

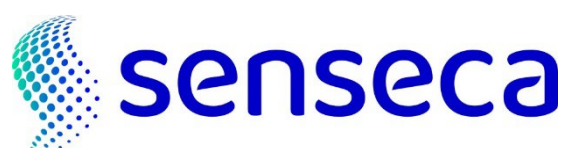
DATASHEETS COLLECTION

LR35 series

LoRaWAN® data loggers



EN_vs3.0



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1 Introduction

The data loggers of the **LR35...** series are wireless devices for **IoT** (Internet of Things) applications that use **LoRaWAN®** technology for long distance data transmission.

LoRaWAN® technology uses the unlicensed frequencies of the ISM band (for example EU868, US915, AU915, KR920, AS923, IN865) and allows a transmission range of several kilometers depending on the installation position and the urbanization condition of the place where the network infrastructure is located, with extremely limited energy consumption, allowing long operation of battery-powered devices.

A system based on LoRaWAN® technology consists of 4 stages:

A. Sensors / data loggers

They detect the physical quantities at the measuring points and send the data via RF to one or more gateways (access points) of the LoRaWAN® network.

The data loggers of the LR35 series can be integrated into any public or private LoRaWAN® network, even existing ones.

B. LoRaWAN® gateway (access point)

The gateway receives the data via RF from the sensors / data loggers and forwards them, using a TCP/IP connection via cellular (e.g. LTE) or ETHERNET/Wi-Fi network, to a network server.

Multiple gateways can be used in the system to increase RF coverage. The gateways are not associated with particular sensors but forward the data of all active sensors in their coverage area.

Senseca can provide already configured third-party gateways, or the user can use his own gateway and do the configuration himself.

C. Network server

It is the IoT platform that receives the data from the sensors / data loggers and forwarded by the gateway. The data loggers of the LR35 series are preconfigured to send the data to the free-to-use network server "**The Things Network (TTN)**", but the user can change the configuration to use other servers, for example a possible network server embedded into the gateway, or Cloud-based platforms.

D. Web application

It is the application that allows you to view the data on the network server.

It can be the Senseca Cloud or a third-party service, both for free use (e.g. myDevices) and for a fee (e.g. ioThink®).

If the Senseca Cloud is used, the **iotcloud.deltaohm.com** platform automatically and transparently converts the data present on the network server (The Things Network) into the data format required by the Senseca Cloud. The Senseca IoT platform also allows sending data via **FTP**.

If instead a third-party service is used, the data are available with the standard **Cayenne LPP** data protocol (only for the most common environmental quantities, such as temperature, relative humidity, barometric pressure, ...) or with a **proprietary data protocol provided free of charge** which allows you to manage any type of measurement and the development of advanced customized applications.

