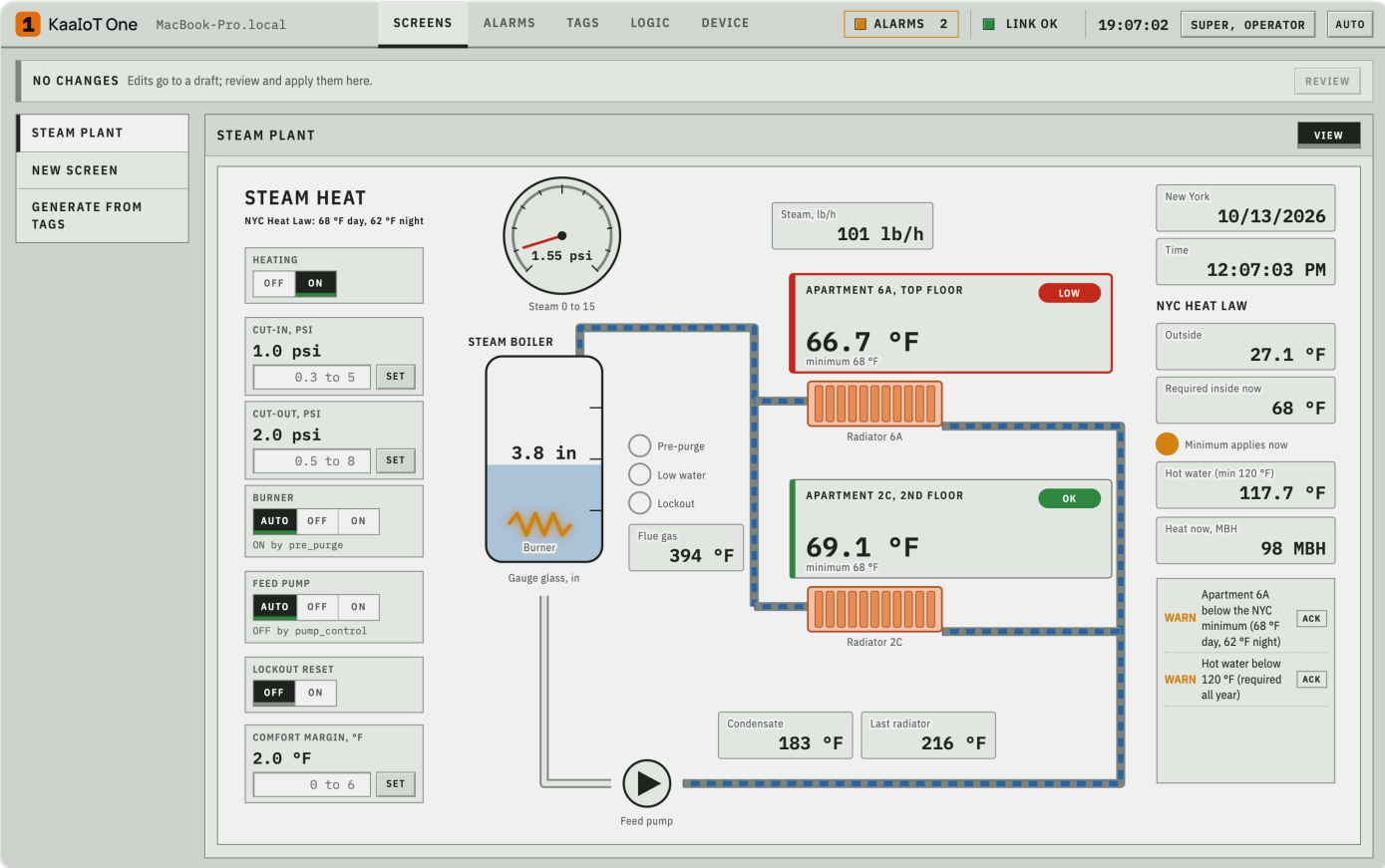


ROOMSYS Heat

ROOMSYS Heat keeps every apartment of a New York City building above the heat law minimum and watches the boiler room. It runs the boiler on hot water or low-pressure steam from a controller in the boiler room, with apartment temperatures from wireless LoRaWAN sensors, and keeps the records for HPD. The controller runs KaaloT One; the cloud side runs on KaaloT.



