24/7 ASSET MONITORING SOLUTION
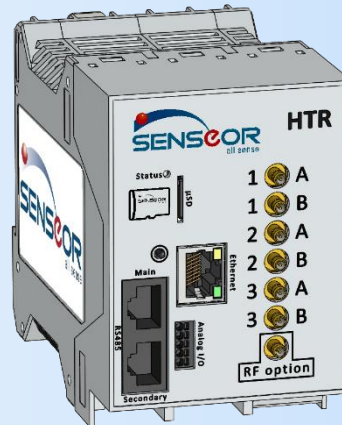
HTR02 USER MANUAL

SENSeOR (head office)

Bâtiment Natura 2
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Maurice Donat
06250 Mougins
France

ISO 9001:2015
BUREAU VERITAS
Certification

Contact address:
support.senseor@wika.com

Regional distributors

Visit www.senseor.com for the latest distribution locations.

WIKA

WARRANTY

These products are warranted to be free from functional defects in material and in workmanship at the time of the manufacturing and to conform at that time to the specifications set forth in the relevant instruction manuals or in the data sheets, for such products for a period of one year.

Reference SENSeOR terms and conditions provided at time of purchase for complete warranty details.

SENSeOR (head office)
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06250 Mougins
France

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SENSeOR is not responsible for errors or for possible lack of information in this document.

TABLE OF CONTENTS

⚠ SAFETY INSTRUCTIONS

IT IS IMPORTANT TO READ THIS MANUAL BEFORE INSTALLING OR COMMISSIONING SENSEOR ASSETS MONITORING SYSTEM.

1.0   CONVENTIONS

DANGER

DANGER INDICATES AN IMMINENTLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.
FAILURE TO FOLLOW THE INSTRUCTIONS GIVEN WILL RESULT IN DEATH OR SERIOUS INJURY.

WARNING

WARNING INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.
FAILURE TO FOLLOW THE GIVEN INSTRUCTIONS CAN RESULT IN DEATH OR IN SERIOUS INJURY.

CAUTION

CAUTION INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY.
FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY.

NOTICE

NOTICE PROVIDES GUIDANCE ON DAMAGE UNRELATED TO PERSONAL INJURY, SUCH AS THOSE THAT CAN CAUSE DETERIORATED PROPERTY.
FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PROPERTY DAMAGE.

IMPORTANT

IMPORTANT INDICATES ADDITIONAL INFORMATION ABOUT MAKING EFFECTIVE USE OF THIS PRODUCT.

1.1   SAFETY INFORMATIONS

► Protect product from moisture and humidity.

► Protect product from too high or too low temperature.

► Protect product from fire.

► Do not paint the product.

► Do not modify or disassemble the product. Service must be carried out by *SENSeOR*.

► Store products in dry and dust-free place.

OVERVIEW

CAUTION

THIS READER IS DEDICATED TO SWITCHGEAR MONITORING WITH WIRELESS PASSIVE SAW TEMPERATURE SENSORS, ENVIRONMENTAL SENSOR AND UHF PARTIAL DISCHARGE DETECTION. IT IS DESIGNED FOR USE INSIDE METALLIC CAVITIES ONLY LIKE THE SWITCHGEAR CABINET AND TUNED TO BE COMPLIANT WITH IEC 62271 ENABLING A LICENSE-FREE USE IN SWITCHGEAR WORLDWIDE.

1.0   RELATED DOCUMENTS

- UM00013EN-AG: SENSeOR Configuration Tool for HTR02 User Manual.
- SD00184EN-AC: HTR02 readers Datasheet.

For additional related documentation and file downloads see support website at senseor.com/downloads.

1.1   AVAILABLE PRODUCTS

This manual covers the following products:

- **HTR02-2AWS**: Temperature monitoring only.
- **HTR02-6AWS**: Temperature monitoring only.
- **HTR02-6AWS-PDD**: Temperature & partial discharge monitoring.

1.2   INSTRUCTIONS FOR USE

The HTR02 reader is dedicated to monitor electrical equipment like switchgears. The temperature of live conductors is measured by SAW sensors and prevent overheating and overload. Partial discharges are measured by antenna pairs and prevent equipment failure. Ambient temperature and humidity measurements are also available through an optional environmental sensor connected with wires to the reader.

The reader is intended to be installed in low voltage compartments of switchgear or in similar type of assets. It can also be installed in a weatherproof environmental enclosure.

The reader is intended for use at a maximum altitude of *5 km*, typically between *-20°C* to *+70°C* (refer to reader specification for the complete specification) and between *10%* to *95%* non-condensing relative humidity.

WARNING

THE READER IS NOT INTENDED FOR INSTALLATION INTO MEDIUM OR HIGH VOLTAGE COMPARTMENT ASSETS. ONLY SAW TEMPERATURE SENSORS, ENVIRONMENTAL SENSOR AND RF ANTENNAS ARE INTENDED FOR INSTALLATION INTO MEDIUM VOLTAGE COMPARTMENTS.

1.3   READER OVERVIEW

Included in scope of delivery:
- 1x HTR02 reader.
- 1x µSD card.
- 1x 4-pin power connector.
- 1x 4-pin environmental sensor connector (for HTR02-6AWS readers).

