

Amp-Trap 2000®

When there's absolutely no time for downtime.



 GROUPE
CARBONE LORRAINE

 **Ferraz Shawmut**
Your circuit protection resource.

Your electrical system is your lifeline.

A lifeline that can be cut by a short circuit. Transformers can disintegrate. Conductors can vaporize. Bus bars can break. And components like switchgear, controlgear and motor starters can be destroyed, bringing your operation to a halt.

That downtime can cost your business thousands of dollars — or more — a minute in lost productivity. Add to that the costs of component replacement and equipment repair, and you're facing a drain on your profitability.

You need the Type "2" (No-Damage) protection of Amp-Trap 2000®.

Traditional fuses were designed to protect your electrical system from fire and explosion, and your people from potential harm.

Ferraz Shawmut's Amp-Trap 2000 current-limiting fuses do more than that. They provide the Type "2" (No-Damage) protection that prevents high-energy arcs from destroying your production, HVAC, lighting and communications equipment. And from jeopardizing other, not-so-tangible assets like productivity and profitability.

Opening in less than one-quarter cycle at fault currents up to 300kA, Amp-Trap 2000 fuses minimize the let-thru current that flows downstream. Instead of spending hours repairing damaged equipment, you simply clear the source of the fault. Replace your Amp-Trap 2000 fuses. And get your equipment back on line. Fast.

So not only do Amp-Trap 2000 fuses save you the time and costs of equipment repair and replacement, they minimize the downtime that can diminish your productivity and profits. In short, they protect *all* your assets.





Short circuit protection

is just the beginning.

In addition to the Type "2" (No-Damage) protection that safeguards your equipment, Amp-Trap 2000 fuses offer you:

- **Total system coverage.** The Amp-Trap 2000 family includes Class L, Class J, Class RK1 and Class CC fuses in a wide range of amperages. It's the only one you need to protect your complete low-voltage electrical system, from service entrance to your smallest motors.
- **Reduced inventory.** Because one Amp-Trap 2000 fuse can replace multiple SKUs, you reduce the number of fuses you use and stock — typically by up to 25%. That means decreased inventory and operating costs, and less time ordering and stocking.
- **Time delay.** Amp-Trap 2000 fuses withstand high inrush currents from motors and transformers to eliminate nuisance opening. Time delay also simplifies selection and permits the use of smaller amperage ratings, providing better protection in case of overloads.

■ **Easy 2:1 selectivity.** When a fault occurs, a selective system ensures that the fuse closest to the fault opens without affecting fuses in upstream circuits, preventing nuisance shutdowns and "blackouts." With Amp-Trap 2000, selectivity is achieved between any two fuses in series (above 60 amps) when the ratio of upstream rating to downstream rating is 2-to-1 or greater (see table, page 8).

■ **Improved safety.** High-energy arcs can create temperatures of 35,000°F and 1,500 pounds per square foot of force. Highly current-limiting Amp-Trap 2000 fuses protect personnel and equipment from these catastrophic effects. And their versatility and rejection-style design help to avoid hazardous misapplications.

■ **Tomorrow's protection today.** Type "2" (No-Damage) protection is the wave of the future. By installing Amp-Trap 2000 fuses, you'll protect your equipment today and be ready for more stringent requirements tomorrow.



Find open fuses faster, with SmartSpot™.

Leave it to a forward-thinking fuse company like Ferraz Shawmut to come up with a whole different kind of open-fuse indicator.

Patented SmartSpot is an obvious improvement in indicator fuses — one that helps you find the open fuse quickly and easily, and cut even *more* costly downtime.

When a fuse opens, SmartSpot senses it and turns from silver to red, so you can spot it quickly and safely — even with the power off. To see a demo, visit ferrazshawmut.com.



What makes SmartSpot so smart?

Our innovative SmartSpot features a unique solid-body design that doesn't compromise the fuse's structural integrity or reliability. And advanced material that works like the elements inside a fuse. When a fuse opens, this material responds to the increased current and immediately turns the SmartSpot indicator from silver to eye-catching red.

And SmartSpot stays red, so you can quickly zero in on the open fuse with the power off. Just open the panel and scan. Wherever you see any red in a SmartSpot indicator, you know that fuse is open.

Look for SmartSpot on our most widely used Amp-Trap 2000® fuses — Class J and Class RK1, 8 amps and up.



For the latest innovations in fuse technology, look to Ferraz Shawmut — your circuit protection resource.



Quality fuses deserve quality blocks and holders.

