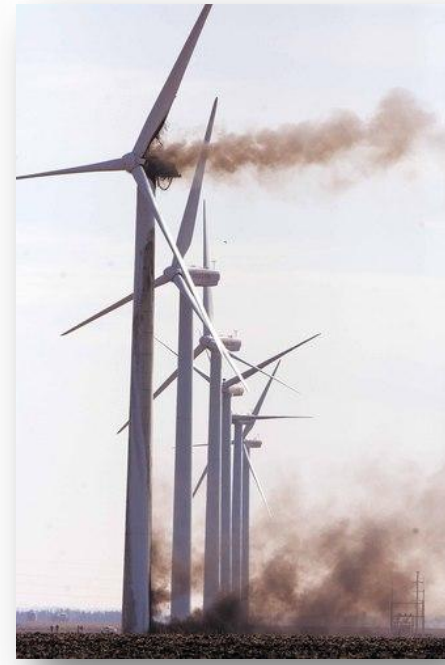
SELCO

SELCO D1000 Arc Protection

Installation and Configuration Guidelines

Wind Turbines without Arc Fault Protection



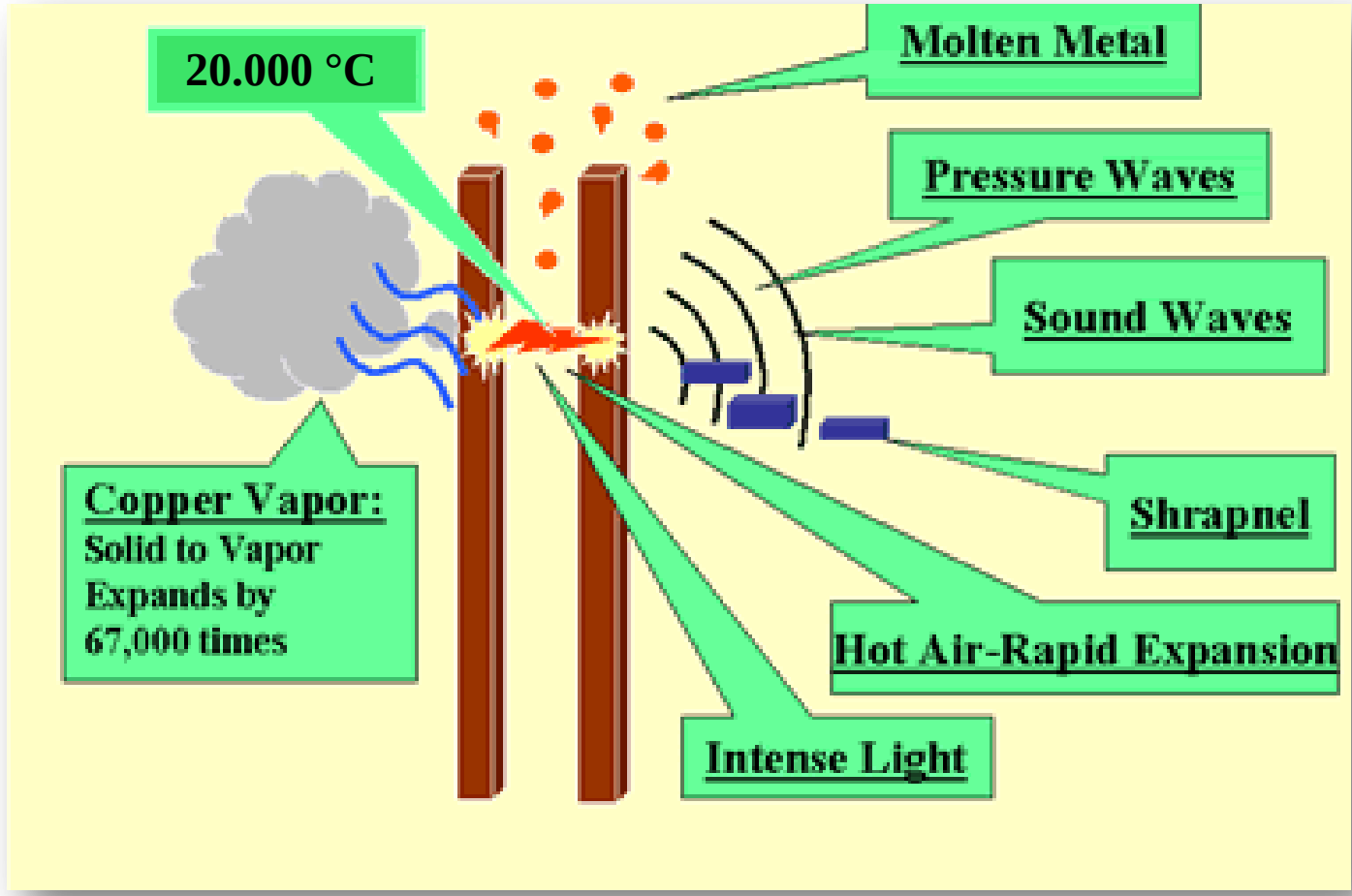
These wind turbines could have been saved by an Arc Fault Protection system like the D1000. Arc Fault Protection cannot prevent failure, but it will restrict the damage so that the installation can be easily repaired.

… just imagine what it will take to repair those wind turbines (in the middle of the ocean)!

Arc Faults – Dangerous and Costly!

May lead to fires, burns, unrepairable damage - and **loss of life**…

The Effects of an Arc Fault

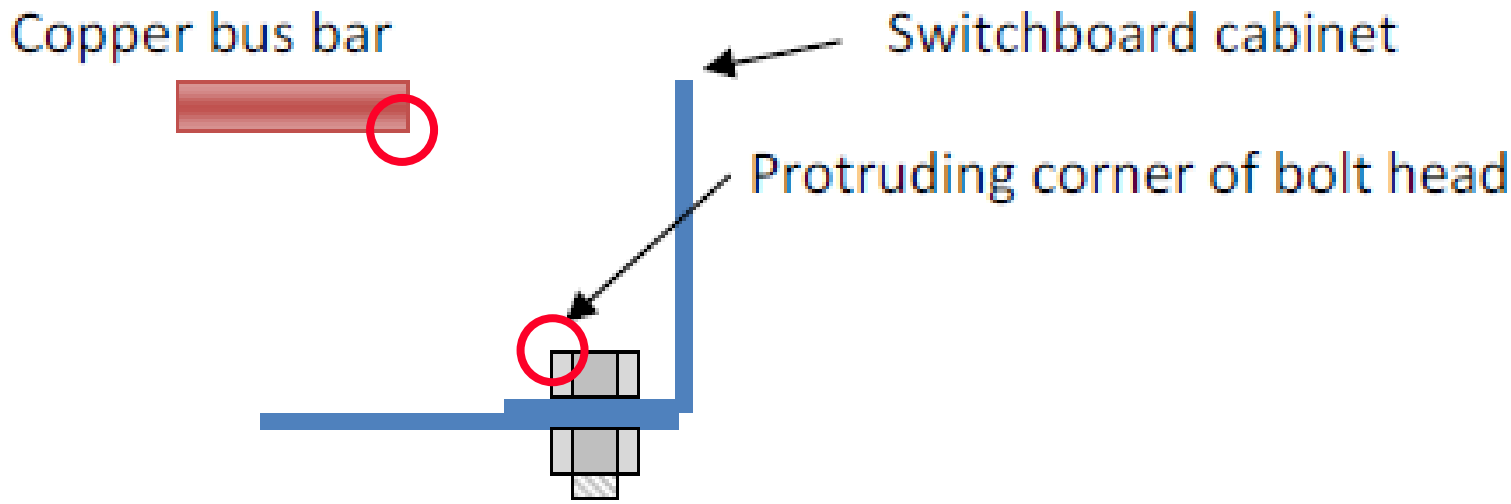


Unrepairable damage to equipment – Risk of serious personal injury to personel

Arc Development

When overvoltages of sufficient amplitude enter the switchboard from either the consumer side or the power supply side, several subsequent steps occur to form the final flashover (Arc).

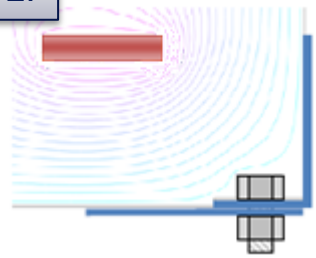
In the example below, a simple cross sectional drawing of a copper busbar in a switchboard is used. The flashover (Arc) will develop between the corner of the busbar and the bolt head at the side of the cabinet.

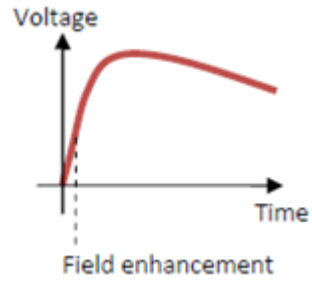


The 6 Steps of the Arc Lifespan

SELCO

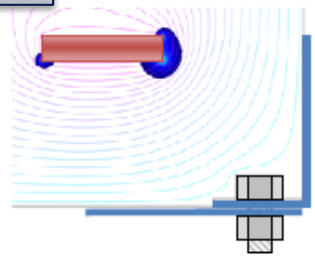
1.