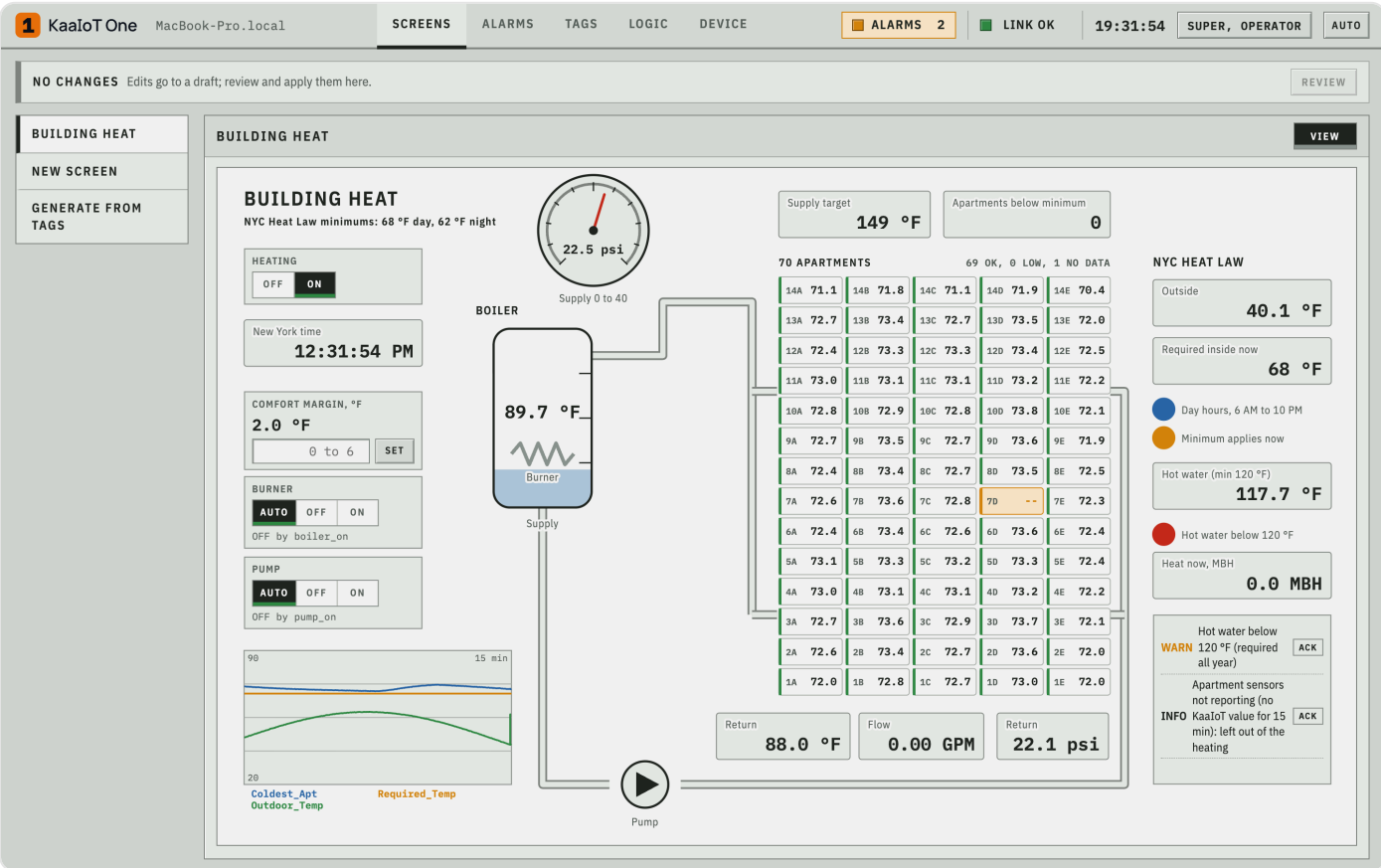
Operator screen of a low-pressure steam plant: pressure gauge, gauge glass, burner, steam mains, radiators, apartments against the NYC minimum

Scope

Plant type	Template	Controlled equipment
Hot water heating	nyc_building	boiler burner (relay R1), circulation pump (relay R2)
Low-pressure steam (one-pipe)	nyc_steam	burner call to the flame safeguard (relay R1), boiler feed pump (relay R2)

- Control runs on the controller; the cloud link is optional.
- Operating control only: the plant's hardwired safety chain (LWCO, limits, flame safeguard) stays in place.