1.3.1   SERIALIZATION LABEL
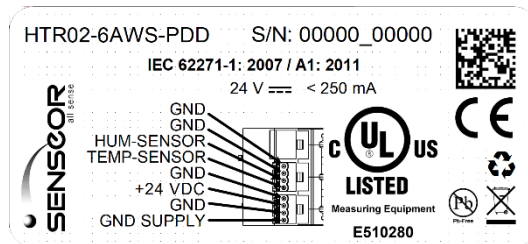
Figure 1: HTR02-6AWS-PDD reader serialization label

1.3.2   FRONT LABEL
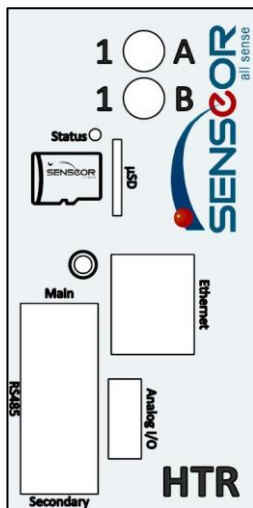
Figure 2: HTR02-2AWS front product label
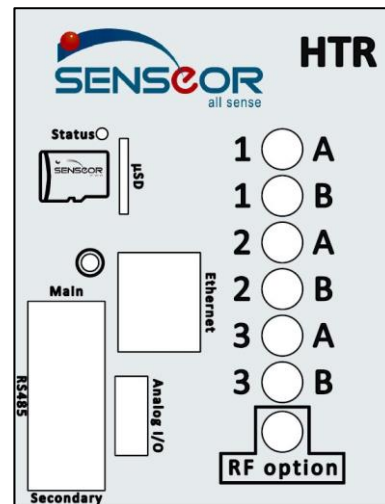
Figure 3: HTR02-6AWS front product label

1.4   CONNECTORS AND FUNCTIONS

Status led

µSD card reader

Alarm acknowledgement push button

Ethernet RJ45 connector

RS485 Modbus RJ45 connectors

Analog inputs/outputs connector

Power input connector

Ambient temperature and humidity probe connector

RF SMB connectors of antenna pairs (only one antenna pair available for HTR02-2AWS)
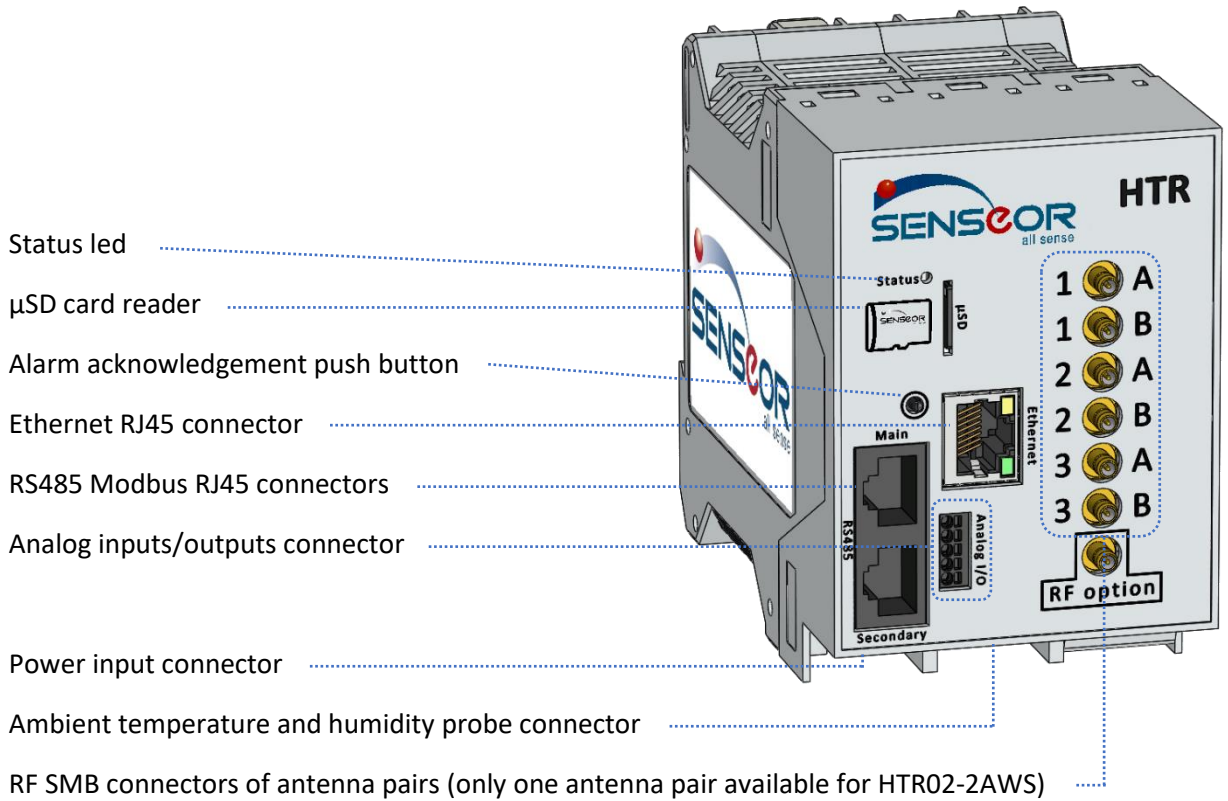
1.4.1   INPUT POWER (MAIN CONNECTOR)

Pin	Type	Description
1 (left)	GND SUPPLY	Ground
2	GND	*Ground (not used)*
3	+24VDC	Main power supply input
4 (right)	GND	*Ground (not used)*
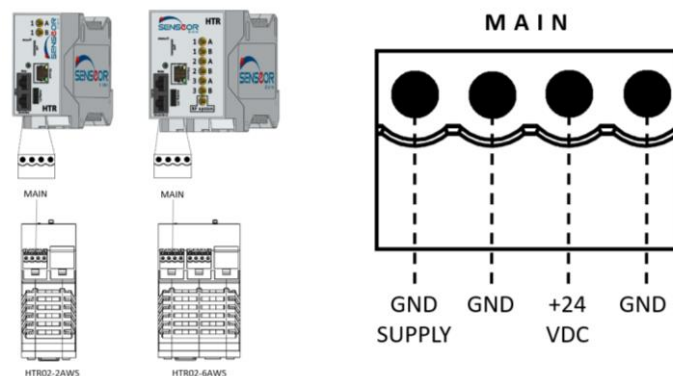
CAUTION

DO NOT REVERSE THE POWER SUPPLY POLARITY, THIS MAY CAUSE ELECTRICAL DAMAGE.