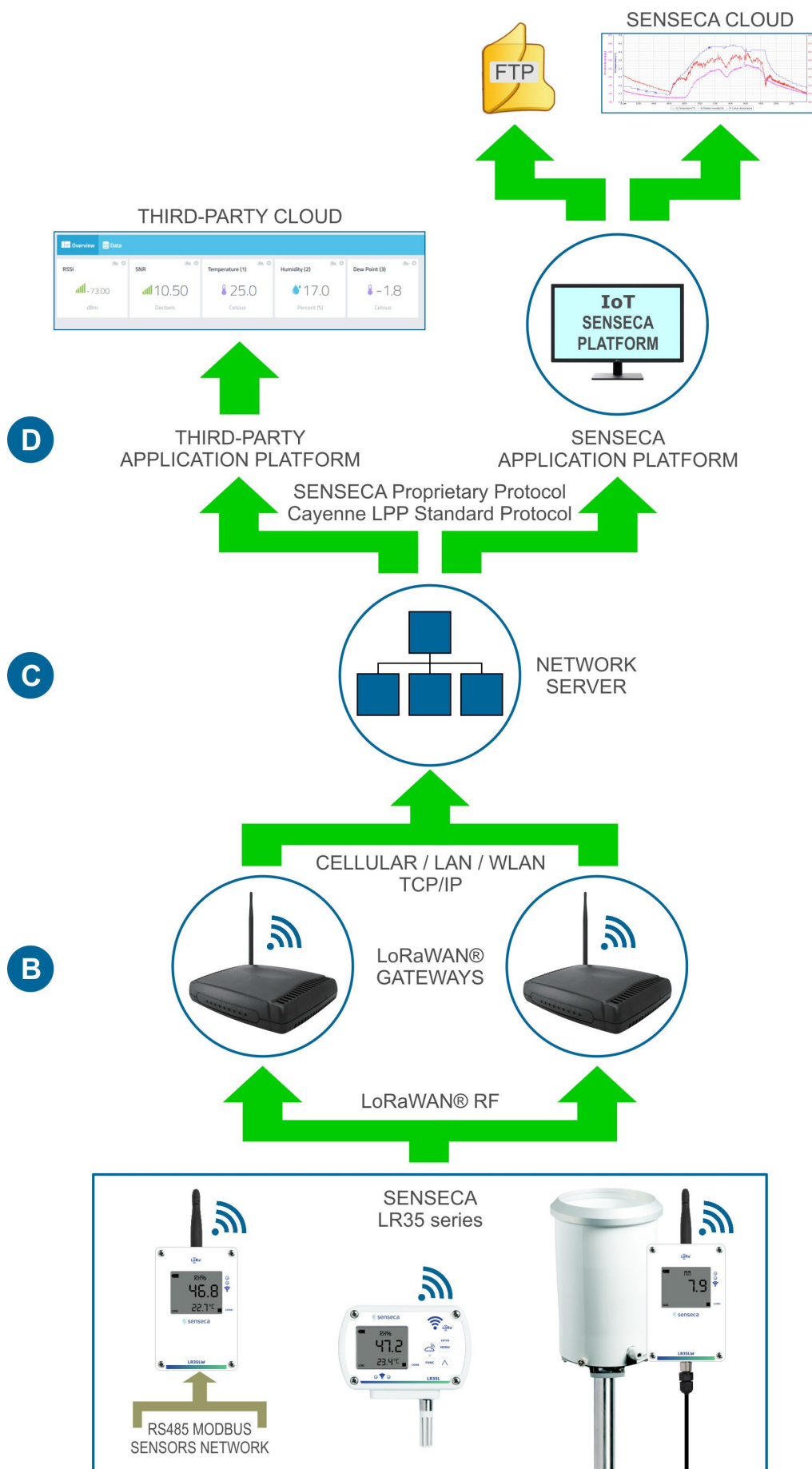


Fig. 1.1: LoRaWAN® network architecture

2 Indoor Models

Measured quantities	Sensor/configuration	Without display	With display
Temperature	Fixed NTC probe	LR35NTV...	LR35LNTV...
Temperature	Pt100/Pt1000 probe with cable, 1 channel	LR357P/1TC...	LR35G7P/1TC...
Temperature	Pt100/Pt1000 probes with cable, 3 channels	LR357P/3TC...	LR35G7P/3TC...
Relative Humidity & Temperature	Combined NTC and RH probe with cable	LR351NTC...	LR35L1NTC...
Relative Humidity & Temperature	Fixed NTC probe, chemically resistant RH sensor	LR351NTV...	LR35L1NTV...
Relative Humidity, Temperature & Atmospheric Pressure	Fixed probe and integrated pressure sensor	LR3514bNTV...	LR3514bNTV...
CO ₂ , Relative Humidity & Temperature	Integrated sensors, CO ₂ up to 5000 ppm	LR351NB...	LR35G1NB...
Differential Pressure	Autozero, ± 100 Pa	LR354r1Z...	LR35L4r1Z...
Temperature, Relative Humidity & Differential Pressure	Fixed probe, autozero, ± 100 Pa	LR351N4r1ZTV...	LR35L1N4r1ZTV...
Standard Analog Sensors	Three configurable terminal inputs	LR35H...	LR35GH...

LR35NTV – LR35LNTV - TEMPERATURE LoRaWAN® DATA LOGGER WITH FIXED VERTICAL PROBE



Temperature LoRaWAN® data logger. Custom LCD display (**option L**). It stores the measures in its internal memory (68,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request. Temperature fixed vertical probe with **NTC10KΩ** temperature sensor.

Mini-USB port on the side. Acoustic alarm with internal buzzer.

Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iotcloud.deltaohm.com** platform.

Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	±0.3 °C @ T=0...+70 °C / ±0.4 °C @ T<0 °C and T>+70 °C
Stability	0.1 °C/year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1 ^(*) , 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(*) Models measuring several quantities may have a minimum interval exceeding 1 second.

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

ORDERING CODES

LR35	NTV.	
		RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
LCD: Blank = without LCD L = with custom LCD		

LR357P/...TC – LR35G7P/...TC - 1 OR 3-INPUT TEMPERATURE LoRAWAN® DATA LOGGER FOR Pt100/Pt1000 SENSOR TEMPERATURE PROBES WITH CABLE



Temperature LoRaWAN® data logger. Graphic LCD display (only with **option G**). It stores the measures in its internal memory (from 42,000 to 68,000 samples depending on the number of inputs) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Depending on the model, one or three inputs with M12 connector for temperature probes with **Pt100/Pt1000** sensor:

LR357P/1 – LR35G7P/1: one input

LR357P/3 – LR35G7P/3: three inputs

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iotcloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Temperature	
Sensor	Pt100 / Pt1000
Measuring range	-200...+650 °C
Resolution	Configurable 0.1/0.01 °C
Accuracy	±0.1 °C plus the error of the connected probe
Stability	0.1 °C/year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1 ^(*) , 2 ^(*) , 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(*) 1 s recording 1 input; 2 s recording 2 inputs

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

PROBES

TP35.1..../C: 4-wire 1/3 DIN **Pt1000** temperature probe. Range -50...+105 °C. Ø5x40 mm AISI 316 tube. Cable ending with 4-pole M12 connector. Cable length 3 m (TP35.1.3/C), 5 m (TP35.1.5/C) or 10 m (TP35.1.10/C).



TP35.2..../C: 4-wire 1/3 DIN **Pt1000** temperature probe. Range -40...+105 °C. Ø5x20 mm thermoplastic rubber tube. Suitable for use with chemically aggressive solutions as well. Cable ending with 4-pole M12 connector. Cable length 3 m (TP35.2.3/C) or 5 m (TP35.2.5/C).



TP35.4..../C: 4-wire 1/3 DIN **Pt100** temperature probe. Range -50...+105 °C. Ø6x50 mm AISI 316 tube. Cable ending with 4-pole M12 connector. Cable length 3 m (TP35.4.3/C) or 5 m (TP35.4.5/C).