- Templates run on simulated sensors for demos; each tag is pointed at its real source at commissioning.



Hot-water heating: boiler, pump, supply and return pressure, apartments with LoRaWAN sensors, the heat law right now

Measured points

Hot water (nyc_building)

Point	Unit	Description	Typical source
Supply_Temp	°F	water leaving the boiler	ADAM module on RS-485
Return_Temp	°F	water coming back to the boiler	ADAM module on RS-485
Outdoor_Temp	°F	temperature outside	ADAM module on RS-485
System_Pressure	psi	supply pressure after the pump	ADAM module on RS-485
Return_Pressure	psi	return pressure before the pump	ADAM module on RS-485
Water_Flow	GPM	water flow through the loop	pulse counter on a digital input
DHW_Temp	°F	domestic hot water at the heater outlet	ADAM module on RS-485
Apt_1A_Temp ... Apt_14E_Temp	°F	70 apartment temperatures (floors 1 to 14, A to E)	LoRaWAN sensors through KaaloT

Low-pressure steam (nyc_steam)

Point	Unit	Description	Typical source
Steam_Pressure	psi	steam pressure at the boiler header	analog input, 0-15 psi, 4-20 mA
Water_Level	in	water in the gauge glass above its bottom nut	analog input, level probe, 4-20 mA
Stack_Temp	°F	flue gas leaving the boiler	ADAM module on RS-485
Condensate_Temp	°F	condensate coming back to the receiver	ADAM module on RS-485
Radiator_Temp	°F	last radiator on the mains, top floor	ADAM module on RS-485
Steam_Flow	lb/h	steam leaving the boiler	steam meter on RS-485 (Modbus)
Outdoor_Temp	°F	temperature outside	ADAM module on RS-485
DHW_Temp	°F	domestic hot water (tankless coil)	ADAM module on RS-485
Apt_2C_Temp, Apt_6A_Temp	°F	apartment temperatures	LoRaWAN sensors through KaaloT

The number of apartments is project-specific; the templates show two per building.

Calculated values

Value	Unit	Template	Formula or meaning
Required_Temp	°F	both	legal minimum inside right now
Target_Temp	°F	both	Required_Temp + Comfort_Margin
Coldest_Apt	°F	both	lowest apartment temperature
Supply_Target	°F	hot water	outdoor reset target
Delta_T	°F	hot water	supply minus return
Heat_Power	MBH	hot water	0.5 x GPM x delta T
Heat_Energy	kBTU	hot water	heat summed over time, kept over restarts
Steam_Power	MBH	steam	lb/h x 0.97 (970 BTU/lb)
Steam_Energy	kBTU	steam	heat summed over time, kept over restarts
Burner_Hours	h	steam	firing time summed over time

Control functions

Hot water

Function	Setting
Heat demand	coldest apartment below target, 1.5 °F band
Outdoor reset curve	180 °F at 0 °F, 160 °F at 32 °F, 130 °F at 55 °F, 110 °F at 65 °F outside
Burner	on while heating is on, an apartment wants heat and supply is below the reset target (7 °F band)
Circulation pump	on while heating is on and an apartment wants heat
Pump overrun	120 s after the burner stops

Function	Setting
Comfort margin	0 to 6 °F, default 2 °F
Heating season	by schedule; off June 1 to September 30

Low-pressure steam

Function	Setting
Heat demand	coldest apartment below target, 1.5 °F band
Pressuretrol	cut-in 1.0 psi, cut-out 2.0 psi (operator adjustable: cut-in 0.3 to 5, cut-out 0.5 to 8 psi)
Pre-purge	15 s before every firing
Feed pump	by gauge-glass level: on below 3.5 in, off above 4.5 in; runs all year
Comfort margin	0 to 6 °F, default 2 °F
Heating season	by schedule; off June 1 to September 30

Operator controls on the screens: Heating on/off, comfort margin, HAND/AUTO for burner and pump, cut-in and cut-out (steam), Lockout reset (steam).

Safety functions (software, in addition to hardwired)

These trips force the burner off whatever the operator or the heating program wants (interlock beats HAND). They never replace the boiler's hardwired LWCO, pressure limit or flame safeguard.

