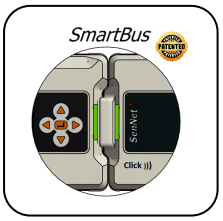
SenNet



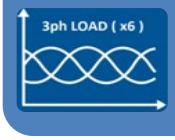
-Series 200-

SenNet IoT DL 290 / 291

Data logger Series 200 with embedded Linux OS with graphical interface, side expansion bus (SmartBus), option for integrated electrical meters, WWAN communications and LongNet radio network.

IoT DL 291

Internal meters:
3 three-phase or
9 single-phase



IoT DL 290

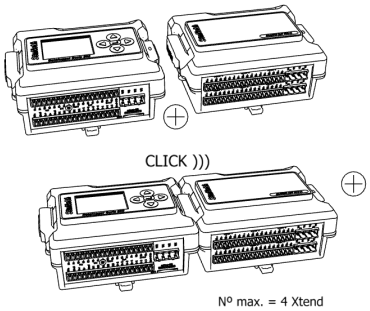
TFT 2" (320x240) / SmartBus / WWAN (LTE) / RFNet / RS485 / RS232 / RS232 (console) / 4 digital outputs / 3 digital inputs / 4 GB internal storage memory / external micro-SD up to 16 GB / LongNet radio technology.

IoT DL 290:

IoT DL 291:

General Features			
Power supply	8v...30Vdc (6–10 W depending on functionality and extensions)		
Conectivity	Ethernet 10/100Mbps	WWAN (LTE-3GPP) (SMA-female) *On request	
Graphic interface	2" TFT graphic interface (320x240), 65k colors – backlit		
SmartBus **(patented)**	Side expansion bus (up to 4 Xtend modules)		
Communications	RS485	RS232	RS232 (console)
Inputs/outputs	4 digital inputs	3 digital outputs (Vinput @100mA)	1 auxiliary power output (5 V @ 300 mA)
OS / processor	Linux 3.8.13 (security-certified distribution – anti-intrusion)		ARM® Cortex®-A8-based (800 MHz)
RAM / eMMC	512MB		4GB
External micro-SD slot	Up to 16 GB – industrial card (not included)		
Battery	Internal backup battery (approx. 45 minutes)		
RFNet	868 MHz / 915 MHz @ 12 mW (SMA-female)		
RF LongNet 2.0 *On request*	433 MHz @ 10 mW / 869 MHz (EU) – 915 MHz (US) @ 25 mW RX sensitivity –124 dBm		
Internal energy meter **DL291 (x3)** **DL291/1**	• Energy (reactive – active – apparent) • Power (reactive – active – apparent) • Power factor • Current • Frequency • Advanced power quality functions (micro-cuts / over-voltage ...) • Harmonics (model DL291H only in the version with three analyzers)		

SmartBus (patent- propietary)



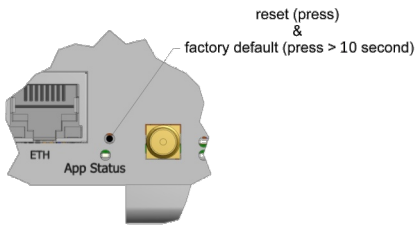
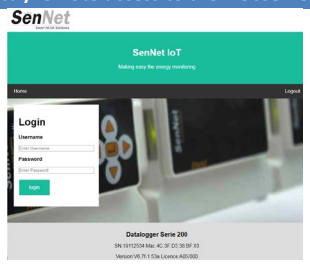
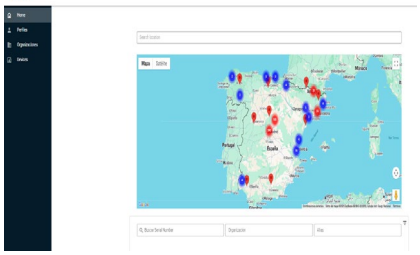
Application Access

Our data logger includes a webserver graphical interface that allows configuring its different functions through a web browser. To log in to the web interface, manually enter the IP address and user/password* in the browser.

