Instruction Manual
wiAutoLink
Wireless Electronic Sectionalizer
15kV, 27kV and 38 kV

ABB

Table of Contents

Section A: Safety Notices

Do not perform any of the activities described on this document with the Sectionalizer energized.

All the activities listed on this document it must be performed with the Sectionalizer completely de-energized and out of service.

ALWAYS follow your company Safety procedures before performing any work on this equipment.

This product is intended to be operated and maintained by qualified persons, thoroughly trained and knowledgeable of hazards involved. This document is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in safety procedures for this device.

Detailed descriptions of procedures, safety principles and service operations are not included on this document.

These warnings do not cover all conceivable ways in which service, whether or not recommended by ABB, might be performed or the possible hazardous consequences of each conceivable way, nor could ABB investigate such ways. Anyone using service procedures or tools, whether or not recommended by ABB, must satisfy himself thoroughly that neither personal safety nor equipment safety will be jeopardized by the service method or tools selected.

⚠ **WARNING**

**HAZARDOUS VOLTAGE
CAN SHOCK, BURN
OR CAUSE DEATH**

Safety Concerns

➢ Make sure that the installation area (spaces, divisions and ambient) is suitable for electrical apparatus.

➢ Check that all the installation, putting into service and maintenance operations are carried out by personnel with suitable knowledge of the apparatus.

➢ Make sure that the standard and legal prescriptions are complied with during installation, putting into service and maintenance, so that installations according to the rules of good working practice and safety in the workplace are constructed.

➢ Strictly follow the information given in this document.

➢ Check that the rated performance of the apparatus is not exceeded during service.

➢ Check that the personnel operating the apparatus have this document at hand, as well as all necessary information for correct intervention.

➢ Pay special attention to the danger notes indicated in this document by the following symbol:

⚠

Responsible behavior safeguards your own and other's safety!

For any requests, please contact ABB.

The information and illustrations are not binding. We reserve the right to make changes during technical development of the product.

Section B: Introduction

B.1.   About this Document

This document contains the required information to install medium voltage wiAutoLink Sectionalizer and put it into service.

For a correct use of the product, please read it carefully.

Like every apparatus we manufacture, wiAutoLink is designed for specific applications.

Use only original spare parts.

For further information, please read the technical catalogue.

This user manual is written according the standard IEC 82079-1.

⚠️ **READ CAREFULLY THIS DOCUMENT BEFORE USE.**
KEEP FOR FUTURE REFERENCE.

B.2.   Target Group

This document is written only for such qualified persons, thoroughly trained and knowledgeable of hazards involved.

B.3.   Related Documentation

This document and product-related documentation can be downloaded from the website of ABB: http://www.abb.com

B.4.   Document Revision History

Document revision/date	History
1/2013-12-01	First release
1/2014-04-01	Content updated
3/2014-11-26	Content updated
4/2020-05-07	Content updated

Section C: Preparing for Use

All installation, putting into service, commissioning and maintenance operations must be carried out by suitably qualified personnel with in-depth knowledge of the apparatus.

C.1.   Packing and Transportation

The wiAutoLink Sectionalizer is shipped in cardboard package, in armed position.

C.1.1.   Variants of the Cardboard Packing

Units of 15kV and 27 kV of voltage rating: Dimensions: Width: 0.12m, Length: 0.42m, Height: 0.11m – Weight: 2.2kg.

Units of 38kV of voltage rating: Dimensions: Width: 0.12m, Length: 0.54m, Height: 0.11m – Weight: 2.5kg.

C.2.   Checking on Reception

Before carrying out any operation, always make sure that the operating mechanism springs are charged and that the apparatus is in armed position. When performing a reception test, it is required to wait 5 minutes with the device de-energized after a tripping operation, to reset it.

On reception, check the state of the apparatus, integrity of the packing and nameplate information is the same requested on the purchase order specifications.

Make sure that all materials described in the shipping note are included in the supply.

If any damage or irregularity is seen in the supplied product after unboxing, notify ABB (directly or through the agent or distributor) as soon as possible within five days of receipt. Please inquire about the terms of warranty from the nearest ABB representative.

The apparatus is only supplied with the accessories specified at the time of ordering and validated in the order acknowledgement sent by ABB.

The documents sent in the shipping packing are:

- Test Certification.

- Product Warranty.

- Packing List.

Other documents which are sent prior to shipment of the apparatus are:

- Order acknowledgement.

- Original shipping advice notes.

- Any drawings or documents referring to special configurations/conditions.

C.3.   Storage

When the apparatus is unboxed, it must be carefully unpacked and checked as described in Chapter 3 of this manual.

If immediate installation is not possible, store the equipment on its original packaging in a covered, well-ventilated, dry, dust-free, non-corrosive ambient, away from any flammable materials and at a temperature between -5°C and +45°C.

In any case, avoid any accidental impacts or positioning which stresses the apparatus.

C.4.   Installation

C.4.1.   General

Correct installation is very important. The manufacturer's instructions must be carefully studied and followed. It is good practice to use gloves for handling the pieces during installation.

C.4.2.   Installation and Service Conditions

The following standards must be taken into particular consideration during installation and service:

-        IEC 60694.

-        IEC 61936: Electrical Installation.

-        ANSI C37 63: Automatic Sectionalizer.

-        All accident prevention regulations in relative countries.

The wiAutoLink is compatible with the Fuses bases model ICX from ABB, Type XS from SYC, Type C from AB Chance and Type L from Cooper.

For special installation requirements or other operating conditions, please contact ABB.

When wiAutoLink is installed in presence of mobile radio stations or RF devices operating in the 2.4 GHz band, it is recommend that there should be some distance (some meters) between the transmitters and the WiAutolink.

FCC ID: 2ABDQWIAUTOLINK   IC: 11571A-WIAUTOLINK

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)

This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the responsible party could void the user's authority to operate the equipment.

This device has been designed to operate with the on-board inverted F antenna. No other antennas may be used.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication. Operating the device with the supplied antenna will ensure that this requirement is met.

A separation distance of 20 cm should be observed to maintain compliance with the FCC's RF exposure guidelines set out in OET Bulletin 65.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

C.4.3.   Opening of the Unit

Remove the top cap using a 34mm fork spanner holding the tube with the hand. Check condition of O-ring, and replace it if necessary, applying grease on it.

Figure 1.

Connect the micro-USB cable to calibrate the current, set counting operations, tripping mode, network id and frequency. This connection can be used to download the events.

Note: Handle with care without damaging the micro-USB connector.

Figure 2.

C.4.4.   wiAutoLink Configuration Tool

C.4.4.1.   Installation

The WACT tool requires a computer with windows operating system, with USB port and the framework .NET 4.0. The application should be installed following this procedure:

1.   Connect the computer to Internet.

2. Launch the Installer and follow the indications of the setup shown below. In the event of missing dependencies, the installer process will automatically proceed to the download of missing components.
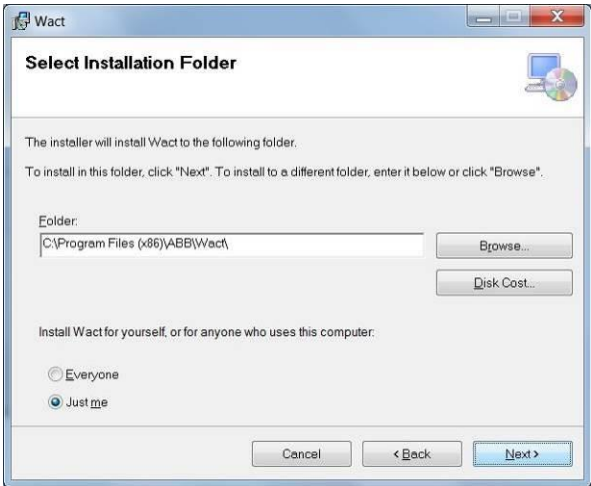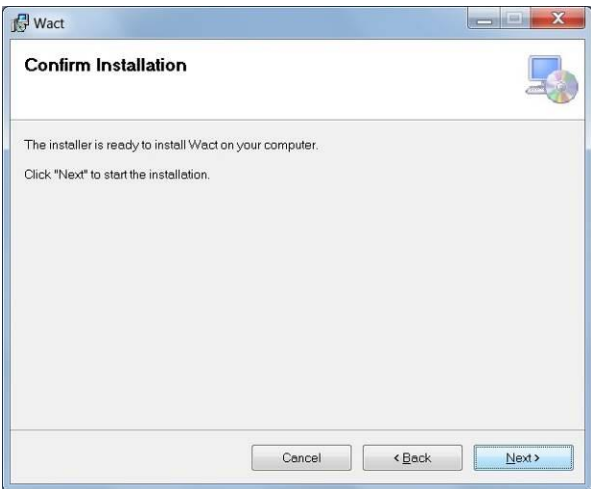
3.