ORDERING CODES

LR35		7P/		TC.	
					RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
					NUMBER OF INPUTS: 1 = 1 input 3 = 3 inputs
					LCD: Blank = without LCD G = with graphic LCD

LR351NTC – LR35L1NTC - TEMPERATURE AND HUMIDITY LoRaWAN® DATA LOGGER FOR T/RH COMBINED PROBE WITH CABLE



Temperature and humidity LoRaWAN® data logger. Custom LCD display (only with **option L**). It stores the measures in its internal memory (24,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

One input with M12 connector for the **HP3517WTC...** temperature and relative humidity combined probe (**NTC10KΩ** temperature sensor). **Calculated quantities:** dew point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iotcloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Humidity	
Sensor	Capacitive
Measuring range	0...100%
Resolution	0.1%
Accuracy	±1.8% (0...85%) / ±2.5% (85...100%) @ T=15...35 °C ±(2 + 1.5% of the measure)% @ T= remaining range
Sensor operating temperature	-40...+150 °C
Response time	T ₆₃ <10 s (10→80% @T const., air speed 2 m/s, with filter)
Stability	1%/year (in the whole temperature and RH range)
Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	±0.3 °C @ T=0...+70 °C ±0.4 °C @ T<0 °C and T>+70 °C
Stability	0.1 °C/year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

PROBES

HP3517W... Temperature and relative humidity combined probe. R.H. sensor measuring range: 0...100%. NTC temperature sensor. Ø14 mm. Filter in PBT and stainless steel grid. 4-pole M12 connector.



HP3517W		.	
			Cable length: 2 = 2 m 5 = 5 m 10 = 10 m
			Stem length and material: TC1 = 135 mm in PBT TC2 = 150 mm in AISI 304 TC3 = 335 mm in PBT

TP35N1.../C: NTC temperature probe. Range -40...+105 °C. Ø5x40 mm AISI 316 tube. 4-pole M12 connector. Cable length 3 m (TP35N1.3/C), 5 m (TP35N1.5/C) or 10 m (TP35N1.10/C)



ORDERING CODES

LR35		1NTC.	
			RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
			LCD: Blank = without LCD L = with custom LCD

LR351NTV – LR35L1NTV - TEMPERATURE AND HUMIDITY LoRaWAN® DATA LOGGER WITH T/RH FIXED VERTICAL PROBE



Temperature and humidity LoRaWAN® data logger. Custom LCD display (only with **option L**). It stores the measures in its internal memory (from 24,000 to 60,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Temperature and relative humidity fixed vertical probe (**NTC10KΩ** temperature sensor). **Calculated quantities:** dew point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Humidity	
Sensor	Capacitive
Measuring range	0...100%
Resolution	0.1%
Accuracy	±1.8% (0...85%) / ±2.5% (85...100%) @ T=15...35 °C ±(2 + 1.5% of the measure)% @ T= remaining range
Sensor operating temperature	-40...+150 °C
Response time	T ₆₃ < 10 s (10→80% @T const., air speed 2 m/s, with filter)
Stability	1%/year (in the whole temperature and RH range)
Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	±0.3 °C @ T=0...+70 °C ±0.4 °C @ T<0 °C and T>+70 °C
Stability	0.1 °C/year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

ORDERING CODES

LR35		1NTV.	
			RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
	LCD: Blank = without LCD L = with custom LCD		

LR3514bNTV – LR35L14bNTV – TEMPERATURE, HUMIDITY, ATMOSPHERIC PRESSURE LoRaWAN® DATA LOGGER WITH FIXED VERTICAL PROBE



Temperature, humidity and atmospheric pressure LoRaWAN® data logger. Custom LCD display (only with **option L**). It stores the measures in its internal memory (from 22,000 to 60,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Fixed vertical temperature and relative humidity combined probe (**NTC10KΩ** temperature sensor). Integrated pressure sensor. **Calculated quantities:** dew point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Humidity	
Sensor	Capacitive
Measuring range	0...100%
Resolution	0.1%
Accuracy	±1.8% (0...85%) / ±2.5% (85...100%) @ T=15...35 °C ±(2 + 1.5% of the measure)% @ T= remaining range
Sensor operating temperature	-40...+150 °C
Response time	T ₆₃ <10 s (10→80% @T const., air speed 2 m/s, with filter)
Stability	1%/year (in the whole temperature and RH range)
Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	±0.3 °C @ T=0...+70 °C ±0.4 °C @ T<0 °C and T>+70 °C
Stability	0.1 °C/year
Atmospheric Pressure	
Sensor	Piezoresistive
Measuring range	300...1100 hPa
Resolution	0.1 hPa
Accuracy	±0.5 hPa (700...1100 hPa) ±1 hPa (500...1100 hPa) / ±1.5 hPa (300...500 hPa)
Stability	±1 hPa/year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

ORDERING CODES

LR35		14bNTV.	
			RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
LCD: Blank = without LCD L = with custom LCD			

LR351NB – LR35G1NB - TEMPERATURE, HUMIDITY AND CARBON DIOXIDE (CO₂) LoRaWAN® DATA LOGGER



Temperature, humidity and carbon dioxide LoRaWAN® data logger. Graphic LCD display (only with **option G**). It stores the measures in its internal memory (from 44,000 to 120,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

The sensors are all inside the housing. **Calculated quantities:** dew point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Humidity	
Sensor	Capacitive
Measuring range	0...100%
Resolution	0.1%
Accuracy	±2.5% (0..85%) / ±3.5% (85...100%) @ T=23 °C
Temperature drift	0.05%/K (0...60 °C)
Sensor operating temperature	-40...+105 °C (R.H. max=[100-2*(T-80)] @ T=80...105 °C)
Response time	T ₆₃ < 6 s (10→80% @T const., air speed 2 m/s, with filter)
Stability	<1%/year (@ 23 °C and 30...70 %RH)
Temperature	
Sensor	PTAT integrated in humidity module
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	±0.2 °C @ T=0...+60 °C ±(0.2 - 0.05 * T) °C @ T=-40...0 °C ±[0.2 + 0.032 * (T-60)] °C @ T=+60...+105 °C
Long-term stability	0.05 °C/year
Carbon dioxide (CO₂)	
Sensor	Non-dispersive infrared rays (NDIR)
Measuring range	0...5000 ppm
Resolution	1 ppm
Accuracy	±(50 ppm+3% of measurement) @ 25 °C and 1013 hPa
Operating conditions	0...50 °C / 0...95%RH non-condensing / 950...1050 hPa
Response time	T ₉₀ < 120 s (air speed= 2 m/s)
Calibration interval	>5 years (under normal operating conditions)
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-10...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 30
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