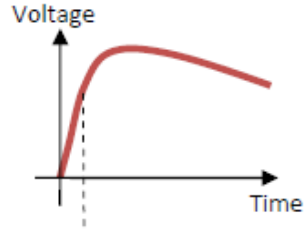




Field enhancement

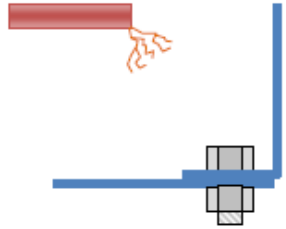
2.

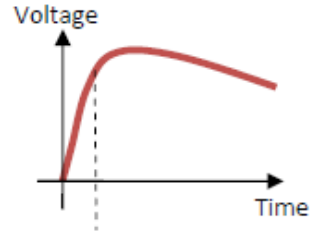




Corona inception

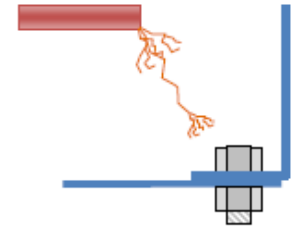
3.

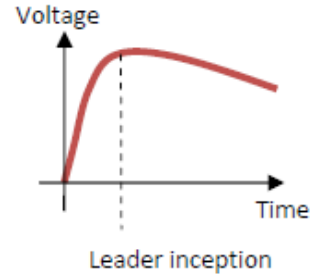




Streamer inception

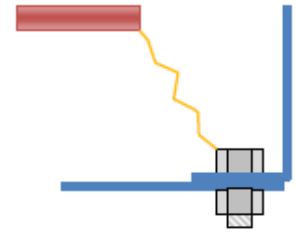
4.

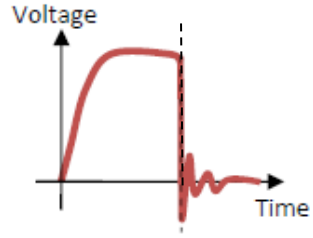




Leader inception

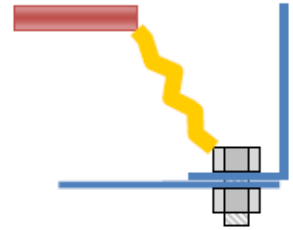
5.

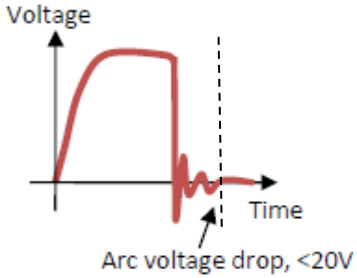




Spark discharge

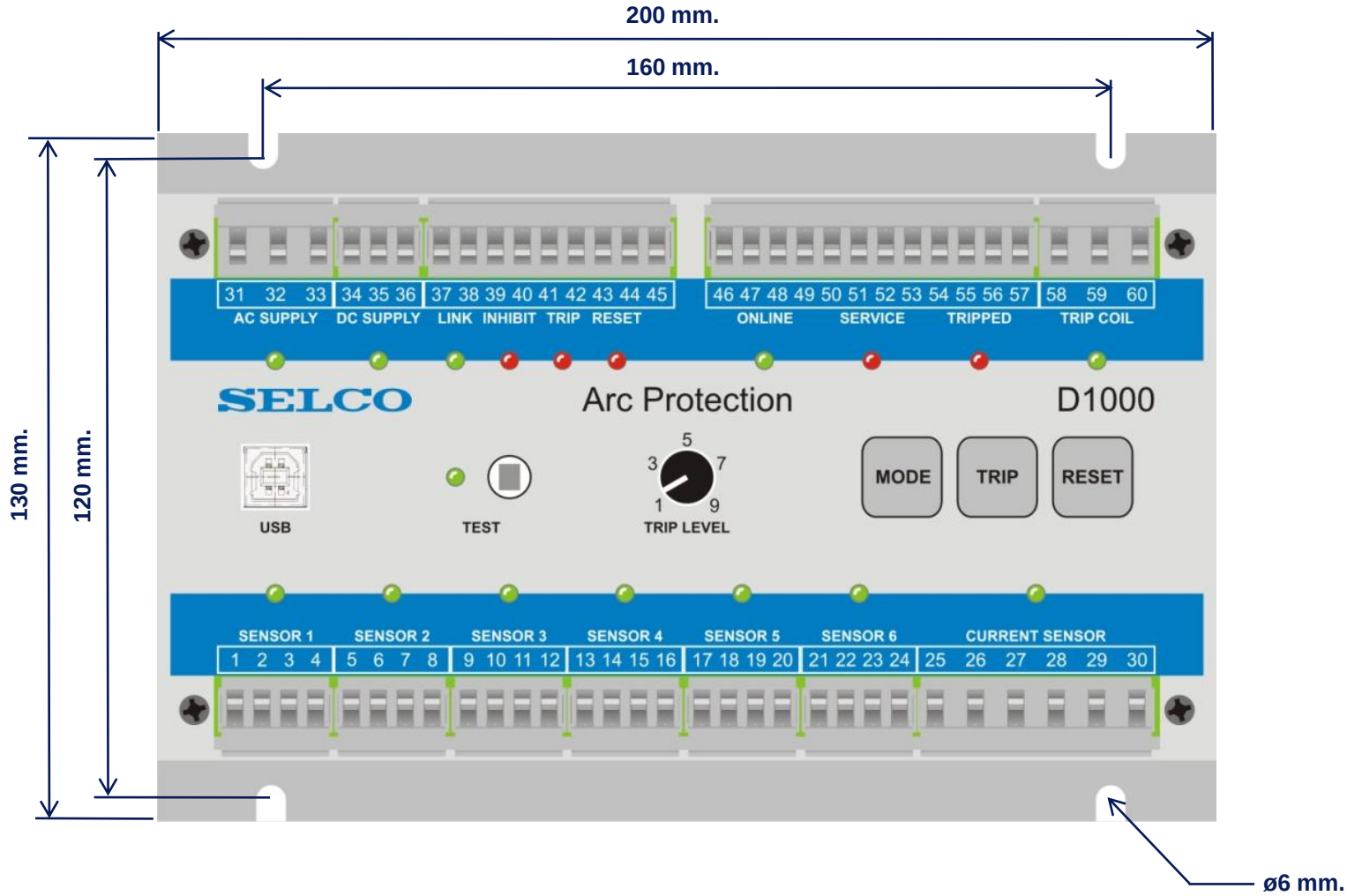
6.