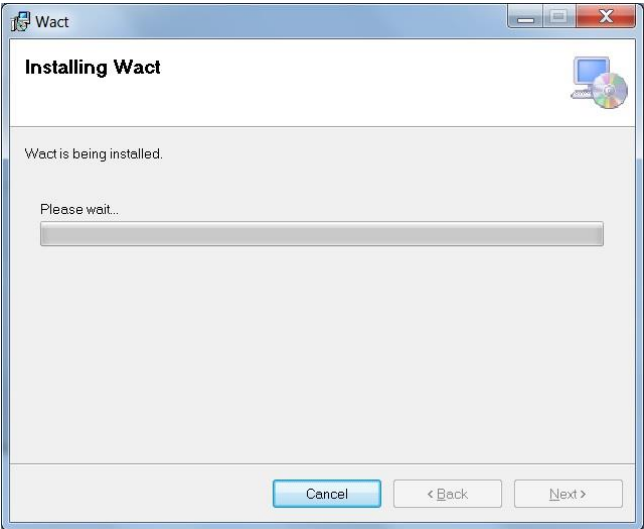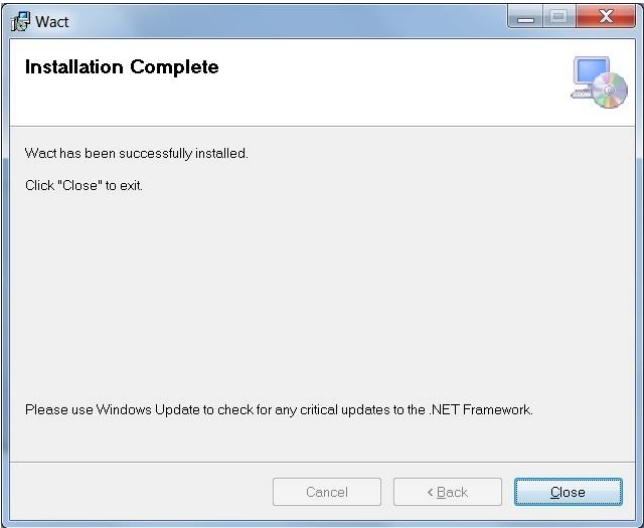*Figure 3.*

Figure 4.

Figure 5.

Figure 6.

Figure 7.

4. Attach wiAutoLink and be sure that the computer is connected to the internet. Wait for the operating system to download and install the FTDI driver.
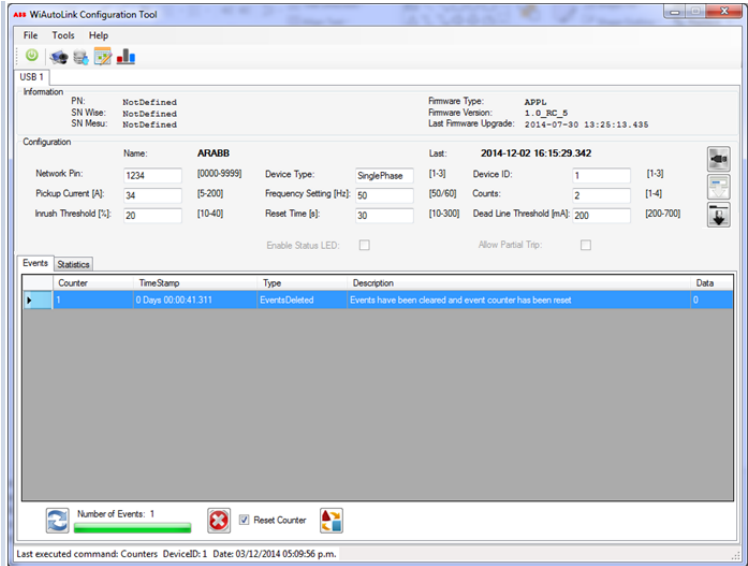
5. Open the WACT application:

Figure 8.

C.4.4.2.   *Simultaneous connection of wiAutoLink units:*

It is possible to connect simultaneous up to three devices to administrate them through the appropriate TAB. The application creates a section uniquely numbered from 1 to 3, containing the respective data. It is also possible to configure the devices simultaneous using the wizard tool.
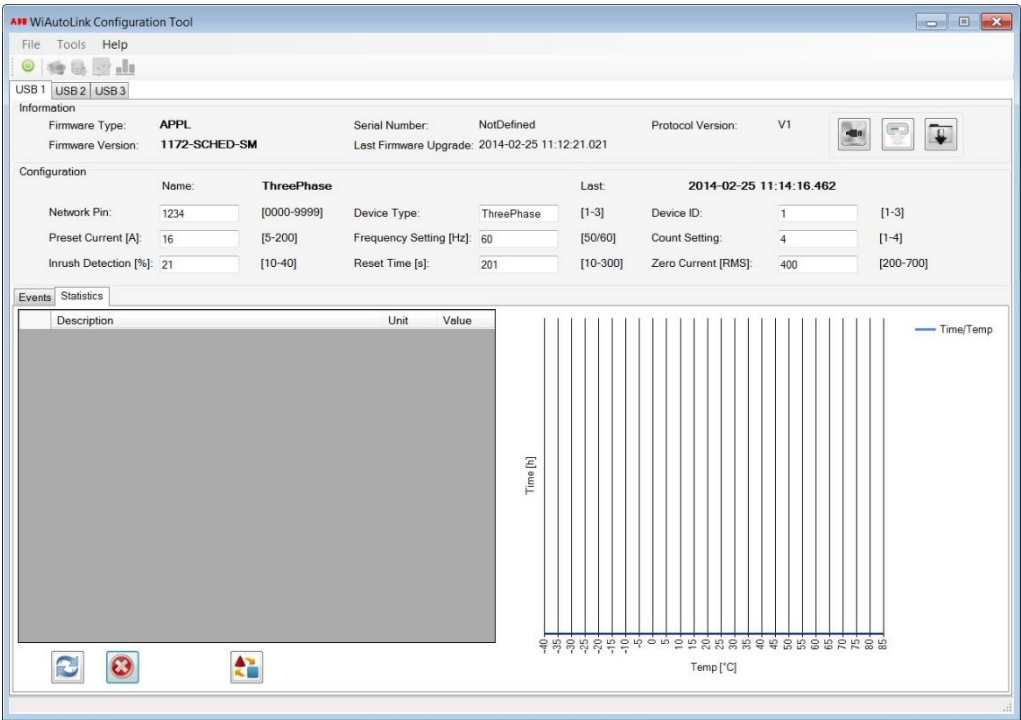

Figure 9.

If the devices connected have different configurations, the tool disables parts of the program so the user can interact with the necessary tools to bring all of them to a uniform version.

C.4.4.3.   *USB Tab*

Each device is presented on the tab containing all the controls to view and change its status. When a single device is connected it will be presented on the TAB USB1, and so on up to three. Select the Tab relative to the device of interest.
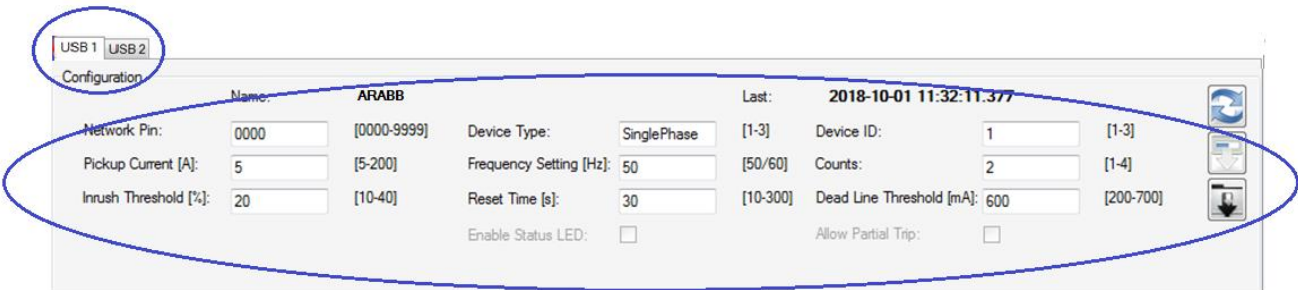

Figure 10.

On this section all the device information is presented according to the following criteria:

Firmware Type: Indicates the firmware type. The values can be "APP" (application firmware, full access to all the features) or "BOOT" (bootloader firmware, to update itself or load the application firmware)

Firmware Version

Serial Number: ID number of the device.

Last Firmware Upgrade: Last firmware update date.

Protocol Version: Version identifier of the communication protocol supported by the device.

The buttons grouped on the right has the following features:

Device Identification: If enabled, it will identify the device connected by blinking the led for approximately 10 seconds.

Figure 11.

Firmware Upgrade: When it is enabled, allows the firmware upgrade.

Figure 12.

