



Overhead Fault Indicators SENTINEL



Summary

IMPROVE CUSTOMER SATISFACTION.....	03
FUNCTIONAL DESCRIPTION.....	05
SENTINEL® SL	08
SENTINEL® A ON POLE	10
SENTINEL® SLC	12
SENTINEL® SLC + I	14
COLLECTOR FOR SENTINEL® SLC & SLC + I	16
ACCESSORIES.....	19
SENTINEL® SMART APP	20
IVISION® SC	21

Improve customer satisfaction

Customer satisfaction is often difficult to measure. So one of the key figures used to indicate the performance of a distribution network is SAIDI. SAIDI (System Average Interruption Duration Index) is often measured and monitored every month or as a sum over one year. SAIDI gives the average outage duration that any customer would experience and is the sum of two factors:

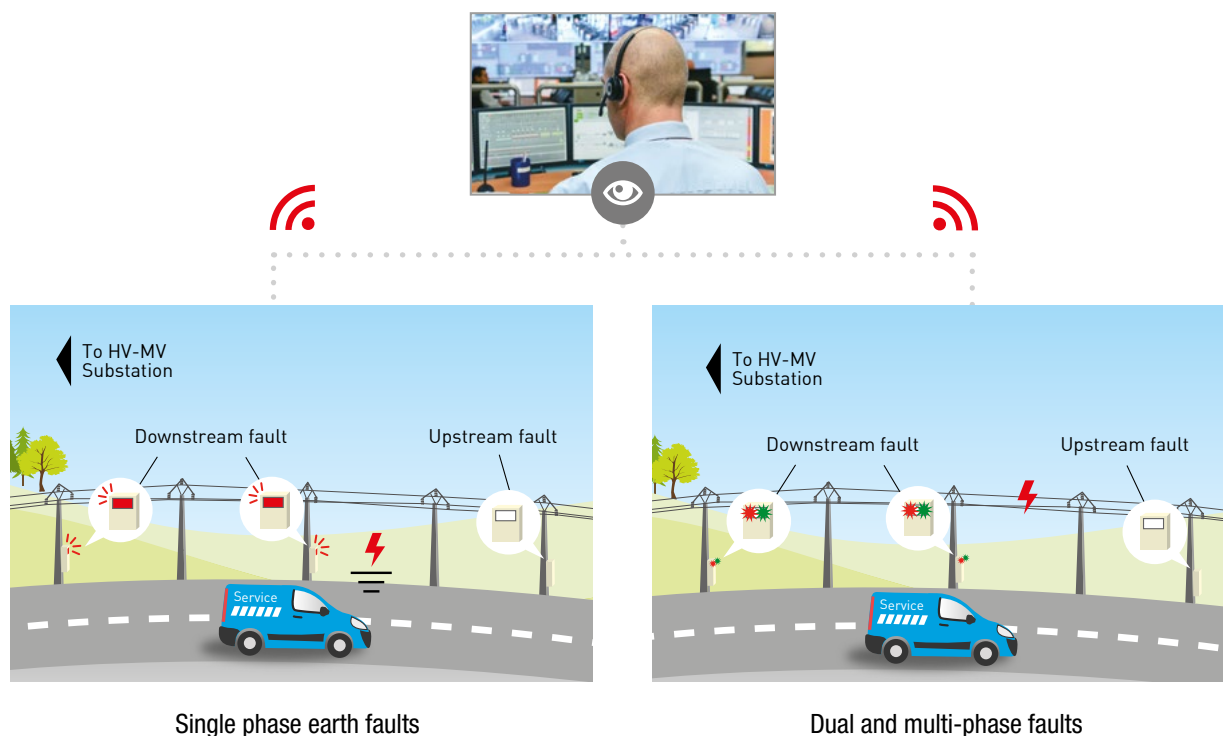
- The time it takes to find the fault,
- The time it takes to repair the fault.

> FAULT INDICATIONS

It is the time to find the fault that often drives the SAIDI in a negative direction. Distribution feeders normally have sectionalizing switches throughout the network. However, sectionalizing can only start when the faulty location is known. It is therefore outmost important to know where the fault is as quickly as possible. Using local indicators will reduce the fault-finding time, because the patrolling down the healthy feeders are avoided.

Using fault indicators with communication will reduce fault-finding time to the absolute minimum. Immediately after the fault is detected, all indicators in the faulty path will send an alarm message to the operation room. The operator will immediately see where the faulty section is and can start sectionalizing.

Using **CAHORS'** remote control system for sectionalizing of the network will reduce SAIDI further, as customer on the healthy part of the feeder will have the energy restored within minutes rather than hours.



Indicators between the substation's feeder and the faulty section start flashing and send a fault message by SMS to Ivision® SC micro SCADA System