Hot water

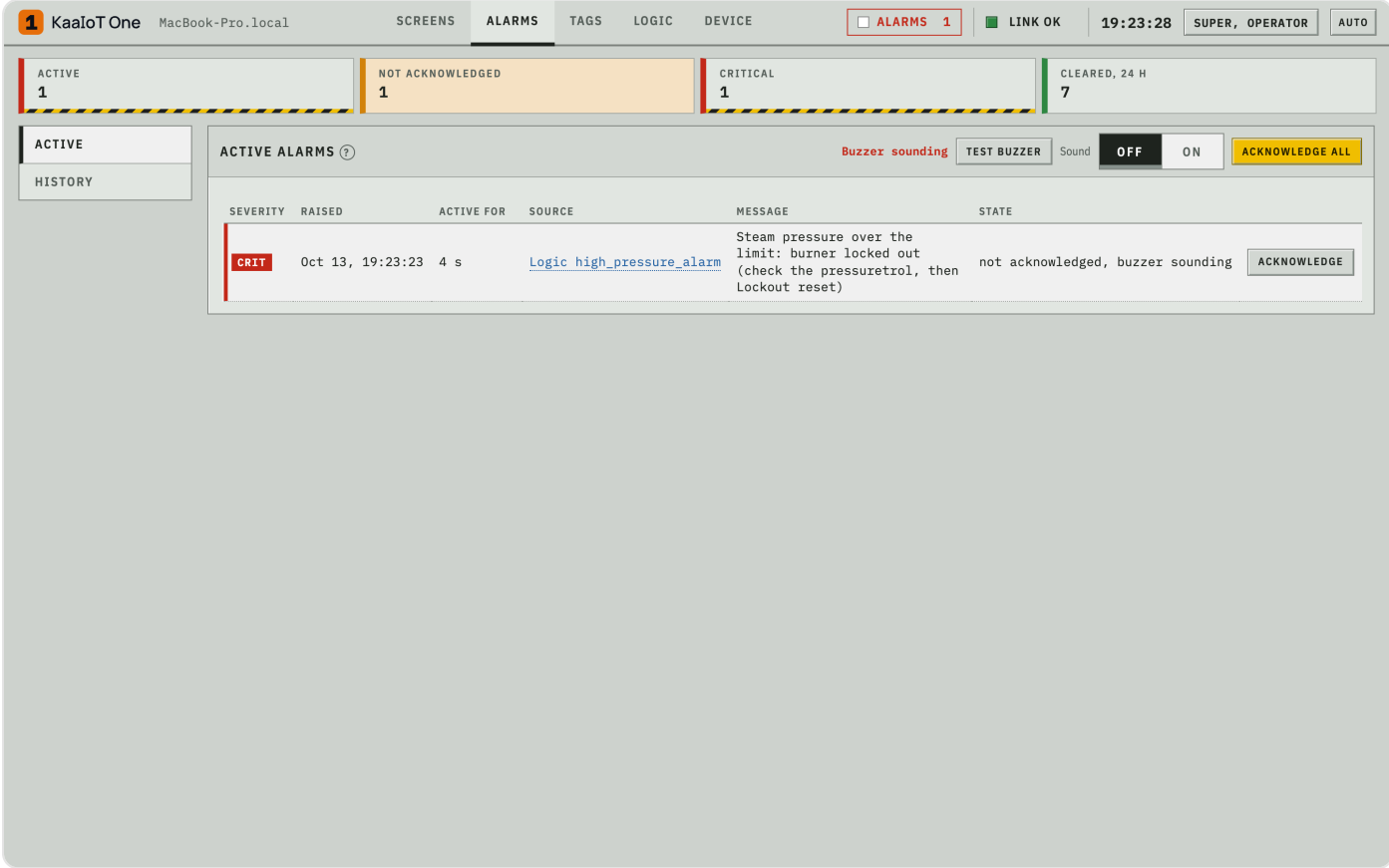
Trip	Condition	Action	Reset
Over-temperature	supply above Max_Supply_Temp (default 190 °F, 120 to 200 °F), 18 °F band	burner off, critical alarm	automatic when below
Low pressure	system pressure below Min_Pressure (default 8 psi, 0 = off), 1.5 psi band	burner blocked, critical alarm	automatic when above
No flow	burner on and flow below 0.2 GPM for 20 s	burner off, latched, critical alarm	heating off and on