Web server access: https://192.168.1.35:8080 User: admin_dl
Password: sennet$$

* *(These are default credentials; users are advised to change them for greater security).*

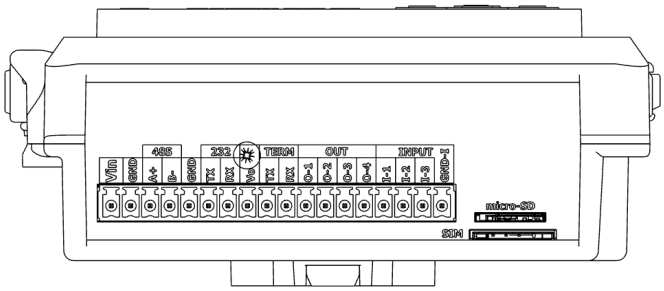
The table shows the different options to access the data logger configuration: local, remote, or through the management platform.

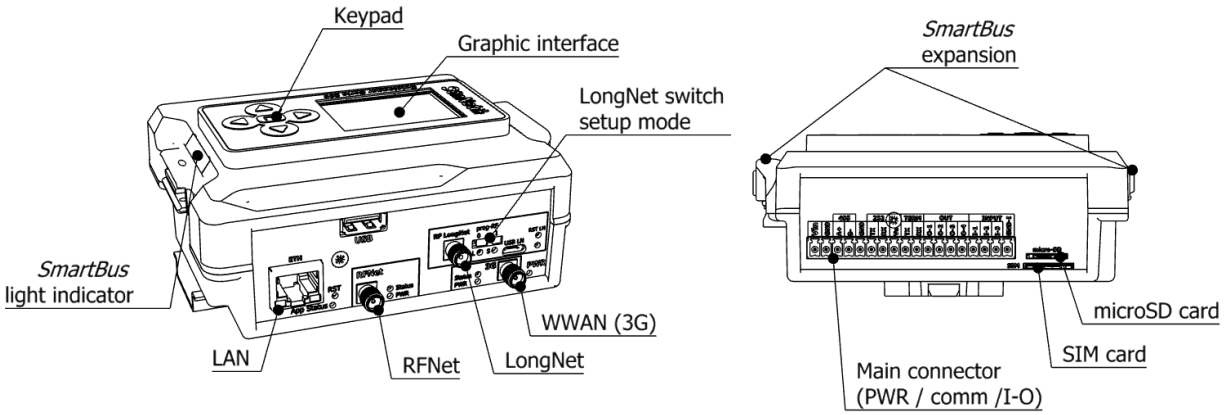
Restore original local IP (press >10 s)	Local/remote access to the webserver	Global management platform: *Device Manager*
		

Data Logger Wiring

The device can be powered via batteries or with a stabilized external power supply.
For increased safety, we recommend using a 2 A fuse on the device's power line and grounding the device.

Terminals		Description
1	+	Power supply
2	-	
3	A	RS485
4	B	
5	GND	
6	TX1	RS232
7	RX1	
8	Vout-Aux	Auxiliary power output
9	TX2	RS232 (console)
10	RX2	
11	Out-1	Digital outputs 8–30 VDC @ 100 mA max.
12	Out-2	
13	Out-3	
14	Out-4	
15	In-1	Digital inputs 8–30 VDC range
16	In-2	
17	In-3	
18	GND-In	Input GND; option to isolate the digital inputs





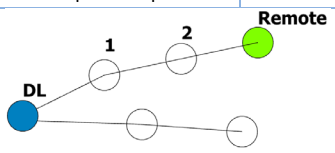
RFNet

Through the proprietary RFNet radio network, it is possible to extend a network to communicate with any type of device, perform measurements of temperature / humidity / illuminance / presence / CO2 / pulses, as well as the SenNet Compact Meter analyzer series.

	Frecuency	Modulation	Over-the-air rate	Standard
EU version	868MHz	BPSK	20kbit/s	IEEE 802.15.4-2006
US version	915MHz	BPSK	40kbit/s	IEEE 802.15.4-2006

RF characteristics	
Number of RF channels	1
RX sensitivity	-110dBm
TX power	11 dBm (12mW)

The RFNet protocol is developed on the ZigBee PRO and ZigBee physical layer, with the installation flexibility of such networks.
It is characterized as a Mesh-type network (self-configuring), with the possibility of applying the repeater role to devices with constant power supply.

