== stack⁷

Let us design, deliver and operate your next IoT project

We create effective end-to-end IoT projects for startups and enterprise clients. We also know a thing or two about hardware development, radio protocols, data processing, and visualisation.

About Stack7



Our goal is to provide you with everything you need to deliver a great IoT product. Professional IoT development doesn't happen overnight. Developing a working IoT product from scratch is a complicated, expensive, and time-consuming process. Don't reinvent the wheel when you can work with us to use existing expertise, team, and code.

With us, you will build and deliver higher quality end to end IoT projects faster, with more quality and confidence. We have the technology integrations you need – and when you need something special, we will find the best solution to make your IoT project work.

Based in the Czech Republic in the heart of Europe, we can keep our development costs low by hiring local developers while still maintaining the highest possible quality. As all of our development is done in-house, we can maintain a very high standard and ensure perfect compatibility.

Why choose Stack7

- We are IoT veterans who have been in business since 2011.
- We offer vertically integrated in-house development. We are experts in every aspect of IoT.
- We have rich experience building and selling a user-centric energy management IoT system for all utilities (electricity, gas, water) and air quality (temperature, humidity, CO₂ concentration), in a highly secured, cloud-based solution.
- Our biggest competitive advantage is the management of our own production line for quick and effective deployment and rapid prototyping.
- We know how to handle real-time data.
- Whitelabeling and customization is our speciality: we can help you build a custom solution from our broad range of products.
- Our stack is built on modern technologies (MQTT, Docker, InfluxDB, Amazon Web Services,...).
- A great ratio of price to performance, based in the Czech Republic, we keep our development costs low and pass the savings on to you.

We have a history with IoT

Stack7 grew out of a set of technologies that power Energomonitor.com. These technologies were developed and improved over many years.



....

We are experts in all of the 7 layers of IoT development.



Hardware components

Hardware layer

We have developed a wide variety of sensors and gateways for data collection. Depending on your requirements, we can cover your needs with existing hardware, or develop a brand new device.

Engineering and electronics design

PCB and mechanical design

- Prototyping (3D printing)
- Testing
- Pre-production runs
- Production (1000+ pcs)

Industrial design

- CAD/3D design
- Rendering, visualization
- Testing
- 3D printing and CNC machining

2 Data link protocols

Communication layer

We developed our own encrypted short-range radio protocol Chirp, which works on 433/868 MHz for optimized power consumption and transmission distance. Depending on the application, we work also with LoRa, NB-IoT, GPRS, and Dash7.

Data link protocols

- Short range / low bandwidth (Sub-1GHz, DASH7, Z-Wave, wM-Bus)
- Short range / high bandwidth (Wi-Fi, ZigBee)
- Long range / low bandwidth (LoRa, Sigfox, NB-IoT)
- Long range / high bandwidth (GSM, LTE)
- Tethered (Modbus, Ethernet)





In the second second

Communication layer

Our devices send data over IPv4.

O Session protocols

Communication layer

We work with all common IoT protocols.

Session protocols

- MQTT
- HTTP
- CoAP
- UDP



5 System hardware & IoT platforms

MOT

Software layer

Our system is cloud-based and covers all the necessary components: device management, data collection / processing / storage / analysis, and a RESTful API.

Software services/components

- Messaging
- Databases
- Processing / Analytics
- Network / Device management
- Middleware software components

OPresentation & Visualisation

Software layer

We develop intuitively designed web applications for data visualization along with native Android and iOS apps.





Ø Business application

Application layer

We are ready to help you develop your IoT application (smart city, smart grid, smart home, connected mobility, Internet of Energy, security, ...).

Business/Industrial IoT

- Energy and Industrial
- Healthcare
- Buildings/Cities
- Retail and Services
- Smart Farming

Customer IoT

- Smart home
- Lifestyle
- Healthcare
- Mobility

Energomonitor product scheme

Energomonitor is our flagship product where you can see our ability to build IoT product. Every thing which Energomonitor contains can be part of your IoT project or we can build something brand new for you.







- 7

Energomonitor app features

- Consumption and production information not only in KWh, but in **real cost** as well.
- Real-time data every 5 seconds.
- Adjustable dashboard with 4 types of widgets.
- **Remote control** of connected devices.
- **Unlimited history** of snapshots **taken every 90 seconds**. An easy to understand overview visualized through graphs and charts.
- **Comparison** of individualized time periods.
- **Custom notifications** for unexpected events or unusually high/low consumption, shown in the app or sent via e-mail.
- Weekly and monthly **e-mail reports**.
- Data accessible through the **REST API**.
- Easy export of all saved data to XLS or CSV.
- Up to 30 connected devices under one location.
- Multiple locations possible under one account.
- Available as a **browser app**, native Android app and native **iOS app**.

