Appendix B: Building Information Requirements

List of contents

Brief introduction

The following tables include the required information for the buildings definition. Since the processing and storage of data is specified in the WP2, these tables are only an orientation for data acquisition (for further information see D2.1: *Data Warehouse requirements and Extended BIM specification* and D3.1: *High-level architecture, interfaces definitions and data models extension description*).

Although all contained data would be necessary for the BaaS system operation, some missing data could be established by default. WP2 will be in charge of addressing data inconsistences in the correspondent task.

All data fields have been classified following the structure defined in D5.1: *Functional and interoperability requirements for building services*:

1. **Static data – Building Information Model (BIM)**
    a. Building geometrical data
    b. Building material data
    c. Building systems data
        i. Daylight control systems
        ii. Shading control systems
        iii. Airflow control systems
        iv. Thermal control systems
        v. Humidity control systems
        vi. Energy generation systems

2. **Dynamic data – Data warehouse (DWH)**
    a. Schedules
        i. Occupancy
        ii. Internal gains
        iii. Uncontrollable devices
        iv. Controllable devices
    b. Performance data (**PFD**)
    c. Weather data (**WTH**)
        i. Weather file data
        ii. Estimated weather data

Table 1: Location and climate data

LOCATION AND WEATHER					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WHT
Location					
Latitude	Deg				
Longitude	Deg				
Time zone	Hr				
Elevation	M				
Climate conditions					
Climatic area					
Heating degree days (HDD 18ºC based)					
Cooling degree days (CDD 20ºC based)					
Maximum dry-bulb temperature	ºC				
Dry-bulb temperature range	ΔºC				
Relative humidity	%				
Barometric pressure	Pa				
Wind speed	m/s				
Wind direction	Deg				
Total solar radiation	W/m^2				
Diffuse solar radiation	W/m^2				
Sunshine hours	Hr				
Daylight saving time indicator					
Water mains temperature					
Annual average outdoor temperature	ºC				
Precipitation model type					
Design level for total annual precipitation	m^3/yr				
Average total annual precipitation	m^3/yr				
Daily wet-bulb temperature range	ΔºC				
Weather data					
Outside dry-bulb temperature	ºC				
Outside dew point temperature	ºC				
Outside wet-bulb temperature	ºC				
Sky temperature	ºC				
Ground temperature	ºC				
Outside atmospheric pressure	Pa				
Wind direction	deg				
Wind speed	m/s				

Humidity ratio of outside air					
Relative humidity	%				
Weather codes					
Rain index					
Sky IR radiation	W				
Direct solar irradiance	W/m^2				
Diffuse solar irradiance	W/m^2				
Cloud cover index					
Direct clearness factor					
Diffuse clearness factor					
Albedo					
Density of dry air	kg/m^3				
Density of air	kg/m^3				
Specific heat of air	J/(kg·K)				
Weather forecast					
Outside dry-bulb temperature	ºC				
Outside dew point temperature	ºC				
Outside wet-bulb temperature	ºC				
Sky temperature	ºC				
Ground temperature	ºC				
Outside atmospheric pressure	Pa				
Wind direction	deg				
Wind speed	m/s				
Humidity ratio of outside air					
Relative humidity	%				
Rain index					
Sky IR radiation	W				
Direct solar irradiance	W/m^2				
Diffuse solar irradiance	W/m^2				
Cloud cover index					

Table 2: Building geometry and construction elements definition

BUILDING GEOMETRY DEFINITION (geometrical information included in CAD file whether it's possible)					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WTH
Site (oriented and with surroundings definition)					
Floor plans					
Elevations					
Sections					
Windows and doors detailing plans					
Construction systems details					
HVAC system schemes (generation and distribution)					
Lighting and electrical systems schemes					
Plumbing schemes					
Monitoring and control system scheme (geometrical scheme)					
Energy on-site production schemes					
CONSTRUCTION ELEMENTS (provide the as-build documentation whether it's possible)					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WTH
Average envelopment transmittances					
Average opaque elements transmittances	$W/m^2 \cdot K$				
Average windows and doors transmittances by orientation	$W/m^2 \cdot K$				
Percentage of glazed area by orientation					
Opaque elements (walls, roofs, etc.)					
Construction					
Airtightness					
Material layer bedding					
Materials					
Roughness					
Thickness	m				
Thermal conductivity	$W/m \cdot K$				
Density	kg/m^3				
Specific heat	$J/kg \cdot K$				
U-value	$W/m^2 \cdot K$				
Short-wave absorption coefficient					
Long-wave emittance coefficient					