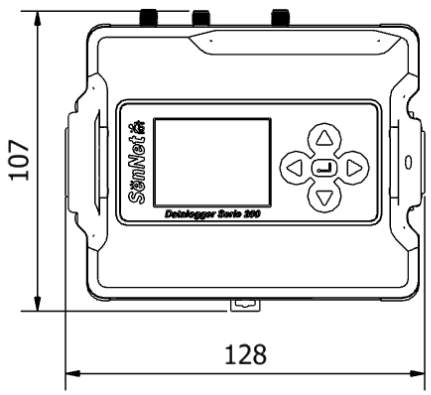
		Mesh network (self-configuring)	
Roles		Maximum number of hops via Repeater	2
Coordinator	Data logger		
Repeater / End point	RS232-485 Gateway / Compact Meter-RF / CO2 / Repeater (bidirectional communication)		
End point	THL-I / THL-IM / T-RF / PC-RF (unidirectional communication)		

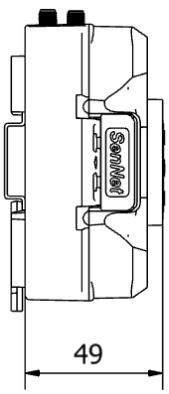
(*) *It is possible to exceed this number of hops only when connected devices are end points with unidirectional communication.*

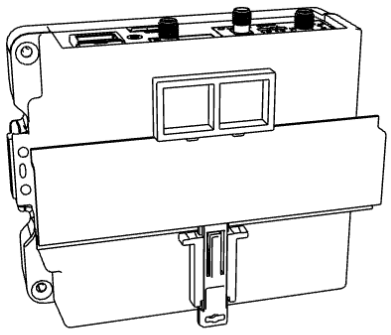
Standards / Enclosure / Mounting

Environmental characteristics	
Operating temperature	-20ºC...+60ºC
Storage temperature	-20ºC...+75ºC
Enclosure	
Dimensions	128 x 107 x 49 mm
Mounting	Carril DIN (DIN46277)
Protection rating	IP40
Material	ABS – V0 self-extinguishing
Standards	
	UNE-EN 60950-1:2007
	UNE-EN61000-6-1:2007
	UNE-EN61000-6-3:2007
	UNE-EN 55 022:2011 / UNE-EN 55 024:2011
	EN 301489-11.9.2
Security	Anti-intrusion security certificate