1.4.2   RS485 PORTS

RJ45 ports for Modbus-RTU communication.

Pin	Type	Description
1 (left)	-	*Not used*
2	-	*Not used*
3	-	*Not used*
4	A	Data +
5	B	Data -
6	-	*Not used*
7	-	*Not used*
8 (right)	GND	Ground
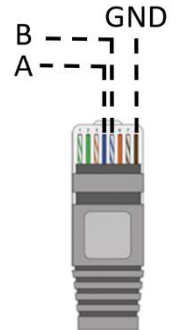
Figure 4: RS485 socket pinout

1.4.3   ENVIRONMENTAL SENSOR

Pin	Type	Description
1 (left)	TEMP IN	4–20 mA input for temperature sensor
2	HUM IN	4–20 mA input for humidity sensor
3	GND	Ground
4 (right)	GND	Ground
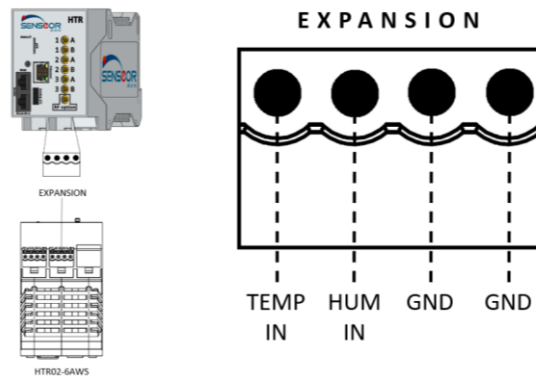
Figure 5: Environmental sensor socket pinout

NOTE

THIS CONNECTOR IS ONLY AVAILABLE FOR HTR02-6AWS-PDD READERS.

1.4.4 ANALOG INPUTS/OUTPUTS (FRONT SELF-TIGHTENING CONNECTOR)

Pin	Type	Description
1 (top)	TRIG OUT	Alarm relay activation output
2	I IN	4–20 mA input
3	SYNC IN	Digital input
4	I OUT	4–20 mA output
5 (bottom)	V OUT	0–10V output
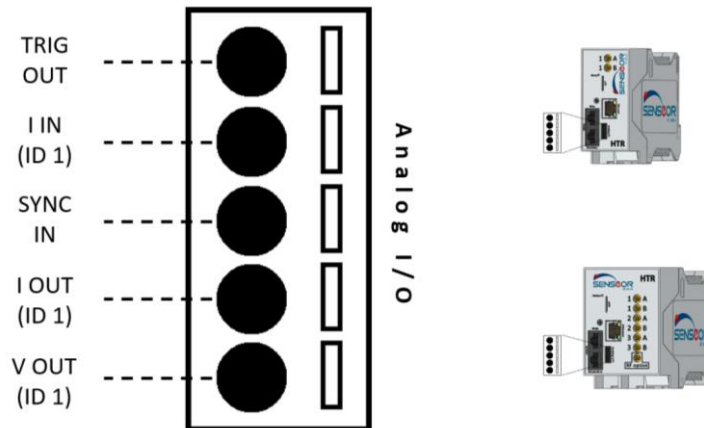
Figure 6: Analog I/Os socket pinout

1.4.5 RF ANTENNAS

Connector	Type	Description
1A	1A	RF antenna 1A
1B	1B	RF antenna 1B
2A	2A	RF antenna 2A *(only for HTR02-6AWS)*
2B	2B	RF antenna 2B *(only for HTR02-6AWS)*
3A	3A	RF antenna 3A *(only for HTR02-6AWS)*
3B	3B	RF antenna 3B *(only for HTR02-6AWS)*
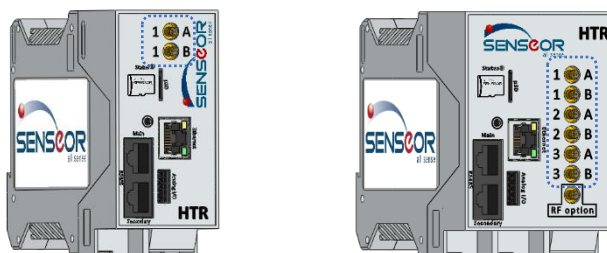
Figure 7: RF antennas

1.5   STATUS LED

Status LED is used to indicate the functional state of reader.

Description	LED status
No power	
Installation mode	
Configuration mode	
Measure mode (SAW & partial discharge)	
SAW measurements demonstration mode	
PDD measurements demonstration mode	
Warning threshold reached	
Alert threshold reached	
System error	
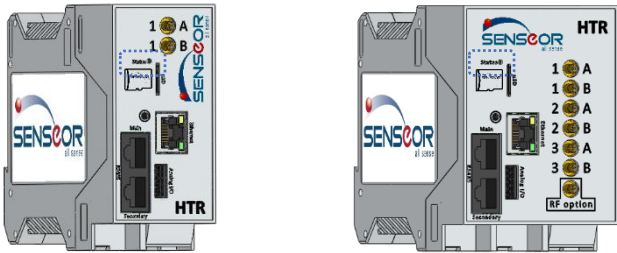
Figure 8: Status led

INSTALLATION

IMPORTANT

THE INSTALLATION INSTRUCTIONS ARE ONLY FOR THE HTR02 READER.