Google" play



There are unlimited uses for Energomonitor:

- **Keep calm and check online** if you switched off the gas when you left home.
- **Inspect** your fridge or other home devices remotely to ensure they are working properly.
- **Know** when your family arrives home, or what time your employees arrive to work.

•••				
🤣 ene	rgoi	moni	tor	
Dashboard	🚱 E	lectricity	G	as (
Q Dem	0 /	Now /	,	
•	2.	09	kW Main	
Dem	0 /	Now /	(
	1	5.2	℃ Inside	
Dem7.	io - M	1ain kWł	/ Tod	ay /
	€	1.5	3	
2.00 kW				
1.50 kW				
1.00 kW -				



- How much does it cost when all the office computers are left running uselessly through the night?
- Have a comprehensive overview of the production and consumption of power from your solar installation and be able to optimize effectively.
- Know when the air quality at home is not keeping you healthy.

Take a look at a demo of our application at

energomonitor.com/demo







Homebase

The heart of every Energomonitor installation. The Homebase collects data via a wireless connection to all sensors in a particular location.

Every Homebase sends the received data to cloud servers for further processing via a wired internet connection. One Homebase can collect data from up to 30 sensors.

Part	gateway
Model	EWG6
Dimensions	110 x 80 x 26 mm (without antenna)
Weight	128 g
Material	plastic or metal*
Protection	IP20
Temperature	0 to 60 °C
Humidity	< 80 %RH non-condensing band (868
Interface	1x LAN 10/100 Mb/s (RJ-45), 1x TTL RS-232 (RJ- 12), 1x power (USB-B)
Antenna	unremovable telescopic
Power supply	5 VDC (USB-B)
Consumption	< 2 W
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)

* photos contain the metallic version or the chassis

Portasight

Portasight is a portable display, continuously updated with data from home sensors.

Portasight features:

- Portasight shows two user selected values from an Energomonitor installation on a low power LCD.
- Each Portasight contains sensors of its own. It contains an internal thermometer and humidity meter.
- Every Portasight is **elegantly designed** with **an anodised aluminium chassis** and **wooden back**.
- Can be placed almost anywhere: with a practical stand for desks or counters or via magnets in the device to any steel surface.
- Totally wire free display, 100% portable.
- Long battery life that lasts at least 1 year.

Part	transmitter
Model	EDI1
Dimensions	device: 103 x 92 x 14 mm, active display: 90 x 65 mm
Weight	135 g
Material	metal and wood
Protection	IP40
Temperature	0 to 60 °C
Humidity	< 80 %RH non-condensing
Antenna	internal
Power supply	2× exchangeable AAA alkaline battery 1,5 V
Consumption	battery life > 1 year
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)
Built-in sensors	temperature, humidity
Resolution of metering	temperature: 0,1 °C, humidity: 1 %RH
Accuracy of metering	temperature: ± 0,5 °C, humidity: ± 4 %RH
Range of metering	temperature: 5 to 50 °C, humidity: 0 to 80 %RH



Electricity monitoring

Powersense

The Energomonitor Powersense sensor measures electricity consumption and production by direct measurement of 1 phase or 3 phase by current transformers.

For current up to 80 A



Part	transmitter without probe	removable probe	removable probe
Model	EOS6-PS_80	ECT1-CLIP_80	ECT1-CLAMP_80
Dimensions	45 × 92 × 29 mm (without antenna)	26 x 40 x 23 mm, Ø 10 mm, clip	55 x 60 x 30 mm, Ø 12 mm, clamp
Weight	150 g	60 g	78 g
Material	metal and plastic	plastic	plastic
Protection	IP20	IP40	IP40
Temperature	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing	< 80 %RH non-condensing
Interface	3x probe port (DC connector 3.5/1.3 mm),	1x port	1x port
	1x antenna (SMA female)	(DC connector 3.5/1.3 mm)	(DC connector 3.5/1.3 mm)
Antenna	removable (SMA male)	-	-
Power supply	2x exchangeable AA alkaline battery 1,5 V	-	-
Consumption	battery life > 2 years	-	-
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)	-	-
Built-in sensors	-	current	current
Resolution of metering	1 W	-	-
Accuracy of metering	10 %	-	-
Range of metering	3x < 80 A	< 80 A, 20 W to 20 kW	< 80 A, 20 W to 20 kW
Conversion constant	190, 195, 200, 205, 210, 215, 220, 225, 230, 235,	-	-
	240, 245, 250 [V]		