ORDERING CODES

LR35		1NB	
			RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
LCD: Blank = without LCD G = with graphic LCD			

LR354r1Z – LR35L4r1Z – DIFFERENTIAL PRESSURE LoRaWAN® DATA LOGGER – AUTOMATIC CALIBRATION



Differential pressure LoRaWAN® data logger for clean rooms. With automatic calibration of the differential pressure at zero. Custom LCD display (only with **option L**). It stores the measures in its internal memory (68,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Pressure inputs Ø 5.5 mm for tubes Ø 5 mm.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iotcloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Differential Pressure	
Sensor	Piezoresistive
Measuring range	±100 Pa
Resolution	0.1 Pa
Accuracy	±(0.8% of measure + 0.5) Pa @ 0...50 °C
Stability	±0.2 Pa with zero self-calibration
Overpressure limit	50 kPa
Compatible media	Only air and non-aggressive dry gases
Pressure inputs	Ø 5.5 mm
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	3 x AA alkaline batteries
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

ORDERING CODES

LR35	4r1Z.	
		RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
		LCD: Blank = without LCD L = with custom LCD

LR351N4r1ZTV... – LR35L1N4r1ZTV... – TEMPERATURE, HUMIDITY AND DIFFERENTIAL PRESSURE LoRaWAN® DATA LOGGER WITH FIXED T/RH VERTICAL PROBE – AUTOMATIC CALIBRATION



Temperature, humidity and differential pressure LoRaWAN® data logger for clean rooms. With automatic calibration of the differential pressure at zero. Custom LCD display (only with **option L**). It stores the measures in its internal memory (from 22,000 to 60,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Temperature and relative humidity fixed vertical probe (**NTC10KΩ** temperature sensor). Pressure inputs Ø 5.5 mm for tubes Ø 5 mm.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Humidity	
Sensor	Capacitive
Measuring range	0...100% RH
Resolution	0.1% RH
Accuracy	± 1.8% (0...85%) / ± 2.5% (85...100%) @ T=15...35 °C ± (2 + 1.5% meas.)% @ T=remaining range
Sensor operating temp.	-20...+80 °C
Response time	T ₆₃ < 10 s (10→80% @T const., air speed 2 m/s, with filter)
Stability	1% / year (in the whole temperature and RH range)
Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	± 0.3 °C in the range 0...+70 °C ±0.4 °C @ T<0 °C and T>+70 °C
Stability	0.1 °C / year
Differential Pressure	
Sensor	Piezoresistive
Measuring range	±100 Pa
Resolution	0.1 Pa
Accuracy	±(0.8% of measure + 0.5) Pa @ 0...50 °C
Stability	±0.2 Pa with zero self-calibration
Overpressure limit	50 kPa
Compatible media	Only air and non-aggressive dry gases
Pressure inputs	Ø 5.5 mm
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	3 x AA alkaline batteries
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

ORDERING CODES

LR35ED		1N4r1ZTV.	
			RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
	LCD: Blank = without LCD L = with custom LCD		

LR35H... – LR35GH... – TERMINAL HEADER INPUTS FOR STANDING ANALOG SENSOR



LoRaWAN® data logger with three terminal header inputs for the connection of transmitters with 4÷20 mA, 0÷1 V or 0÷50 mV output, Pt100/Pt1000 sensors, K, J, T, N, E thermocouples, sensors with voltage free contact output (max. one sensor) and potentiometric sensors.

Graphic LCD display (only with **option G**). It stores the measures in its internal memory (from 36,000 to 68,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Mini-USB port on the side. Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software, front keyboard (only indoor version with LCD) or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount removable (by using the included support) or fixed (with optional flanges) installation.

TECHNICAL CHARACTERISTICS

Pt100/Pt1000	
Measuring range	-200...+650 °C
Resolution	0.1 °C
Accuracy	± 0.1 °C (excluding probe error)
Sensor coefficient	$\alpha=0.00385 \text{ }^{\circ}\text{C}^{-1}$
Connection	2, 3 or 4 wires
Thermocouple	
Thermocouple type	K, J, T, N, E (inputs not isolated, use thermocouples with isolated hot junction)
Measuring range	K: -200...+1370 °C J: -100...+750 °C E: -200...+750 °C T: -200...+400 °C N: -200...+1300 °C
Resolution	0.1 °C
Accuracy (excluding probe error)	K: ± 0.1°C (< 600°C) E: ± 0.1°C (< 300°C) ± 0.2°C (> 600°C) ± 0.2°C (> 300°C) N: ± 0.1°C (< 600°C) J: ± 0.1°C ± 0.2°C (> 600°C) T: ± 0.1°C
Current input	
Input range	0...20 mA or 4...20 mA
Shunt resistance	Internal (50Ω)
Resolution	16 bit
Accuracy	±2 μA
Voltage input	
Input range	0...50 mV, 0...1 V
Input Resistance	100 MΩ
Resolution	16 bit
Accuracy	±0.01% f.s.
Inputs for counting the switchings of a voltage-free contact	
Switching frequency	50 Hz max.
Hold Time	10 ms min.
Potentiometer input	
Value	Typical 10 kΩ
Resolution	16 bit
Accuracy	± 0.01% f.s.
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer

Power supply	Li-SOCl ₂ not rechargeable battery
Battery life (**)	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 50
Weight	200 g approx.
Housing	ABS

(**) Battery life is greatly reduced if the USB port is left connected to the PC for a long time.