IT IS ASSUMED THAT SAW TEMPERATURE SENSORS AND PARTIAL DISCHARGE PROBE ANTENNAS HAVE BEEN CONFIGURED AND INSTALLED.

WARNING

PROFESSIONAL INSTALLATION REQUIRED.

INSTALLATION AND CONFIGURATION SHOULD BE PERFORMED ONLY BY USERS WHO ARE TECHNICALLY COMPETENT AND AUTHORIZED TO DO SO.

LOCAL REGULATIONS REGARDING ELECTRICAL INSTALLATION AND SAFETY MUST BE OBSERVED.

FAILURE TO FOLLOW THE GIVEN INSTRUCTIONS CAN RESULT IN DEATH OR IN SERIOUS INJURY.

WARNING

THE USE OF THIS EQUIPMENT IN A MANNER NOT SPECIFIED IN THIS MANUAL OR BY THE MANUFACTURER MAY IMPAIR PROTECTION OF THE USER AND EQUIPMENT.

CAUTION

THIS EQUIPMENT IS DESIGNED FOR INSTALLATION IN AN ENCLOSURE THAT PROVIDES ADEQUATE PROTECTION AGAINST ELECTRICAL SHOCK.

1.6   UNPACKING

1.6.1   PHYSICAL DIMENSIONS

Product	Dimensions
HTR02-2AWS	45 x 99 x 117 mm
HTR02-6AWS(-PDD)	68 x 99 x 117 mm
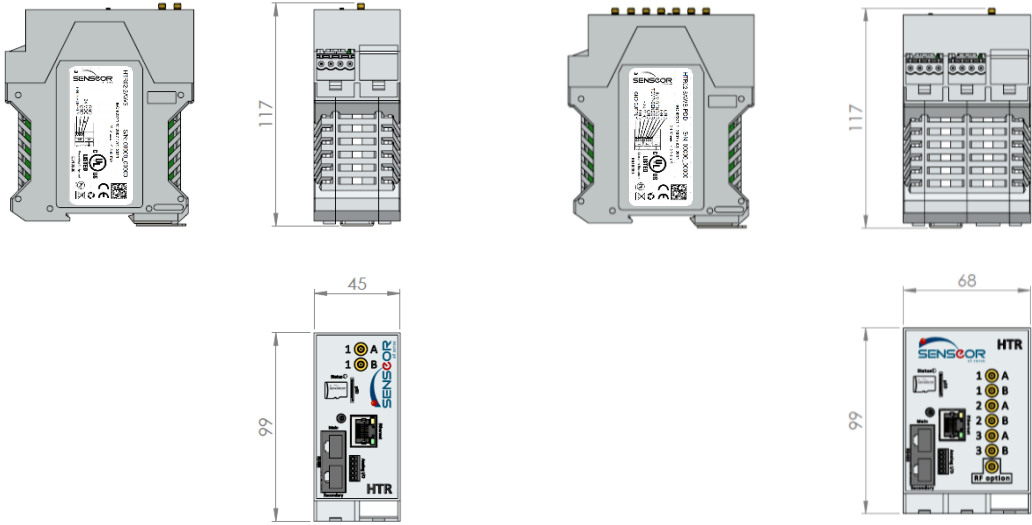
Figure 9: Readers dimensions views

1.7   DIN RAIL MOUNTING

CAUTION

ENSURE THAT THE LOW-LEVEL COMPARTMENT WHERE THE READER IS MOUNTED IS SUFFICIENTLY VENTILATED TO PREVENT OVERHEATING. THE DEVICE MUST BE ELECTRICALLY GROUNDED FOR EMC COMPLIANCE.

The reader is designed for installation on a grounded 35 mm DIN rail. DIN rail fixation is integrated on its rear enclosure.
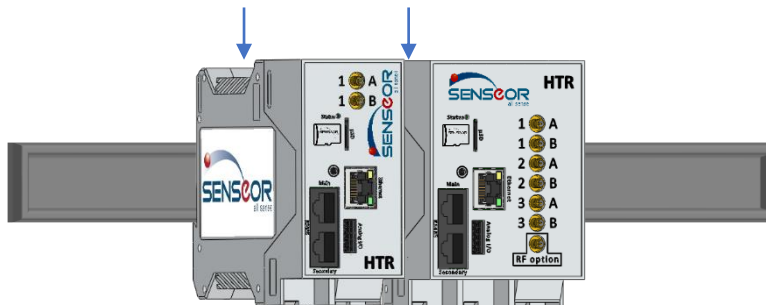
Figure 10: DIN rail fixation

1.7.1   READER EMPLACEMENT

The reader is intended to be installed in the low voltage compartment of the switchgear. The other electrical assets are recommended to be weather protected in an enclosed location.
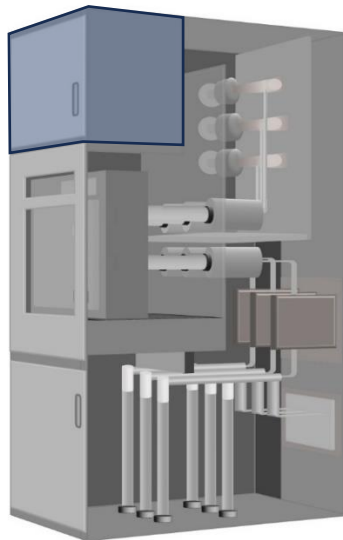
Figure 11: Reader emplacement in switchgear

The reader is required to be installed within a maximum distance of *10 meters* from the antennas, corresponding to the maximum length of the antenna coaxial cable for SAW temperature sensors and partial discharge measurement.

