Residential Building Solution

If the building space is modular, eco-friendly and augmentable over time, it's best done with ABB Building Solutions. Energy distribution and automation suiting the spaces.

Index

Building Segment Overview

Building Segment Overview
Segmentation

In a certain sense, the technology is transversal, but the solutions are effective when the technology is calibrated to the application. The best technical and economic compromise, the best design solutions are the result of experience, system choices and component choices.
The careful and detailed analysis of the needs of the case of interest defines the user case.

Building Segment Overview
Segmentation

Residential

Single Family
• Houses
• Private dwellings
• Single Apartments

Multiple Family
• Multi family dwelling
• Apartment's complex

Commercial

Hospitality
• Hotels, Resorts, Motels
• Dormitories, Lodgings, Rooming
• Cruiser ships

Office
• Low/Mid/High-rise
• Multi-purpose
• Laboratories
• Call centres
• Single/Time-share property

Retail & Mall
• Stores, Hypermarkets
• Retail chains, Malls
• Restaurants, Food chains
• Showrooms

Leisure Facilities
• Casinos, Theme parks
• Sport stadiums, gym-pools
• Museum, Theatres

Institutional

Healthcare
• Hospitals
• Nursing, Retirement homes
• Elderly Care, Day Care
• Multi-centres

Educational
• Schools, Universities, Colleges
• Research facilities
• Archives, Libraries

Public
• State/city buildings, Halls
• Post-offices
• Temples, Historic
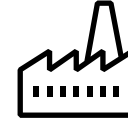• Police, Military, Prisons

Infrastructure

Transportation
• Airports, Ports, Stations
• Bus/Truck/Train terminals
• Parking facilities
• Tunnels

Storage
• Warehouses
• Cold storage plants

Others Infrastructure
• Water/Sewage treatment

Industrial

Manufacturing
• Factory
• Manufacturing
• Transformation
• Packaging

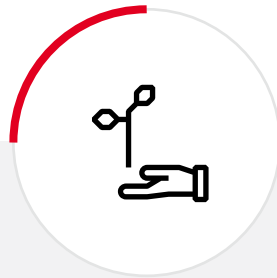**Others Industrial**
• Chemical, Pharmaceutical
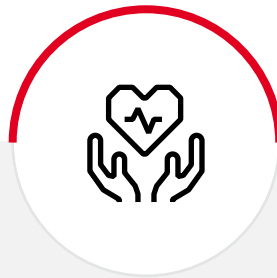• Processing
• Telecom
• Power Plants
• Agricultural

Building Segment Overview
Core needs

Currently, the strategic lines that guide the
definition of the characteristics of a building are
aimed at satisfying 4 classes of fundamental needs:

Environmental
footprint

Health & comfort
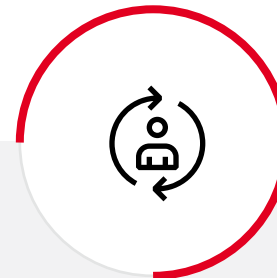
Life cycle cost
and value

Future
proof assets

These classes of basic needs can be translated into 7 performances that measure the quality
of the building itself. Transversal aspects common to all the required performances are
scalability and modularity, more important the more rapidly the market demands change.

Building Segment Overview
Building performances

Connectivity

The building enables its intelligent components to connect providing proper cyber security, preventing software vulnerabilities and minimizing risks associated with data flow and storage.

Efficiency

The building optimizes the energy consumption and supports the efficient use of resources.

Total Cost of Ownership

The building gives the transparency of the operating and maintenance costs. Warnings occur before a major fault.

Sustainability

The building aims to reduce the CO_2 footprint of its operation in accordance global standards for people and planet.

Productivity

The building increases the productivity of employees, sets the right conditions (light, air quality, temperature …) adapting to the occupancy and expected performances.

Flexibility

The building technology allows it to adapt easily to new usage requirements.

Well-being

The building technology keeps employees and visitors healthy.

Residential Solution

Residential Vertical Profile
Introduction

Single family home

VILLA, BUNGALOW, OR TOWN HOUSE

Free-standing residential building usually occupied by just one household or family, and consists of just one dwelling unit or suite. These building does not share wall with other houses and are built on lots larger than the structure itself, adding an area surrounding the house.

Garden style apartment building

TWO- OR THREE-STORY WALK-UP STRUCTURE IN A GARDEN-LIKE SETTING

Low-rise apartment complex with abundant green spaces for residents to use. A garden-apartment community generally has several low-rise buildings that are spread out across the property.


High Rise multifamily residential tower

MID-RISE (4 TO 10 STORIES) - HI-RISE (10 + STORIES)

Also known as tower blocks and may be referred to as MDU (multi-dwelling unit). Characterized by technical and economic advantages in areas of high population density, they have become a distinctive feature of housing accommodation in virtually all densely populated urban areas around the world.