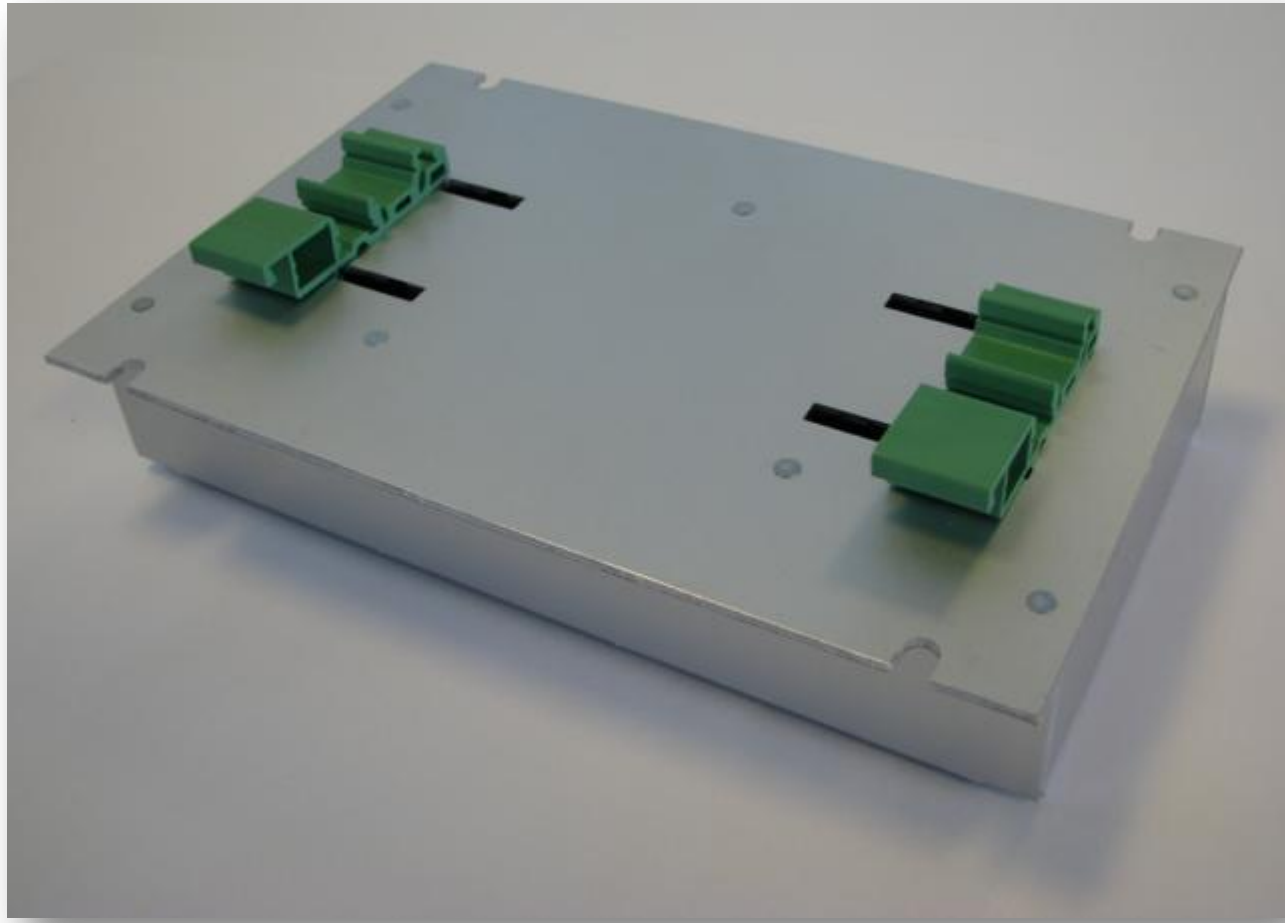
Arc voltage drop, <20V

D1000 Dimensions



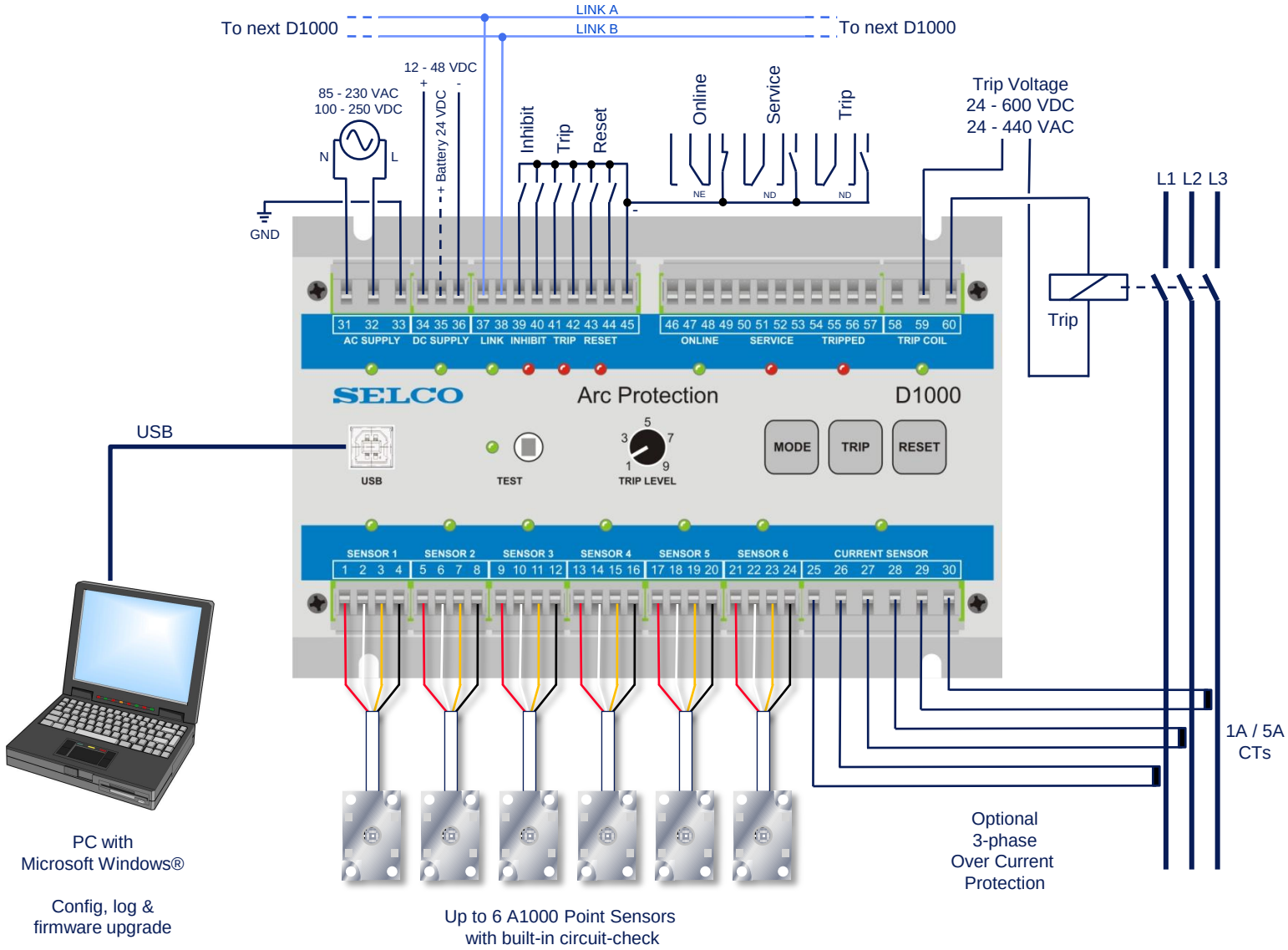
Depth (including plug-in terminals): 52 mm.

D1000 DIN rail mounting



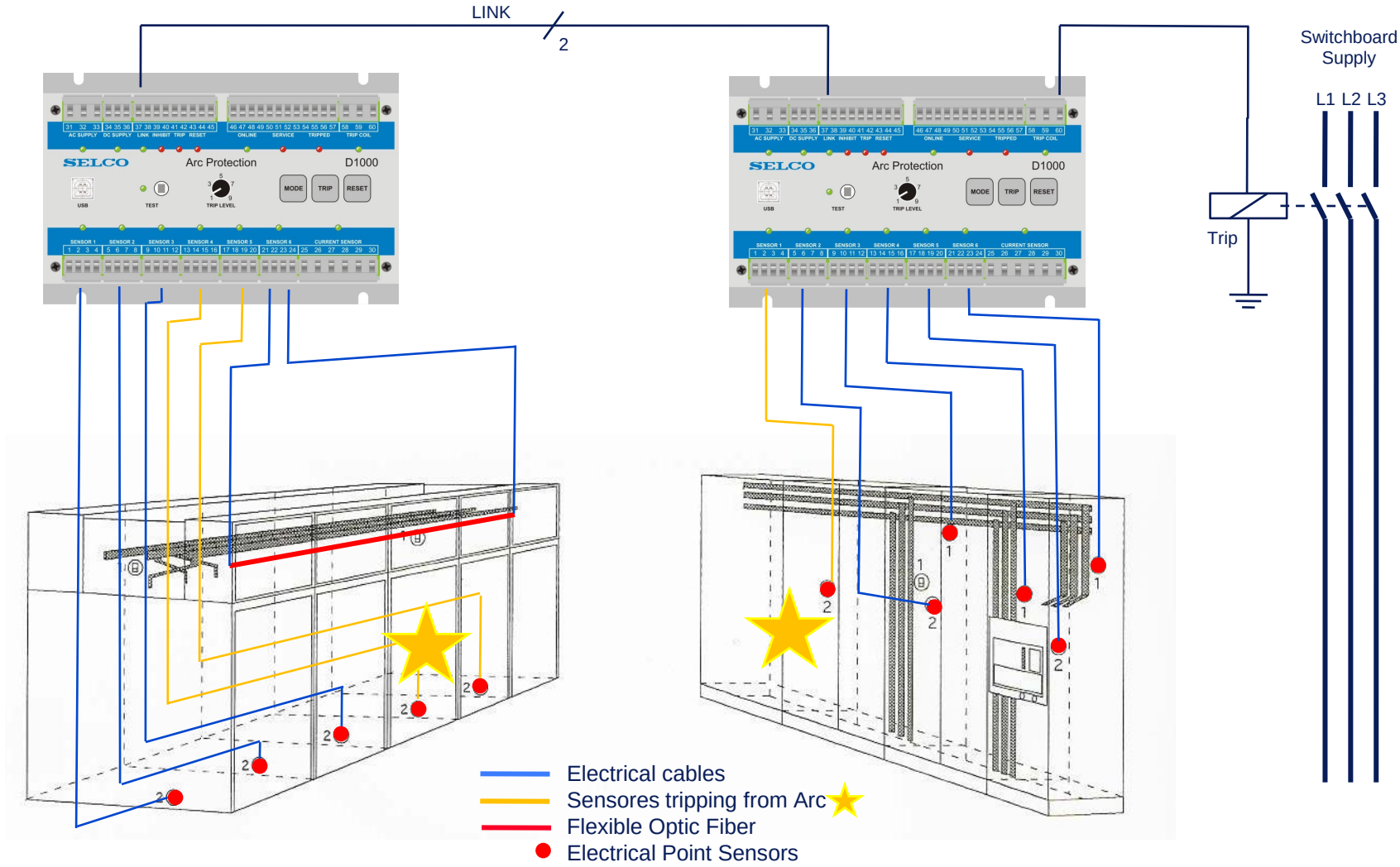
Optional green DIN-rail snap-on brackets available (increases depth approximatly 11 mm. – including DIN rail)