Bootloader Upgrade: In order to upgrade the bootloader it is essential not disconnect the device during the update process.

The application disable the access to certain functionality by disabling the buttons shown when the firmware type APP is not installed or it is an incompatible version and the bootloader is not installed.

C.4.4.4. *Configuration of the Unit*

Figure 13.

The Groupbox configuration contains all the information of the device. The values shown are only modifiable through the Configuration Wizard.

The fields displayed are:

1. Name: Configuration Name.

2. Last: Last change date.

3. Network Pin: code identification of the network to a set of wiAutoLink. Range [0000-9999]. The network pin must be different between near outdoor stations. This Pin is used to identify each wiAutoLink group.

4. Device Type: Identifies the type of device configuration. It can be set SinglePhase, BiPhase or ThreePhase.

5. Device ID: device identification within the same network. Range [1-3].

6. Pickup Current [A]: Nominal current of the network of devices. Range [5-200].

7. Frequency Setting [Hz]: Nominal frequency of the network of devices. Range [50/60].

8. Counts: Number of faults (≥ Preset Current + 10%) to be detected prior the line interruption. Range [1-4]. Default value 2

9. Inrush threshold [%]: If the ratio of second harmonics versus fundamental harmonics is exceeded the device prevents the tripping operation. Range [10-40].

10. Reset Time [s]: Time in seconds to reset the fault counts, if no fault condition are met. Range [10-300].

11. Dead Line Threshold [mA]: Value in mA RMS below which the line is considered deenergized. Range [200-700].

12. Enable status Led: If set in configuration, the LED will blink in case of primary current flow beyond Dead current threshold every 10s.

13. Allow partial trip: If set in the configuration, the tripping operation can be done according to the rules in three-phase conditions, if set by flag

Here, below four scenario, which should get confidence on the setting parameters.

C.4.4.4.1. *Compatibility among tools and firmware revisions*

The new settings functionalities introduced in the firmware has required software changes in the windows tab and changes in configuration parameters.

Here in below the compatibility matrix from WiACT tool and Firmware revision level

	FW <1.3	FW 1.3
WiACT 1.0	OK	No compatible
WiACT 1.3	OK	OK

No problem with configuration files compatibility:

The new WiACT 1.3 can read configuration files generated by the old 1.0. By default, the new Status LED enabled and Partial Trip Allowed features, not contained in the old configuration, are disabled. By saving the file from WiACT 1.3, the file is converted to the new format which also contains the two new parameters.

The old WiACT 1.0 can read the configuration files generated by the new 1.3. The Status LED enabled and Partial Trip Allowed parameters are simply ignored. By saving the file from WiACT 1.0, the file is converted to the old format which does not contain the two new parameters.

C.4.4.4.2. *Scenario_1: Three-Phase standard operation*

In the case, for example to configure the wiAutoLink for tripping only on permanent faults at 2 counts in a 50 Hz grid of a nominal current of 50A in three phase mode with 30 seconds to reset the fault counts, enable Status LED is enable, and allowed partial trip is disable.

Pickup current shall be at least set 20% lower than the minimum pick up threshold of the recloser protection.

The dead line threshold shall be configured according to the current when the recloser is open (e.g. 200mA).

In the normal condition the LED flashing every 10s.

The inrush threshold shall be configured to distinguish between line energizing and fault conditions. The inrush threshold also helps to detect faults on overhead lines affected by long decay dc component (>100ms). If that is a foreseen case, the inrush threshold shall be set at maximum (40%).

The tripping operation will be followed on all three-phase apparatus when the tripping counting overload conditions are achieved.

To download parameters into wiAutolink, please refer to the configuration wizard instruction section:

Network Pin: 1234	Device Type: Three phase.	Count settings: 2.
Pickup Current: 60A.	Frequency Setting: 50 Hz.	Zero Current Threshold: 200 mA
Inrush threshold: 40%	Reset Time: 30 s.	

Enable Status LED: yes   Allow partial trip: no

C.4.4.4.3. *Scenario_2: Three-Phase tripping operation without handshake request*

Configure the wiAutoLink as well in chapter 4.4.1.2, but here in this example the "Allowed partial trip" flag is enabled.

Hence, in the normal condition, the LED flashing every 10s.

When the counting overload condition has been reached, the tripping operation will be followed on all three-phase apparatus if the intercommunication procedure between the devices succeeded, or will trip on the apparatus, which detected the fault, eventually.

To download parameters into wiAutolink, please refer to the configuration wizard instruction section:

Network Pin: 1234	Device Type: Three phase.	Count settings: 2.
Pickup Current: 60A.	Frequency Setting: 50 Hz.	Zero Current Threshold: 200 mA
Inrush threshold: 40%	Reset Time: 30 s.	

Enable Status LED: yes   Allow partial trip: yes

C.4.4.4.4. *Scenario_3: Single-Phase tripping operation with blinking led active*

Configure the wiAutoLink in single-phase, and but here in this example the "enable Status LED" is enabled.

Hence, in the normal condition, the LED flashing every 10s.

When the counting overload condition has been reached, the tripping operation will be followed in single-phase apparatus.

Hence, the "Allowed partial trip" do no have effect because in single phase configuration.

To download parameters into wiAutolink, please refer to the configuration wizard instruction section:

Network Pin: 1234	Device Type: Single phase.	Count settings: 2.
Pickup Current: 60A.	Frequency Setting: 50 Hz.	Zero Current Threshold: 200 mA
Inrush threshold: 40%	Reset Time: 30 s.	

Enable Status LED: yes

Allow partial trip: yes or not (do not have effect in single phase)

C.4.4.4.5. *Scenario_4: Single-Phase tripping operation with blinking led Disabled*

Configure the wiAutoLink as well in chapter 4.4.1.4, but here in this example the, and but here in this example the "enable Status LED" is disabled.

Hence, in the normal condition, the LED flashing only once time during the start-up of the device.

When the counting overload condition has been reached, the tripping operation will be followed in single-phase apparatus.

Hence, the "Allowed partial trip" do no have effect because in single phase configuration.

To download parameters into wiAutolink, please refer to the configuration wizard instruction section:

Network Pin: 1234	Device Type: Single phase.	Count settings: 2.
Pickup Current: 60A.	Frequency Setting: 50 Hz.	Zero Current Threshold: 200 mA
Inrush threshold: 40%	Reset Time: 30 s.	

Enable Status LED: yes

Allow partial trip: yes or not (do not have effect in single phase)

C.4.4.5.   *Event Log*

This event list is stored in the device and displayed in tabular format with the following fields:

Counter: Progressive number.

Timestamp: Date from power of the device.

Type: Event Type.

Description: Event Description.

Data: Any data related to the event.

The quantity of events is informed on the application startup allowing it to be downloaded using the appropriate button. A bar shows the progress:
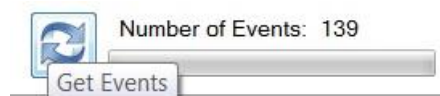

Figure 14.

The same button can be used to interrupt the request and pressed again during the download.
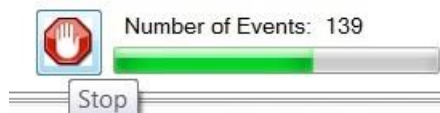

Figure 15.

The delete button erases all the events stored on the device. By selecting the flag "Reset Counter" the progressive counter will start from 1, otherwise it will resume from the last event stored.

Figure 16.

There is a button to export the events in csv format, offering the possibility to consult them at any time using a compatible program (Excel) or through the appropriate viewer. Make the export request and specify the file name and path on disk:
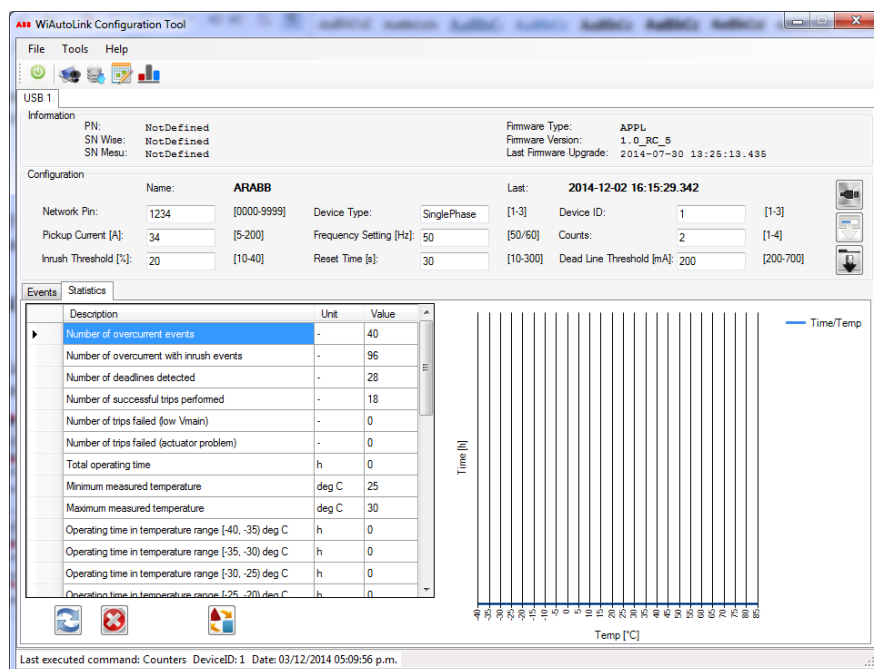

Figure 17.