1.7.2   RECOMMENDED SPACING

For connectors access, it is recommended to leave the minimum clearance for front and bottom panels of *5 cm (2 inches)*.

Figure 12: Reader access clearance

WIRING

1.8 POWER

The reader power connector is a 2-pin male connector. This screw connector supports from *16 to 26 AWG* wires. For stranded conductor use connector ferrules on the termination.

Figure 13: Connector ferrule

1.8.1 INPUT POWER

The reader operates at *24VDC* nominal with a total power consumption of *6 Watts* maximum.

SENSeOR recommends the use of a **DC power supply** in the same low-voltage compartment as the reader. It is possible to run a DC power bus to power multiple readers from one DC power supply. However, this option requires a careful consideration of the wire diameter, AC/DC and circuit breaker capabilities.

Power connections are recommended to be at a minimum of *16 AWG*.

If bussed power is being considered, the wire gauge must be selected to prevent excessive voltage drop between the DC power source and the reader that is electrically farthest from the source.

The following block diagram outlines the recommended power wiring for the reader with a 2-pole circuit breaker and an AC/DC power supply. Surge suppression devices can also be installed between the input line and the neutral only if higher safety rating is required.
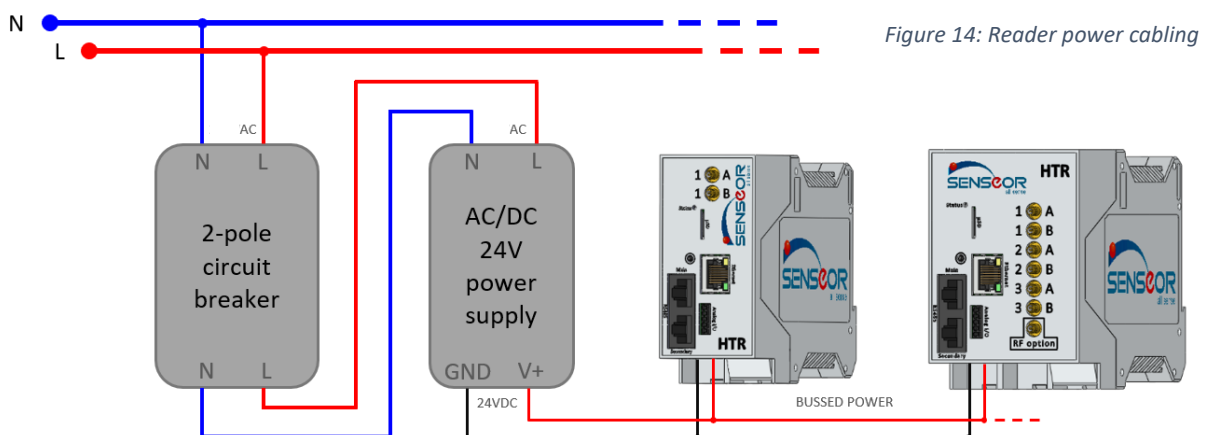
Figure 14: Reader power cabling

1.8.2   INTERNAL BATTERY

SENSeOR reader has an internal *3VDC* non rechargeable battery to keep the UTC date and the time in case of power down. Battery needs to be replaced if voltage value is under **2.7V**.

It can be replaced only by authorized person using the following or an equivalent reference:

Figure 15: 3V Lithium CR1632 battery

1.8.2.1   *Battery replacement procedure*

► Disconnect all the HTR02 reader connections (antennas, environmental sensor, analog I/Os and power supply).

► Extract the reader from its location on the DIN rail.

► Using a *flat* screwdriver, open the rear plastic enclosure by pressing the clips above and under the reader.

► Remove the electronic card from the rear enclosure.

► Identify and replace the CR1632 battery **by carefully respecting its polarity**.

► Reinsert the electronic card in the enclosure.

► Reclip the rear plastic enclosure.

► Reposition the reader on its location on the DIN rail.

► Reconnect all the HTR02 reader connections (antennas, environmental sensor, analog I/Os and power supply).

WARNING

THERE IS A RISK OF EXPLOSION IF THE BATTERY IS REPLACED BY AN INCORRECT TYPE.
BE CAREFUL OF USED BATTERY IN ACCORDANCE WITH YOUR REGIONAL LEGAL INSTRUCTIONS.

1.9 COMMUNICATION CONNECTIONS

The components are used to connect Modbus devices, energy communication systems and industrial equipment with each other and to SCADA or cloud systems.

The reader could be connected to a network using RS485 Modbus-RTU or Ethernet Modbus-TCP.

1.9.1 CABLING FOR RS485 COMMUNICATION

SENSeOR recommends the use of shielded cable for the RS485 wiring, providing at least one twisted pair, one single line, and a drain wire. Although, a typical recommended cable has two twisted pair. The twisted pair provides *DATA ±* signals to each reader while the single line would be for *D-COM*, providing a low-impedance return for each reader.
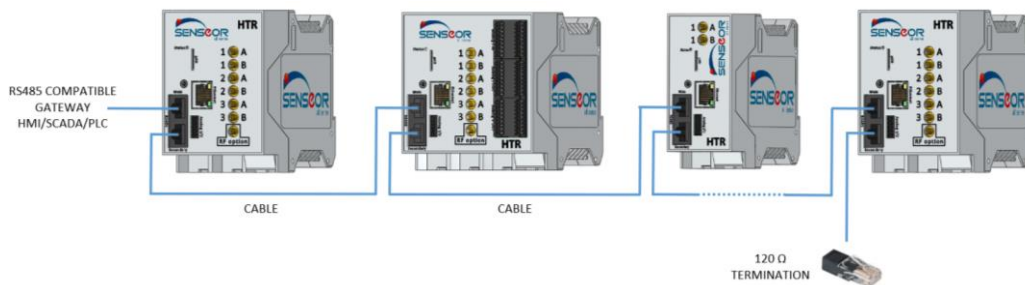
Figure 16: RS485 daisy chaining

1.9.2 BUS RESISTIVE TERMINATION

The RS485 bus needs to be terminated at each end with a *120 Ohms* resistor when long stretches of cable are used. This ensures that the bus has the correct impedance.