D1000 Connection Terminals



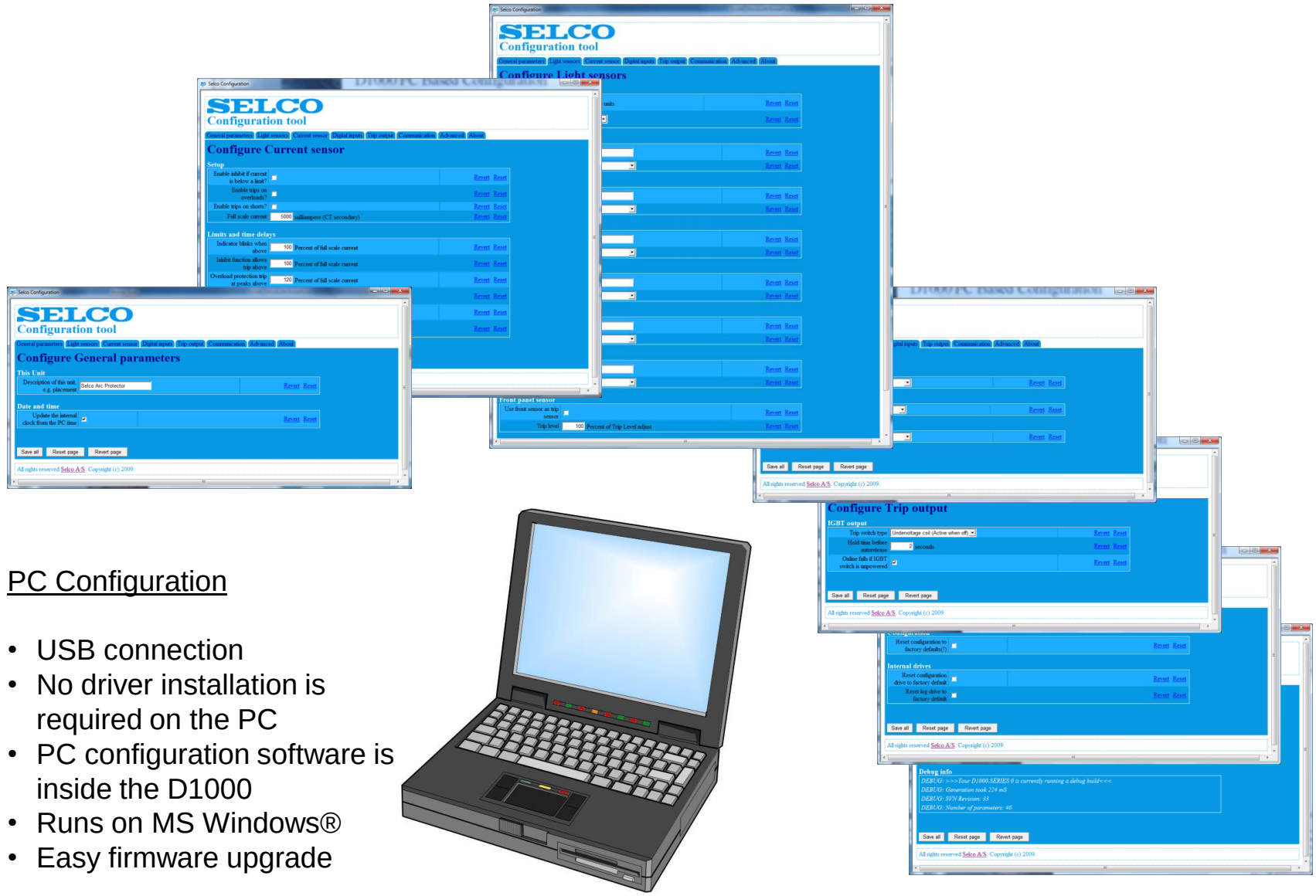
Relays are shown with D1000 in online state (normal operation)

Typical Switchboard Application with two modules linked as one system



System can be expanded with even more D1000 modules

D1000 PC Based Configuration



PC Configuration

- USB connection
- No driver installation is required on the PC
- PC configuration software is inside the D1000
- Runs on MS Windows®
- Easy firmware upgrade

D1000 Supported Sensors

A1000 Point sensor

- 180 x 180° viewing angle
- LED for visual feedback
- Built-in circuit check
- 10 m. shielded cable
- Plug-in connector
- Non-epoxy material

NEW!

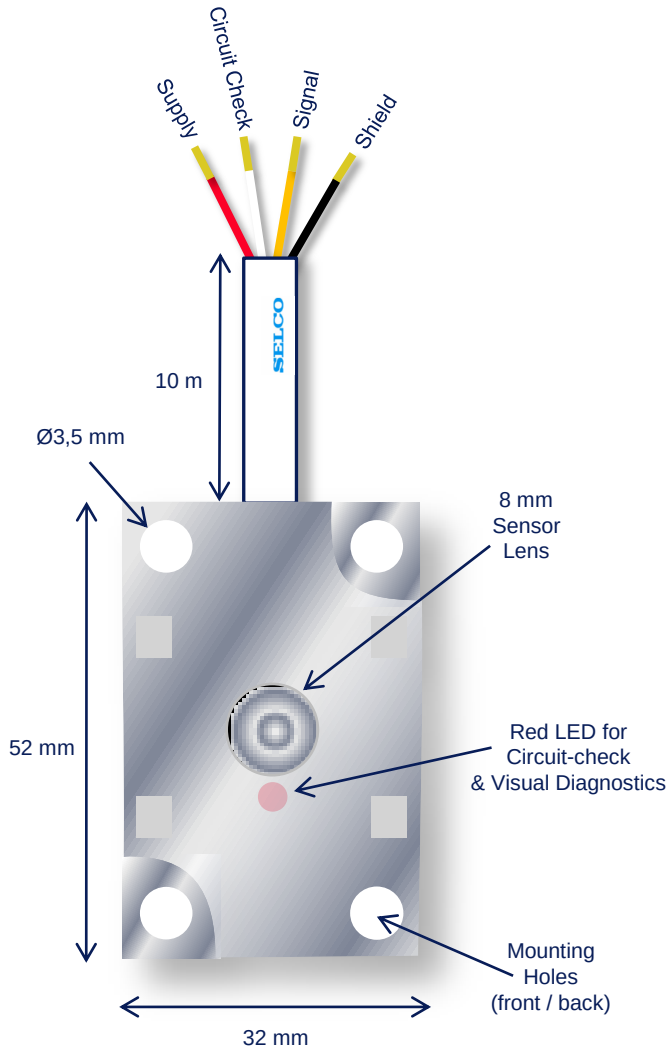
A2000 Fiber line sensor

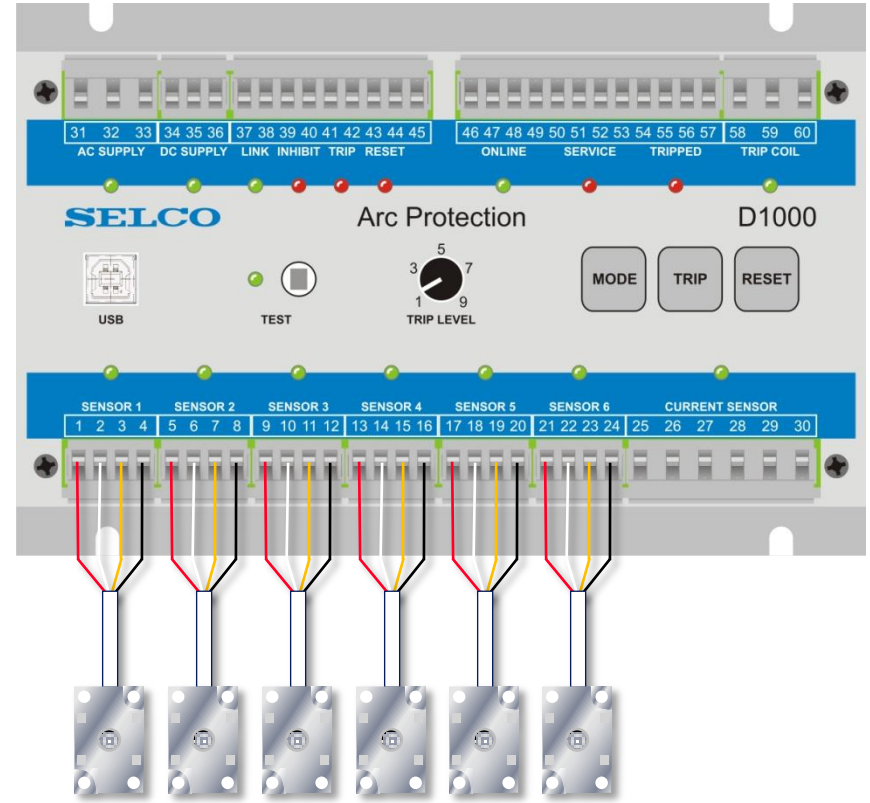
- 8 m flexible fiber
- 360° viewing angle
- LED for visual feedback
- Built-in circuit check
- Electrically extendable
- Plug-in connector

NEW!