C.4.4.6. Statistics

Figure 18.

This tool is aimed at obtaining a query of the statistics grouped in the following fields:

Description: Records description.

Unit: measurement unit.

Value

On the right of the window is seen a graphical representation of the values expressed by the fields "Operating temperatures range in time". The values of the abscissa refer to the range of maximum and minimum temperature at which data is sampled on the form of elapsed time. The buttons Delete and Export dealing respectively delete and export data in csv format.

C.4.4.7. Menu

The menu has the classic buttons where some of them and there is also shortcuts accessible through buttons located on the Tool bar immediately bellow it. All the operations carried out in both sections are intended as general. In this regard, particular attention should be taken to the group "Global" due to the menu item "Tools" that performs operations on all connected devices.
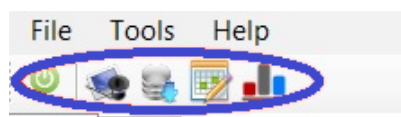
C.4.4.8. Tool Bar

Figure 19.

The tool bar provides access to the same features displayed on the menu but in form of shortcuts. The characteristics are the following ones:

Connect / Disconnect Devices.

Configuration Wizard

Global Firmware Upgrade.

Global Events Downloads.

Global Statistics Download.

C.4.4.9.   File

This menu section enables to import or export a file containing the configuration. It can be saved to disk and recall a frequently used configuration in order not to redo it again.
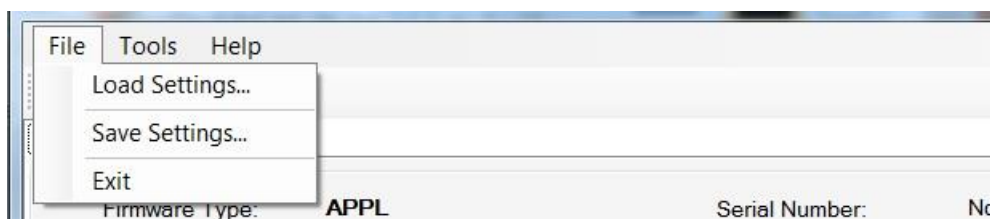

Figure 20.

C.4.4.9.1. Load Settings

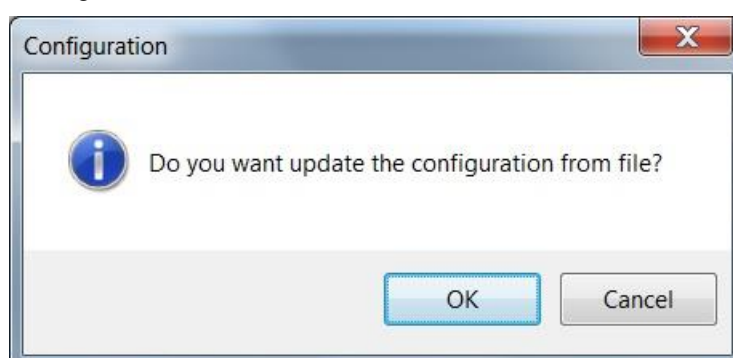Load a previously saved configuration into the device, the user must confirm his choice:

Figure 21.

Cancel returns to the main window, otherwise the tool proposes a further dialog box in which a file with the extension *.was can be imported to load settings:
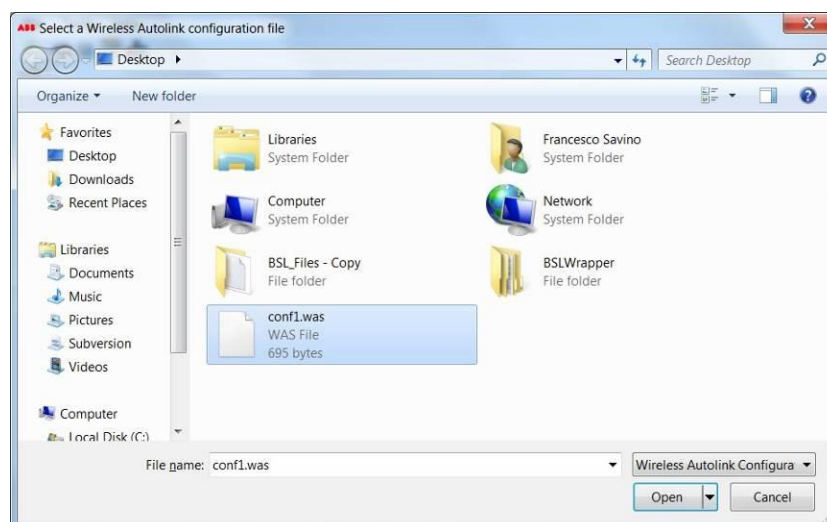

Figure 22.

Cancel returns to the main window, Open displays and writes the configuration to the device.

C.4.4.9.2. Save Settings

Save the current configuration to a file for later use, making it available through the functionality of the Load Settings. A dialog box is open to specify the file name and path.
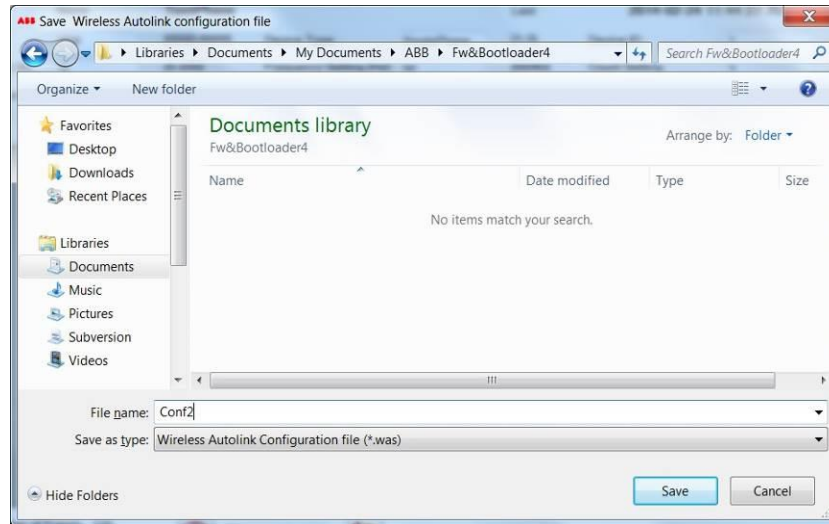
Figure 23.

C.4.4.9.3. Exit

The button closes the application.

C.4.4.10. Tools

This menu is designed to interact directly with the device. The Global group refers to control all the devices altogether.

C.4.4.11. Configuration Wizard

The wizard is designed to configure the connected equipment. It is able to detect the number of connected devices and initiate the appropriate configuration. The alternatives are the following ones:

SinglePhase: one device connected.

BiPhase: two devices connected.

ThreePhase: three devices connected.

In order to configure BiPhase or ThreePhase the devices must be connected before the wizard. The following example is referred to BiPhase mode:
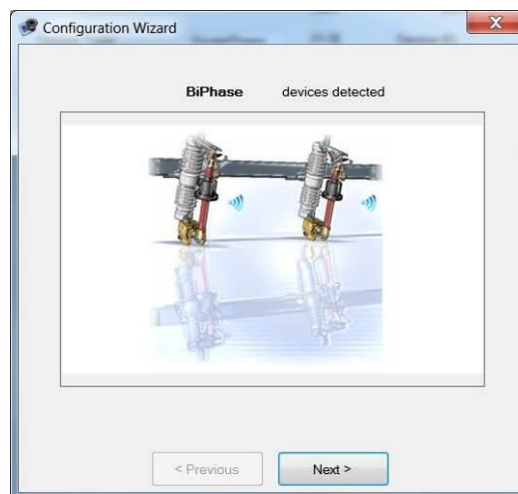

Figure 24.