Solar transmittance					
Heat gain coefficient					
Phase change materials					
Roughness					
Thickness	m				
Conductivity	W/m·K				
Density	kg/m^3				
Specific heat	J/kg·K				
U-value	$W/m^2·K$				
Short-wave absorption coefficient					
Long-wave emittance coefficient					
Solar transmittance					
Heat gain coefficient					
Green roof materials					
Height of plants	m				
Leaf area	m^2				
Leaf reflectivity					
Leaf emissivity					
Minimum stomata resistance	s/m				
Roughness					
Thickness	m				
Conductivity of dry soil	W/m·K				
Density of dry soil	kg/m^3				
Specific heat of dry soil	J/kg·K				
U-value	$W/m^2·K$				
Short-wave absorption coefficient					
Long-wave emittance coefficient					
Solar transmittance					
Heat gain coefficient					
Saturation volumetric moisture content of soil					
Residual volumetric moisture content of soil					
Initial volumetric moisture content of soil					
Windows-glazing doors					
Opaque area construction					
Airtightness					
Glazing material and gas layer bedding					
Frame and divider					
Frame Width	m				

Frame Outside projection	m				
Frame Inside projection	m				
Frame Conductance	$W/m^2 \cdot K$				
Ratio of frame-edge glass conductance to centre-of-glass conductance					
Frame Solar absorptance					
Frame Visible absorptance					
Frame Thermal hemispherical emissivity					
Glazing					
Thickness	m				
Solar transmittance at normal incidence					
Solar diffusing					
Gas					
Gas type					
Thickness	m				
Windows shading elements control and schedules					
Shading type (interior/exterior shade, exterior screen, interior/exterior blind, between glass shade or blind, switchable glazing)					
Shading control type (always on, always off, solar radiation, zone temperature…)					
Shading elements operation schedule					
Windows – glazing doors Air flow control					
Source (indoor/outdoor)					
Destination (indoor, outdoor, return air)					
Maximum flow rate	$m^3/s \cdot m$				
Control type (always on, always off…)					
Windows opening angle schedule					
Doors					
Construction					
Material layer bedding					
Materials					
Roughness					
Thickness	m				
Conductivity	$W/m \cdot K$				
Density	kg/m^3				
Specific heat	$J/kg \cdot K$				
Thermal absorptance					
Solar absorptance					
Visible absorptance					

Doors Air flow control					
Source (indoor/outdoor)					
Destination (indoor, outdoor, return air)					
Maximum flow rate	$m^3/s \cdot m$				
Control type (always on, always off…)					
Doors opening angle schedule					
External shading surfaces					
Trees – high fences – other buildings					
Trees – high fences – other buildings transmittance schedule					
Geometry description					
Overhangs – fins					
Overhangs – fins transmittance schedule					
Geometry description					

Table 3: Thermal zones, internal gains and exterior energy equipment

THERMAL ZONES					
FIELD	UNITS	BIM	DHW		
			SCH	PFD	WTH
Thermal zone geometry					
Area	m^2				
Volume	m^3				
Virtual bounds of thermal zones					
Walls consisting the thermal zone					
Windows – glass door consisting the thermal zone					
Doors consisting the thermal zone					
Internal gains per zone					
People internal gains					
Lighting equipment internal gains					
Electric equipment internal gains					
Gas equipment internal gains					
Steam equipment internal gains					
Other equipment internal gains					
Internal thermal mass (walls located inside the thermal zone and furnitures)					
Internal thermal mass objects					
Total area per internal thermal mass object type	m^2				
HVAC system					
Forced air unit objects					
Radiative/convective unit objects					
Air loop terminal unit objects					
Zone HVAC equipment connection objects					
Zone airflow					
Design infiltration flow rate	m^3/s				
Infiltration air changes per hour					
Effective air leakage area	cm^2				
Design ventilation flow rate	m^3/s				
Ventilation air changes per hour					
Ventilation type (natural, intake, exhaust, balance)					
Fan pressure rise	Pa				
Fan total efficiency					
Maximum and minimum indoor temperature set points	ºC				