However, if the bus length is less than *2%* of its maximum (20 meters at 9 600 bauds), the termination resistor may be omitted.

In general, RS485 adapters and master bus provide the source impedance internally and should be located at one end of the bus. If not, use this pinout to cable the resistor.

Pin	Type	Description
1 (left)	-	*Not used*
2	-	*Not used*
3	-	*Not used*
4	120 Ohms	Resistance pin 1
5	120 Ohms	Resistance pin 2
6	-	*Not used*
7	-	*Not used*
8 (right)	-	*Not used*

1.9.3   BUS DATA RATE

The RS485 bus data rate is dependent on the bus cable length and the number of readers on the bus. In industrial environments, slower data communication rates are generally more reliable.

1.9.4   BUS LENGTH

Bus cable length has an impact on the overall data rates that can be achieved. A conservative rule for RS485 follows this equation:

$$Baud\ rate\ x\ cable\ length\ (m) < 10\ x\ 10^6$$

A 9 600 bauds network would require a bus length less than (10 x 10^6 / 9 600) equals to 1 042 meters (about 3 400 feet). This is perfectly adequate for most substation installations.

1.9.5   NUMBER OF READERS

The more readers on the RS485 bus there are, the weaker the baud rate is. Baud rate must be adjusted to accommodate the electrical characteristics depending on the circuit.

The following table provides an example of recommended baud rate following the number of readers:

Number of readers	Recommended baud rate
1	115 200
2	38 400
3	19 200
From 4 to 15	9 600

SENSeOR recommends to connect a maximum of 15 readers on a RS485 bus.

1.9.6   MODBUS-RTU DEFAULT CONFIGURATION

By default, the reader is configured with the following settings:

- Baud rate: **19 200**
- Data bits: **8**
- Parity: **Even**
- Stop bits: **1**

1.9.7   CABLING FOR ETHERNET COMMUNICATION

SENSeOR recommends the use of shielded *Cat 5e SFTP* cable for the Ethernet wiring.

Readers Ethernet network is provided by a fixed configuration more detailed below.

The IP address is defined by the last four digits of the product serial number printed on the side of the reader.

<div align="center">

Serial number: 12345_67890

IP address: 10.200.78.90

</div>

The connected computer must have an IP address in the range of '*10.200.AA.BB'* subnet and with '*255.255.0.0'* mask. To avoid any IP addresses conflict between the reader and the computer, '*AA*' and '*BB*' settings are recommended to be higher or to be equal to the value of '*100*'.
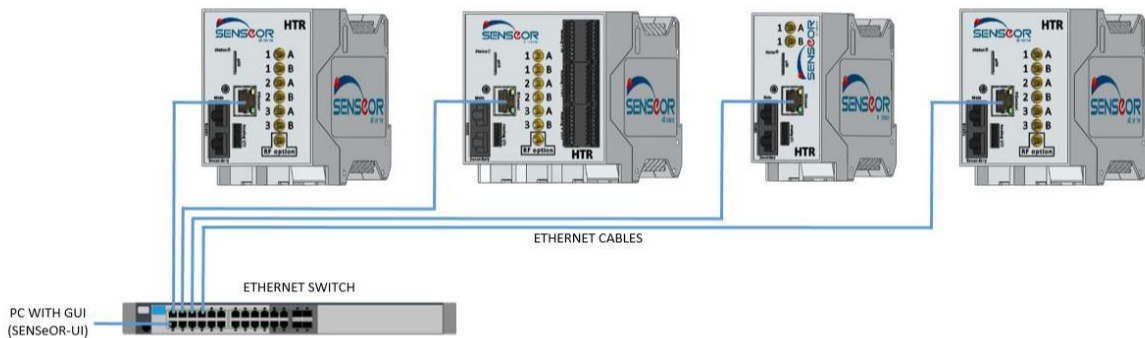
Figure 17: Modbus-TCP cabling

WARNING

IN CASE OF COMMUNICATION TROUBLES WITH THE '*SENSEOR CONFIGURATION TOOL FOR HTR02'* APPLICATION, CHECK THAT THE FOLLOWING COMMUNICATION PORTS ARE OPENED ON THE COMPUTER: '*6560'*, '*5706'* & '*5707'*.

1.10 ENVIRONMENTAL SENSOR CONNECTION

The *SENSeOR* environmental sensor provides humidity, ambient temperature and dew point measurements recommended to complement the partial discharges data. Connection of this environmental sensor must be done respecting cable and connector positions.