Existing SELCO A0200 / A0300 point sensors are supported (without support for circuit check)

A1000 Point Sensor





Up to 6 A1000 Point Sensors
with built-in circuit-check

D1000 can also be used with exisiting A0200 / A0300 point sensors (without circuit check)

A1000 Point Sensor Installation

1. Place the included adhesive drill guide where you want the sensor to be mounted.

2. Mark and drill 2 of the 4 holes directly through the drill guide (depending on how the sensor is to be installed).

3. Fasten the sensor using pop rivets or self-tapping screws.

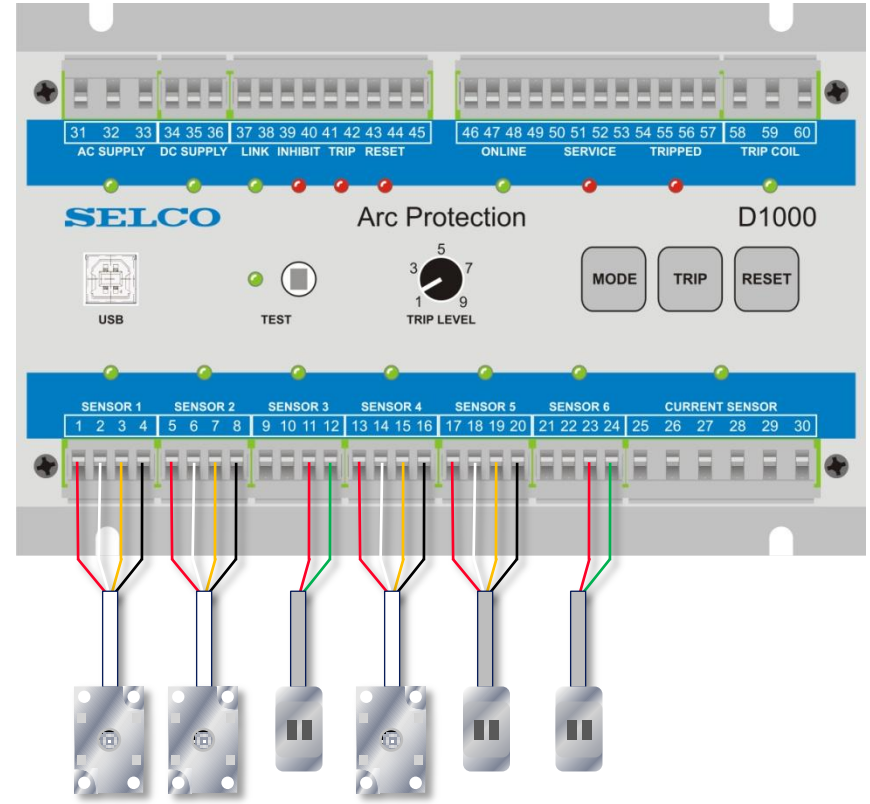
The sensor can be also be mounted
”see-through” from the back of the cabinet.

A0200 / A0300 Point Sensor (old type)

Easy upgrade...

A0200 / A0300 Point Sensors

- Two wire connection
- No circuit check
- No visual feedback
- Mounting bracket needed for fixation



Mix of A1000, A0200 and A0300 Point Sensors

Confirmation of installed sensors

1. Press MODE to switch to SERVICE mode (SERVICE LED will ignite)
2. Press and hold RESET to start the test sequence
3. All sensors and indicators will flash for about 10 seconds while the system tests all sensors
4. Observe that the TEST LED is flashing. Move a light source towards the TEST sensor until the LED turns off. Note the distance.
5. Observe that all connected sensors have now started flashing. Move a light source towards the sensors until they turn off.
6. When all sensors have been tested, the system will flash green on all sensors briefly, and go back to normal SERVICE mode.
7. Press MODE to switch back to ONLINE mode. The sensors are now configured, and the system will alarm if a sensor malfunctions.

Performing a Simple Sensor Test

1. Press MODE to switch to SERVICE mode (SERVICE LED will ignite with steady red light)
2. Confirm that all indicators at connected sensors are showing a steady green light
3. Confirm that all connected sensors are giving a double flash of red light periodically, indicating that the sensor is being tested
4. Point a light source at a sensor and check that both the sensor LED and the indicator LED changes to steady blinking, and that the Tripped indicator turns on.
5. Repeat step 4 for the remaining sensors
6. Press MODE to switch back to ONLINE mode (ONLINE LED will ignite with steady green light)

Press MODE at any time to cancel test

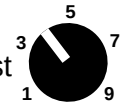
Testing the Trip Coil

1. Make sure that the system is ready for test (TRIP COIL output will be tripped during this procedure)
2. Press MODE to switch to SERVICE mode (SERVICE LED will ignite with steady red light)
3. Press TRIP and hold it pressed for a few seconds to activate the TRIP COIL output
4. Observe that the connected trip coil trips correctly. The output will reset itself after the configured time, typically 2 seconds
5. Re-prime the TRIP COIL
6. Press MODE to switch back to ONLINE mode (ONLINE LED will ignite with steady green light)

Full operations test (online)

1. Make sure that the system is ready for test (TRIP COIL output will be tripped during this procedure)
2. Press MODE to switch to ONLINE mode (ONLINE LED will ignite with steady green light)
3. Confirm that there is a steady green light in the sensor LED of each connected sensor (shows that sensors are connected and healthy)
4. Confirm that a short red flashing light occurs periodicaly in each detector (indicates that the sensor circuit is being checked)
5. Move a light source towards the TEST sensor and confirm that it starts flashing
6. Move the light source towards a sensor. Stop when the sensor LED start flashing with a green light
   (shows pre-warning before trip)
7. Now move light source closer to the sensor. Confirm that the TRIP COIL output trips and that the LEDs of the TRIP COILs
   sensor and detector changes to a flashing red light (trip)
8. Re-prime the TRIP COIL relay and press RESET to re-enable the system
9. Repeat steps 6 to 8 for the remaining sensors

Adjustment of Sensor Sensitivity

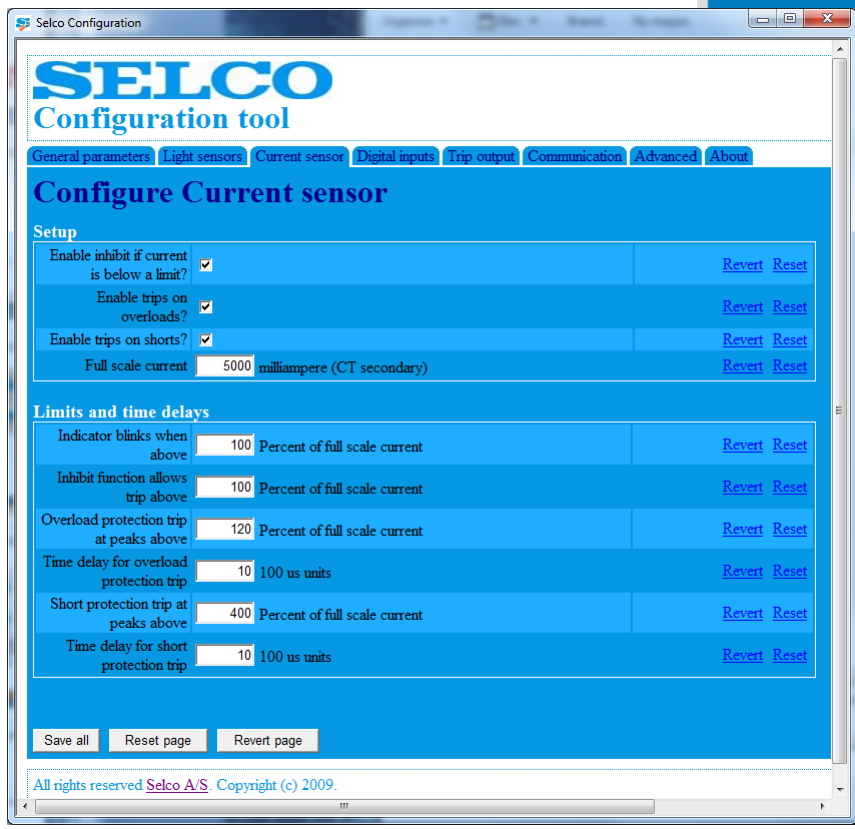
1. Look up the proper adjustment level in the manual. You will need to know the power of the smallest arc fault you wish to detect, and the maximum distance from the sensors to a possible arc fault.
2. Adjust 

TRIP LEVEL to the corresponding trip level setting – lower numbers for smaller arcs and greater distances
3. If you have access to a calibrated light source, this can be used to check the trip level. Otherwise, a normal photo blitz can be used to check operation in service- or online mode. The output of a compact camera flash is approximately equivalent to a small arc fault, and should be detectable from all corners of the cabinet.