> EFFECTIVE DEPLOYMENT

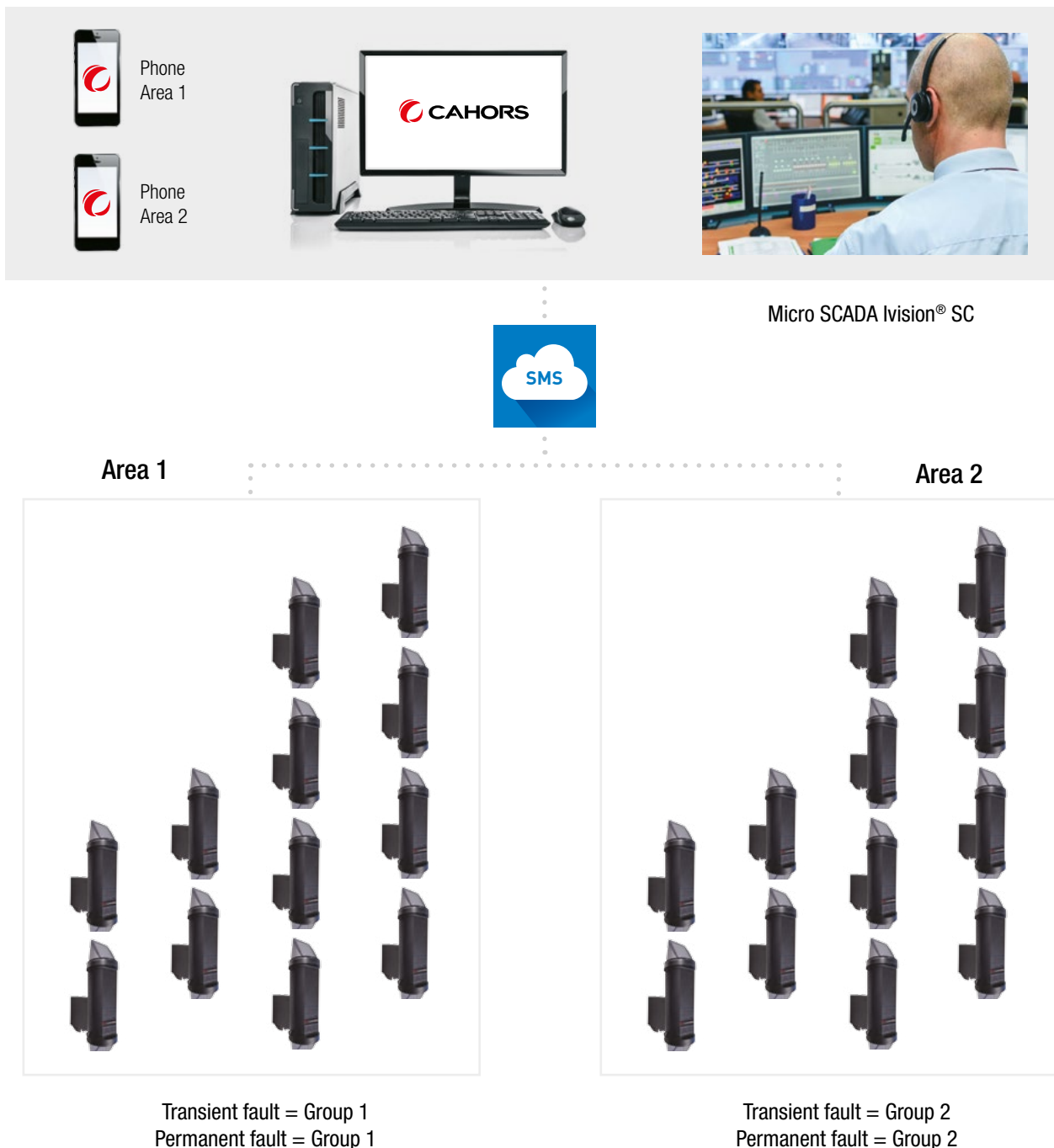
The use of fault indicators will also give other benefits which is also important for an utility:

- Response time can be reduced without increased staff
- Call-out time is reduced -> Reduced costs
- Improved safety for staff
- Increased revenues due to more delivered energy
- Improved Shareholder value by cost reductions

An effective deployment of staff is also important to reduce the effect of a fault in the distribution network.

Alarms sent from indicators with communication can be routed to the right person immediately based on information about where in the network the indicators are located and the person which is responsible for that particular area

Remote communication



Functional description

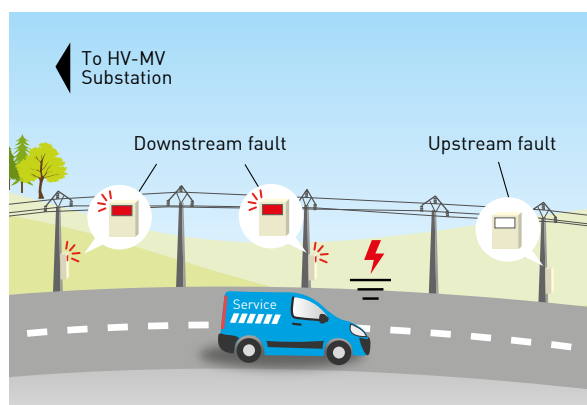
Sentinel SL and **Sentinel A on pole Fault Passage Indicators** are used to locate short circuit (PtP = Phase to Phase) and earth faults (PtG = Phase to Ground) in overhead line distribution networks.

Sentinel product line will fully cover the different fault configurations that may occur.

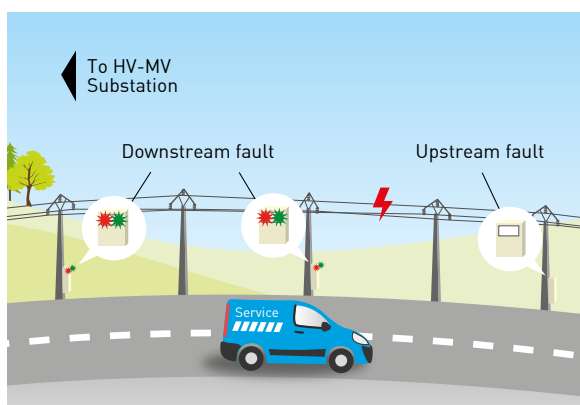
> FUNCTION

The indicators are placed at strategic locations along the line such as after branching points and sectionalizers. Live line installation makes installation safe, easy and rapid. Upon detecting a fault on the line, the indicator gives off an intermittent LED type flashing.

Pole mounted Indicator

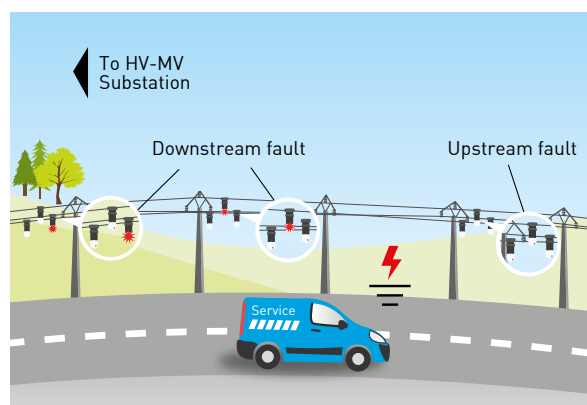


Single phase earth faults

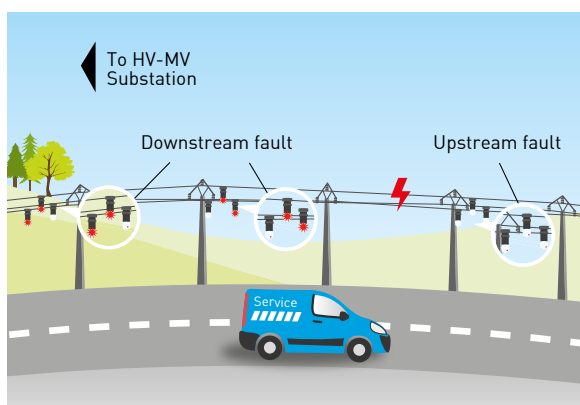


Dual and multi-phase faults

Phase mounted Indicator



Single phase earth faults



Dual and multi-phase faults

All indicators installed between the feeding substation and the fault will operate when a fault occurs. The indicators placed behind the fault and on the T-offs remain idle.