Use 4-conductor *24 AWG* shielded cable with 6-meter maximum length.
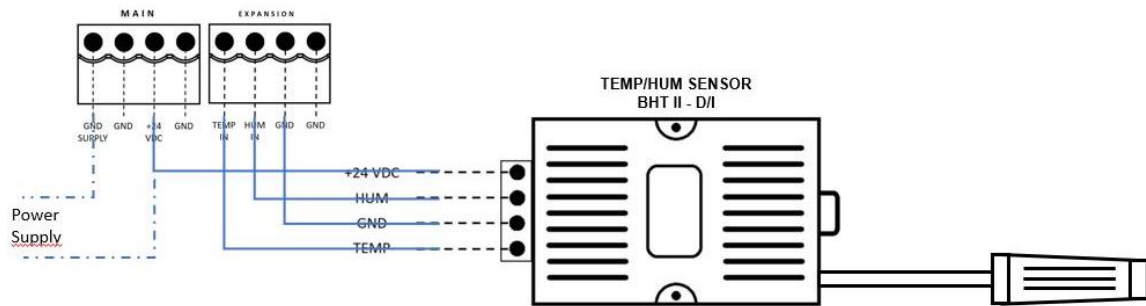
Figure 18: Environmental sensor cabling

SYSTEM INSTALLATION & CONFIGURATION

1.11 SAW TEMPERATURE SENSORS INSTALLATION

This manual does not cover all specific SAW temperature sensors installation.

1.12 SYSTEM CONFIGURATION

The reader requires a system configuration for the associated installed SAW temperature sensors, the ambient humidity and temperature sensors and the partial discharge probe antennas.

The configuration is performed through the Ethernet network interface and uses the '*SENSeOR* Configuration *Tool for HTR02'* application.

For configuration details, see the '[SENSeOR Configuration Tool for HTR02 User Manual](#)*'* for detailed instructions.

SYSTEM INTEGRATION

The HTR02 reader supports RS485 Modbus slave communication. It can be connected to an existing *SCADA* or *PLC*.

1.13 MODBUS REGISTERS

Description		Register address	Data type	Min. value	Max. value	Error value	Meaning
INPUT REGISTERS (READ ONLY)							
SAW SENSOR TEMPERATURE DATA							
Group A (Antenna 1)	SAW ID 1 (A1)	**30001**	Signed	-500 (for °C)	1 800 (for °C)	-32 768	1/10°
	SAW ID 2 (A2)	**30002**					
	SAW ID 3 (A3)	**30003**					
Group B (Antenna 1)	SAW ID 4 (B1)	**30004**					
	SAW ID 5 (B2)	**30005**					
	SAW ID 6 (B3)	**30006**					
Group C (Antenna 2)	SAW ID 7 (C1)	**30007**					
	SAW ID 8 (C2)	**30008**					
	SAW ID 9 (C3)	**30009**					
Group D (Antenna 2)	SAW ID 10 (D1)	**30010**					
	SAW ID 11 (D2)	**30011**					
	SAW ID 12 (D3)	**30012**					
Group E (Antenna 3)	SAW ID 13 (E1)	**30013**					
	SAW ID 14 (E2)	**30014**					
	SAW ID 15 (E3)	**30015**					
Group F (Antenna 3)	SAW ID 16 (F1)	**30016**					
	SAW ID 17 (F2)	**30017**					
	SAW ID 18 (F3)	**30018**					
SAW SENSOR GROUP DATA							
Group A (Antenna 1)	Mean measurement	**30019**	Signed	-500	1 800	-32 768	1/10°
	Alarm status bit mask	**30020**	Unsigned	0	65 535	0	*see Table 1*
Group B (Antenna 1)	Mean measurement	**30022**	Signed	-500	1 800	-32 768	1/10°
	Alarm status bit mask	**30023**	Unsigned	0	65 535	0	*see Table 1*
Group C (Antenna 2)	Mean measurement	**30025**	Signed	-500	1 800	-32 768	1/10°
	Alarm status bit mask	**30026**	Unsigned	0	65 535	0	*see Table 1*
Group D (Antenna 2)	Mean measurement	**30028**	Signed	-500	1 800	-32 768	1/10°
	Alarm status bit mask	**30029**	Unsigned	0	65 535	0	*see Table 1*
Group E (Antenna 3)	Mean measurement	**30031**	Signed	-500	1 800	-32 768	1/10°
	Alarm status bit mask	**30032**	Unsigned	0	65 535	0	*see Table 1*
Group F (Antenna 3)	Mean measurement	**30034**	Signed	-500	1 800	-32 768	1/10°
	Alarm status bit mask	**30035**	Unsigned	0	65 535	0	*see Table 1*
ENVIRONMENTAL SENSOR DATA							

Ambient temperature		**30037**	Signed	-500	1 800	-32 768	1/10°
Ambient humidity		**30038**	Unsigned	0	1 000	65 535	1/10 %rH
Ambient dew point		**30039**	Signed	-500	1 800	-32 768	1/10°
PARTIAL DISCHARGE DATA							
Probe antenna 1	Alarm status bit mask	**31000**			0		*see Table 2*
	LFB ratio	**31001**					1/10 dB
	LFB EPPC	**31002**					1/10 peaks/cycle
	MFB ratio	**31004**			65 534		1/10 dB
	MFB EPPC	**31005**					1/10 peaks/cycle
	HFB ratio	**31007**					1/10 dB
	HFB EPPC	**31008**					1/10 peaks/cycle
Probe antenna 2	Alarm status bit mask	**31013**			0		*see Table 2*
	LFB ratio	**31014**	Unsigned	0		65 535	1/10 dB
	LFB EPPC	**31015**					1/10 peaks/cycle
	MFB ratio	**31017**			65 534		1/10 dB
	MFB EPPC	**31018**					1/10 peaks/cycle
	HFB ratio	**31020**					1/10 dB
	HFB EPPC	**31021**					1/10 peaks/cycle
Probe antenna 3	Alarm status bit mask	**31026**			0		*see Table 2*
	LFB ratio	**31027**					1/10 dB
	LFB EPPC	**31028**					1/10 peaks/cycle
	MFB ratio	**31030**			65 534		1/10 dB
	MFB EPPC	**31031**					1/10 peaks/cycle
	HFB ratio	**31033**					1/10 dB
	HFB EPPC	**31034**					1/10 peaks/cycle
SYSTEM DATA							
Serial number		**39001**	String (10)	0			S/N
Product vendor		**39011**	String (7)	-	-		SENSeOR
Product model		**39018**	String (14)				*see Table 3*
Main board	Major HW revision	**39032**				-	
	Minor HW revision	**39033**					
	Major SW revision	**39034**					
	Minor SW revision	**39035**					
	Patch SW revision	**39036**					
PDD board	Major HW revision	**39037**					
	Minor HW revision	**39038**	Unsigned	0	65 535		Default value: 65 535
	Major SW revision	**39039**					
	Minor SW revision	**39040**					
	Patch SW revision	**39041**					
Modbus table version	Major revision	**39042**					Default value: 1
	Minor revision	**39043**					Default value: 2
	Patch revision	**39044**					Default value: 0