Maximum and minimum outdoor temperature set points	ºC				
Other ventilation systems definition (earth tube, cool tower, thermal chimney…)					
Design infiltration flow rate	m^3/s				
INTERNAL GAINS (defined by the occupation profiles and the systems schemes and documentation)					
FIELD	**UNITS**	**BIM**	**DWH**		
			SCH	**PFD**	**WTH**
People					
Maximum number of people per zone	people				
Occupancy schedule					
Fraction radiant	0-1				
Sensible heat fraction	0-1				
Carbon dioxide generation rate	$m^3/s \cdot W$				
Comfort evaluation parameters					
Work efficiency (metabolic rate)	W/m^2				
Clothing insulation ◊	clo				
Lights					
Lighting level	W				
Lighting operation schedule					
Return air fraction	0-1				
Fraction radiant	0-1				
Fraction visible	0-1				
Fraction replaceable	0-1				
Daylight controls					
Luminance set points at reference point					
Luminance set points schedule					
Electric equipment					
Design level	W				
Electric equipment operation schedule					
Fraction latent	0-1				
Fraction radiant	0-1				
Fraction lost	0-1				
Gas equipment					
Design level	W				
Gas equipment operation schedule					
Fraction latent	0-1				
Fraction radiant	0-1				

Fraction lost	0-1				
Hot water equipment					
Design level	W				
Hot water equipment operation schedule					
Fraction latent	0-1				
Fraction radiant	0-1				
Fraction lost	0-1				
Steam equipment					
Design level	W				
Steam equipment operation schedule					
Fraction latent	0-1				
Fraction radiant	0-1				
Fraction lost	0-1				
Other equipment					
Design level	W				
Other equipment operation schedule					
Fraction latent	0-1				
Fraction radiant	0-1				
Fraction lost	0-1				
EXTERIOR ENERGY EQUIPMENT					
FIELD	**UNITS**	**BIM**	**DWH**		
			SCH	**PFD**	**WTH**
Exterior lights					
Design level	W				
Exterior lights operation schedule					
Exterior fuel equipment					
Design level	W				
Fuel type					
Exterior fuel equipment operation schedule					
Exterior water equipment					
Design level (maximum volumetric flow)	m^3/s				
Exterior water equipment operation schedule					

Table 4: HVAC systems

HVAC SYSTEM					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WTH
Zone HVAC forced air units					
Four Pipe fan coil					
Supply air maximum flow rate	m^3/s				
Four pipe fan coil availability schedule	0-1				
Outdoor air flow rate	m^3/s				
Supply fan total efficiency	%				
Pressure rise al full flow	Pa				
Supply fan motor efficiency	%				
Four pipe FC chilled water availability schedule	0-1				
Four pipe FC hot water availability schedule	0-1				
Packaged terminal air conditioner					
Cooling supply air flow rate	m^3/s				
Heating supply air flow rate	m^3/s				
Outdoor air flow rate	m^3/s				
Supply fan total efficiency	%				
Pressure rise al full flow	Pa				
Supply fan motor efficiency	%				
Packaged terminal AC cooling coil availability schedule	0-1				
Packaged terminal AC heating coil availability schedule	0-1				
Cooling coil rated capacity	W				
Heating coil rated capacity	W				
Cooling coil rated COP					
Heating coil rated COP	%				
Packaged terminal heat pump					
Cooling supply air flow rate	m^3/s				
Heating supply air flow rate	m^3/s				
Outdoor air flow rate	m^3/s				
Supply fan total efficiency	%				
Pressure rise al full flow	Pa				
Supply fan motor efficiency	%				
Packaged terminal HP cooling coil availability schedule	0-1				
Packaged terminal HP heating coil	0-1				

availability schedule					
Water to air heat pump					
Cooling supply air flow rate	m^3/s				
Heating supply air flow rate	m^3/s				
Outdoor air flow rate	m^3/s				
Supply fan total efficiency	%				
Pressure rise al full flow	Pa				
Supply fan motor efficiency	%				
Water to air HP cooling coil availability schedule	0-1				
Water to air HP heating coil availability schedule	0-1				
Cooling coil rated capacity	W				
Heating coil rated capacity	W				
Cooling coil rated COP					
Heating coil rated COP	%				
Dehumidifier					
Dehumidifier availability schedule					
Rated water removal					
Rated energy factor					
Rated air flow rate					
Water removal curve					
Energy factor curve					
Energy recover ventilator					
Energy recover ventilator availability schedule					
Heat exchanger					
Supply air flow rate	m^3/s				
Supply air fan	m^3/s				
Exhaust air fan					
Ventilation rate	m^3/s				
Terminal unit: variable refrigerant flow					
Terminal unit: VAV availability schedule					
Supply air flow rate during cooling operation	m^3/s				
Supply air flow rate when no cooling is needed	m^3/s				
Supply air flow rate during heating operation	m^3/s				
Supply air flow rate when no heating is needed	m^3/s				
Outdoor air flow rate during cooling	m^3/s				