PROBES

TP35.1....: 4-wire 1/3 DIN **Pt1000** temperature probe. Range -50...+105 °C. Ø5x40 mm AISI 316 tube. Cable ending with free wires. Cable length 3 m (TP35.1.3), 5 m (TP35.1.5) or 10 m (TP35.1.10).



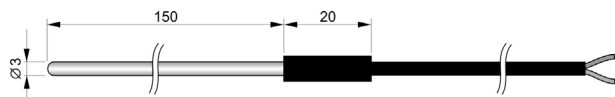
TP35.2....: 4-wire 1/3 DIN **Pt1000** temperature probe. Range -40...+105 °C. Ø5x20 mm thermoplastic rubber tube. Suitable for use with chemically aggressive solutions as well. Cable ending with free wires. Cable length 3 m (TP35.2.3) or 5 m (TP35.2.5)



TP35.4....: 4-wire 1/3 DIN **Pt100** temperature probe. Range -50...+105 °C. Ø6x50 mm AISI 316 tube. Cable ending with free wires. Cable length 3 m (TP35.4.3) or 5 m (TP35.4.5).



TP35K6.5: K-thermocouple temperature probe. Isolated junction. Class 1 according to IEC 60584-1. Range -50...+750 °C. Ø3x150 mm AISI 316 tube. Cable length 5 m. Cable ending with free wires.



ORDERING CODES

LR35	H.	
		RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
LCD: Blank = without LCD G = with custom graphic display		

3 Indoor Models – Accessories

CODE	Description	
CP23	Direct USB connection cable with male mini-USB connector on the instrument side and male A type USB connector on the PC side. Cable length 1.5 m.	
HD35.03	Spare plastic support for the removable installation of data loggers.	
HD35.11K	Pair of flanges made of anodized aluminium alloy for the fixed installation of data loggers. Pin for padlock.	
HD35-BAT2	3.6 V size A Li-SOCI2 non rechargeable battery, Molex 5264 2-pole connector. For all models powered by Li-SOCI2 battery.	
HD75	75%RH saturated solution for checking the relative humidity sensor, complete with screw adaptor for probes Ø 14 mm, M12×1 thread.	
HD33	33%RH saturated solution for checking the relative humidity sensor, complete with screw adaptor for probes Ø 14 mm, M12×1 thread.	
HD11	11%RH saturated solution for checking the relative humidity sensor, complete with screw adaptor for probes Ø 14 mm, M12×1 thread.	
	SOFTWARE	
HD35AP-CFR21	Advanced version of the HD35AP-S and HDServer1 software for the management of the data logging system in accordance with the FDA 21 CFR part 11 recommendations : traceability of activities (audit trail) performed with the software and management of users' access for the system configuration and viewing of data in the database. It works with USB hardware key (included).	

4 Outdoor Models

Measured quantities	Sensor/configuration	Models
Relative Humidity & Temperature	Combined NTC probe with cable	LR35LW1NTC
Particulate Matter	PM1.0, PM2.5 and PM10; external power supply	LR35WPM
Particulate Matter	PM1.0, PM2.5 and PM10; USB power supply	LR35WPM-USB
Particulate Matter & CO ₂	External power supply	LR35WPMB
Particulate Matter & CO ₂	USB power supply	LR35WPMB-USB
Solar Radiation	Pyranometer input	LR35LWRTC
Rainfall	Rain gauge with contact output	LR35LWPTC
Rainfall & Water Level	Rain gauge and level sensor inputs	LR35LWDPTC
Soil Water Content & Temperature	Combined VWC/T probe, 1 or 3 inputs	LR35LWS/1TC, LR35LWS/3TC
Standard Sensors	Four configurable terminal inputs; internal battery	LR35LWH
RS485 Modbus Sensors & Rainfall	Modbus-RTU and contact inputs	LR35LW-MB

LR35LW1NTC - WATERPROOF TEMPERATURE AND HUMIDITY LoRaWAN® DATA LOGGER FOR T/RH COMBINED PROBE WITH CABLE



Temperature and humidity LoRaWAN® data logger with custom LCD display. **IP 67** waterproof housing. It stores the measures in its internal memory (from 24,000 to 60,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request..

One input with M12 connector for the **HP3517WTC...** temperature and relative humidity combined probe (**NTC10KΩ** temperature sensor).

Calculated quantities: dew point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

TECHNICAL CHARACTERISTICS

Humidity	
Sensor	Capacitive
Measuring range	0...100% RH
Resolution	0.1% RH
Accuracy	$\pm 1.8\%$ (0...85%) / $\pm 2.5\%$ (85...100%) @ T=15...35 °C $\pm (2 + 1.5\% \text{ meas.})\%$ @ T=remaining range
Sensor operating temp.	-20...+80 °C
Response time	$T_{63} < 10 \text{ s}$ (10→80% @T const., air speed 2 m/s, with filter)
Stability	1% / year (in the whole temperature and RH range)
Sensor	Capacitive
Measuring range	0...100% RH
Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution	0.1 °C
Accuracy	$\pm 0.3 \text{ °C}$ @ T=0...+70 °C $\pm 0.4 \text{ °C}$ @ T<0 °C and T>+70 °C
Stability	0.1 °C / year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

HP3517W... Temperature and relative humidity combined probe. R.H. sensor measuring range: 0...100%. NTC temperature sensor. Ø14 mm. Filter in PBT and stainless steel grid. 4-pole M12 connector.



