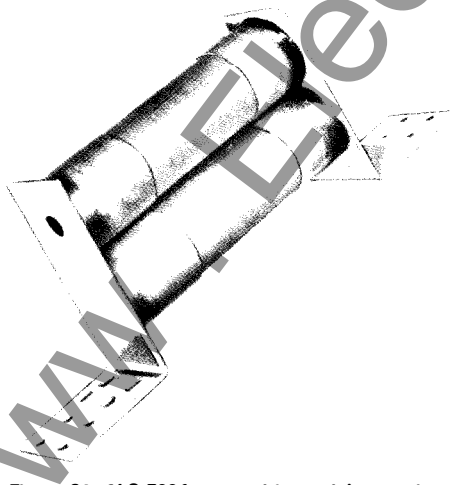
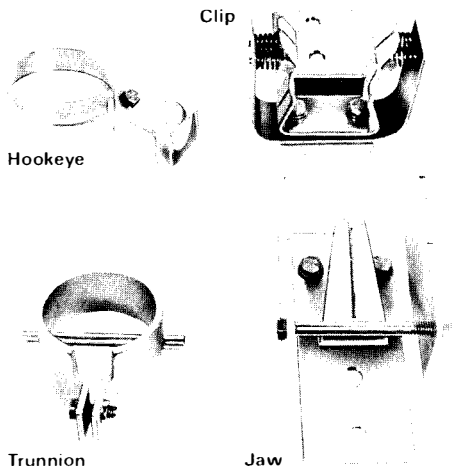


Figure 6A: CLS-700 for use with special mounting



Trunnion

Jaw



CLS Interchangeability Chart

The following information lists other manufacturer's fuse styles for which we have an interchangeable fuse unit or mounting. These fuses are mechanically interchangeable and carry the same current rating. For close coordination the time-current curves should be checked to assure desired selectivity. Included in the list are the manufacturer's style listed alpha-numerically, the Westinghouse style, current rating, voltage rating and type of fuse.

Allis Chalmers

A C Style	Style	Amps	KV	Fuse
24-FM2X-4	591C812G02	2R	2.8	CLS
24-FM3X-4	591C812G03	3R	2.8	CLS
24-FM4X-4	591C812G04	4R	2.8	CLS
24-FM6X-4	591C812G06	6R	2.8	CLS
24-FM9X-4	591C812G07	9R	2.8	CLS
24-FM12X-4	591C812G08	12R	2.8	CLS
24-FM18X-5	591C813G01	18R	2.8	CLS
24-FM24X-5	591C813G02	24R	2.8	CLS
48-FM2X-4	151D241G02	2R	5.5	CLS
48-FM3X-4	151D241G03	3R	5.5	CLS
48-FM4X-4	151D241G04	4R	5.5	CLS
48-FM6X-4	151D241G06	6R	5.5	CLS
48-FM9X-4	151D961G01	9R	5.5	CLS
48-FM12X-4	151D961G02	12R	5.5	CLS
48-FM18X-5	151D961G03	18R	5.5	CLS
48-FM24X-5	151D961G04	24R	5.5	CLS

Bussman

Buss Style	Style	Amps	KV	Fuse
JCL 2R	151D241G02	2R	5.5	CLS
JCL 3R	151D241G03	3R	5.5	CLS
JCL 4R	151D241G04	4R	5.5	CLS
JCL 6R	151D241G06	6R	5.5	CLS
JCL 9R	151D961G01	9R	5.5	CLS
JCL 12R	151D961G02	12R	5.5	CLS
JCL 18R	151D961G03	18R	5.5	CLS
JCL 24R	151D961G04	24R	5.5	CLS
JCK 2R	591C812G02	2R	2.8	CLS
JCK 3R	591C812G03	3R	2.8	CLS
JCK 4R	591C812G04	4R	2.8	CLS
JCK 6R	591C812G06	6R	2.8	CLS
JCK 9R	591C812G07	9R	2.8	CLS
JCK 12R	591C812G08	12R	2.8	CLS
JCK 18R	591C813G01	18R	2.8	CLS
JCK 24R	591C813G02	24R	2.8	CLS