You'll find the same quality and reliability of Ferraz Shawmut Amp-Trap 2000 fuses in our extensive line of fuse blocks and holders. Choose from traditional fuse blocks as well as space-saving configurations, and unique features like adder blocks that just snap on to form as many poles as needed.

For our Class J and Class CC fuses, you can also choose the IP20 protection of our popular UltraSafe™ IEC-style finger-safe fuse holders. Compact and modular, they offer flexibility in panel design, the simplicity of DIN-rail mounting, and safe, flick-of-the-finger changeouts.

Innovation and so much more, from your circuit protection resource.

Amp-Trap 2000, SmartSpot and UltraSafe are just part of an unparalleled range of innovative solutions offered by Ferraz Shawmut — your circuit protection resource.

Our vast product selection also includes semiconductor fuses, high- and low-power disconnect switches, and devices for surge protection and thermal management. And like our industrial fuses, they're all backed by our exceptional applications and technical support, and a distribution network that combines global experience and capabilities with local, customer-first service.

So whatever and wherever your circuit protection needs might be, there is one company that can meet them all.



The Amp-Trap 2000® family — for total system protection.

The Amp-Trap 2000 fuse family encompasses a wide range of sizes and current ratings, so it's all you need to bring Type "2" (No-Damage) protection to your electrical system.

Choose Amp-Trap 2000 Class L fuses for your service entrance. Compact Class J fuses (and their smaller, less costly fuse blocks) for new installations. Class RK1 fuses to upgrade your existing circuit protection. And Class CC fuses for your smallest motors and transformers.

In addition to their high current-limiting ability, Amp-Trap 2000 fuses feature:

- Time delay, to handle inrush currents from motor starters and transformers without nuisance opening.
- Easy 2:1 selectivity that helps avoid nuisance shutdowns and blackouts.
- Long-lasting metal-embossed dates and catalog numbers for easy traceability and preventive maintenance.
- A fiberglass body that provides dimensional stability in harsh industrial environments.
- An instantly recognizable, bright orange label.

With Amp-Trap 2000 fuses, you'll be assured of the best protection — upstream *and* downstream.

For complete product information, refer to

The Advisor or visit ferrazshawmut.com.



Class L, A4BQ fuses — safety where your circuit starts.

Safeguard your circuits at the point of power entry with the best possible protection — Amp-Trap 2000 A4BQ fuses. They provide a minimum time delay of 4 seconds at 500% of their rated current to handle harmless inrush currents, plus they're 20% more current limiting than any other Class L fuse. That means optimal overcurrent protection for service entrances, large motors, feeders and other circuits.

A4BQ ratings range from 601 to 6000 amperes, 600V AC, 300kA I.R., and an exclusive 500V DC, 100kA I.R., through 3000A. (Non-UL Listed ampere ratings down to 100A also available.)

Features

- Fastest operation under short circuit conditions
- Most current limiting for lowest peak let-thru current
- Replace all older Class L fuses
- Pure silver links for long fuse life
- AC and DC ratings
- High-grade silica filler for fast arc quenching

Applications

- Mains and feeders
- Large motors
- Lighting, heating and general loads
- Power circuit breaker backup
- UPS DC links, battery disconnects and other DC applications

Application notes

- Mains and feeders — Size at 100% of expected full load, unless equipment manufacturers specify otherwise.
- Motor starters — Consult your motor control manufacturer's recommendations.
- Lighting, heating and general loads — Size at 100% to 125%, depending on load make-up.
- Transformers — Due to the high inrush currents that can be experienced with transformers, size fuse to carry 12 times transformer full load for 0.1 second and 25 times full load for 0.01 second.



Class J, AJT fuses — compact fuses, big protection.

The most current-limiting UL-class fuses, Ferraz Shawmut's AJTs provide optimal performance, prevent interchangeability with other fuses, and save valuable panel space. So you can use smaller, more economical fuse blocks and IEC contactors to provide superior protection for dedicated or combined motor, lighting, heating and transformer loads.

Plus their time delay characteristic allows for use in a wide range of applications. Rated from 1 to 600 amperes, 600V AC, 300kA I.R., and 500V DC, 100kA I.R., listed to UL 248-8, they're the right fuses for any new installation.