HP3517W	.	
		Cable length: 2 = 2 m 5 = 5 m 10 = 10 m
		Stem length and material: TC1 = 135 mm in PBT TC2 = 150 mm in AISI 304 TC3 = 335 mm in PBT

TP35N1.../C: NTC temperature probe. Range -40...+105 °C. Ø5x40 mm AISI 316 tube. 4-pole M12 connector. Cable length 3 m (TP35N1.3/C), 5 m (TP35N1.5/C) or 10 m (TP35N1.10/C)



ORDERING CODES

LR35LW1NTC.	
	RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.

LR35WPM[B][-USB]- PARTICULATE MATTER LoRaWAN® DATA LOGGER WITH OPTIONAL CO₂ SENSOR



Particulate Matter and CO₂ (optional) LoRaWAN® data logger. Measurement of PM1.0, PM2.5 and PM10. It stores the measures in its internal memory and transmits the logged data to the base unit automatically at regular intervals or upon request. Min. 34,000 / Max. 60,000 samples for the model measuring only PM, Min. 26,000 / Max. 60,000 samples for the model measuring PM and CO₂.

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Wall mount or fixing to a mast with optional supports. Supplied with fixing support.

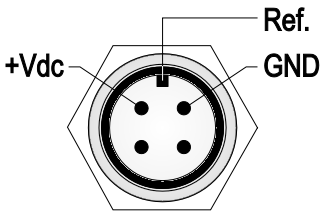
Two power supply versions available: USB-powered or 7...30 Vdc external power supply.

TECHNICAL CHARACTERISTICS

Particulate Matter	
Measuring principle	Laser scattering
Measured pollutants	PM1.0, PM2.5 and PM10
Measuring range	0...1000 µg/m ³ (for each pollutant)
Particle size detection range	Ø 0.3...10 µm
Linearity error	< 5%
Repeatability	< 3%
Warm up time	15 s
Temperature drift	< 0.01 µg/m ³ /°C
CO ₂ (optional)	
Measuring principle	Non-dispersive infrared rays (NDIR)
Measuring range	0...5,000 ppm
Accuracy	±(50 ppm + 3% of meas.) @ 25 °C and 1013 hPa
Sensor operating conditions	-20...60 °C / 0...95%RH non condensing / 700...1100 hPa
Response time	T ₉₀ < 120 s (air speed=2 m/s)
Calibration interval	> 5 years (under normal operating conditions)
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	Internal
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	LR35WPM[B]: 7...30 Vdc (25 mA @ 24 Vdc) external power supply LR35WPM[B]-USB: external power supply via USB
Operating conditions	-20...+70 °C / 0...95 %RH not condensing
Protection Degree	Equipped with a rain-proof and UV resistant inlet air filter - IP 53
Weight	250 g approx.
Housing	Polycarbonate

CONNECTION

4-pole M12 male connector pinout for 7...30 Vdc external power supply version:



ORDERING CODES

LR35WPM			.	
				RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
		Blank = 7...30 Vdc power supply -USB = USB-powered		
	Blank = Only PM B = PM + CO ₂			

LR35LWRTC - WATERPROOF SOLAR RADIATION LoRaWAN® DATA LOGGER



Solar radiation LoRaWAN® data logger with custom LCD display. **IP 67** waterproof housing. It stores the measures in its internal memory (from 42,000 to 68,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

One input with M12 connector for the pyranometer. A pyranometer with mV output is required. The pyranometer mV signal is also displayed.

Calculated quantities: daily solar radiation in Wh/m² (Wh = watt hour).

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

TECHNICAL CHARACTERISTICS

Solar Radiation(*)	
Sensor	Thermopile
Measuring range	0...2000 W/m ²
Resolution	1 W/m ²
Sensitivity	Configurable in mV/(kW m ⁻²)
(*) Other characteristics depend on the sensor connected; please refer to the data sheet of the sensor.	
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

For Pyranometers please check the relevant datasheets of LPS10 – LPS02 – LPS03.

ORDERING CODES

LR35LWRTC.	
	RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.

LR35LWPTC - WATERPROOF RAINFALL QUANTITY LoRAWAN® DATA LOGGER



Rainfall quantity LoRaWAN® data logger with custom LCD display. **IP 67** waterproof housing. It stores the measures in its internal memory (from 26,000 to 58,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

One input with M12 connector for the rain gauge.

Calculated quantities: rainfall rate in mm/h, daily rainfall in mm.

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

TECHNICAL CHARACTERISTICS

Rainfall quantity(*)	
Sensor	Tipping bucket with NC or NO configurable contact
Resolution	Configurable 0.1 – 0.2 – 0.5 mm/tipping
(*) Other characteristics depend on the sensor connected; please refer to the data sheet of the sensor.	
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

For Rain Gauges please check the relevant datasheets of RTD04 series and RTD02 series.

ORDERING CODES

LR35LWPTC.	
	RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.

LR35LWDPTC - WATERPROOF LEVEL AND RAINFALL QUANTITY LoRaWAN® DATA LOGGER



Level and rainfall quantity LoRaWAN® data logger with custom LCD display. **IP 67** waterproof housing. It stores the measures in its internal memory (from 24,000 to 52,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Two inputs: one with **M12 connector** for the rain gauge and one with **cable gland** for the level sensor. The level is measured with a sensor of pressure relative to the atmosphere.

Calculated quantities: rainfall rate in mm/h, daily rainfall in mm.

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

TECHNICAL CHARACTERISTICS

Level	
Sensor	Sensor of pressure relative to the atmosphere
Pressure measuring range	0...1 bar
Level measuring range	Depends on the fluid density (configurable via software). For water: 0...10 m approx.
Resolution	1 hPa / 0,01 m (for water)
Accuracy	±0.8% f.s. @ 25 °C
Rainfall quantity(*)	
Sensor	Tipping bucket with NC or NO configurable contact
Resolution	Configurable 0.1 – 0.2 – 0.5 mm/tipping
(*) Other characteristics depend on the sensor connected; please refer to the data sheet of the sensor.	
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

For Rain Gauges please check the relevant datasheets of **RTD04 series** and **RTD02 series**.

