Pelena Energy
Technical Data Sheet

Fuses

A fuse is a protective device in an electric circuit. It protects wiring and devices "downstream" from faults, such as short circuits. It does this by opening the circuit so that electricity cannot flow. A fuse that has opened the circuit has "blown".

A fuse is, most simply, a thin piece of wire whose thickness is carefully designed so that it will melt when the electric current flowing through it exceeds its rated value. However, there are many variations on this idea, depending on the exact function the fuse needs to perform. For example:

- Fast-blow: this type of fuse blows faster than standard fuses, to protect devices that will be damaged by even a small amount of current over the rated current.
- Slow-blow: this type of fuse blows slower than standard fuses, to allow devices such as motors to draw an over-current at start-up without blowing the fuse.
- Voltage rating: Electricity can jump between two points if they are close enough: higher voltages can jump larger distances. Therefore, a fuse that will be used on a high voltage wire will need a larger gap when the fuse opens ("blows").
- Breaking Capacity: When a fuse blows, the flow of electricity must stop. But if a large current is flowing when the fuse blows, it may continue jumping across the fused gap, possibly assisted by the metal plasma created when the fuse melted. The breaking capacity of a fuse tells the size of the current the fuse is able to break.

When a fuse blows, it is destroyed and it must be replaced. It cannot be reset or switched back on like a circuit breaker.

Pelena Energy commonly uses two types of fuse, shown below.

3AG type fuse used in control cabinets.
Good (left), Blown (right).
The wire in the 3AG fuses is visible through the glass casing and it is easy to tell if the fuse is blown.

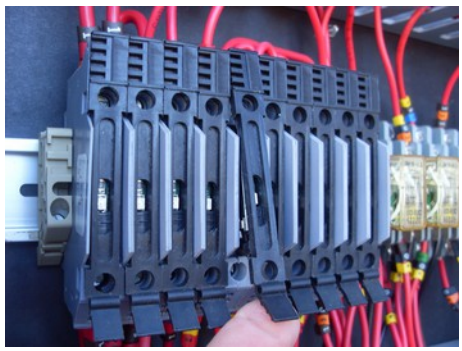
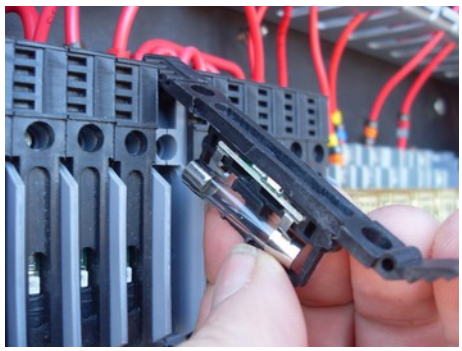
HRC fuse used in village distribution.
HRC fuses are filled with sand to stop the current arcing when the fuse blows. It is not always visibly obvious that the fuse has blown.

REMOVING FUSES

A fuse must be removed from its fuse holder to be checked. Pelena Energy has standardised on one type of fuse holder for each type of fuse.

> ***ALWAYS DISCONNECT THE ELECTRICITY SOURCE***
> *before attempting to remove a fuse.*

Removing 3AG Fuses from Fuse Holder

1	Pull gently but firmly on the black tab at the bottom of the fuse holder. The whole black section will swing up about the hinge at the top.	
2	Push the fuse sideways out from the holder.	

Check the fuse visually to see if the wire has melted. If the wire is still in one piece across the full length of the fuse and you suspect that the fuse has blown, use a multimeter to test for continuity (see the section below for testing for continuity). Sometimes the wire can become disconnected from the metal end-cap, and this is very hard to see.

Removing HRC Fuses from Fuse Holder

Hold the top section of the fuse holder and pull it out of the base.

Check the fuse by using a multimeter to test for continuity between the blades of the fuse holder (see the section below for testing for continuity).

REPLACING FUSES

> ***ALWAYS*** *use the* ***SAME TYPE and RATING*** *for the replacement fuse, or the circuit will not be properly protected. (Many fires have started because people used the wrong fuse.)*
>
> ***ALWAYS DISCONNECT THE ELECTRICITY SOURCE*** *before attempting to replace a fuse.*
>
> *Find out what caused the fuse to blow, if possible. If fuses keep on blowing, there is something wrong in the protected circuit.*

Find the correct Pelena Part Number (PPN), or the rating for the fuse on an engineering drawing, if possible. If this is not possible, read the rating from the blown fuse.

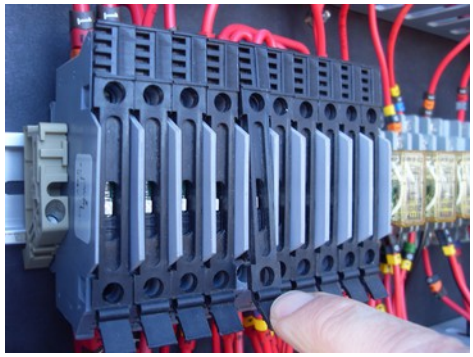
The **voltage rating** of the replacement fuse must be **equal to or greater than** the rating of the original fuse, but it is unlikely that a replacement that physically fits will have a different voltage rating.