Features

- Most current-limiting UL-class fuses
- Timesaving SmartSpot™ indicator
- Unique dimensions prevent misapplications
- Optional mechanical indicator available on 70A to 600A AJT fuses

Applications

- Motor circuits
- Mains and feeders
- Branch circuits
- Lighting, heating and general loads
- Transformers and control panels
- Circuit breaker backup
- Bus duct
- Load centers

Application notes

- Mains and feeders — Size at 125% of load for NEC and CEC code compliance.
- Motor starters — For typical starting duty and optimal coordination, fuse rating should not exceed 150% of motor FLA. Where "no damage" tests have been conducted, follow the controlgear manufacturer's fuse ampere rating recommendations.
- Lighting, heating and general loads — Size at 125% of combined load for NEC and CEC code compliance.
- Transformers — Due to the high inrush currents that can be experienced with transformers, size fuse to carry 12 times transformer full load for 0.1 second and 25 times full load for 0.01 second.



Class RK1, A2D and A6D fuses — upgrade to advanced technology.

Significantly more current limiting than Class RK5 fuses, Ferraz Shawmut's A2D and A6D fuses are ideal for upgrading your existing feeder and branch circuits to today's Type "2" (No-Damage) technology. They also offer plenty of application flexibility, with ratings from 1/10A to 600A (250V or 600V), 300kA I.R.

Features

- Highly current limiting
- Timesaving SmartSpot™ indicator
- Brass end caps (blade style) for cooler operation and superior performance
- Rejection-style design

Applications

- Motors
- Safety switches
- Transformers
- Branch circuit protection
- Disconnects
- Control panels
- General-purpose circuits

Application notes

- Mains and feeders — Size at 125% of load for NEC and CEC code compliance.
- Motor starters — For typical starting duty and optimal coordination, fuse rating should not exceed 150% of motor FLA. Where "no damage" tests have been conducted, follow the controlgear manufacturer's fuse ampere rating recommendations.
- Lighting, heating and general loads — Size at 125% of combined load for NEC and CEC code compliance.
- Transformers — Due to the high inrush currents that can be experienced with transformers, size fuse to carry 12 times transformer full load for 0.1 second and 25 times full load for 0.01 second.



Class CC, ATDR fuses — the best small-motor protection.

Choose our highly current-limiting ATDR fuses when you need maximum fault protection for sensitive branch circuit components and small motors. They deliver the best time-delay characteristics and exceptional cycling ability for frequent motor starts and stops without nuisance opening.

Features

- Highly current limiting
- Best time-delay characteristics in a Class CC fuse
- Exceptional cycling ability for frequent motor stops and starts
- Rejection-style design

Applications

- Small motors
- Contactors
- Branch circuit protection

Application notes

- Motor starters — For typical starting duty. Where "no damage" tests have been conducted, follow the controlgear manufacturer's fuse ampere rating recommendations.
- Lighting, heating and general loads — Size at 125% of combined load for NEC and CEC code compliance.



Class CC, ATQR fuses — optimal transformer protection in the smallest package.

ATQR Class CC fuses provide the time delay needed to handle the high inrush currents of control transformers, solenoids, and similar inductive loads. They're available in 1/10A to 30A, 600V AC, 200kA I.R.

Features

- Highly current limiting
- Rejection-style design
- Special time-delay characteristics for transformer loads

Applications

- Control transformers
- Solenoids
- Inductive loads
- Branch circuit protection

Application notes

- Control transformers, solenoids and similar inductive loads — For control transformers 600V AC or less with ratings up to 2000VA. ATQR fuses are designed to handle 40 times the transformer's primary full load amperes for 0.01 second.
- Lighting, heating and general loads — Size at 125% of combined load for NEC and CEC code compliance.

Easy system selectivity.

When a fault occurs, a selective system eliminates power outages and costly downtime in those parts of the system not directly affected by the fault, resulting in significant cost savings and increased safety.

In a properly designed selective system, the required minimum melting energy of the main fuse must be greater than the total clearing energy required to open the branch fuse. Under fault conditions, the branch fuse will then open without damaging the main fuse.

Amp-Trap 2000 makes system selectivity simple. Just follow the ratios shown in the chart at right.

Amp-Trap 2000 Selectivity Chart

BRANCH FUSE	MAIN FUSE			
	A4BQ	AJT	A2D	A6D
A4BQ	2:1	—	—	—
AJT 50A and up	2:1	2:1	2:1	2:1
AJT 30A-45A	—	2.5:1	—	2:1
A2D 60A and up	2:1	2:1	2:1	—
A2D 30A-50A	—	3:1	3:1	—
A6D 65A and up	2:1	2:1	—	2:1
A6D 30A-60A	—	3.5:1	—	3:1

Amp-Trap 2000 makes fuse coordination easy. Selectivity is achieved between any two Amp-Trap 2000 fuses in series (above a 60A rating) where the ratio of the upstream fuse ampere rating to the downstream fuse ampere rating is 2-to-1 or greater.