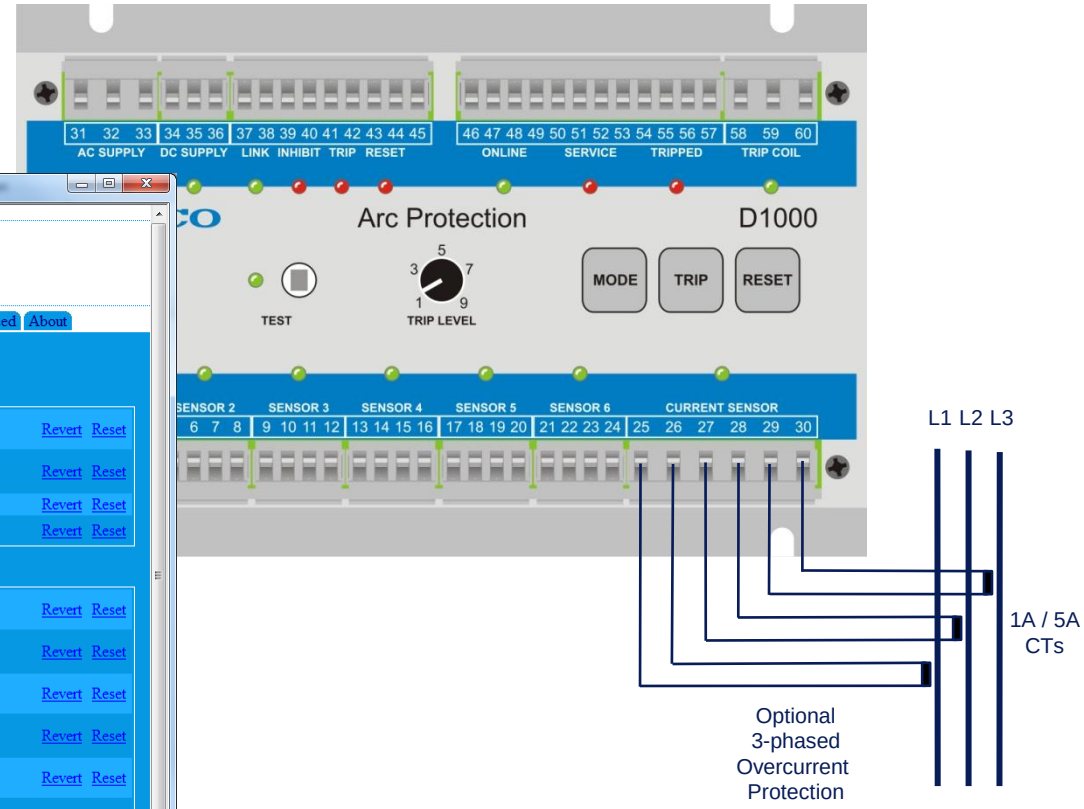
D1000 Optional 3-phase Overcurrent Trip

Trips in less than 1 millisecond for short- and overcurrent protection.

Optionally inhibits tripping if the current is below a set level, still with less than 1 ms delay.



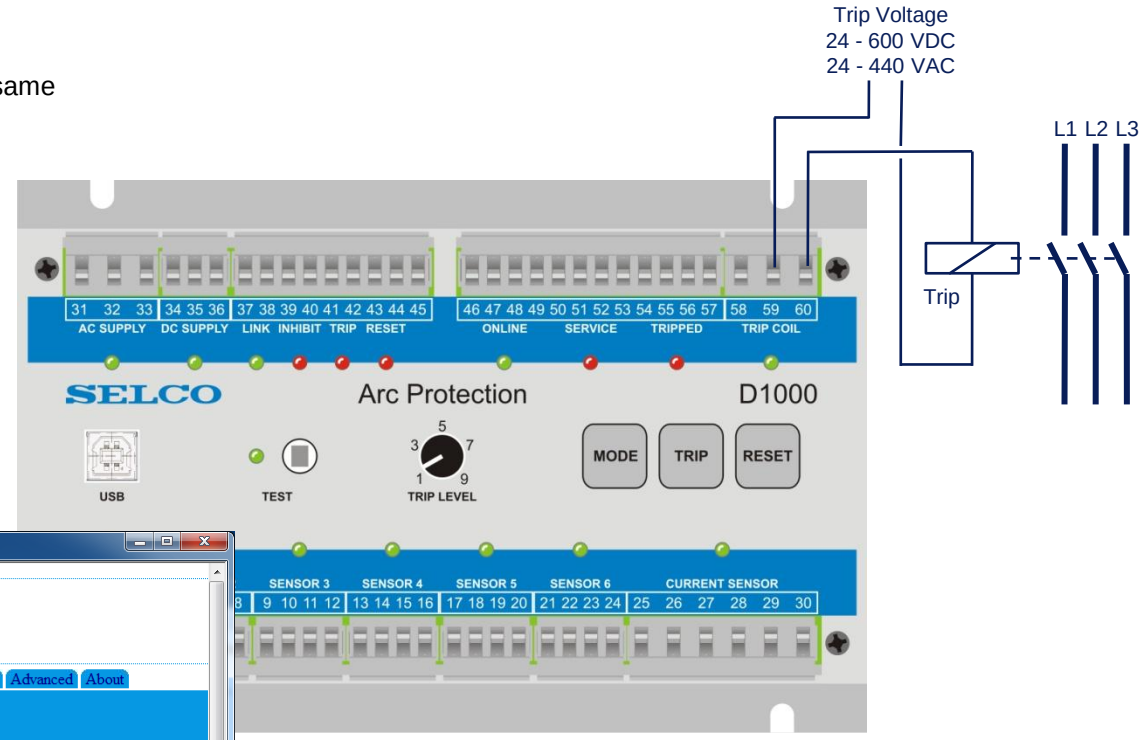
PC/USB based Configuration

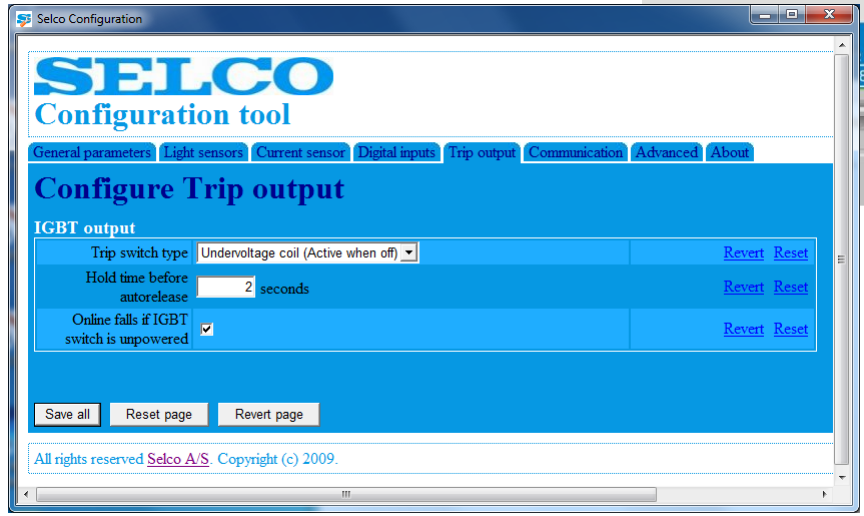


D1000 Trip Coil

Trip relay can be driven by external DC or AC voltage, by the supply voltage of the D1000, or by a chargable 24 VDC battery.

Multiple D1000 units can be installed to control the same trip relay, by utilizing the Link feature.





PC/USB based Configuration

Undervoltage Trip: Trip Coil output trips by disconnecting the voltage to the trip relay

Shunt Trip: Trip Coil output trips by providing voltage to the coil of the trip relay
Auto Release ensures that the relay coil is not stressed or damaged.

D1000 Inputs and Relays

Inputs (NO, negative reference)

INHIBIT: Prevents activation of trip coil when one of the two inputs are active.

TRIP: Performs external trip of trip coil upon activation of one of the two inputs.

RESET: Performs external Reset of trip upon activation of one of the two inputs.