Sentinel fault indicators provide fast fault localisation enabling reduction in outage times. This represents enhanced service to the customers thereby improving the utilities image and significant reduction in the cost related to faults and outages.

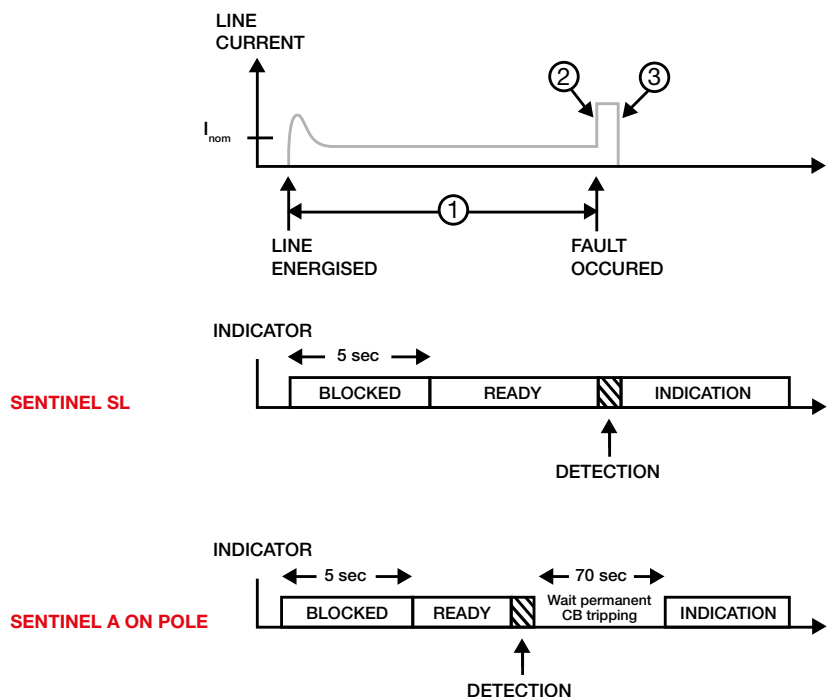
Another important aspect of using fault indicators is that unnecessary operations of circuit-breakers and sectionalizers to locate faults are avoided. This way the indicators help to reduce wear and tear as reclosing cycles causes stress to the switchgear.

> DETECTION PRINCIPLE

Sentinel fault Passage Indicators fault sensing is based on detection of the electromagnetic field below the conductors. The units are fully self-contained; no external transformers or connections of any kind are required.

To determine whether the feeder is faulted or not, the indicator looks for a specific sequence in the line conditions to occur before it starts flashing. The general sequence is as follows:

- The line should be energised for a period, normally 5 seconds. (Inrush Blocking)
- The line current should increase rapidly above the value set by the user (the nominal trip level).
- The line should be de-energised. (Configurable)



The user may program the criteria for operation to suit the local requirement by manipulating a bank of micro-switches inside the indicator. On some models, this can be executed remotely from the control center or by a hand-held unit from the ground.

The current flowing in the lines generates a magnetic field (B-field) which is constantly measured by the indicators. The measured B-field is applied to an adaptive di/dt detector.

This detector automatically adjusts to the normal conditions on the line. Slow variations in load current will not affect the detector. A fault current will cause a rapid increase in the B-field. The detector in the indicator will detect this increase and respond accordingly.

The detector will now require that one of two conditions are satisfied:

- The relative increase is greater than a certain level.
- The absolute increase is greater than a pre-set value.

> INSTALLATION AND CHOICE OF INDICATORS

Installation of a fault indicator usually requires a line survey to ensure that the best use of it may be obtained. Several factors should be considered, such as fault frequency, type of customers, the number of customers, accessibility etc. For the best economic benefit it is recommended that the indicators are used in easily accessible line points, before and after line segments difficult to access. A general rule of thumb could be to install indicators on each T-off as well as in the main feeder. A combination of local and remote indicators could also be a good solution in some networks.

Indicators, directly hanging on the line can be used in all different pole and network configurations. Pole mounted indicators have some limitations to where to install them. If a parallel line runs nearby, if the pole has multiple feeders or if the earth-wire is located between the indicator and the three phases, pole mounted indicators cannot be used. Pole mounted indicators requires a pole as “clean” as possible.

It is a significant difference between the benefit of using fault indicators with communication option compared to indicators with a local flash. **CAHORS system** for remote indication benefits from an effective communication system which allows powering from long-life batteries without any external charging.

Indicators with communication with a central monitoring system (or SCADA) reduce the fault-finding time down to driving time to the faulty section.



Indicators,
directly hanging on the line



Indicators,
installed on the support pole of the line



Sentinel® SL

DISTRIBUTION NETWORKS (6-36 kV)

Sentinel SL is a conductor mounted indicator for detection of PtG (Phase to Ground) and PtP (Phase to Phase) faults in overhead line networks.

The indicator is powered by replaceable long-life lithium batteries which have a life expectancy of 10 years. It provides a 360 degree visibility for indication both for transient faults and permanent faults.



- **Programmable** : Dipswitches.
- **Threshold level** : 250 - 750 A.
- **Trip level di/dt** : 6 - 120 A.
- **Reset** : Manual, timer & automatic y return of voltage or current.
- **Fault Indication** : Permanent (super intensive red LED with strobe effect), Transient (Green LED), Low battery (yellow LED).
- **Mounting** : Live-line mounting with hotstick.