Low-pressure steam

Trip	Condition	Action	Reset
Low water cutoff	level below LWCO_Level (default 2.0 in), 0.25 in band	burner off, critical alarm	automatic when water is back
Auxiliary LWCO	level below Aux_LWCO_Level (default 1.25 in)	burner lockout, critical alarm	Lockout reset
High pressure limit	steam pressure above Max_Pressure (default 5.0 psi, 2 to 12 psi)	burner lockout, critical alarm with buzzer	Lockout reset
Flue gas	stack above 550 °F for 60 s, 20 °F band	warning alarm	automatic

Outputs with no good command go to their safe value (burner off, pump off), also on a stall or shutdown.

Alarms and notification



Active alarms: a high-pressure lockout sounding the buzzer, not acknowledged; a low-water alarm acknowledged

Channel	Behaviour
Operator screen	alarms widget on the plant screen
Top bar	indicator on every page; active alarms blink until acknowledged
Alarms page	filters; 30-day history with who acknowledged
Buzzer	device buzzer for alarms with the buzzer option (steam high-pressure limit) until acknowledged
Browser	optional sound
Remote (KaaloT)	count of active alarms as a metric; state tags marked "cloud" (Low_Water, Lockout, violations); alerting on these values is configured in KaaloT per project

Other alarm sources: outputs that cannot be driven, field devices not answering, hardware, network.

NYC Heat Law compliance functions

Rule (HPD)	Implementation
Heat season October 1 to May 31	from the controller clock (month)
6 AM to 10 PM: at least 68 °F inside when below 55 °F outside	schedule block for day hours; outdoor compare with 1 °F band

Rule (HPD)	Implementation
10 PM to 6 AM: at least 62 °F inside	night minimum, any weather
Hot water at least 120 °F all year	DHW compare with 1 °F band

Function	Detail
Required minimum now	Required_Temp and Law_Applies, shown on screen and sent to KaaloT
Per-apartment violation	apartment below the minimum while it applies (0.5 °F band); warning alarm after 120 s
Hot water violation	below 120 °F; warning alarm after 120 s
Evidence	violation flags logged and sent to the cloud; heat report for any day: every apartment against the legal minimum
Heat control	heat follows the coldest apartment: target = legal minimum now + comfort margin

1

KaaloT One

MacBook-Pro.local

SCREENS

ALARMS

TAGS

LOGIC

DEVICE

ALARMS 2

LINK OK

19:07:20

ADMIN, ADMIN

AUTO

NO CHANGES

Edits go to a draft; review and apply them here.

REVIEW

APPLY

DISCARD

LOGIC

RUNNING

SCAN

1 S, 0.7 MS

ALARMS

2

PROGRAMS

6 OF 6 RUNNING

OVERVIEW

SIMULATOR

NYC HEAT LAW

HEATING

FEED WATER

STEAM METER

SAFETY

NEW PROGRAM

NYC HEAT LAW ?

running, always ?

STOP

START

DIAGRAM

TABLE

RUN

FIT

100%

ARRANGE

UNDO

REDO

PROGRAM

YAML

00

06

12

18

24

What the law requires right now and whether each apartment and the hot water meet it.

Search blocks and tags

BLOCKS

LOGIC

COMPARE AND MATH

TIMERS AND SCHEDULES

law_day

SCHEDULE

out

1

heat_season

SCRIPT

season

1

cold_outside

COMPARE

out

1

apt_2c_online

QUALITY

in

1

apt_6a_online

QUALITY

in

1

dhw_low

COMPARE

out

1

rule

SCRIPT

required

1

appt_2c_low

COMPARE

out

1

appt_2c_offline

ALARM

when

1

appt_6a_low

COMPARE

out

1

appt_6a_offline

ALARM

when

1

PROGRAM

20 blocks. Select an element to edit it. Add a block or a tag; drag it from the list on the left, or click it there.