In this example, BiPhase configuration has been detected and therefore the image is two devices. The configuration alternatives is displayed after pressing the next button. The user must then change the attributes of the default or any previous configurations.
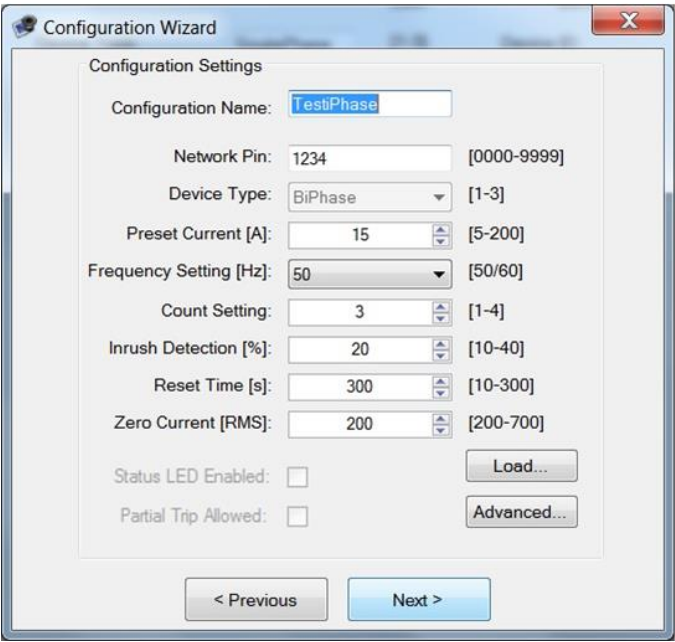
Figure 25.

Using the Load button write a previously saved configuration, just as with the Load setting option from the menu. The device ID can be chosen arbitrary by choosing the advanced button:

Figure 26.
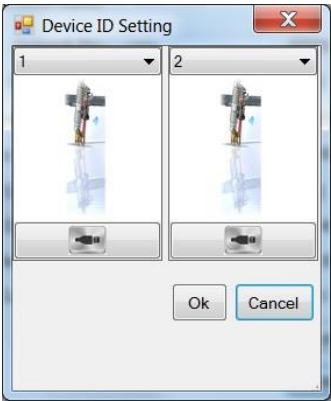
The combo box located on the top shows the available IDs for the configuration, while the button below is used to identify the device by blinking its LED for about 10 seconds. The Ok confirms the choice. It is not possible to assign the same ID to multiple devices. Once back at the configuration menu, pressing Next get the writing on the devices. A bar will show the progress:
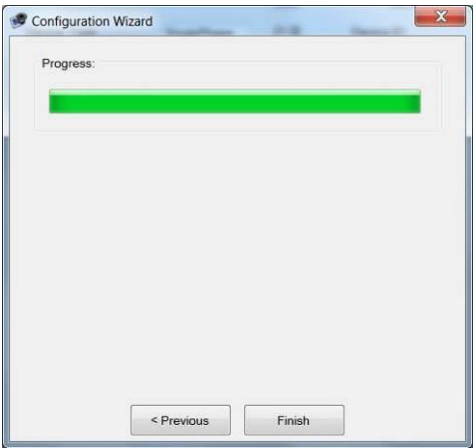

Figure 27.

The wizard can be cancelled any time by pressing the X button on the upper right corner. The Previous Page button is used to go to the previous windows. The writing will only happen when the progress bar is shown.

C.4.4.12. *Global Firmware Upgrade*

This menu starts a multithreaded process of firmware update, for all the connected devices. The user should choose the file to upload, the application perform a consistency check to ensure that the firmware file is compatible before uploading.
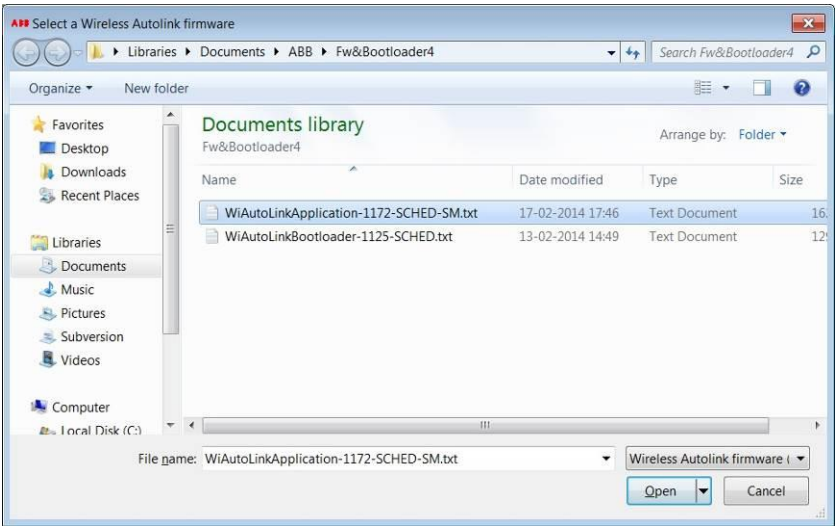

Figure 28.

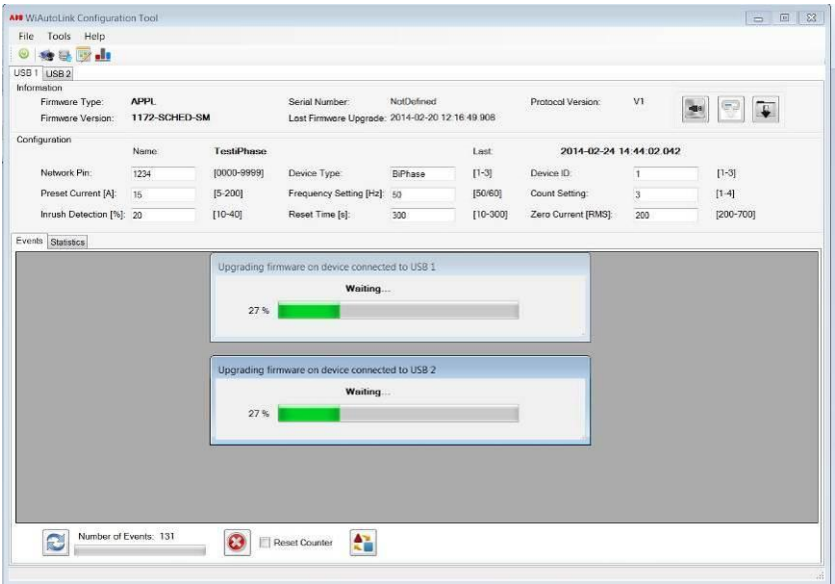During this step, the progress bars shows the status of the upgrade of the devices.

Figure 29.

In case the upgrade fails on one or more device, this is clearly indicated by the progress bars.

C.4.4.13. *Global Events*

The global events request will be made on all connected devices and the results will be displayed on each appropriate tab (USB1, USB2 and USB3).

C.4.4.14. *Global Statistics*

The global statistics request will be made on all connected devices and the results will be displayed on each appropriate tab (USB1, USB2 and USB3).
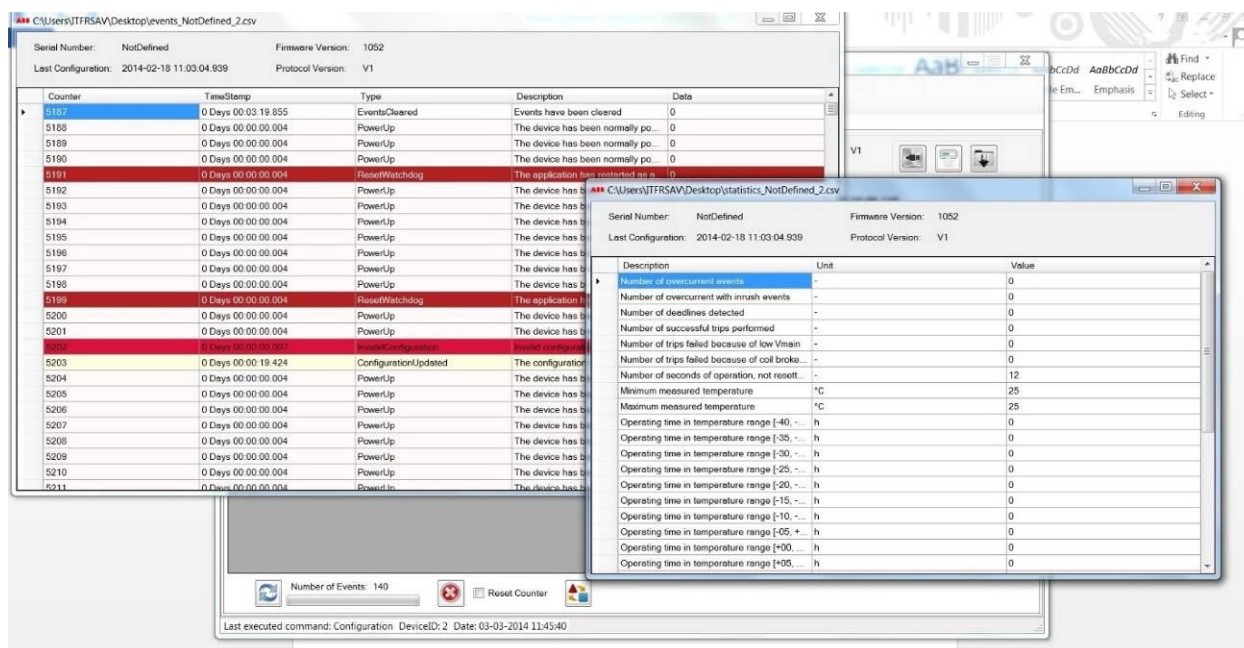
C.4.4.15. *Events / Statistics Viewer*

Figure 30.