For current up to 300 A

Part	transmitter without probe	removable probes
Model	EOS6-PS_300	ECT1-CLIP_300
Dimensions	45 × 92 × 29 mm (without antenna)	60 x 85 x 45 mm, Ø 36 mm, clip
Weight	150 g	390 g
Material	metal and plastic	plastic
Protection	IP20	IP40
Temperature	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing
Interface	3x probe port (DC connector 3.5/1.3 mm), 1x antenna (SMA female)	1x port (DC connector 3.5/1.3 mm)
Antenna	removable (SMA male)	-
Power supply	2x exchangeable AA alkaline battery 1,5 V	-
Consumption	battery life > 2 years	-
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)	-
Built-in sensors	-	current
Resolution of metering	1 W	-
Accuracy of metering	10 %	-
Range of metering	3x < 300 A	< 300 A, 200 W to 72 kW
Conversion constant	190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250 [V]	-

Optosense

The Energomonitor Optosense sensor measures electricity consumption and production by reading a digital electricity meter's optical impulse output.

Part	transmitter without probe	removable probe
Model	EOS6-OS	EOC2
Dimensions	45 × 92 × 29 mm (without antenna)	1 m cable
Weight	150 g	25 g
Material	metal and plastic	plastic
Protection	IP20	IP20
Temperature	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing
Interface	1x probe port (RJ-9), 1x antenna (SMA female)	1x port (RJ-9)
Antenna	removable (SMA male)	-
Power supply	2x exchangeable AA alkaline battery 1,5 V	from transmitter
Consumption	battery life > 2 years	-
Radio protocol	proprietary protocol Chirp 433 MHz	
	(868 MHz optionally)	-
Built-in sensors	-	pulse
Resolution of metering	depends on electrometer conversion	
	constant [imp/kWh]	1 imp
Accuracy of metering	1 imp	1 imp
Range of metering	2^32 impulse counter; > 1 ms pulse width	-
Conversion constant	100, 400, 500, 600, 800, 1000, 1250, 1600, 3200,	-
	4000, 5000, 10000 [imp/kWh]	



Plugsense

The Energomonitor Plugsense device measures the consumption of specific appliances which can then be remotely operated.

Part	transmitter
Model	ESO5
Dimensions	103 x 86 x 62 mm
Weight	138 g
Material	plastic
Protection	IP20
Temperature	-20 to 60 °C
Humidity	< 80 %RH non-condensing
Interface	socket type E CEE 7/5-6 (French) or F CEE 7/3-4 (Schukostecker)
Antenna	internal
Power supply	100 to 240 VAC / 50Hz
Consumption	1,5 W (on state) / 0.5 W (off state)
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)
Built-in sensors	current, voltage
Resolution of metering	1 W
Accuracy of metering	± 2%
Range of metering	< 13 A, 0 to 3 kW (240 V)



Powersense DC

The Energomonitor Powersense DC sensor monitors power consumption of DC powered equipment using up to 5 direct current transducers.

The clamps are available separately and are compatible with cables with the following diameters:



medium - 21mm



Examples of usage:

- Photovoltaics monitoring of DC output, individual circuits
- Telecom System power usage monitoring (for ex. BTS tower power usage monitoring)
- Data Centers UPS system battery health and power usage monitoring
- Battery installations monitoring of charging and discharging
- Base Transceiver Station (BTS) monitoring of radio equipment



Key characteristics:

- Power is calculated as a product of measured current and voltage. The measured voltage is common for all of the five current transducer sensors (same rail supply).
- Space efficient and simple installation without the need to disrupt the monitored circuits.
- The Power supply is protected from incorrect installation. If installed at the wrong polarity, the unit will be protected from shorting out.
- Values measured every 5s (other frequencies are possible as depending on requirements.
- Possibility of manual calibration of DC transducers for better precision.
- The range of the radio link is up to 100m, depending on the shielding of walls and electromagnetic interference.