> DISTRIBUTION SYSTEMS

Sentinel SL can be used in line systems/configuration as shown below:



Single Distribution Systems



Distribution Systems with Earth-Wire



Multiple Distribution Systems

> TECHNICAL CHARACTERISTICS

SENTINEL-SL		
Application		
Short circuit and earth fault indication for overhead lines, direct hanging on the line		
MV network		
System network	6-36 kV	
Grounding system	Isolated, resistor or solidly grounded	
Frequency	50 / 60 Hz	
Fault detection		
Sensitivity	Sensitivity threshold	Configurable di/dt : 6, 12, 25, 60 or 120 A or threshold : 250, 500 or 750 A
Timing delay	Fault duration	> 60 ms
	Inrush blocking	5 sec
	CB tripping	Within 5 sec (before the indication of permanent fault)
	Before counting fault	No fault count
Reset	Automatic	30 sec after re-energized line (voltage or current configurable)
	Timer	2, 6, 12, 24 hours
	Manual	By magnet / mounting / reset tool
Indication		
Indicator light	Intensity	< 40 lumens for permanent faults
	Visibility	360°
	Permanent fault	Strobe flash by ultra bright red LED
	Transient fault	Green led (1 flash/5 sec)
	Low battery	Yellow led (1 flash/10 sec) If total time > 5 years or < 20% of total capacity (16,5Ah) left
Relay contact	No indication	
Communication	Communication mode	None
	Frequency	
	Radio range	
	Informations provided	
Power supply		
Power source	1 lithium cell 3,6 V - 16,5 Ah - D size	
Battery change	Normally every 10 years or 2500 flash hours (15 years shelf life)	
Mounting		
Mounting type	Live line mounting on conductor (size 5-36 mm)	
Tool	Grip-all Clamp Hot-stick or magnet/mounting/reset tool with standard Hot-stick	
Housing		
Material	Polycarbonate, UV stabilized	
Dimension	202 x 54 mm	
Weight	345 g include battery	
Environment		
Operating temperature	-40°C to +85°C	
Storage temperature	-40°C to +85°C	
Protection index (EN 60529)	IP 54 (IP 68 upon request)	
Mechanical impact (EN 62262)	IK 09 (10J)	



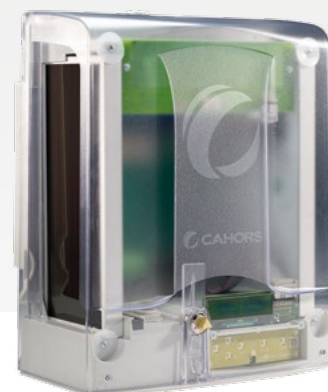
Sentinel® A on pole

DISTRIBUTION NETWORKS (6-36 kV)

Sentinel A on pole is a cost effective pole mounted indicator for detection of PtG (Phase to Ground) and PtP (Phase to Phase) faults until 36kV overhead line networks.

The unit mounts 5-11m below the conductors and monitors all three phases. The indicator is powered by replaceable long-life lithium batteries which have a life expectancy of 10 years (in option, possibility to supply by photovoltaic cells).

It provides a 150 degree visibility for indication both for PtG and PtP permanent faults (amperemetric or directional).



- **Programmable** : By display menu or by bluetooth control.
- **PtG Faults thresholds** : 20 - 240 A.
- **PtP Faults thresholds** : 250 - 900 A.
- **Reset** : Manual, timer & automatic on return of voltage.
- **Fault Indication** : Permanent PtP (two super intensive LEDs with strobe effect : green and red), Permanent PtG (red LED).
- **Mounting** : Live-line mounting with strap-bands.
- **Poles** : Lattice Towers, concrete and wooden poles.

> DISTRIBUTION SYSTEMS

Sentinel A on pole can be used in line systems/configuration as shown below:



Single Distribution Systems

> TECHNICAL CHARACTERISTICS

SENTINEL-A ON POLE		
Application		
Short circuit and earth fault indication for overhead lines, installation on the support pole of the line		
MV network		
System network	6-36 kV	
Grounding system	Resistor or solidly grounded	
Frequency	50 / 60 Hz	
Fault detection		
Sensitivity	Sensitivity threshold	Configurable single phase : 20A to 240 A dual-single phase : 250 A to 900 A multi-phases : 250 A to 900 A
Timing delay	Fault duration	Configurable from 60 to 500 ms
	Inrush blocking	5 sec (desactivable)
	CB tripping (before the indication of permanent fault)	Configurable - 1, 10, 20 or 70 sec
	Before counting fault	3 sec
Reset	Automatic	5 sec after re-energized line (voltage)
	Timer	2, 4, 12, 24 hours
	Manual	by front panel push button
Indication		
Indicator light	Intensity	< 40 lumens for permanents faults
	Visibility	150°
	Permanent fault	Strobe flash by ultra bright red and green LED
	Transient fault	No indication
	Low battery	No indication
Relay contact	None	
Communication	Communication mode	None
	Frequency	
	Radio range	
	Informations provided	
Power supply		
Power source	3 lithium cells 3,6V - 13Ah - D size or 12Vdc external power (-10% /+30%) or built-in photovoltaic panels and ultra capacitor	
Battery change	Normaly every 10 years or 500 flash hours for lithium cells maintenance free for other power models (15 years shelf life)	
Mounting		
Mounting type	On pole	
Tool	Screws or stainless steel strap-bands	
Housing		
Material	Polycarbonate, UV stabilized	
Dimension	320 x 260 x 140 mm	
Weight	2,5 kg (include batteries)	
Environment		
Operating temperature	-25°C to +55°C	
Storage temperature	-40°C to +70°C	
Protection index (EN 60529)	IP 54	
Mechanical impact (EN 62262)	IK 09 (10J)	



Sentinel® SLC

DISTRIBUTION NETWORKS (6-36 kV)

Sentinel SLC is a conductor mounted indicator for detection of PtG (Phase to Ground) and PtP (Phase to Phase) faults in overhead line networks with local radio communication.

The indicator is powered by replaceable long-life lithium batteries which have a life expectancy of 7-10 years. It provides a 360 degree visibility for indication both for transient faults and permanent faults.

The indicator unit has the same detection/sensing principles as the local indicator **Sentinel SL**. The difference is that it is equipped with a built-in 2.4GHz radio device that can communicate with a receiver located underneath the indicators.

The **Sentinel SLC** can communicate with one type of receiver model :

- **Collector for Sentinel SLC & SLC + I:** Communication module with built-in GSM module for two-way communication with an Android application or a central unit/SCADA.



- **Programmable** : Dipswitches or remotely through GSM or hand-held unit from ground.
- **Threshold level** : 250 to 750 A.
- **Trip level di/dt** : 6 to 120 A.
- **Reset** : Manual, timer & automatic by return of voltage or current or remotely through GSM.
- **Fault Indication** : Permanent (super intensive red LED with strobe effect), Transient (green LED)
Low Battery (yellow LED).
- **Mounting** : Live-line mounting with hotstick.