ORDERING CODES

LR35LWDPTC.	
	RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.

LR35LWS...TC - WATERPROOF SOIL TEMPERATURE AND VOLUMETRIC WATER CONTENT (VWC) LoRaWAN® DATA LOGGER



Soil temperature and volumetric water content LoRaWAN® data logger with custom LCD display. **IP 67** waterproof housing. It stores the measures in its internal memory (from 42,000 to 68,000 samples – 1 input; from 18,000 to 52,000 samples – 3 inputs) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Depending on the model, one or three inputs with M12 connector for **HP3510.1** or **HP3510.2** soil temperature and volumetric water content combined probes:

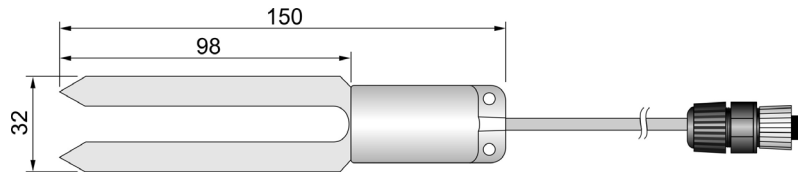
Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

TECHNICAL CHARACTERISTICS

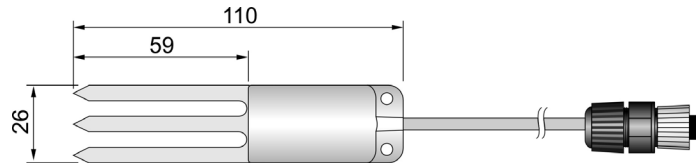
Soil volumetric water content	
Measuring principle	Capacitive
Measuring range	0...60% VWC (Volumetric Water Content)
Resolution	0.1%
Accuracy	±3 % between 0 and 50% VWC (standard mineral soil up to 5 mS/cm)
Measuring volume	Ø=100 mm x H=150 mm (HP3510.1...) Ø=80 mm x H=110 mm (HP3510.2...)
Sensor working temperature	-40...+60 °C
Temperature	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+60 °C
Resolution	0.1 °C
Accuracy	±0.5 °C
Stability	0.1 °C/year
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

HP3510.1...: 2-electrode probe for measuring the soil volumetric water content. With integrated NTC temperature sensor. 5 m (HP3510.1.5) or 10 m (HP3510.1.10) cable. 5-pole M12 connector.



HP3510.2...: 3-electrode probe for measuring the soil volumetric water content in restricted volumes. Integrated NTC temperature sensor. 5 m (HP3510.2.5) or 10 m (HP3510.2.10) cable. 5-pole M12 connector.



ORDERING CODES

LR35LWS		TC.	
			RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.
			Number of inputs /1 = 1 input /3 = 3 inputs

LR35LWH - WATERPROOF LoRAWAN® DATA LOGGER WITH FOUR TERMINAL HEADER INPUTS FOR STANDARD SENSORS



LoRaWAN® data logger with custom LCD display and with four terminal header inputs for the connection of transmitters with 4÷20 mA, 0÷1/0÷10 V or 0÷50 mV output, Pt100/Pt1000 sensors, K, J, T, N, E thermocouples, sensors with voltage free contact output (max. one sensor) and potentiometric sensors.

IP 67 waterproof housing. It stores the measures in its internal memory (from 28,000 to 58,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. Powered by the internal battery. Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

TECHNICAL CHARACTERISTICS

Pt100/Pt1000	
Measuring range	-200...+650 °C
Resolution	0.1 °C
Accuracy	± 0.1 °C (excluding probe error)
Sensor coefficient	$\alpha=0.00385\text{ }^{\circ}\text{C}^{-1}$
Connection	2, 3 or 4 wires
Thermocouple	
Thermocouple type	K, J, T, N, E (inputs not isolated, use thermocouples with isolated hot junction)
Measuring range	K: -200...+1370 °C J: -100...+750 °C E: -200...+750 °C T: -200...+400 °C N: -200...+1300 °C
Resolution	0.1 °C
Accuracy (excluding probe error)	K: ± 0.1°C (< 600°C) E: ± 0.1°C (< 300°C) ± 0.2°C (> 600°C) ± 0.2°C (> 300°C) N: ± 0.1°C (< 600°C) J: ± 0.1°C ± 0.2°C (> 600°C) T: ± 0.1°C
Current input	
Input range	0...20 mA or 4...20 mA
Shunt resistance	Internal (50 Ω)
Resolution	16 bit
Accuracy	±2 µA
Voltage input	
Input range	0...50 mV, -50...50 mV, 0...1 V, 0...10 V
Input Resistance	100 MΩ
Resolution	16 bit
Accuracy	±0.01% f.s.
Inputs for counting the switchings of a voltage-free contact	
Switching frequency	50 Hz max.
Hold Time	10 ms min.
Potentiometer input	
Value	Typical 10 kΩ
Resolution	16 bit
Accuracy	± 0.01% f.s.
Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)

Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	Li-SOCl ₂ not rechargeable battery
Battery life	2 years typical, with 2 min measuring and data transmitting interval
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

TP35.1....: 4-wire 1/3 DIN **Pt1000** temperature probe. Range -50...+105 °C. Ø5x40 mm AISI 316 tube. Cable ending with free wires. Cable length 3 m (TP35.1.3), 5 m (TP35.1.5) or 10 m (TP35.1.10).