Part	transmitter without probes	removable probe	removable probe	removable probe
Model	EHT1	EHT1-CLIP_50	EHT1-CLIP_100	EHT1-CLIP_400
Dimensions	110 x 80 x 26 mm	37 x 33 x 20 mm (without cable)	61 x 60 x 16 mm (without cable)	100 x 100 x 25 mm (without cable)
Weight	140 g	21 g	65 g	300 g
Material	plastic	plastic	plastic	plastic
Protection	IP20	IP20	IP20	IP20
Temperature	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing	< 80 %RH non-condensing	< 80 %RH non-condensing
Interface	5x probe port (RJ-12)	1x port (RJ-12)	1x port (RJ-12)	1x port (RJ-12)
Antenna	internal	-	-	-
Power supply	24 to 55 VDC from monitored rail	from transmitter	from transmitter	from transmitter
Consumption	< 2 W	-	-	-
Radio protocol	proprietary protocol Chirp 433 MHz	-	-	-
	(868 MHz optionally)			
Built-in sensors	voltage	DC current	DC current	DC current
Resolution of metering	1 W	-	-	-
Accuracy of metering	± 2%	-	-	-
Range of metering	5x < 400 A	< 50 A	< 100 A	< 400 A

Gas monitoring

Relaysense Gas

The Energomonitor Relaysense Gas sensor measures gas consumption by reading the pulse counter of a compatible gas meter.



Part	transmitter without probe	removable probe
Model	EOS6-GS	ESC2
Dimensions	45 × 92 × 29 mm (without antenna)	1 m cable
Weight	150 g	18 g
Material	metal and plastic	plastic
Protection	IP20	IP40
Temperature	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing
Interface	1x probe port (RJ-9), 1x antenna (SMA female)	1x port (RJ-9)
Antenna	removable (SMA male)	-
Power supply	2x exchangeable AA alkaline battery 1,5 V	from transmitter
Consumption	battery life > 2 years	-
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)	-
Built-in sensors	-	pulse
Resolution of metering	depends on gas meter conversion constant [imp/m³]	1 imp
Accuracy of metering	1 imp	1 imp
Range of metering	2^32 impulse counter; > 1 ms pulse width	-
Conversion constant	10, 100, 1000, 10000 [imp/m ³]	-

Water monitoring

Relaysense Water

The Energomonitor Relaysense Water sensor measures water consumption by connecting to the impulse counter of a compatible water meter.

Part	transmitter without probe	removable probe
Model	EOS6-WM	EWC1
Dimensions	45 × 92 × 29 mm (without antenna)	0,5 m cable
Weight	150 g	10 g
Material	metal and plastic	plastic
Protection	IP20	IP20
Temperature	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing
Interface	1x probe port (RJ-9), 1x antenna (SMA female)	1x port (RJ-9)
Antenna	removable (SMA male)	-
Power supply	2x exchangeable AA alkaline battery 1,5 V	-
Consumption	battery life > 2 years	-
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)	-
Built-in sensors	-	pulse
Resolution of metering	0,5 L	1 imp
Accuracy of metering	1 imp	1 imp
Range of metering	2^32 impulse counter; > 45 ms pulse width	-

Relaysense Water Sealed

Part	transmitter without probe
Model	EWM3-P
Dimensions	65 × 60 × 40 mm (without antenna)
Weight	92 g
Material	plastic
Protection	IP66
Temperature	-20 to 60 °C
Humidity	< 100 %RH
Interface	1x non potential pulse input (via the terminals),
	1x antenna (SMA female)
Antenna	removable (SMA male)
Power supply	2x exchangeable AAA alkaline battery 1,5 V
Consumption	battery life > 2 years
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)
Resolution of metering	depends on water meter conversion constant [imp/m ³]
Accuracy of metering	1 imp
Range of metering	2^32 impulse counter; > 1 ms pulse width
Conversion constant	1, 2, 4, 10, 20, 40, 100, 200, 400, 1000 [imp/m ³]





Air quality monitoring

Airsense Canary / Airsense Industrial

The Energomonitor Airsense sensor monitors complex air quality in the room - carbon dioxide (CO₂) concentration, temperature and humidity.