This section allows to read only csv file previously exported from the appropriate export button. The user can choose the file without distinction of events or statistics in order to open the display window. Multiple files can be referred without limit. The following table specifies the different event types that can be recorded by the WiAutoLink (names can be different in reference to the Windows tool revision, here in table below names refers to the WACT 0.0.7):

Event Name	Description	Data
PowerUp	The device has been normally powered up	N/A
PowerLost	The power supply has been lost	N/A
PowerDown	The device has been normally powered down (after a trip)	N/A
ConfigurationMode	The application entered maintenance mode	0 = config missing or corrupted 1 = serial cable connected
InconsistentApplications	The devices in the system have different FW versions	N/A
MissingConfiguration	Missing configuration detected at startup	N/A
InvalidConfiguration	Invalid configuration detected at startup	N/A
InconsistentConfigurations	The devices in the system have different configurations	N/A
ApplicationUpdated	The application has been upgraded	CRC (lower 16 bits)
ConfigurationUpdated	The configuration has been updated	CRC (lower 16 bits)
EventsCleared	Events have been cleared	N/A

EventsDeleted	Events have been cleared and event counter has been reset	N/A
FaultDetected	Fault non tripping condition	Current [0.1 Arms]
FaultTrippingCondition	Fault tripping condition	Current [0.1 Arms]
DeadLineCondition	Dead line condition	N/A
ReturnToNormalCondition	Device returned to normal condition	N/A
ResetTimeElapsed	Reset time elapsed since last detected fault: counting cancelled	N/A
TrippingOperationScheduled	Tripping operation has been scheduled	Overall Cycles to Trip
TrippingOperationAborted	Tripping operation has been aborted	N/A
TrippingOperationSucceeded	Tripping operation has been successfully performed	N/A
TrippingOperationFailed	Tripping operation was tried but it failed	1 = Not enough energy 2 = Vmain stayed "high"

C.4.4.16.   *Application Log*

This option displays the log of the application life cycle. It is useful to track cases of malfunction.

C.4.5.   *Closing of the Unit*

Place the cap, holding the tube with the hand, and tighten it using a 34 mm fork spanner (torque between 8 and 10 Nm) without damaging the O-Ring.

Figure 31.

C.4.6.   **wiAutoLink Repositioning**

Push the interlocking bolt until blocked (it will rotate freely). Do not strike the bolt, nor use any type of tool to reset.

Figure 32.

Turn the tensioning device support.
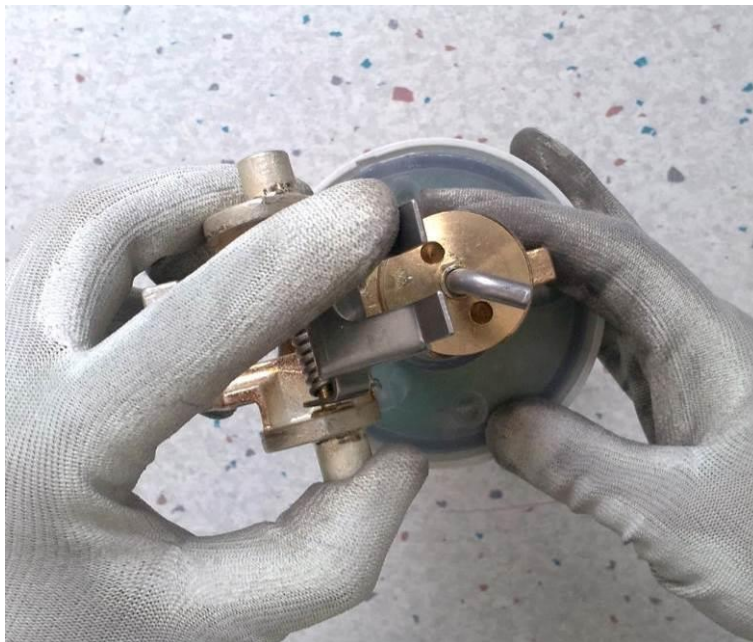
Place the tensioning device support facing the interlocking bolt.

Figure 33.

Turn the tripping pin 90°, until the lower contact is firmly blocked.

Figure 34.

Place the pole in the tube inferior eyelet and position in the cutout-base.

Figure 35.

Withdraw the pole and place it in the tube's superior eyelet. Push it until it remains in closing position.

Figure 36.

C.5.   Commissioning

C.5.1.   General procedures

When commissioning, all operations must be carried out by suitable qualified customer personnel with in-depth knowledge of the apparatus and the installation itself.

It is not recommended to open wiAutoLink under charge using a common hookstick, as it could cause an arc that might damage the personnel or the equipment. The wiAutoLink has horns to be used with a load break tool.

Section D: Operation of the wiAutoLink

D.1.   General

The wiAutoLink Electronic Sectionalizer is a device that operates at a permanent fault in the distribution line. It must be used together with an upstream recloser or circuit breaker with reclosure capability. Please take note that the wiAutoLink is not a fuse tripping device, therefore it cannot be used as a protection device by itself.

The main function of the wiAutoLink is to discriminate between permanent and transient faults in the distribution line, making it possible for the upstream recloser or substation breaker to clear transient faults without permanent interruption to the customers.

The wiAutoLink is not a fuse tripping device, it will operate to isolate a permanent fault on no load condition. The wiAutoLink fits into a standard fuse cutout and it directly replaces an existing fuse base. When it operates the wiAutoLink drops open like a fuse.

> ⚠️ **The wiAutoLink Electronic Sectionalizer is designed ONLY to sectionalize faulty lines and NOT for saving people from accidents or electrocution when contacting energized circuits.**

D.2.   Operating Under Fault Conditions

D.2.1.   Operating Under Temporary Fault Conditions

In distribution overhead lines 80-90% of the faults are temporary, and are cleared by an upstream recloser or breaker.
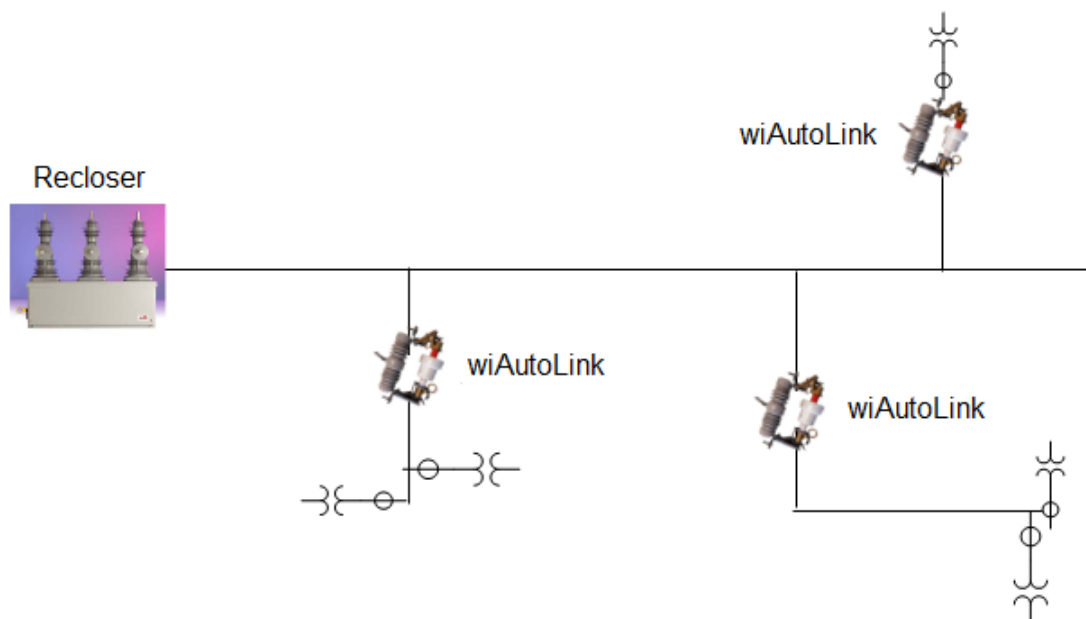

Figure 37.

1. The wiAutoLink is in monitor mode under normal load conditions.

   wiAutoLink register:

   a.   *"Device returned to normal condition"* if last overhead has been solved without trip

   b.   *"The device has been normally powered up"* if is the first time that wiAutoLink has powered.

2. When a fault is present

   The wiAutoLink senses a current above a programmed pickup threshold (Ia wiAutoLink) and becomes active.