CobaltBond technology services
Security certifier





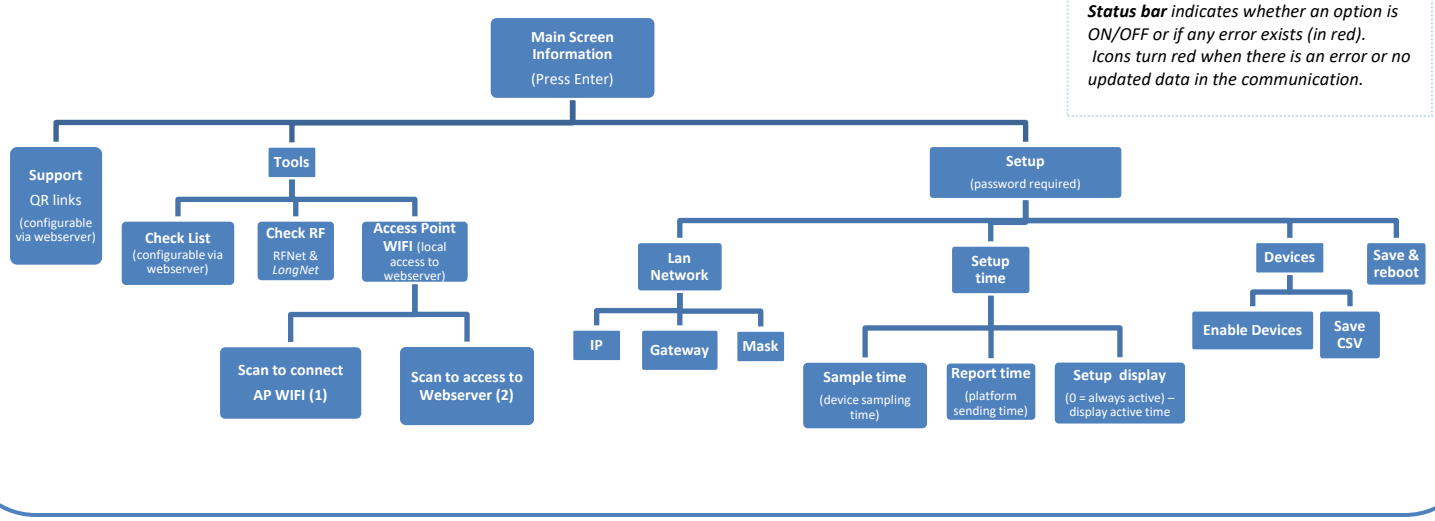


Rail DIN support

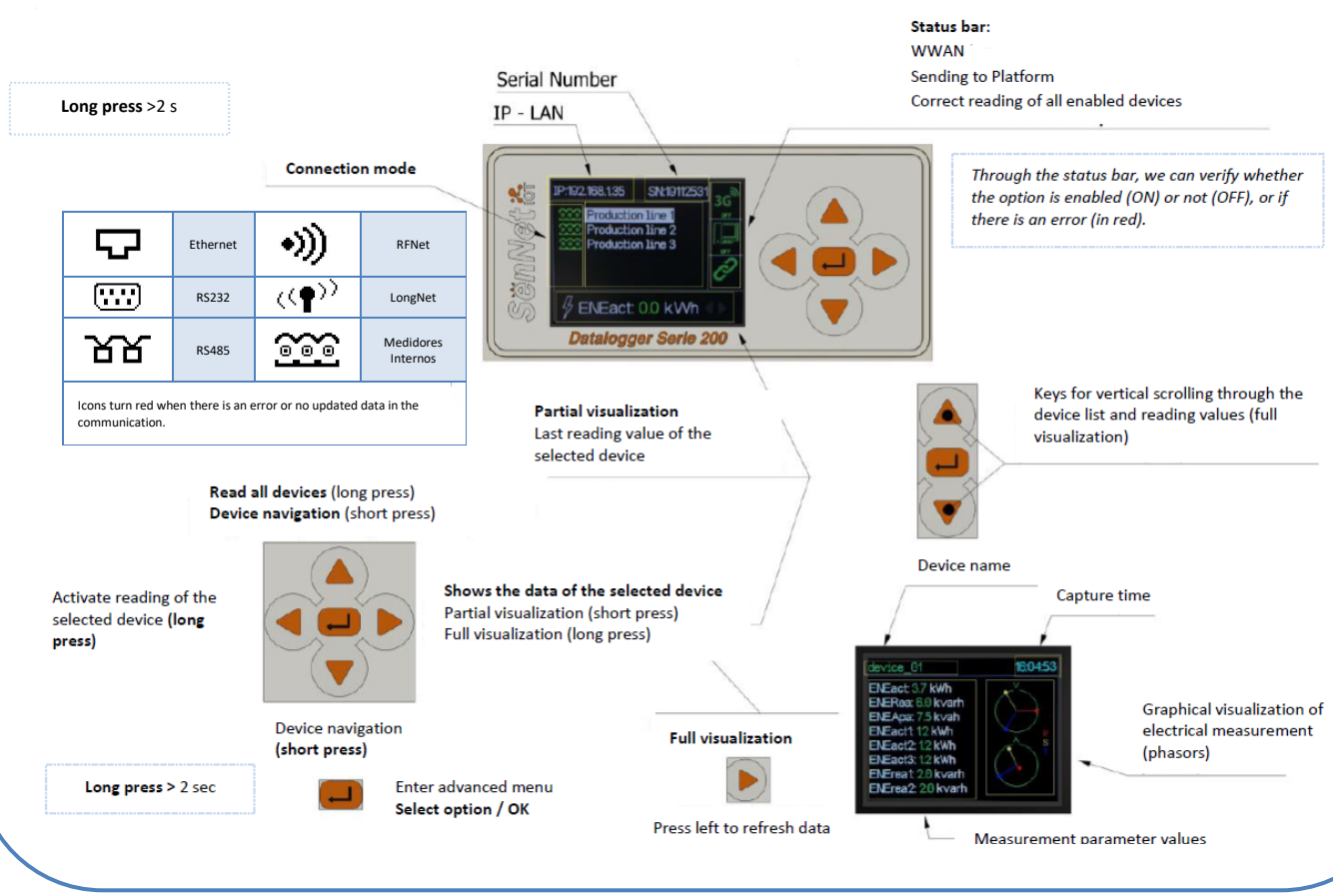
Screen Menu

Using the screen and keypad, it is possible to quickly access captured data as well as configuration and installation check options.