> DISTRIBUTION SYSTEMS

Sentinel SLC can be used in line systems/configuration as shown below:



Single Distribution Systems



Distribution Systems with Earth-Wire



Multiple Distribution Systems

> TECHNICAL CHARACTERISTICS

SENTINEL-SLC		
Application		
Short circuit and earth fault indication for overhead lines, direct hanging on the line		
MV network		
System network	6-36 kV	
Grounding system	Isolated, resistor or solidly grounded	
Frequency	50 / 60 Hz	
Fault detection		
Sensitivity	Sensitivity threshold	Configurable di/dt : 6, 12, 25, 60 or 120 A or threshold : 250, 500 or 750 A
Timing delay	Fault duration	> 60 ms
	Inrush blocking	5 sec
	CB tripping	within 5 sec (before the indication of permanent fault)
	Before counting fault	No fault count
Reset	Automatic	30 sec after re-energized line (voltage or current configurable)
	Timer	2, 6, 12, 24 hours
	Manual	by magnet / mounting / reset tool
Indication		
Indicator light	Intensity	< 40 lumens for permanents faults
	Visibility	360°
	Permanent fault	Strobe flash by ultra bright red LED
	Transient fault	Green led (1 flash/5 sec)
	Low battery	Yellow led (1 flash/10 sec) if total time >5 years or <20% of total capacity (16,5Ah) left
Relay contact	No indication	
Communication (in combination with Sentinel-Collector)	Communication mode	Short Range Radio Device
	Frequency	ISM-band. 2,4GHz - License Free - 1 mW maximum
	Radio range	Up to 30m, line of sight
	Informations provided	Indication of fault detections
Power supply		
Power source	1 lithium cell 3,6V - 16,5Ah - D size	
Battery change	Normally every 7-10 years or 1500 flash hours (15 years shelf life)	
Mounting		
Mounting type	Live line mounting on conductor (size 5-36 mm)	
Tool	Grip-all Clamp Hot-stick or magnet/mounting/reset tool with standard Hot-stick	
Housing		
Material	Polycarbonate, UV stabilized	
Dimension	202 x 54 mm	
Weight	460 g (include battery)	
Environment		
Operating temperature	-40°C to +85°C	
Storage temperature	-40°C to +85°C	
Protection index (EN 60529)	IP 54 (IP 68 upon request)	
Mechanical impact (EN 62262)	IK 09 (10J)	



Sentinel® SLC+I

DISTRIBUTION NETWORKS (6-36 kV)

Sentinel SLC + I is a conductor mounted indicator for detection of PtG (Phase to Ground) and PtP (Phase to Phase) faults in overhead line networks with local radio communication and current measurement.

The indicator is powered by replaceable long-life lithium batteries which have a life expectancy of 7-10 years. It provides a 360 degree visibility for indication both for transient faults and permanent faults. Load current measurement is also provided.

The indicator unit has the same detection/sensing principles as the local indicator **Sentinel SL**. The difference is that it is equipped with a built-in 2.4 GHz radio device that can communicate with a receiver located underneath the indicators.

The **Sentinel SLC + I** can communicate with one type of receiver model:

- **Collector for Sentinel SLC & SLC + I:** Communication module with built-in GSM module for two-way communication with an Android application or a central unit/SCADA.



- **Programmable** : Dipswitches or remotely through GSM or hand-held unit from ground.
- **Threshold level** : 250 to 750 A.
- **Trip level di/dt** : 6 to 120 A.
- **Reset** : Manual, timer & automatic by return of voltage or current or remotely through GSM.
- **Fault Indication** : Permanent (super intensive red LED with strobe effect), Transient (green LED), Low Battery (yellow LED).
- **Mounting** : Live-line mounting with hotstick.

> DISTRIBUTION SYSTEMS

Sentinel SLC + I can be used in line systems/configuration as shown below:



Single Distribution Systems



Distribution Systems with Earth-Wire



Multiple Distribution Systems

> TECHNICAL CHARACTERISTICS

SENTINEL-SLC + I		
Application		
Short circuit and earth fault indication for overhead lines, direct hanging on the line		
MV network		
System network	6-36 kV	
Grounding system	Isolated, resistor or solidly grounded	
Frequency	50 / 60 Hz	
Fault detection		
Sensitivity	Sensitivity threshold	Configurable di/dt : 6, 12, 25, 60 or 120 A or threshold : 250, 500 or 750 A
Timing delay	Fault duration	> 60 ms
	Inrush blocking	5 sec
	CB tripping	within 5 sec (before the indication of permanent fault)
	Before counting fault	No fault count
Reset	Automatic	30 sec after re-energized line (voltage or current configurable)
	Timer	2, 6, 12, 24 hours
	Manual	by magnet / mounting / reset tool
Indication		
Indicator light	Intensity	< 40 lumens for permanents faults
	Visibility	360°
	Permanent fault	Strobe flash by ultra bright red LED
	Transient fault	Green led (1 flash/5 sec)
	Low battery	Yellow led (1 flash/10 sec) if total time >5 years or <20% of total capacity (16,5Ah) left
Relay contact	No indication	
Communication (in combination with Sentinel-Collector)	Communication mode	Short Range Radio Device
	Frequency	ISM-band. 2,4GHz - License Free - 1 mW maximum
	Radio range	Up to 30m, line of sight
	Informations provided	Indication of fault detections load current monitoring
Power supply		
Power source	1 lithium cell 3,6V - 16,5Ah - D size	
Battery change	Normally every 7-10 years or 1500 flash hours (15 years shelf life)	
Mounting		
Mounting type	Live line mounting on conductor (size 5-36 mm)	
Tool	Grip-all Clamp Hot-stick or magnet/mounting/reset tool with standard Hot-stick	
Housing		
Material	Polycarbonate, UV stabilized	
Dimension	202 x 54 mm	
Weight	460 g (include battery)	
Environment		
Operating temperature	-40°C to +85°C	
Storage temperature	-40°C to +85°C	
Protection index (EN 60529)	IP 54 (IP 68 upon request)	
Mechanical impact (EN 62262)	IK 09 (10J)	



Collector for Sentinel® SLC & SLC+I

DISTRIBUTION NETWORKS (6-36 kV)

The **Collector for Sentinel SLC & SLC + I** is a pole mounted communication device used for communication with up to 9 fault **Sentinel SLC** or **Sentinel SLC + I** conductor mounted fault passage indicators.

The **collector for Sentinel SLC & SLC + I** uses a 2.4 GHz ISM band radio to communicate with 9 fault detectors within a radius of up to 40 m. The alarm messages of the fault indicators are sent to the operator via SMS (Short Message Service) via the GSM network.