General Electric

G.E. Style	Style	Amps	KV	Fuse
9F60LCB802	591C812G02	2R	2.8	CLS
9F60LCB803	591C812G03	3R	2.8	CLS
9F60LCB804	591C812G04	4R	2.8	CLS
9F60LCB806	591C812G06	6R	2.8	CLS
9F60LCB809	591C812G07	9R	2.8	CLS
9F60LCB812	591C812G08	12R	2.8	CLS
9F60LCL102	591C154G02	2R	2.8	CLS
9F60LCL103	591C154G03	3R	2.8	CLS
9F60LCL104	592C154G04	4R	2.8	CLS
9F60LCL106	591C154G06	6R	2.8	CLS
9F60LCL109	591C154G07	9R	2.8	CLS
9F60LCL112	591C154G08	12R	2.8	CLS
9F60LJD802	151D241G02	2R	5.5	CLS
9F60LJD803	151D241G03	3R	5.5	CLS
9F60LJD804	151D241G04	4R	5.5	CLS
9F60LJD806	151D241G06	6R	5.5	CLS
9F60LJD809	151D961G01	9R	5.5	CLS
9F60LJD812	151D961G02	12R	5.5	CLS
9F60LJN102®	151D240G02	2R	5.5	HCLS
9F60LJN103®	151D240G03	3R	5.5	HCLS
9F60LJN104®	151D240G04	4R	5.5	HCLS
9F60LJN106®	151D240G06	6R	5.5	HCLS
9F60LJN109®	151D962G01	9R	5.5	HCLS
9F60LJN112®	151D962G02	12R	5.5	HCLS
9F60MCB818	591C813G01	18R	2.8	CLS
9F60MCB824	591C813G02	24R	2.8	CLS
9F60MCL118	591C156G01	18R	2.8	CLS
9F60MCL124	591C156G02	24R	2.8	CLS
9F60MJD818	151D961G03	18R	5.5	CLS
9F60MJD824	151D961G04	24R	5.5	CLS
9F60MJN118	151D962G03	18R	5.5	HCLS
9F60MJN124	151D962G04	24R	5.5	HCLS

Nelson

Nelson Style	Style	Amps	KV	Fuse
70-2M-IC-2.75	591C812G01	2R	2.8	CLS
70-2M-IC-5.5	151D241G01	2R	5.5	CLS
100-3M-IC-2.75	591C812G03	3R	2.8	CLS
100-3M-IC-5.5	151D241G03	3R	5.5	CLS
130-4M-IC-2.75	591C812G04	4R	2.8	CLS
130-4M-IC-5.5	151D241G04	4R	5.5	CLS
150-5M-IC-2.75	591C812G05	5R	2.8	CLS
150-5M-IC-5.5	151D241G05	5R	5.5	CLS
170-6M-IC-2.75	591C812G06	6R	2.8	CLS
170-6M-IC-5.5	151D241G06	6R	5.5	CLS
200-9M-IC-2.75	591C812G07	9R	2.8	CLS
200-9M-IC-5.5	151D961G01	9R	5.5	CLS
230-12M-IC-2.75	591C812G08	12R	2.8	CLS
230-12M-IC-5.5	151D961G02	12R	5.5	CLS
390-18M-2C-2.75	591C813G01	18R	2.8	CLS
390-18M-2C-5.5	151D961G03	18R	5.5	CLS
450-24M-2C-2.75	591C813G02	24R	2.8	CLS
450-24M-2C-5.5	151D961G04	24R	5.5	CLS

"R" Designation - NEMA SG.2-46-10

The numerical and "R" signifies that the fuse will melt in a range of 15 to 35 seconds at a current value equal to 100 x "R" number.

Note: CLS Fuses now have new ampere ratings and an "R" designation. The table below shows the necessary cross references: "Present rating" indicates those fuses manufactured prior to January, 1975 and not stamped with an "R" rating.

Present Ampere Rating	New Ampere Rating	Fuse "R" Designation
25	25	NONE
30	30	NONE
50	70	2R
70	100	3R
90	130	4R
110	150	5R
130	170	6R
200	200	9R
225	230	12R
300	390	18R
400	450	24R
480	480	26R
650	600	32R
700	650	36R

Further Information

Price List 36-609
Application Data 36-693
Technical Certification Section 36-692A
Technical Data 36-691