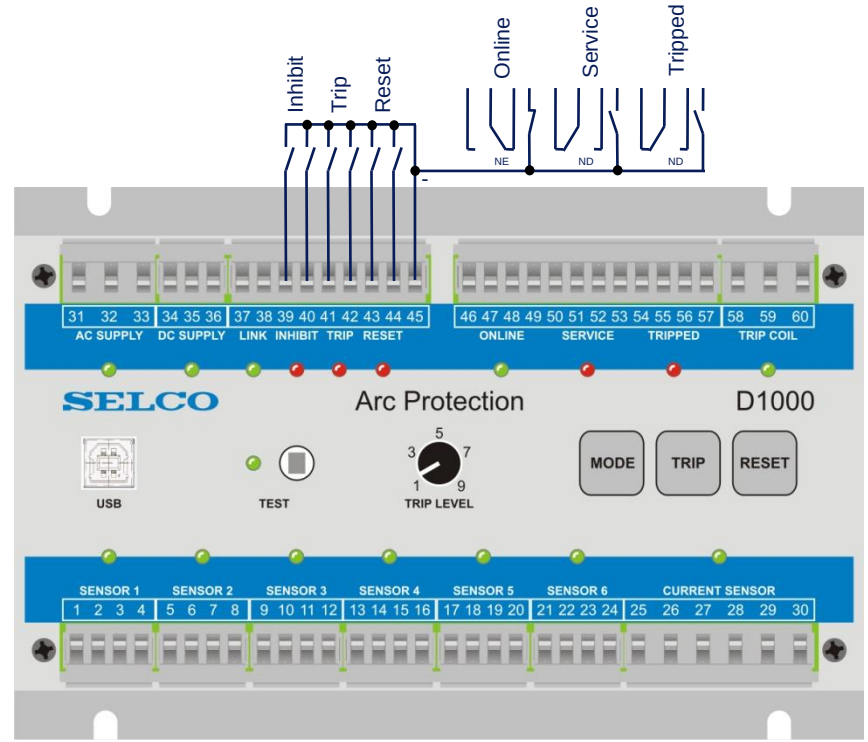
Relay (NE, change-over / contact)

ONLINE: Indicates that D1000 is on-line. The online relay is also used to signal alarm conditions (with intermediate pulse for every new alarm)

Relay (ND, change-over / contact)

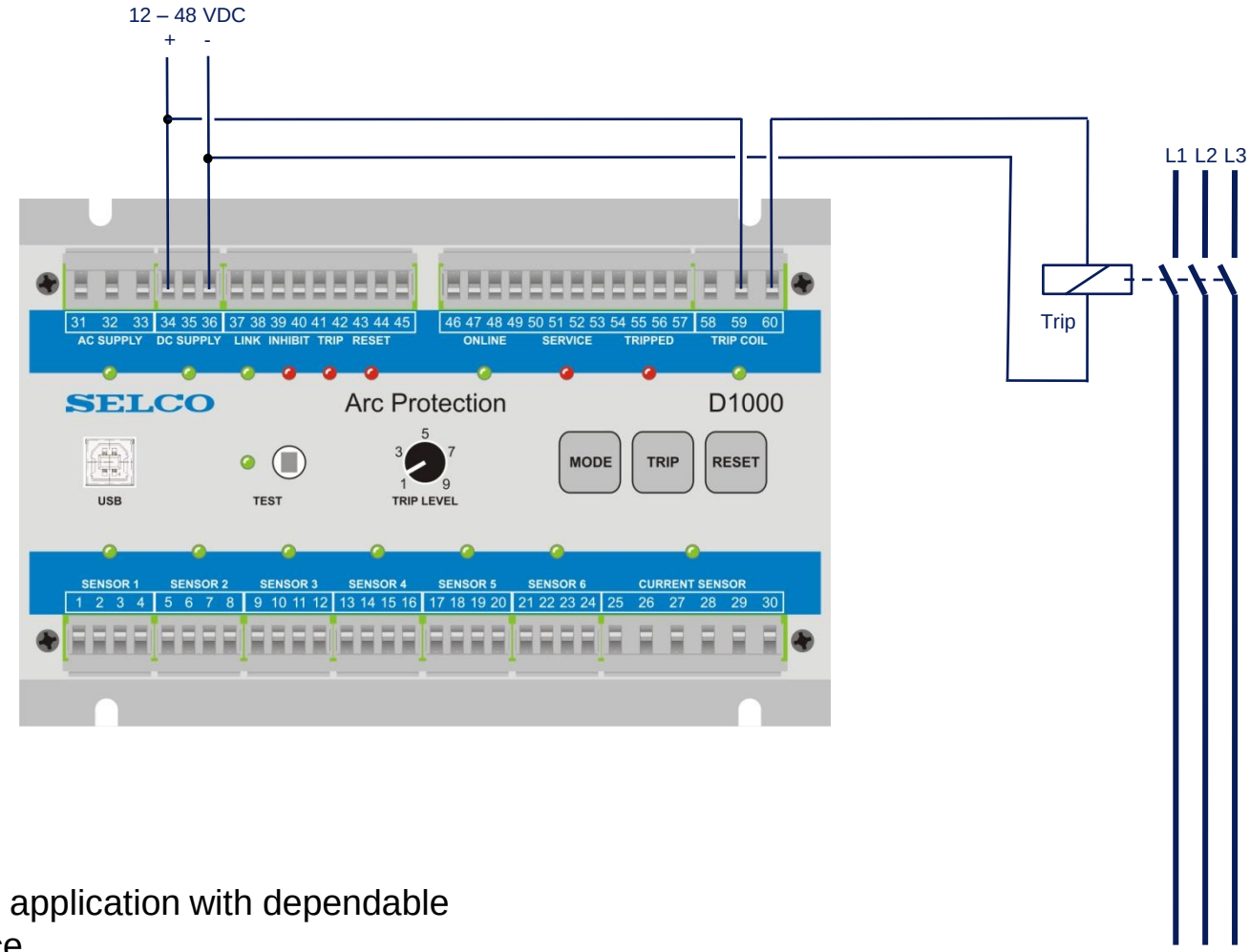
SERVICE: Indicates that the D1000 is in service mode (off line).

TRIPPED: Indicates that the D1000 Trip Coil has been activated.



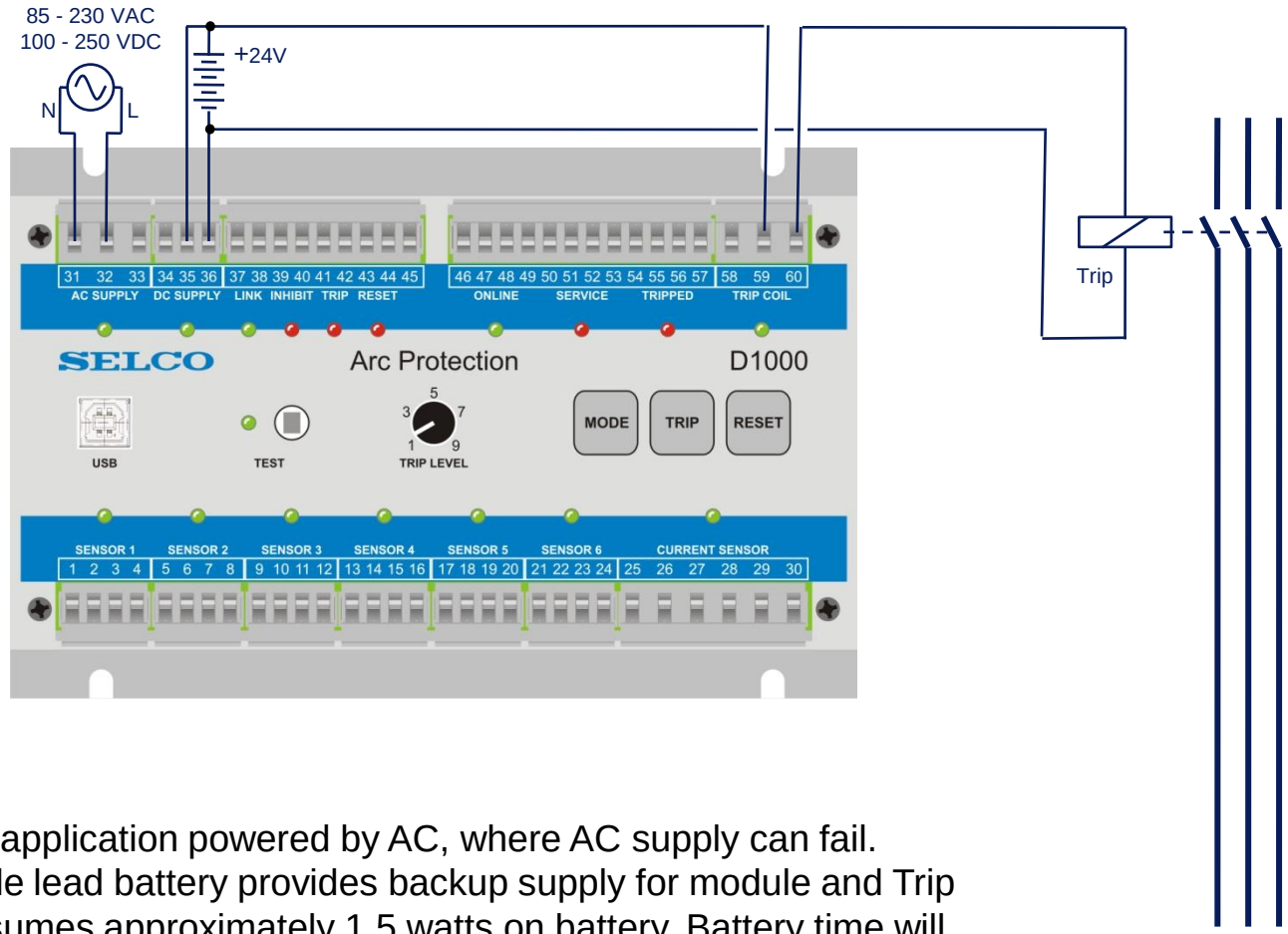
Relays shown as D1000 is in online state