Collector for Sentinel SLC & SLC + I sends the following alarms/messages to the receiver :

- Status OK (no faults and line energized)
- Transient Fault Alarm
- Permanent Fault Alarm
- Loss of Voltage (line de-energized)
- Low Battery Warning from Indicators
- Low Battery Warning from Collector unit
- Communication lost with indicator(s)
- Heartbeat message (health check)

> ALARM MANAGEMENT

The alarm messages sent to the control center will contain information about which phase the fault is on as well as the time the event occurred.

All events will also be stored in the Collector (128 last events) and the log can be uploaded to a computer through the GSM interface.

The collector can store the configuration settings for the indicators and all configuration settings are possible to upload to the connected indicators at any time.

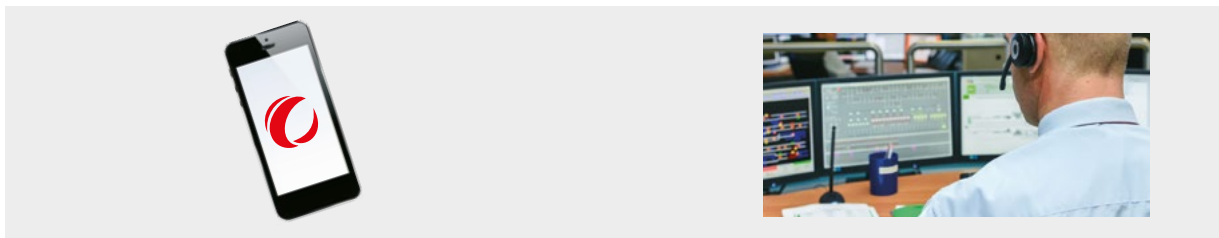
Configuration settings are also possible to be changed from the central unit making it unnecessary to go out in the field to change any configuration in the collector or the indicators.

Collector for Sentinel SLC & SLC + I can communicate with 3, 6 or 9 fault indicators (**Sentinel SLC** or **Sentinel SLC + I**).

The collector sends alarms through SMS and can be setup with three different recipient numbers.

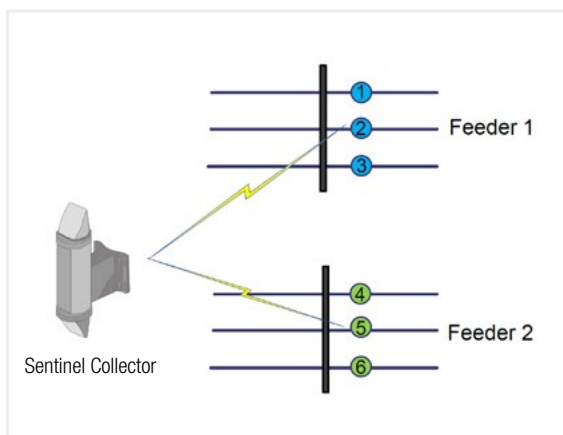
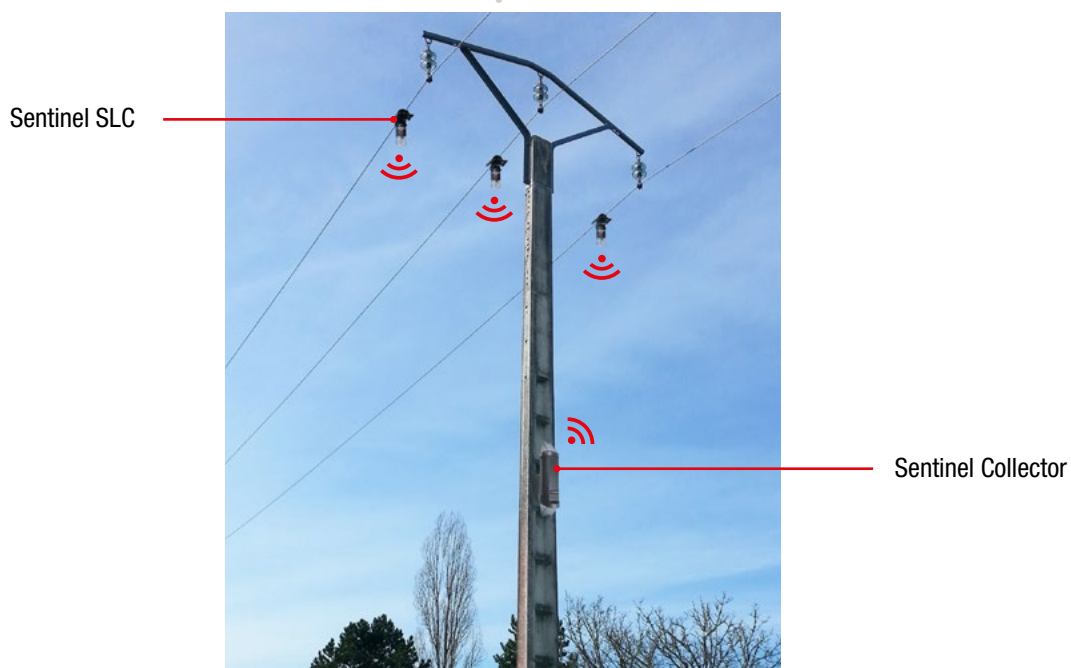
Collector for Sentinel SLC & SLC + I has also a message-forwarding filter where it is possible to route specific alarms to specific numbers. This feature is very useful when important alarms such as Permanent Fault should be sent to the SCADA system and less important alarms (e.g. low battery) to the maintenance department.