So far wiAutoLink process an Fault condition and waits an opening of the upstream recloser or breaker.

At the occurrence of zero current, the sectionalizer registers the first count and show information *"Dead line condition"*

3. If the upstream recloser or breaker closes and no further fault detected, could be considered an temporary fault condition, within the memory resetting time.

The wiAutoLink will timeout reset its counter and return to the monitor mode. So far, wiAutoLink register *"Device returned to normal condition"*
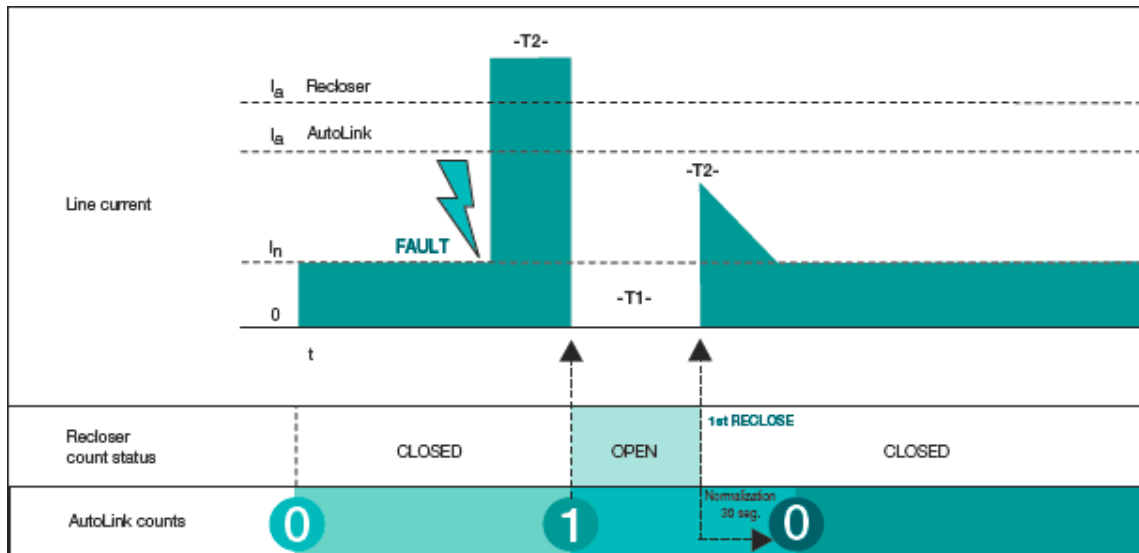

Figure 38.

D.2.2. Operating Under Permanent Fault Conditions

The remaining 10-20% of faults in distribution overhead lines considered permanent. During these faults, the continuous cycling of the recloser does not clear the fault.

The wiAutoLink will pick up, measure zero current and count, reaching its trip count setting.

The wiAutoLink will trip on the last open cycle of the recloser, isolating the permanent fault in its branch and allowing the recloser to close prior to going to lockout and maintain power to the unaffected branches.

D.2.2.1. Operating Under Permanent Fault Conditions with Trip two count setting Recloser.

1. The wiAutoLink is in monitor mode under normal load conditions.

   wiAutoLink register *"Device returned to normal condition"* if last overhead has been solved without trip or *"The device has been normally powered up"* if is the first time that wiAutoLink has powered.

2. When a fault is present the wiAutoLink senses a current above a programmed pickup threshold (Ia wiAutoLink) and becomes active.

   So far, wiAutoLink process a Fault condition and waits an opening of the upstream recloser or breaker.

   At the occurrence of zero current, the sectionalizer registers the first count and show information *"Dead line condition"*

3. If the upstream recloser or breaker closes and further fault detected, could be considered a permanent fault condition and wiAutoLink process an Fault condition again waiting an opening of the upstream recloser or breaker. *"Device returned to normal condition"*

4. If the upstream recloser or breaker open again and the occurrence of zero current, the sectionalizer registers the last count and wiAutoLink opening procedure are performed as indicated below:

   a. So far, show information *"Fault tripping condition"*

   b. Opening operation *"Tripping operation has been successfully performed"*

   c. After Opening operation "*Device has been normally powered down (after trip)*"
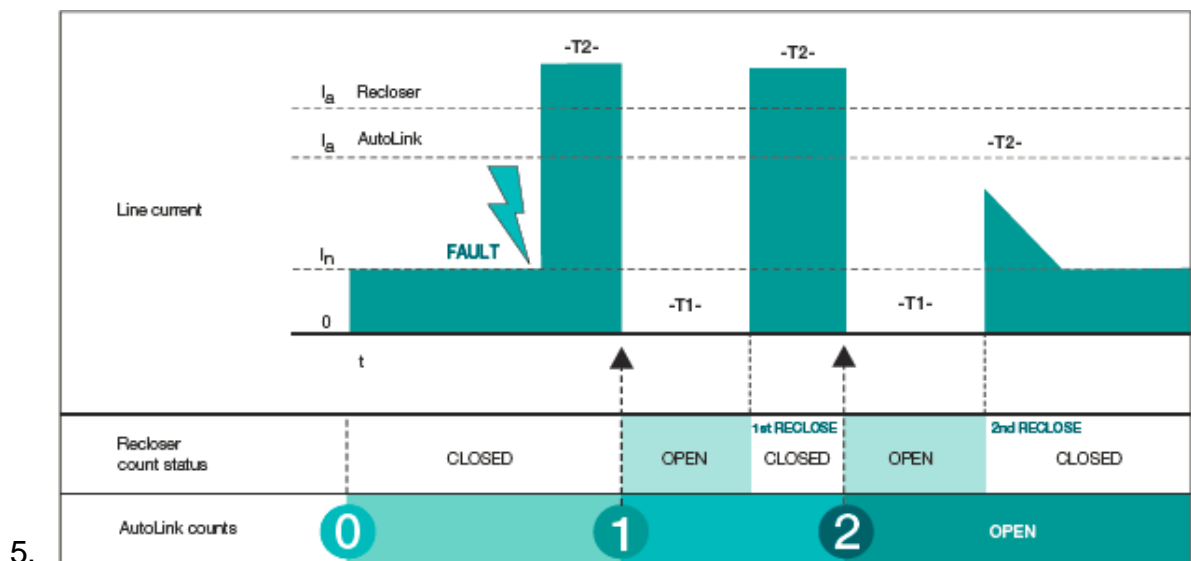
Below, in figure 4 diagram.

5.

Figure 39.

The times shown in Diagrams B and C as T1 correspond to the time the recloser takes to reconnect the circuit. This "dead time" is usually adjustable up to 3 minutes. The wiAutoLink can operate while keeping the count performed with the current at zero for up to 3.5 minutes, above any possible dead line value configured in the recloser.

Due to the latest technological improvements recently introduced to reclosers, the time indicated as T2 is the time the recloser takes to open after the fault detected. The wiAutoLink, by means of the spectral analysis in the second harmonic, only needs one cycle to identify a current as a fault current, isolating it from symmetric and asymmetric inrush currents. This feature adds an outstanding technical advantage to the wiAutoLink.

D.2.2.2.   *Operating Under Permanent Fault Conditions with Trip three count setting Recloser.*

1. The wiAutoLink is in monitor mode under normal load conditions.

   wiAutoLink register *"Device returned to normal condition"* if last overhead has been solved without trip or "*The device has been normally powered up*" if is the first time that wiAutoLink has powered.

2. When a fault is present the wiAutoLink senses a current above a programmed pickup threshold (Ia wiAutoLink) and becomes active.

   So far, wiAutoLink process a Fault condition and waits an opening of the upstream recloser or breaker.