operation					
Outdoor air flow rate during heating operation	m^3/s				
Outdoor air flow rate when no heat/cooling is needed	m^3/s				
Supply air fan					
Outside air mixer					
DX cooling coil					
DX heating coil					
Zone HVAC radiative/convective units					
Radiant/convective water					
Rated average water temperature	ºC				
Rated water mass flow rate	kg/s				
Rated capacity	W				
Fraction radiant	m^3/s				
Radiant/convective steam					
Degree of subcooling	ºC				
Maximum steam flow rate	m^3/s				
Fraction radiant					
Radiant/convective electric					
Nominal capacity	W				
Efficiency					
Fraction radiant					
Low temperature radiant					
Hydronic tubing inside diameter	m				
Hydronic tubing length	m				
Temperature control type					
Maximum hot water flow	m^3/s				
Heating control throttling range	ΔºC				
Maximum cold water flow	m^3/s				
Condensation control type					
Condensation control dew point offset	ºC				
Ventilated slab					
Maximum air flow rate	m^3/s				
Outdoor air control type					
Minimum outdoor air flow rate	m^3/s				
Maximum outdoor air flow rate	m^3/s				
Hollow core inside diameter					
Hollow core length					
Number of cores					

Temperature control type					
Zone HVAC air loop terminal units					
Single duct: constant volume					
Single duct: constant volume availability schedule					
Maximum air flow rate	m^3/s				
Reheat Coil					
Maximum Reheat Air Temperature	ºC				
Single duct: VAV reheat					
Single duct: VAV reheat availability schedule	m^3/s				
Damper Air Outlet Node					
Unit Air Inlet Node					
Maximum air flow rate	m^3/s				
Reheat Coil					
Reheat Outlet Node					
Damper Heating Action					
Maximum Reheat Air Temperature	ºC				
Single duct: VAV variable speed fan					
Single duct: VAV variable speed fan availability schedule					
Maximum cooling air volume flow rate	m^3/s				
Maximum heating air volume flow rate	m^3/s				
Zone Minimum Air Flow Fraction	0-1				
Terminal unit's air inlet node					
Terminal unit's air outlet node					
Heating Coil's air inlet node					
Fan					
Heating coil					
Single duct: VAV heat and cool – reheat					
Single duct: VAV heat/cool – reheat availability schedule					
Damper Air Outlet Node					
Unit Air Inlet Node					
Maximum air flow rate	m^3/s				
Reheat Coil					
Unit Air Outlet Node					
Single duct: VAV – no reheat					
Single duct: VAV – no reheat availability schedule					
Unit Air Outlet Node					

Unit Air Inlet Node					
Maximum air flow rate	m^3/s				
Single duct: Series PIU – reheat					
Single duct: Series PIU – reheat availability schedule					
Total volume flow rate through ATU	m^3/s				
Unit Supply Air Inlet Node					
Unit Secondary Air Inlet Node					
Unit Outlet Node					
Mixer	m^3/s				
Fan					
Reheat coil Air Inlet Node					
Reheat Coil					
Single duct: Parallel PIU – reheat					
Single duct: Parallel PIU – reheat availability schedule					
Maximum primary air flow rate	m^3/s				
Maximum secondary air flow rate	m^3/s				
Unit Supply Air Inlet Node					
Unit Secondary Air Inlet Node					
Unit Outlet Node					
Reheat coil Air Inlet Node					
Mixer					
Fan					
Reheat Coil					
Single duct: constant volume – four pipe induction					
Single duct: constant volume – four pipe induction availability schedule					
Maximum total air flow rate	m^3/s				
Induction ratio	%				
Unit Supply Air Inlet Node					
Unit Induced Air Inlet Node					
Unit Outlet Node					
Heating coil Air Inlet Node					
Cooling coil Air Inlet Node					
Mixer					
Heating Coil					
Cooling Coil					
Single duct: constant volume – cooled beam					