Main Screen Information



Main screen information



EXPANSION MODULES:

RF LongNet 2.0 Module

Long-range radio network; due to its narrowband emission characteristics, it has high sensitivity and immunity to noise/interference, providing superior coverage. The new LongNet 2.0 version offers significant improvements in sensitivity, organization, and synchronization among remotes and is compatible with previous hardware versions.
The RF architecture is star-type with the possibility of using repeaters to increase range.

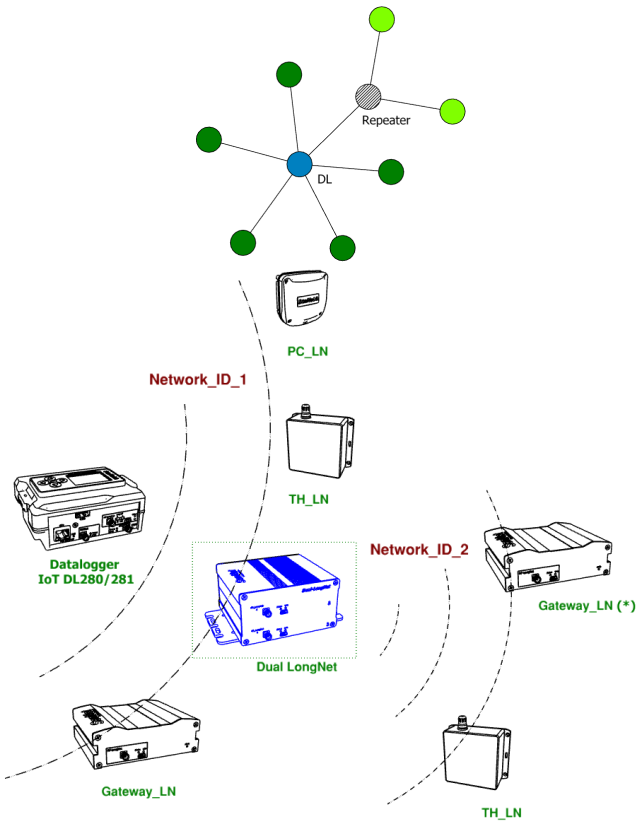
LongNet remotes can perform:
- **Environmental sensing:** Temperature / Humidity / CO2 / Suspended particles / PIR (presence detection) / VOC
- **Electrical meters:** Single Meter / Compact Meter (3 integrated meters)
- **Gateway:** RS232/RS485
- **Pulse Counter:** For pulse counter measurements

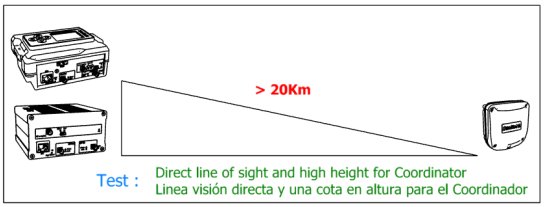
This list is subject to change or extended features without notice.

Characteristics

RF Versions	433 Band
Frecuency	433.99MHZ
TX power	10mW
RX sensitivity	-124dBm @ 300bps
Minimum channelization bandwidth	6.25KHz
Modulations	2-FSK / 2-GFSK / 4-FSK / 4GFSK
Over-the-air rate	300bps 50kbps
Max RF buffer	125 bytes

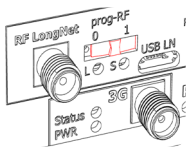
Default configuration	300bps @ 2FSK @ 6.25KHz



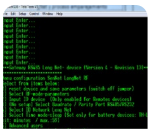


- Pairing process: Each data logger is assigned a "Network ID" that matches the last 6 digits of its serial number. Each remote device to be added to this network must be set with this "Network ID". Two methods:
  - Via the configuration console (micro-USB port), manual setup.
  - Automatic pairing, as follows:

Datalogger	Access to LongNet configuration & pairing



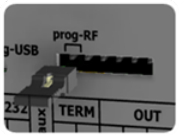
1st step (LongNet DL):
- *Set prog-RF switch to '1'*



For 30 seconds: access console mode to change LongNet parameters.

After 30 seconds: a pairing beacon is sent to remote devices in listening mode.

Remote	Pairing a remote device



1st step (Remote): Insert jumper and wait 30 seconds.

20-second period to receive pairing beacon.

Continuous blinking for 5 seconds → **Paired!**

Note: After each pairing process, reboot both data logger and remote devices.