Sentinel SL with communication

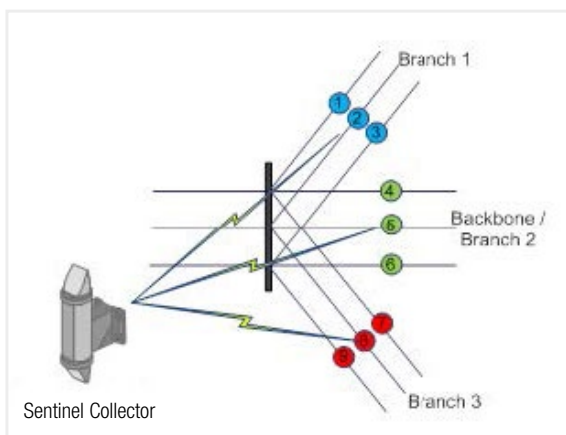


SmartAPP configuration tools

Ivision SC



Parallel feeders or multiple feeders in the same pole



T-offs and branch points

> TECHNICAL CHARACTERISTICS

COLLECTOR FOR SENTINEL-SLC OR SLC+I	
Application	
GSM Communication Unit for Sentinel-SLC & SLC+I	
Short range radio device	
Communication	Communication mode
	Inputs
	Frequency
	Radio range
GSM module	
Communication mode	SMS messages
Informations provided	Status ok
	Transient fault alarm
	Permanent fault alarm
	Loss of voltage (line de-energized)
	Loss battery warning from indicators
	Loss battery warning from collector unit
	Communication lost with indicator
	Heartbeat message
Power supply	
Power source	2 lithium cells 3,6V - 16,5Ah - D size
Mounting	
Mounting type	Screws or Stainless steel strap-bands
Housing	
Material	Polycarbonate, UV stabilized
Dimension	380 x 98 x 200 mm
Weight	1,3 kg (include battery)
Environment	
Operating temperature	-25°C to +70°C
Storage temperature	-25°C to +70°C
Protection index (EN 60529)	IP 54
Mechanical impact (EN 62262)	IK 09 (10J)

Accessories

> MOUNTING / RESET / TEST TOOL KBN-4



- Mounting tool for Sentinel SL, SLC and SLC + I.
- The KBN-4 can be used with a standard hot-stick as shown in the picture. The KBN-4 have a built-in magnet for Test/reset of the indicator.
- It is however possible to mount/dismount the Indicators without the KBN-4, using a “grip-all-clamp” hot-stick.



> FIELD DEVICE PROGRAMMING

AND USB-SERIAL ADAPTER FDP-15



- The FDP-15 hand-held configuration tool is a field programming device where one configuration can be stored.
- Uploading parameters to FDP-15 is done by connecting it to a PC with USB-cable running Netsense FDP configuration utility.
- The Netsense FDP configuration utility can also be used to send configuration settings directly to collectors with the USB-serial adapter.



USB-serial adapter



Sentinel smartAPP®

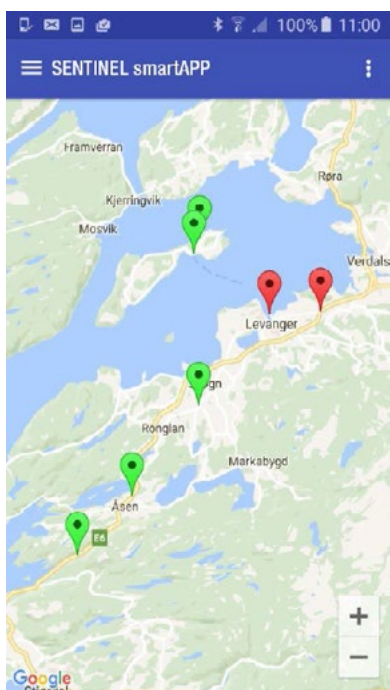
APPLICATION FOR FAULT PASSAGE INDICATORS MONITORING

CAHORS' Sentinel smartAPP is available for Android smartphones (version 5 and above) and is an effective tool for monitoring fault indicators. Using the smartphones integrated map functions it will give driving directions to the faulty location only by one tap on the screen.

This App does not replace IVision-SC microSCADA or systems as the primary monitoring central. It is intended to be an additional service for the network managers to be able to quickly identify the fault location on a map and get the fastest and easiest driving guidance to the faulty location.

However, in smaller systems with only a few indicators it can be used as the only monitoring point. This is especially cost-effective in test installations.

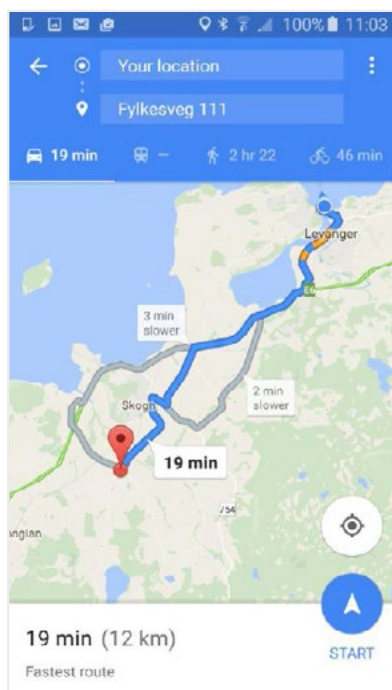
> USING THE MAP



When a fault message is sent from a field unit to the App, the green icon showing an indicator turns red.

On feeders with several indicators downstream, all icons from the breaker to the fault will turn red.

It is only necessary to select the last red icon on the feeder.



The **Sentinel smartAPP** only gives data to the Google maps service on the smartphone.

The route guidance is started as a separate App. **Sentinel smartAPP** will continue to run in the background and receive and store new incoming messages even if the navigation feature runs.

Sentinel SL with communication



SmartAPP configuration tools



IVision® SC (mini SCADA)

A COMMUNICATING SUPERVISION SYSTEM

IVision® SC is a “mini SCADA” system so that electricity utilities can remotely monitor and control their MV networks and improve the quality of electrical service.

IVision® SC can manage several permanent or semi-permanent communication channels (communication protocols: Modbus, IEC 870, DNP3 or other).