HOLDING REGISTERS (READ/WRITE)								
READER SETTINGS								
Modbus	Address	**40001**		1	247		Reader S/N + 1	
	Baud rate code	**40002**		0	7	65 535	*see Table 4	
	Parity code	**40003**			2		*see Table 5	
	Stop bits	**40004**		1	2		Default value: 1	
Temperature unit code		**40005**			1		*see Table 6	
Ethernet IP address	Byte 0	**40006**	Unsigned	0	255	-	Depend of S/N	
	Byte 1	**40007**					Depend of S/N	
	Byte 2	**40008**					Default value: 200	
	Byte 3	**40009**					Default value: 10	
Subnet mask	Byte 0	**40010**					Default value: 0	
	Byte 1	**40011**					Default value: 0	
	Byte 2	**40012**					Default value: 255	
	Byte 3	**40013**					Default value: 255	
Default gateway	Byte 0	**40014**					Default value: 1	
	Byte 1	**40015**					Default value: 0	
	Byte 2	**40016**					Default value: 200	
	Byte 3	**40017**					Default value: 10	
ALARM ACKNOWLEDGEMENTS								
Group A	Alarm acknowledgement	**40101**	Unsigned	0	65 535	-	To proceed: write the 65 535 value to the corresponding register. Alarm mechanisms keep memory of detected alarms. **In case of alarm situation is still in progress, the alarms bit will not be removed.**	
Group B		**40102**						
Group C		**40103**						
Group D		**40104**						
Group E		**40105**						
Group F		**40106**						
PDD probe antenna 1		**40107**						
PDD probe antenna 2		**40108**						
PDD probe antenna 3		**40109**						

NOTE

> FOR LEGACY MODBUS TABLES, PLEASE CONTACT THE SENSEOR SUPPORT
> SUPPORT.SENSEOR@WIKA.COM.

Table 1: Alarm register code

Bit number	Description
0	Sensor 1 overheating warning
1	Sensor 1 overheating alert
2	Sensor 1 deviation warning
3	Sensor 1 deviation alert
4	Sensor 1 RF link alert
5	Sensor 2 overheating warning
6	Sensor 2 overheating alert
7	Sensor 2 deviation warning
8	Sensor 2 deviation alert
9	Sensor 2 RF link alert
10	Sensor 3 overheating warning
11	Sensor 3 overheating alert
12	Sensor 3 deviation warning
13	Sensor 3 deviation alert
14	Sensor 3 RF link alert
15	Ambient temp. and humidity sensor alert

Table 2: Partial discharge probe antenna alarm register code

Bit number	Description
0	Probe antenna LFB Ratio warning
1	Probe antenna LFB Ratio alert
2	Probe antenna LFB EPPC warning
3	Probe antenna LFB EPPC alert
4	Probe antenna MFB Ratio warning
5	Probe antenna MFB Ratio alert
6	Probe antenna MFB EPPC warning
7	Probe antenna MFB EPPC alert
8	Probe antenna HFB Ratio warning
9	Probe antenna HFB Ratio alert
10	Probe antenna HFB EPPC warning
11	Probe antenna HFB EPPC alert
12	*Not used*
13	*Not used*
14	*Not used*
15	*Not used*

Table 3: Reader product register code

Model	Description
HTR02-2AWS	Temperature monitoring only
HTR02-6AWS	Temperature monitoring only
HTR02-6AWS-PDD	Temperature & partial discharge monitoring

Table 4: Modbus baud rate register code

Register value	Baud rate (bps)
0	9 600
1	14 400
2	*19 200 (default value)*
3	28 800
4	38 400
5	57 600
6	115 200
7	230 400

Table 5: Modbus parity register code

Register value	Parity
0	None
1	Odd
2	*Even (default value)*

Table 6: System temperature unit register code

Register value	Configuration
0	*Celsius (default value)*
1	Fahrenheit

CERTIFICATIONS

1.14 CERTIFICATIONS

RoHS 2011/65/EU and 2015/863/EU
IEC 62271-1: Switchgear, CISPR11
IEC 61000-4-2, IEC 61000-4-4, IEC 61000-4-17
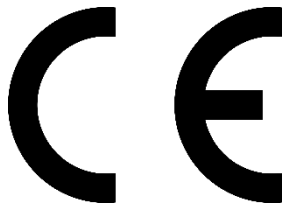IEC 61000-4-18, IEC 61000-4-29
IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6, IEC 60068-2-30
IEC 60068-2-6, IEC 60068-2-78
IEC 60255-21-1, IEC 60255-21-3
IEC 61010-1
CEPRI-EETC06-2019-0023 / CCAM19LP1860T6

1.15 MARKING

File number: E510280 – Measuring Equipment