WWAN LTE Module LTE

OEM expansion for WWAN communications using LTE-3GPP technology, providing the DL29X model with fast and stable internet connectivity. It has two front SMA female connectors for antenna connection and a front opening for micro-SIM insertion.

Module technical characteristics:

Coverage	Global
Technology	LTE Cat 1 (3GPP Rel-10) and VoLTE
Data rate	10 Mbps / 5 Mbps
LTE bands	WWX (FDD: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B18, B19, B20, B25, B26, B28)
Protocols	IPv4/IPv6, TCP/UDP, control AT, FOTA/OTA
Power	Typical 3.8 VDC (Range 3.3–4.2 V)
Temperature	–40 °C a +85 °C
Connection	SMA female MAIN / SMA female AUX
SIM type	MicroSIM
Approvals	GCF (global) / FCC/IC/PTCRB/RCM

Front views with different mounting options:

DL290/DL291

DL290/DL291 + LongNet Module

DL290/DL291 + LTE Module

DL290/DL291 + LTE Module + LongNet Module

Integrated Meters

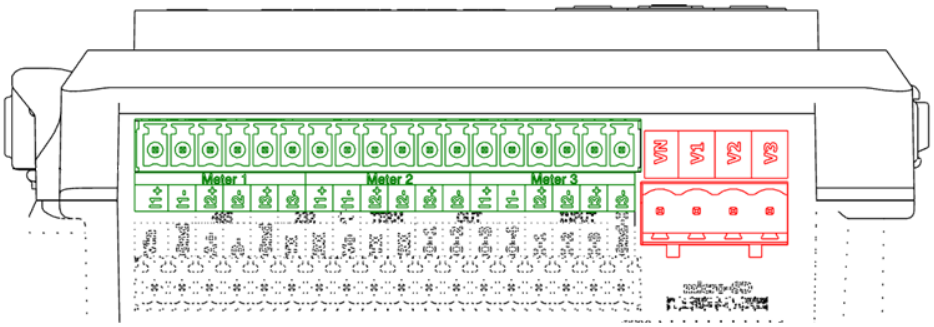
With the meters integrated into the data logger itself, you can perform the tasks of a power analyzer with supply quality, all embedded in the data logger, controlled by the APP and configurable via the webserver or Device Manager.

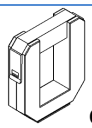
Data logger versions with integrated analyzers:

3 three-phase meters / 9 single-phase meters	**DL291**	
	DL291H	With harmonic analysis
1 three-phase meter or 3 single-phase meters	**DL291/1**	

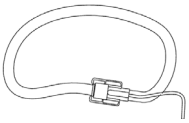
Wiring for Current and Voltage Reference

IoT DL 271 IoT DL 281	Current reference meter 1 -Meter 1-						Current reference meter 2 -Meter 2-						Current reference meter 3 -Meter 3-						Voltage references Medidor 1-2-3			
	I1+ (1)	I1- (2)	I2+ (3)	I2- (4)	I3+ (5)	I3- (6)	I1+ (7)	I1- (8)	I2+ (9)	I2- (10)	I3+ (11)	I3- (12)	I1+ (13)	I1- (14)	I2+ (15)	I2- (16)	I3+ (17)	I3- (18)	Vn (19)	V1 (20)	V2 (21)	V3 (22)





CT 0.33VAC



Flexible probe

Voltage Reference

Range	110-220/240VAC (CAT III – 400V)
Frecuency	50-60Hz
Isolation	2.5Kv @ 60seg
Consumption	0.1 VA per phase
Accuracy	Class 0.2 (+/-0.2%)
⚠	*A protective device prior to this reference tap is recommended.*

Current Reference

Current measurement accuracy: Class 0.2 (±0.2%)
SenNet CT (0.33 V) and flexible probes can be used depending on the current range to be measured.