Part	transmitter
Model	EAS1
Dimensions	140 x 66 x 50 mm
Weight	150 g
Material	plastic
Protection	IP20
Temperature	from +5 to +50 °C
Humidity	< 80 %RH non-condensing
Antenna	internal
Power supply	3x exchangeable AA alkaline battery 1,5 V
Consumption	battery life > 1 year
Radio protocol	proprietary protocol Chirp 433 MHz (868 MHz optionally)
Built-in sensors	CO ₂ , temperature, humidity
Resolution of metering	CO ₂ : 1 ppm, temperature: 0,1 °C, humidity: 1 %RH
Accuracy of metering	$\rm CO_2:\pm 50~\rm ppm\pm 3~\%$ of reading, temperature: ±0,5 °C,
	humidity: ± 4 %RH
Range of metering	$\mathrm{CO_2}$: 5000 ppm, temperature: 5 to 50 °C, humidity: 0 to 80 %RH





Thermosense

The Energomonitor Thermosense sensor measures indoor or outdoor temperature.

	Thermosense Indoor	Thermosense Outdoor	Thermosense Tripoint
Part	transmitter	transmitter	transmitter with fixed probes
Model	ETM3-IN	ETM3	ETM3-3
Dimensions	75 × 75 × 20 mm	65 × 60 × 40 mm (without antenna)	65 × 60 × 40 mm (without antenna),
			1.5m length of probes
Weight	66 g	92 g	130 g
Material	plastic	plastic	plastic
Protection	IP20	IP66	IP66
Temperature	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C, -40 to 120 °C for probes
Humidity	< 80 %RH non-condensing	< 100 %RH	< 100 %RH
Interface	-	1x antenna (SMA female)	1x antenna (SMA female)
Antenna	internal	removable (SMA male)	removable (SMA male)
Power supply	2x exchangeable AAA alkaline battery 1,5 V	2x exchangeable AAA alkaline battery 1,5 V	2x exchangeable AAA alkaline battery 1,5 V
Consumption	battery life > 2 years	battery life > 2 years	battery life > 2 years
Radio protocol	proprietary protocol Chirp 433 MHz	proprietary protocol Chirp 433 MHz	proprietary protocol Chirp 433 MHz
	(868 MHz optionally)	(868 MHz optionally)	(868 MHz optionally)
Built-in sensors	temperature	temperature	3x external temperature
Resolution of metering	0.1 °C	0.1 °C	0.1 °C
Accuracy of metering	±1 °C	±1 °C	±1 °C
Range of metering	-20 to 60 °C	-20 to 60 °C	-40 to 120 °C



Upcoming

Powersense DIN Rail

The Powersense DIN Rail sensor measures AC electricity consumption or production in 1- or 3-phase installations.

- Billing accurate The most accurate monitoring of electricity consumption, including exact values of current, voltage, power factor and energy flow direction.
- Capable of measuring production and consumption in grid connected solar installations where power flows in both directions according to demand.
- Capable of remote switching connected circuits.
- Values measured every 5s.
- Plug-and-play connectivity works wherever mobile networks do - minimal network configuration required.
- Compatible with the Energomonitor system, expandable by other Energomonitor sensors.
- Different radio configurations available: proprietary Chirp protocol, NB-IoT and others according to customer specifications.

Part	transmitter	transmitter
Model	EDM2-1	EDM2-3
Dimensions	40 x 27 x 30 mm	40 x 85 x 30 mm
	(without antenna)	(without antenna)
Material	plastic	plastic
Protection	IP20	IP20
Temperature	-20 to 60 °C	-20 to 60 °C
Humidity	< 80 %RH non-condensing	< 80 %RH non-condensing
Power supply	100-240 VAC / 50Hz	100-240 VAC / 50Hz
Consumption	< 2 W	< 2 W
Radio protocol	proprietary protocol	proprietary protocol
	Chirp 433 MHz, (868 MHz,	Chirp 433 MHz, (868 MHz,
	NB-IoT optionally)	NB-IoT optionally)
Built-in sensors	1x current, 1x voltage	3x current, 3x voltage
Resolution of metering	1 W	1 W
Accuracy of metering	± 2%	± 2%
Range of metering	< 63 A, 0 to 15 kW	3x < 63 A, 3x 0 to 15 kW

* All parameters are preliminary for information purposes only and can differ in the final product.







Energomonitor, s.r.o. Hlubinská 917/20. 702 00 Ostrava Czech Republic **Reg. No:** 25854631 **EU VAT:** CZ25854631

Mail and shipping address

Energomonitor HQ Zašovská 262, 757 01 Valašské Meziříčí Czech Republic

www.stack7.io info@stack7.io