Single duct: constant volume – cooled beam availability schedule					
Cooling Beam Type	m^3/s				
Induction ratio	%				
Unit Supply Air Inlet Node					
Unit Induced Air Inlet Node					
Unit Outlet Node					
Chilled Water Inlet Node					
Cooling coil Air Inlet Node					
Dual duct: VAV					
Dual duct: VAV availability schedule					
Maximum air flow rate	m^3/s				
Induction ratio	m^3/s				
Cold Air Inlet Node					
Hot Air Inlet Node					
Air Outlet Node					
Dual duct: VAV – outdoor air					
Dual duct: VAV – outdoor air availability schedule					
Maximum air flow rate	m^3/s				
Induction ratio	%				
Outdoor Air Inlet Node					
Air Outlet Node					
Zone HVAC equipment connections					
Ducts (length, section, material…)					
Pipes (length, diameter, material…)					
Fans					
Fan efficiency					
Pressure rise	Pa				
Maximum flow rate	m^3/s				
Motor efficiency					
Coils					
Design water flow rate	m^3/s				
Design air flow rate	m^3/s				
Design inlet water temperature	ºC				
Design inlet air temperature	ºC				
Design outlet air temperature	ºC				
Design inlet air humidity ratio	kg H_2O/kg air				

Design outlet air humidity ratio	kg H_2O/kg air				
Rated total cooling capacity	W				
Rated COP					
Humidifiers and dehumidifiers					
Rated capacity	m^3/s				
Rated power	W				
Rated fan power	W				
Standby power	W				
Heat recovery units					
Heat exchanger type (air to air: flat plate or sensible and latent; desiccant)					
Nominal supply air flow rate	m^3/s				
Nominal supply air inlet temperature	ºC				
Nominal supply air outlet temperature	ºC				
Nominal secondary air flow rate	m^3/s				
Nominal secondary air inlet temperature	ºC				
Nominal electric power	W				
Pumps					
Rated flow rate	m^3/s				
Rated pump head	Pa				
Rated power consumption	W				
Motor efficiency					
Control type (continuous/intermittent)					
Pump curve					
Solar collectors					
Gross area	m^2				
Test fluid					
Test flow rate					
Test correlation type (inlet, average, outlet)					
Maximum flow rate	m^3/s				
Coefficient of efficiency	$W/m^2 \cdot K$				
Incident angle	deg				
Orientation	deg				
Boilers					
Nominal capacity	W				
Nominal thermal efficiency					
Design water outlet temperature	ºC				

Design water flow rate	m^3/s				
Chillers					
Nominal capacity	W				
Nominal COP					
Design chilled water outlet temperature	ºC				
Design water flow rate	m^3/s				
Chiller-heat: absorption					
Nominal cooling capacity	W				
Heating to cooling capacity ratio					
Design entering condensed water temperature	ºC				
Design leaving chilled water temperature	ºC				
Design water flow rate	m^3/s				
Design condenser water flow rate	m^3/s				
Design hot water flow rate	m^3/s				
Heat pump					
Nominal capacity	W				
Nominal COP					
Load side flow rate	m^3/s				
Source side flow rate	m^3/s				
Load side heat transfer coefficient	W/K				
Source side heat transfer coefficient	W/K				
District heating					
Nominal capacity	W				
District cooling					
Nominal capacity	W				
Condenser equipment and heat exchangers (include equipment parameters)					
Cooling tower					
Evaporative fluid cooler					
Fluid cooler					
Ground heat exchanger					
Heat exchanger (hydraulic, plate, water side economizer)					
Water heaters and thermal storage					

Table 5: On-site energy generation from renewable sources

ON-SITE ENERGY GENERATION FROM RES					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WTH
Photovoltaic system					
Electric load inverter					
Electric load inverter availability Schedule					
Performance curve					
Maximum DC power input	W				
Maximum AC power produced	W				
Electric load storage battery					
Electric load storage battery availability Schedule					
Number of battery modules in parallel					
Number of battery modules in series					
Maximum module capacity	W				
Charge performance curve					
Discharge performance curve					
Photovoltaic array					
Location-surface attached					
Number of PV modules in parallel					
Number of PV modules in series					
Photovoltaic module					
Number of cells					
Rated current	A				
Rated voltage	V				
Short circuit current	A				
Open circuit voltage	V				
Rated power	W				
Module efficiency	%				
Maximum forward current	A				
Maximum system voltage	V				
Wind turbine					
Wind turbine availability schedule					
Rotor orientation					
Rated rotor speed	rev/min				
Rotor diameter	m				
Overall height	m				
Number of blades					