At the occurrence of zero current, the sectionalizer registers the first count and show information *"Dead line condition"*

3. If the upstream recloser or breaker closes and further fault detected, could be considered a permanent fault condition and wiAutoLink process a Fault condition again waiting an opening of the upstream recloser or breaker. *"Device returned to normal condition"*

4. If the upstream recloser or breaker open again and the occurrence of zero current, the sectionalizer registers the second count and wiAutoLink wait recloser or breaker closes again

   " Fault no tripping condition"

5. If the upstream recloser or breaker closes and further fault detected, could be considered a permanent fault condition and wiAutoLink process an Fault condition again waiting an opening of the upstream recloser or breaker. *"Device returned to normal condition"*

6. If the upstream recloser or breaker open again and the occurrence of zero current, the sectionalizer registers the last count and wiAutoLink opening procedure are performed as indicated below:

   a. So far, show information *"Fault tripping condition"*

   b. Opening operation *"Tripping operation has been successfully performed"*

   c. After Opening operation "*Device has been normally powered down (after trip)"*

D.3.   *Minimum Time Required for Power up the wiAutoLink*

The wiAutoLink is a self-powered device. The following graphs displays the minimum time required for the device to be powered at different currents to enable the operation. The wiAutoLink can harvest the required energy from the precharge current and also from the fault current as far as it fulfills the time-current requirement for fully charge its main energy storage device. The minimum nominal current of the wiAutoLink to be fully charged is 5A.
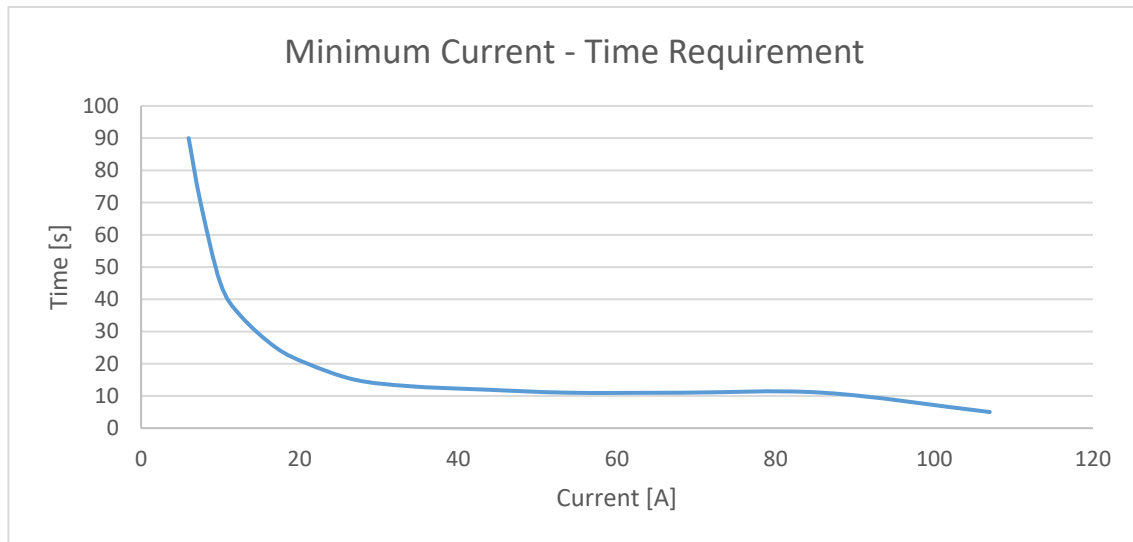
Figure 40.

D.4.   *Minimum Autoreclosing Operating Time required for wiAutoLink operation*

The wiAutoLink requires a line current greater than 5 A in order to be fully charged during at least 90 seconds. After the condition of the device is fully charged the line current can vary as low as 3A and it will continue to be operative.

The recloser reclaim time should be set to 90 seconds. When a fault occurs before that time the recloser goes directly to lockout. If a fault occurs after that time the reclosing sequence is done. The recloser reclaim time is designed to prevent the reclosing operation before the sectionalizer is ready to operate (wiAutoLink is fully charged).

The wiAutoLink is able to detect a fault on the line with a period as small as one cycle. So the recloser can be set to start the tripping command as long as it enables to flow through the sectionalizer one sinusoidal cycle in order to correctly measure the fault using its detection algorithm.

The minimum opening time that the recloser is set to maintain the line deenergized after a fault during a reclosing cycle must be set higher than 0,5 seconds in order to permit the wiAutoLink to perform the mechanical trip and safely isolate its connected faulty load and isolate the fault from the other branches connected to the recloser.
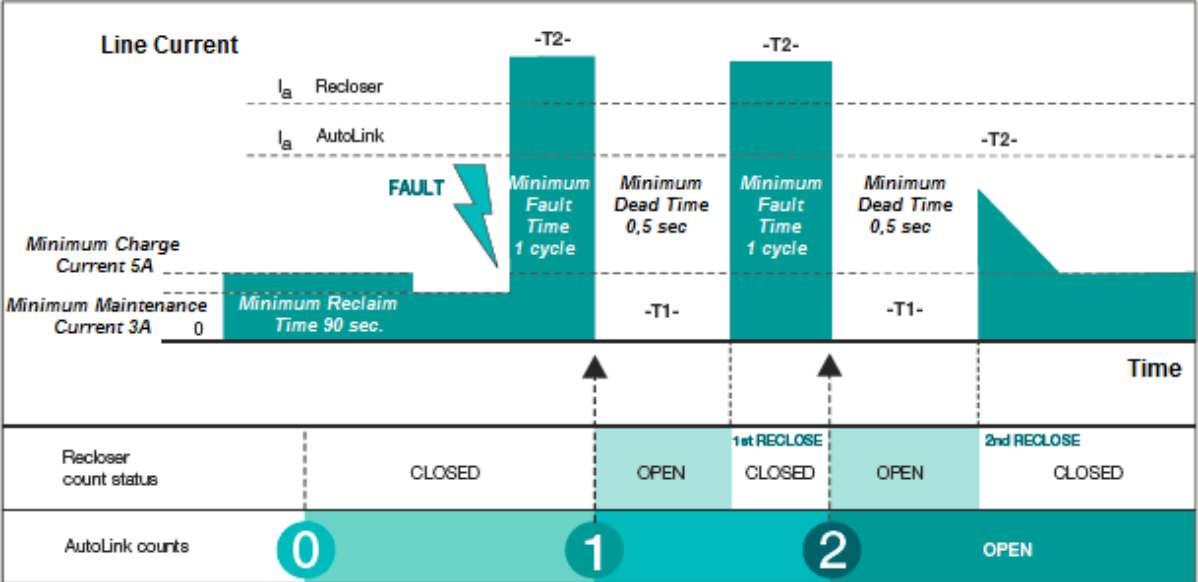
Figure 41.

D.5.   LED feature for wiAutoLink

The wiAutoLink has the added feature of indicating the full operational status of the device once it is fully charged by blinking once the LED in the transformer housing. The blinking LED will happen within 90 seconds of closing the medium voltage line.

In order to give information related to the MV current status condition, a dedicate firmware on request, allow to perform blinking led every 10s. To guarantee safe condition and avoid misunderstanding, a dedicated label/stickers on body of apparatus identify this feature.
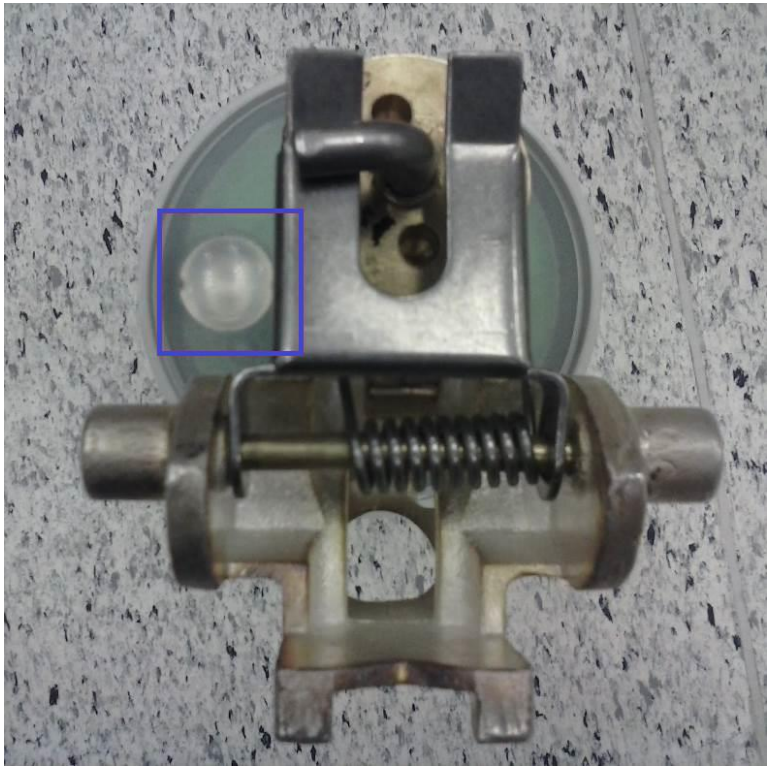

Figure 42.

Section E: Maintenance

Test the correct operation of electronic sectionalizer on a regular basis, preferably, while maintenance on upstream recloser is made:

- Check the closing system.

- Check that the interlocking bolt turns freely. The tensioning device support should move easily and the spring should be sufficiently tightened so that the support may reset when the system opens following the operation of the sectionalizer.

- Check that the mobile lever and the lower support of the wiAutoLink move easily at the joint. Clean and lubricate the joint surfaces of both pieces.

- Keep contact zones clean and place a thin film of conductive grease on those zones.

- Keep the tripping pin clean.

- Check the upper contact cap is correctly fastened and both the o-ring and the silicon grease are present.

Test should be carried out on a laboratory with the appropriate equipment to simulate service conditions. For this operation it is recommended to contact ABB to request the testing procedure.

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