The NYC heat law program: day hours, heat season from the clock, violations per apartment

Energy metering

Quantity	Unit	Plant	Method
Heat rate	MBH	hot water	0.5 x GPM x (supply minus return °F)
Heat energy	kBTU	hot water	integrated every scan, kept over restarts

Quantity	Unit	Plant	Method
Steam flow	lb/h	steam	steam meter
Heat rate	MBH	steam	lb/h x 0.97
Heat energy	kBTU	steam	integrated every scan, kept over restarts
Burner hours	h	steam	firing time integrated every scan

Metering is calculated from the measured points; it is not a certified billing meter.

Remote access and cloud

KAAIOT

MQTT
WS
PROVISION NOW
SETTINGS

LINK	IN KAAIOT						
ENDPOINT TOKEN	up to date						
MQTT	connected, mqtt.cloud.roomsys.com						
WS	up						
WS RECONNECTS	0						
WAITING TO SEND	0						
SENT	2104						
REJECTED BY KAAIOT	0						
COMMANDS RECEIVED	0						
TAGS SENT	Steam_Pressure, Water_Level, Outdoor_Temp, DHW_Temp, Apt_2C_Temp, Apt_6A_Temp, Required_Temp, Apt_2C_Violation, Apt_6A_Violation, DHW_Violation, Low_Water, Lockout						
COMMANDS	status, set_value						
VALUES FROM KAAIOT (TAGS READ THEM AS POINT KAAIOT/<NAME>)							
NAME	DESCRIPTION	ENDPOINT	SERIES	MODE	VALUE	AGE	QUALITY
room1temp	room1-temp	9d21c7aa-5...	auto~temperature	live	24.4 C	565 s, ws	good

ADD VALUE

MESSAGES

LAST PROVISIONING REPORT

KaaloT link: provisioned, MQTT connected, tags sent, values read from other KaaloT devices

Item	Detail
Cloud platform	KaaloT; the controller provisions its application, version, endpoint, time series and command forms
Protocol	kp1 over MQTT
Sent to KaaloT	outdoor, DHW, apartment and steam pressure/level tags, required minimum, violations, low water, lockout; system metrics
Offline	store-and-forward buffer in SQLite, up to 50,000 messages
Apartment sensors	LoRaWAN sensors report to KaaloT; the controller reads them as tag sources
Remote commands	status; set_value for setpoints and flags marked "cloud"; remote shell off by default
Uplinks	Ethernet, Wi-Fi, LTE with failover order
Remote access	OpenVPN client on the controller

Item	Detail
Local access	web UI on port 8080 (HTTP) with sign-in and roles (viewer, operator, engineer, admin); protect with firewall, network segmentation or VPN

What is included

Item	Content
Controller software	KaaloT One platform (Docker Compose on the device)
Templates	nyc_building (hot water), nyc_steam (low-pressure steam)
Logic programs	simulator, NYC heat law, heating, feed water (steam), heat or steam meter, safety
Screens	Building heat (hot water), Steam plant (steam)
Cloud	KaaloT link with automatic provisioning

Typical bill of materials (per site)

Item	Qty	Supply	Notes
TECHBASE ModBerry 500 (X500 CM4) with KaaloT One	1	solution	tested: CM4, 2 GB RAM, 16 GB flash
ExCard 8AI	0 to 2	solution	analog inputs; 0-20 mA option for 4-20 mA transmitters
ExCard 4R	1	solution	burner and pump relays (R1, R2)
LTE modem option, SIM, antenna	optional	solution / customer (SIM)	cellular uplink
DC power supply, 12 to 30 V DC, 30 W	1	project-specific	range and sizing per TECHBASE
Advantech ADAM-4017/4018/4019+ modules	per point count	project-specific	temperatures and pressures on RS-485
Temperature sensors (supply, return, outdoor, DHW, stack, condensate, radiator)	per plant	customer-supplied or project-specific	wired to ADAM modules
Pressure transmitter 0-15 psi, 4-20 mA (steam)	1	customer-supplied or project-specific	
Water level probe, 4-20 mA (steam)	1	customer-supplied or project-specific	
Pressure transmitters (hot water supply and return)	2	customer-supplied or project-specific	
Flow meter with pulse output (hot water)	1	customer-supplied or project-specific	digital input pulse counter
Steam meter, Modbus (steam)	1	customer-supplied or project-specific	RS-485
LoRaWAN apartment temperature sensors	per apartment	customer-supplied or project-specific	delivered through KaaloT
KaaloT tenant	1	solution	