Rated power	W				
Rated wind speed	m/s				
Combined heat and power					
Combined heat and power availability schedule					
Maximum electric power	W				
Minimum electric power	W				
Minimum cooling water flow rate	kg/s				
Maximum cooling water temperature	ºC				
Electrical efficiency curve					
Thermal efficiency curve					
Cooling water flow rate curve					
Heat exchanger U-factor	W/K				
Cooling water flow rate curve	W/K				
Geothermal heat pump					
Heat pump					
Heat pump heating/cooling availability schedule					
Nominal heating/cooling COP					
Nominal heating/cooling capacity	W				
Load side heat transfer coefficient	W/K				
Source side heat transfer coefficient	W/K				
Piston displacement	m^3/s				
Compressor clearance factor					
Loss factor					
Pressure drop	Pa				
Superheat	ºC				
Ground loop heat exchanger					
Number of boreholes					
Borehole length	m				
Borehole radius	m				
Ground thermal conductivity	W/m·K				
Ground heat capacity	$kJ/m^3 \cdot K$				
Fluid specific heat	J/kg·K				
Far field temperature	ºC				
Grout conductivity	W/m·K				
Pipe conductivity	W/m·K				
Fluid conductivity	W/m·K				
Fluid density	kg/m^3				

Dynamic viscosity	m^2/s				
Pipe outer diameter	m				
U-tube shank distance	m				
Pipe wall thickness	m				

Table 6: Energy monitoring and control systems

BUILDING CONTROLS AND MANAGEMENT SYSTEM					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WTH
Building controls system					
Building control type (adaptive/non adaptive)					
System availability manager					
Set point managers					
EMS scheme (topology, addressing and communication protocols definition)					
Sensors					
Actuators					
Communication protocols					
Demand limiting controls					
Exterior lights					
Lights					
Electric equipment					
Thermostats					
Thermostat temperature set points schedule					
Thermostat humidity set points schedule					
HVAC controllers					
Water pipes valves					
Water pipes valves operation schedules					
Outdoor air valves					
Outdoor air valves operation schedules					
Mechanical ventilation valves					
Mechanical ventilation valves operation schedules					
Switch on/off (pumps, boilers, chillers, lighting system…)					
Pumps, boilers, chillers, etc. operation schedules					
ENERGY METERS AND SENSORS					
FIELD	UNITS	BIM	DWH		
			SCH	PFD	WTH
Resources (energy and others) meters					
Gas consumption	m^3 and €				
Other fossil fuels consumption	m^3 and €				
Total electrical energy consumption	kWh or €				
Electrical energy generation	kWh/m^2				

Electrical energy usage	kWh/m^2				
Electrical energy sales/export	kWh/m^2				
Thermal energy total generation	kWh/m^2				
Thermal energy usage	kWh/m^2				
Water consumption	l				
Outdoor climate conditions sensors					
Weather station (variables defined in table 1)					
Indoor climate sensors and comfort parameters					
Occupancy sensor	0-1				
Air temperature	ºC				
Relative humidity	%				
Carbon dioxide concentration (IAQ-CO_2)	ppm				
Volatile organic compounds (IAQ-VOC)	ppm				
Light sensor	lux				
Air velocity	m/s				
Surfaces temperature	ºC				
Critical construction points temperature	ºC				
Critical construction points relative humidity	%				
Dew point sensor	ºC				
Heat flux sensor	W/m^2				
Thermal comfort					
Operative temperature	ºC				
Fanger Predicted Mean Vote (PMV)	%				
Fanger Predicted Percentage of Dissatisfied People	%				
Optical comfort index					
Air quality	CO_2 em.				
Equipment and systems sensors					
Supply temperature	ºC				
Return temperature	ºC				
Flow meter	m^3/s				
Electrical energy meter	kWh				
Thermal energy meter	kWh				
Equipment state (on/off): pumps, boilers, chillers…	0-1				
Reed contacts (windows/doors state)	0-1				
Air velocity on ducts (laminar flow sensor)	m/s				
CO_2 sensor for ducts	ppm				