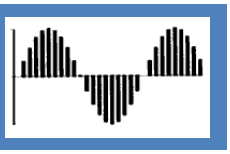
Transformer types	Measurement range	Output	Accuracy
CT 50	1....50 A	0.33VAC	+/-1% (5%....100% In)
CT 100	1....100 A	0.33VAC	+/-1% (5%....100% In)
CT 150	1....150 A	0.33VAC	+/-1% (5%....100% In)
CT 400	1....400 A	0.33VAC	+/-1% (5%....100% In)
CT 800	1....800 A	0.33VAC	+/-1% (5%....100% In)
Flexible 5000 (7cm ¬) (*)	10....5000 A	Rogowski	+/-1% (centering the cable to be measured)
Flexible 5000 (12cm ¬) (*)	10....5000 A	Rogowski	+/-1% (centering the cable to be measured)
Flexible 5000 (20cm ¬) (*)	10....5000 A	Rogowski	+/-1% (centering the cable to be measured)

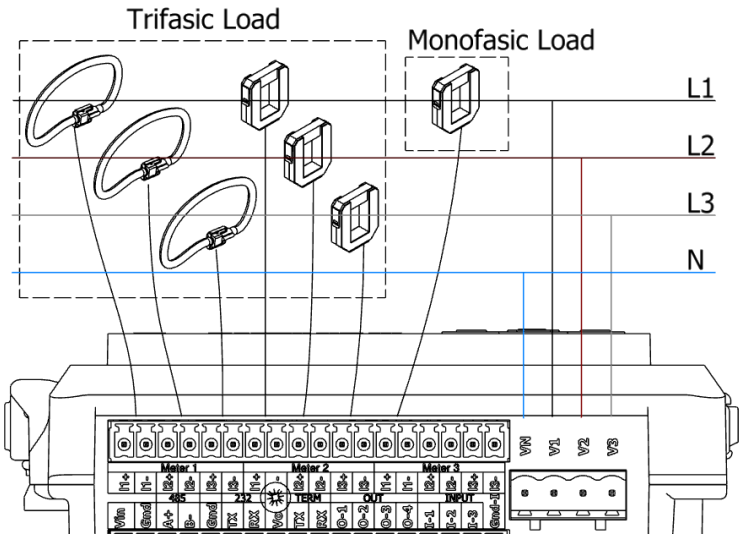
(*)Using SenNet flexible probes, we certify Class 1 measurement, factory-calibrated together with the data logger.

Current measurement accuracies		
Internal meters + SenNet CT transformer	Class 1	
Internal meters + SenNet flexible	Class 1	Factory-calibrated

Isolation	
CT transformer	2.5KV / 0.5mA / 3seg
Flexible	600V CAT IV

Measurement Acquisition	
Current channel sampling	8000 samples / seg
Voltage channel sampling	8000 samples / seg
Resolution	24 bits
Zero-cross sampling	62.5 useg





Example connections for single-phase and three-phase loads. Both configurations can be alternated in the meters. With pre-calibrated SenNet flexible probes, it is important to maintain the order to preserve **Class 1** accuracy.

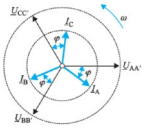
Measurement accuracy	
Voltage/Current	Class 0.2 (+/-0.2%)
Power	Class 1* (+/-1%)
Energy	Class 1* (+/-1%)
Harmonics	Class 1 (+/-1%)

(*) **Class 0.5 (±0.5%)** optional service to obtain this class in the measurement.

For the version with harmonic analysis—both current (% THD I) and voltage (% THD V)—the different options can be configured through the application:

- Without harmonics
- Total + harmonics 3 – 5 – 7 (most recommended option)
- Total + harmonics 2…16

Installation helper tools in the graphical interface:

	**Phasor analysis (voltage/current)**	Visual tool to detect angle and magnitude of the measurement.	
	**Configurable check list**	Software tool (configured from the webserver) to establish verification steps and confirm correct installation	
	QR code	Links to online documentation and videos for installation support	

Warranty

Satel Spain guarantees its products against any manufacturing defects for a period of 1 year.

No material will be accepted for return nor will any equipment be repaired unless accompanied by a report (RMA) indicating the defect observed or the reasons for the return.

The warranty will be void if the equipment has suffered “misuse” or if the storage, installation, or maintenance instructions in this manual are not followed. “Misuse” is defined as any use or storage contrary to the National Electrical Code or that exceeds the limits indicated in this manual.

Satel Spain declines all responsibility for possible damages to the equipment or other parts of the installation and will not cover possible penalties derived from a possible failure, poor installation, or “misuse” of the equipment. Consequently, the warranty does not apply in the following cases:

- Due to over-voltage and/or electrical disturbances in the supply.
- Due to water, if the product does not have the appropriate IP rating.
- Due to exposing the equipment to extreme temperatures exceeding the operating or storage limits.
- Due to product modification by the customer without prior notice to Satel Spain.

Keep this technical sheet updated in case of possible errata.