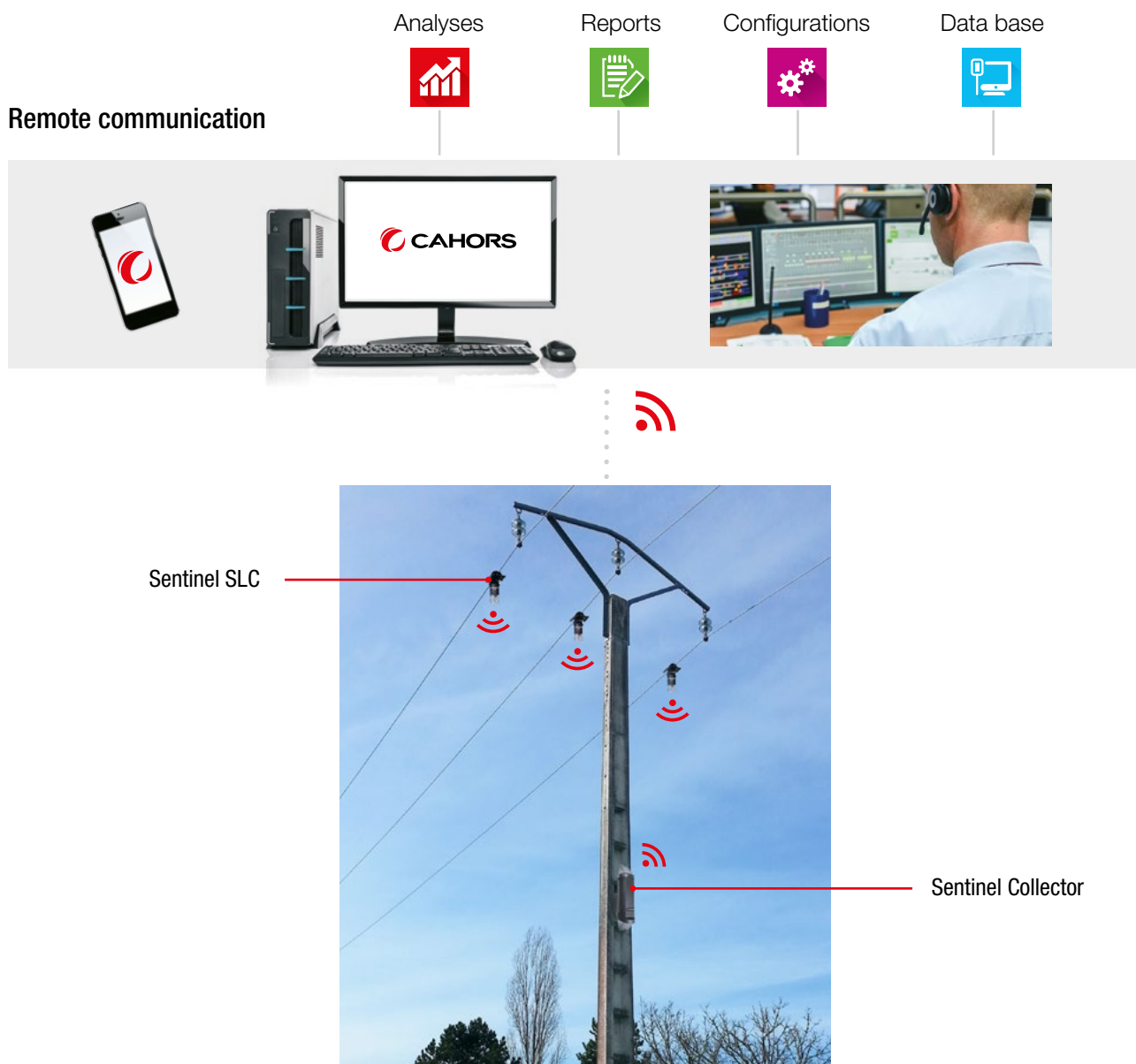
IVision® SC is already configured to function with **CAHORS** MV network management products. In operation, **IVision® SC** enables remote monitoring and control of the products installed on the MV network thanks to its ability to control: alarms and events, remote controls and time based synchronisation.

> TECHNICAL CHARACTERISTICS

OPERATING SYSTEM	
OS type	Windows XP, Vista, 7, 8, 10
COMMUNICATION	
Number of communication ports	1 to 10 (for more, contact us)
Type of ports	RS232, RS485, Ethernet, PTSN, GSM/GPRS LL, Private Radio, optical fiber, SHDSL...
Protocols	Modbus-RTU, Modbus-IP, IEC870-5-101 and 104, DNP3, DNP3-IP (for other, contact us)
Timestamped events	Yes, at source
Redundancy communication with substations	Yes
Time Synchronization	Yes
GRID MANAGEMENT	
Synoptic overview of the network	
Network visualization	Geographic visualization of the electricity grid and substations
Selecting a substation	Direct on the network overview or by names using a combo list
Zoom functions	Yes
Alarm management	Global alarm banner
Access controls	Operator configuration: name, password, authorized functions
Synoptic overview of the substation	
Substation visualization	<ul style="list-style-type: none"> • Single line diagram of the substation • Remote signaling • Telemetry
Switches, CB controls	Dual remote commands Protected by password
Telemetry	Access button to display load curves
Alarm management	Substation alarm banner
Historical management	Historical banner of the substation

CONFIGURATOR	
Integration	Built-in
Function	Automatic generation of variables, synoptic and settings of a substation from the preconfigured objects «CAHORS».
ARCHITECTURES	
Mono station	2 default screens (for other, contact us) : <ul style="list-style-type: none"> • 1 for network overview • 1 for substation single line diagram
Multi-station (client)	Floating (without dongle) limited in duration (4 hours) and number connections or permanent with dongle
Web server	Local access or Web site

> IVISION® SC SCHEME



Commercial Network

CAHORS INTERNATIONAL

AFRICA

CAHORS MOROCCO

Tel: +212 522 53 63 10
commercial@oge-maroc.com

CAHORS in SENEGAL

Tel: +33 677 062 574
catherine.sigal@groupe-cahors.com
sales.support@groupe-cahors.com

CAHORS INTERNATIONAL

For all other African countries
Tel: +33 (0)5 65 35 82 01
sales.support@groupe-cahors.com

ASIA

CAHORS CHINA

Tel: +86 532 8690 7072
lei.lei@groupe-cahors.cn

CAHORS INDIA

Tel: +91 (0) 20 66 49 53 00
sales.support@groupe-cahors.in

CAHORS INTERNATIONAL

For all other Asian countries
Tel: +33 (0)5 65 35 82 01
sales.support@groupe-cahors.com

EUROPE

CAHORS SPAIN

Tel: +34 972 52 60 00
cahors@cahors.es

CAHORS INTERNATIONAL

For all other European countries
Tel: +33 (0)5 65 35 82 01
sales.support@groupe-cahors.com

SOUTH AMERICA

CAHORS SPAIN

Tel: +34 972 52 60 00
cahors@cahors.es

OTHER DESTINATIONS

CAHORS INTERNATIONAL

Tel: +33 (0)5 65 35 82 01
sales.support@groupe-cahors.com



MEDIUM VOLTAGE DIVISION

CRDE, a society of Groupe CAHORS

ZI des Grands Camps • BP 9 • 46090 Mercuès
Tél. +33 (0)5 65 30 38 10 • Fax +33 (0)5 65 20 09 17
www.groupe-cahors.com