D1000 Supply
Module and Trip Coil driven by DC Supply



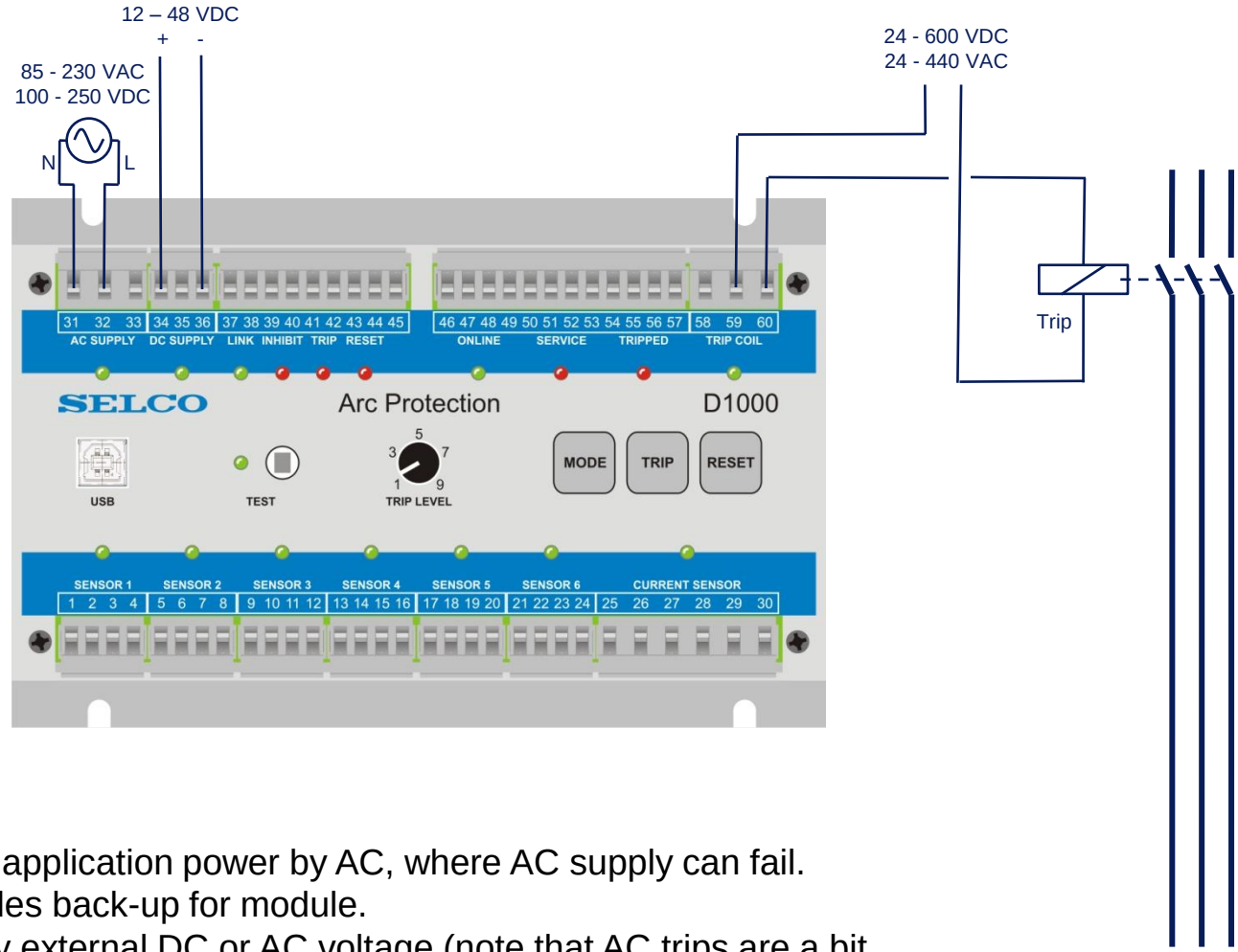
Typical setup for application with dependable DC supply source.

D1000 Supply
Module driven by AC with battery back-up
Trip Coil driven by battery back-up



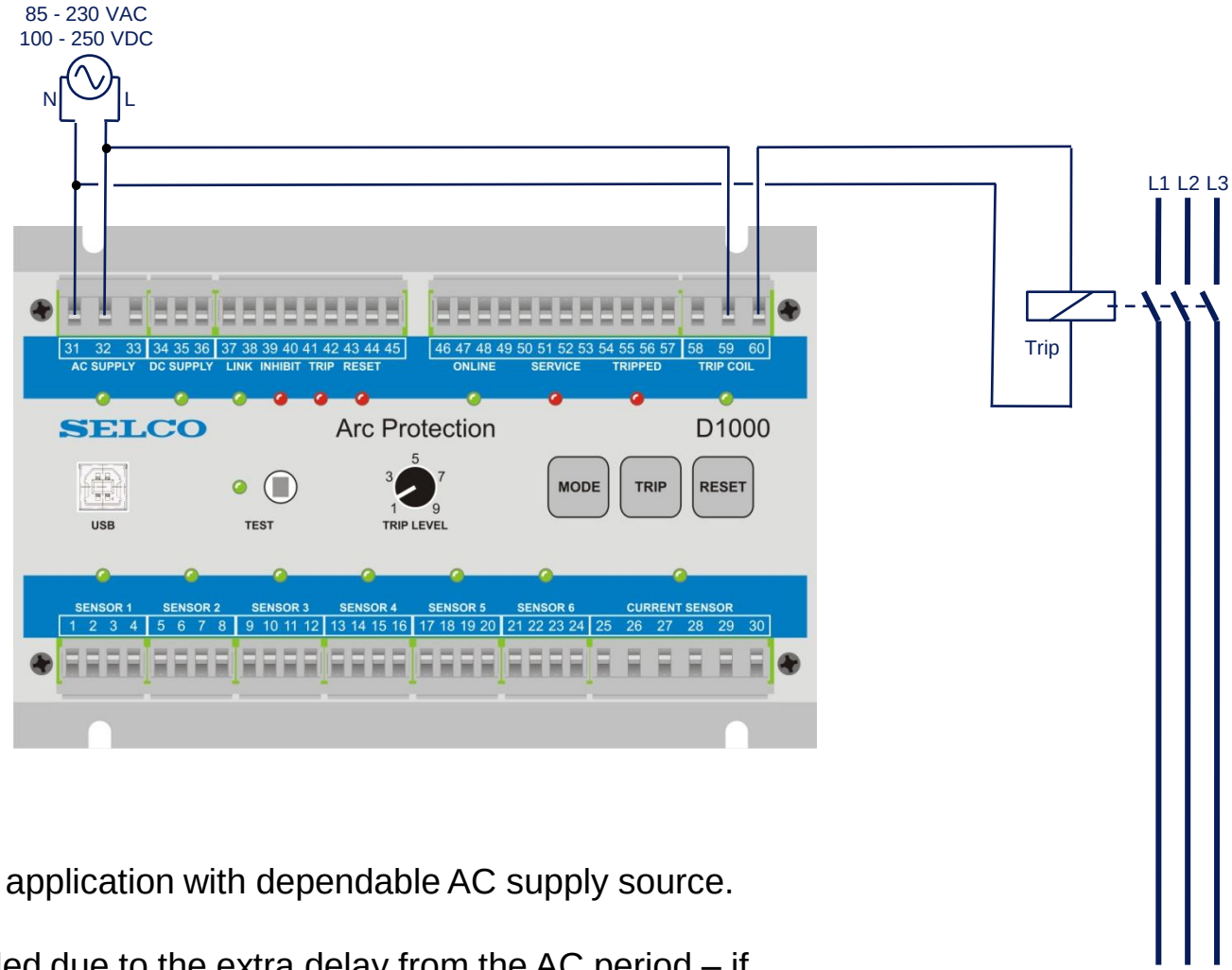
Typical setup for application powered by AC, where AC supply can fail.
24 VDC chargable lead battery provides backup supply for module and Trip Coil. D1000 consumes approximately 1.5 watts on battery. Battery time will depend on battery capacity.

D1000 Supply
Module driven by AC and DC
Trip Coil driven by external voltage



Typical setup for application power by AC, where AC supply can fail.
DC supply provides back-up for module.
Trip coil driven by external DC or AC voltage (note that AC trips are a bit slower than DC – because of the AC voltage period time).

D1000 Supply
Module and Trip Coil driven by AC Supply



Typical setup for application with dependable AC supply source.

(Not recommended due to the extra delay from the AC period – if possible, use a backup battery and a 24VDC trip coil)

Logging and Diagnostics

Log with Date and Time

- Event log with date and time
- Performance graphs