Suggested fuse specifications

1.0 General

The electrical contractor shall furnish and install a complete set of fuses for all fusible equipment on the job, as specified by the electrical drawings. Final tests and inspections shall be made prior to energizing the equipment. These shall include tightening all electrical connections and inspecting all ground conductors. Fuses shall be as follows:

2.0 Mains, feeders and branch circuits

A. Circuits 601 to 6000 amperes shall be protected by current-limiting Ferraz Shawmut Amp-Trap 2000® Class L, time-delay A4BQ fuses. Fuses shall be time delay and shall hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in .01 second or less, and be UL Listed and CSA Certified with an interrupting rating of 300,000 amperes rms symmetrical.

B. Circuits 600 amperes or less shall be protected by current-limiting Ferraz Shawmut Amp-Trap 2000 with SmartSpot™ Class RK1 time-delay A2D (250V) or A6D (600V), or Class J time-delay AJT fuses. Fuses shall hold 500% of rated current for a minimum of 10 seconds (30A, 250V Class RK1 case size shall be a minimum of 8 seconds) and shall be UL Listed and CSA Certified with an interrupting rating of 300,000 amperes rms symmetrical.

C. Motor protection

All individual motor circuits shall be protected by Ferraz Shawmut Amp-Trap 2000 Class RK1 with SmartSpot, Class J with SmartSpot, or Class L time-delay fuses as follows:

• For circuits up to 480A

Class RK1 with SmartSpot — A2D (250V) or A6D (600V)
Class J with SmartSpot — AJT

• For circuits over 480A

Class L — A4BQ

Fuse sizes for motor protection shall be chosen from tables published by Ferraz Shawmut for the appropriate fuse.

D. Motor controllers

NEMA and IEC-style motor controllers shall be protected from short circuits by Ferraz Shawmut Amp-Trap 2000 time-delay fuses. For IEC-style controllers requiring Type "2" (No-Damage) protection, fuses shall be chosen in accordance with motor control manufacturers' published recommendations, based on Type "2" test results. The fuses shall be Class RK1 with SmartSpot, A2D (250V) or A6D (600V); Class J with SmartSpot, AJT (600V); or Class CC, ATDR (600V).

E. Circuit breakers and circuit breaker panels shall be protected by Ferraz Shawmut Amp-Trap 2000 fuses, Class RK1 with SmartSpot, A2D or A6D; Class J with SmartSpot, AJT; or Class L, A4BQ — sized in accordance with tested UL Series-Connected combinations shown in the Recognized Component Directory.

F. Lighting and control circuits in the connected combinations shown up to 600V AC shall be protected by Ferraz Shawmut Amp-Trap 2000 Class CC, time-delay ATDR fuses, sized according to the electrical drawings.

3.0 Spares

Spare fuses amounting to 10% (minimum three) of each type and rating shall be supplied by the electrical contractor. These shall be turned over to the owner upon project completion. Fuses shall be contained and cataloged within the appropriate number of spare-fuse cabinets (no less than one), located per project drawings. Spare-fuse cabinets shall be equipped with a key lock handle, be dedicated for storage of spare fuses, and shall be GSFC, as supplied by Ferraz Shawmut.

Execution

A. Fuses shall not be installed until equipment is to be energized. All fuses shall be of the same manufacturer to assure selective coordination.

B. As-installed drawings shall be submitted to the engineer after completion of the job.

C. All fusible equipment rated 600 amperes or less shall be equipped with fuse clips to accept Class RK1 or Class J fuses as noted in the specifications.

Substitution

Fuse sizes indicated on drawings are based on Ferraz Shawmut Amp-Trap 2000 fuse current-limiting performance and selectivity ratios. Alternative submittals to furnish materials other than those specified shall be submitted to the engineer in writing two weeks prior to bid date, along with short circuit and selective coordination study.



For your free copies of The Advisor, our Select-A-Fuse® software and other valuable, timesaving resources, contact your Ferraz Shawmut representative or distributor, or visit ferrazshawmut.com.

**Are you risking costly
damage to your equipment?**

With Ferraz Shawmut's Amp-Trap 2000® family of fuses, you don't have to. For applications assistance and answers to your questions, call Ferraz Shawmut Technical Services at 978-462-6662.

For complete fuse specifications, consult our information-packed catalog, *The Advisor*.

To obtain your copy of *The Advisor*, our free Select-A-Fuse® software and other timesaving reference tools, contact your Ferraz Shawmut representative or distributor today. Because in your plant, there's absolutely no time for downtime.



Your circuit protection resource.

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