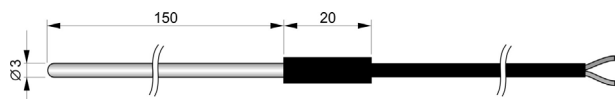
TP35.2....: 4-wire 1/3 DIN **Pt1000** temperature probe. Range -40...+105 °C. Ø5x20 mm thermoplastic rubber tube. Suitable for use with chemically aggressive solutions as well. Cable ending with free wires. Cable length 3 m (TP35.2.3) or 5 m (TP35.2.5)



TP35.4....: 4-wire 1/3 DIN **Pt100** temperature probe. Range -50...+105 °C. Ø6x50 mm AISI 316 tube. Cable ending with free wires. Cable length 3 m (TP35.4.3) or 5 m (TP35.4.5).



TP35K6.5: K-thermocouple temperature probe. Isolated junction. Class 1 according to IEC 60584-1. Range -50...+750 °C. Ø3x150 mm AISI 316 tube. Cable length 5 m. Cable ending with free wires.



ORDERING CODES

LR35LWH.	
	RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.

LR35LW-MB - WATERPROOF LoRaWAN® DATA LOGGER DATA LOGGER FOR SENSORS WITH RS485 MODBUS-RTU OUTPUT



LoRaWAN® data logger with custom LCD display and with RS485 Modbus-RTU input. It allows adding one or more sensors with RS485 Modbus-RTU output (for example an anemometer of the HD52.3D... series) in the wireless network. A voltage-free contact input allows connecting a rain gauge. As an alternative to the Modbus-RTU protocol, a proprietary protocol can be used to connect the HD2003 anemometer.

IP 67 waterproof housing. It stores the measures in its internal memory (from 14,000 to 52,000 samples) and transmits the logged data to the gateway automatically at regular intervals or upon request.

Acoustic alarm with internal buzzer. Configuration via **HD35AP-S** software or **iot-cloud.deltaohm.com** platform. External 7...30 Vdc power supply. It has switched power supply output to power the sensors only when the measurement has to be carried out. The output, when enabled, has the same value as the power input.

Wall mount or fixing to a mast with optional supports. **Optionally** supplied with solar shield and mast clamping (add **X** at the end of the ordering code).

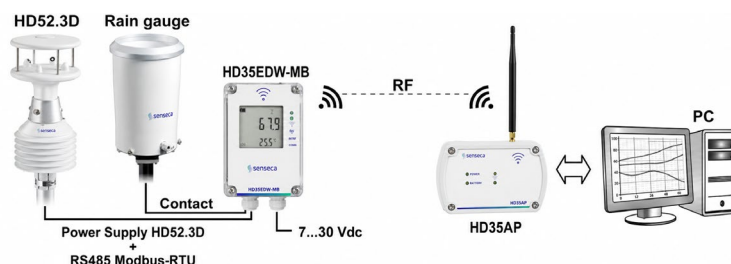
TECHNICAL CHARACTERISTICS

Instrument	
RF band	EU868, US915, AU915, AS923 depending on model. Other frequencies on request
Antenna	External
RF power	+14 dBm
LoRaWAN Class	A
Activation methods	OTAA (Over-The-Air-Activation) - ABP (Activation-by-Personalization)
Data encryption	AES128
Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Data transmitting interval	2, 5, 10, 15, 30, 60 min
Alarm	Acoustic by means of the internal buzzer
Power supply	7...30 Vdc (< 10 mA) external power supply
Operating conditions	-20...+70 °C / 0...85 %RH not condensing
Protection Degree	IP 67
Weight	250 g approx.
Housing	Polycarbonate

PROBES

For Rain Gauges & Anemometers please check the relevant datasheets on the website.

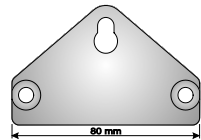
EXAMPLE



ORDERING CODES

LR35LW-MB.	
	RADIO FREQUENCY: E =EU868, U =US915, AU =AU915, AS =AS923, KR =KR920 Other frequencies on request.

5 Outdoor Models – Accessories

CODE	Description	
CP23	Direct USB connection cable with male mini-USB connector on the instrument side and male A type USB connector on the PC side. Cable length 1.5 m.	
HD35.24W	Flange for fixing to the wall.	
HD35.24C	Kit including the HD35.24W flange and a clamp for fixing the flange to a Ø 35...44 mm mast.	
HD35.24C5	Kit including the HD35.24W flange and a clamp for fixing the flange to a Ø 35...60 mm mast.	
HD9007A-1	12-ring protection against solar radiations, with support bracket.	
HD9007A-2	16-ring protection against solar radiations, with support bracket.	
HD35-BAT2	3.6 V lithium-thionyl chloride (Li-SOCl ₂) non-rechargeable battery, size A, 2-pole Molex 5264 connector. For all LR35W except models using BAT-2013DB.	
BAT-2013DB	3.6 V lithium-thionyl chloride (Li-SOCl ₂) not rechargeable battery, size C, Molex 5264 2-pole connector. For LR35W[D]PTC, LR35WS/xTC, LR35WRTC, LR35WH.	
HD75	75%RH saturated solution for checking the relative humidity sensor, complete with screw adaptor for probes Ø 14 mm, M12×1 thread.	
HD33	33%RH saturated solution for checking the relative humidity sensor, complete with screw adaptor for probes Ø 14 mm, M12×1 thread.	
HD11	11%RH saturated solution for checking the relative humidity sensor, complete with screw adaptor for probes Ø 14 mm, M12×1 thread.	
	SOFTWARE	
HD35AP-CFR21	Advanced version of the HD35AP-S and HDServer1 software for the management of the data logging system in accordance with the FDA 21 CFR part 11 recommendations : traceability of activities (audit trail) performed with the software and management of users' access for the system configuration and viewing of data in the database. It works with USB hardware key (included).	

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