The **current rating** of the replacement fuse must be **exactly equal to** the rating shown on the engineering drawing.

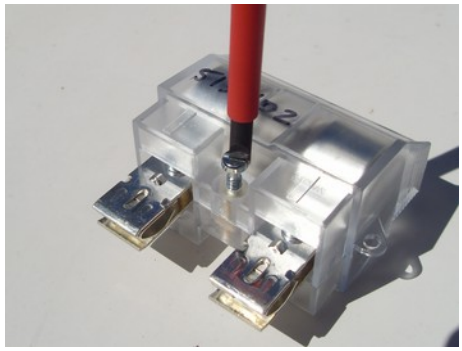
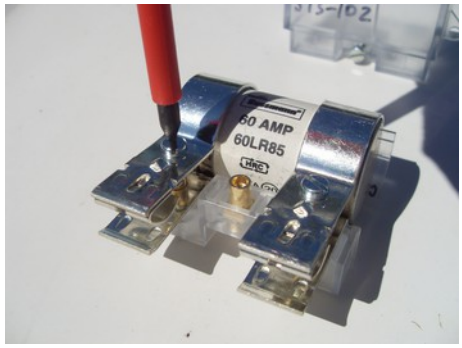
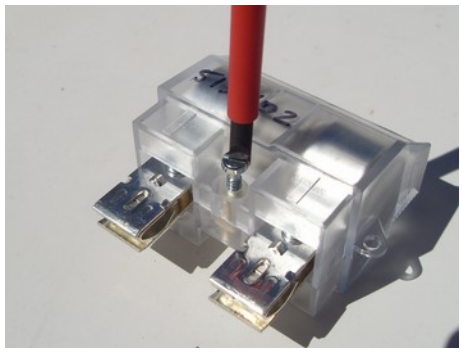
The rating of a 3AG fuse is stamped onto the metal end-caps. Some other information is usually stamped there too, such as the manufacturer's name and logo. The important rating is the current rating (such as 3A).

The rating of a HRC fuse is easily visible on the white section of the fuse. Other information is usually printed there too, such as the manufacturer's name and logo. The important ratings are the current rating (such as 60A), and the HRC designation.

Installing 3AG Fuses in Fuse Holder

1	Gently push the fuse sideways into the holder.	
2	Swing the black section of the fuse holder down. Push firmly until the black section is flush with the rest of the fuse holders. A “click” should be heard when the holder is positioned correctly.	

Installing HRC Fuses in Fuse Holder

1	Undo the single screw in the centre that secures the plastic fuse cover. (A suitable screwdriver is a 5.5mm flat head, such as Pelena Part Number 282-004)	
2	Loosen the two screws that clamp the fuse into the holder until the fuse slides out freely. Slide the new fuse in and screw the clamps down again. Make sure to tighten these screws until they 'stop' against the brass pins. (If these screws are not tightened far enough, the fuse holder will not fit back into the base.)	
3	Replace the plastic cover and screw it down using the centre single screw.	
4	Push the top section back into the base.	

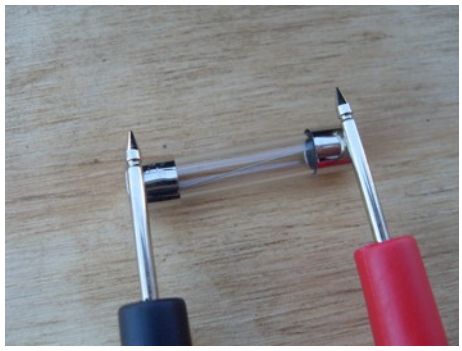
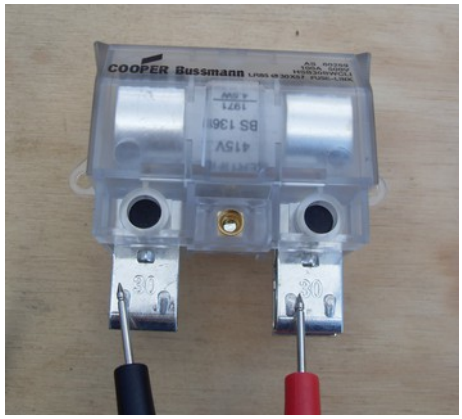
TESTING FOR CONTINUITY

A multimeter can be used to test for continuity (that is, a continuous conductive path for electricity) when it is set to its resistance mode. Some multimeters also have a continuity mode.

Pelena supplies a multimeter (Pelena Part Number 503-006) that has both modes. The following instructions are written for this multimeter.

Pelena Part 503-006

1	Move the mode select switch to point to the resistance mode.	
2	Push the blue “SELECT” button until the continuity icon appears in the LCD display. The continuity icon looks like this:  Touch the multimeter probes together. Listen for a beep and watch for a small number on the display to verify that the multimeter is working correctly.	

3	Put the fuse on a flat, non-conductive surface, such as a piece of wood. Put one probe on each end of the fuse. (A book or a sheet of plastic or paper can be used to cover metal surfaces.)	 
4	The multimeter will sound a 'beep' and display a small number if the fuse is good. The multimeter will not sound a 'beep', and it will display "OL." on the screen if the fuse is blown.