Residential Vertical Profile
Trends and future developments in Smart Home
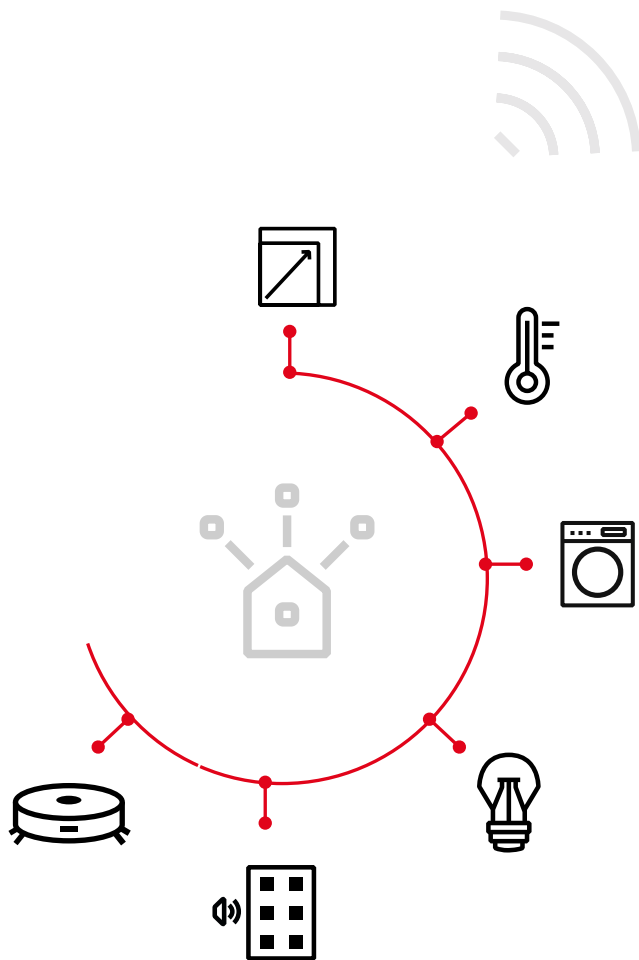
More AI-driven smart building solutions are expected powered by machine learning (M) and deep learning (DL) algorithms to reach the market as buiding managerss understand the value being delivered compared to the cost invested.

LED luminaires with integrated sensors will gain traction as the smart building & homes in market matures.

Io T-enabled sensors, smart thermostat and cloud-based building energy & controls.

Voice-enabled smart display devices are becoming popular as they integrate both voice command features as well as control smart home devices.

Smart connected devices from smart appliances to electric vehicles, integrating those devices with external data, routine and providing predictive strategies and optimization capabilities.

Home robots for domestic purposes such as lawn moving, and vacuum cleaning have been there for quite some time, but we will see increase adoption of social robots with voice command controls for elderly care as the gap widens between caregivers and ageing population.

Source: Frost & Sullivan

Residential Vertical Profile
Trends and future developments in Smart Home

Evolution to connected Homes

Smart home systems and solutions that were labeled as 'dumb' or 'simple' objects are expected to become connected. The level of home automation has several, endless possibilities, limited only by the technological limitations of communication protocols, or the ability to make all desired objects connected; however, this does not mean that the home is smart.
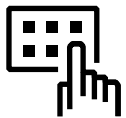
A connected home requires connected devices to be programmed with all instructions.

If the instructions are not coded in, the home would still follow the same routine everyday. Thus, human effort is still significant, requiring residents to input what needs to happen as the context or the environment changes.

A 'smart home' is the one where gadgets are empowered with AI algorithms to self-learn occupant's comfort preferences based on programmed instructions and home routines and act accordingly. A perfect example is Google Nest and other self-learning thermostats; the integration of Velux INTEGRA with Velux ACTIVE is another good example of a true smart home.

A smart home is where human effort is reduced significantly, with the home learning from interaction over time and programming itself.
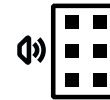
The "intelligent home" envision is where the level of automation is at its peak, voice control has a strong and significant role, and gadgets automate home functions based on voice commands.

Smart speakers are some of the initial requirements of an intelligent home, which should meet the needs of its residents with nearly zero human effort or intervention. This projection is for the long term and foresees a higher level of automation, improved interoperability, and uniform communication protocols and standards.

Residential Vertical Profile
Trends and future developments in Smart Home

Artificial intelligence in home energy management gadgets is limited except for smart thermostat devices. These devices are capable of self-learning the temperature schedule for a home, based on the local weather and user adjustments made previously. This is because of the AI algorithms embedded in devices.

Machine-to-machine learning is another cutting-edge technology that enables connected devices to interact with other devices connected in the same network and to collect data from devices for data transfers to the cloud at a basic level. This has a high impact on the home energy management segment.

Energy disaggregation is a technique that is being used in home-energy monitoring devices to identify home appliances using its unique electrical signatures. Home energy monitoring companies offer smart clamps and a mobile application to home owners to get disaggregated data.

Residential Vertical Profile
Smart Home Networking Technologies

Zigbee

Bluetooth

EnOcean

KNX

Z-Wave

Networking Technologies

WIFI
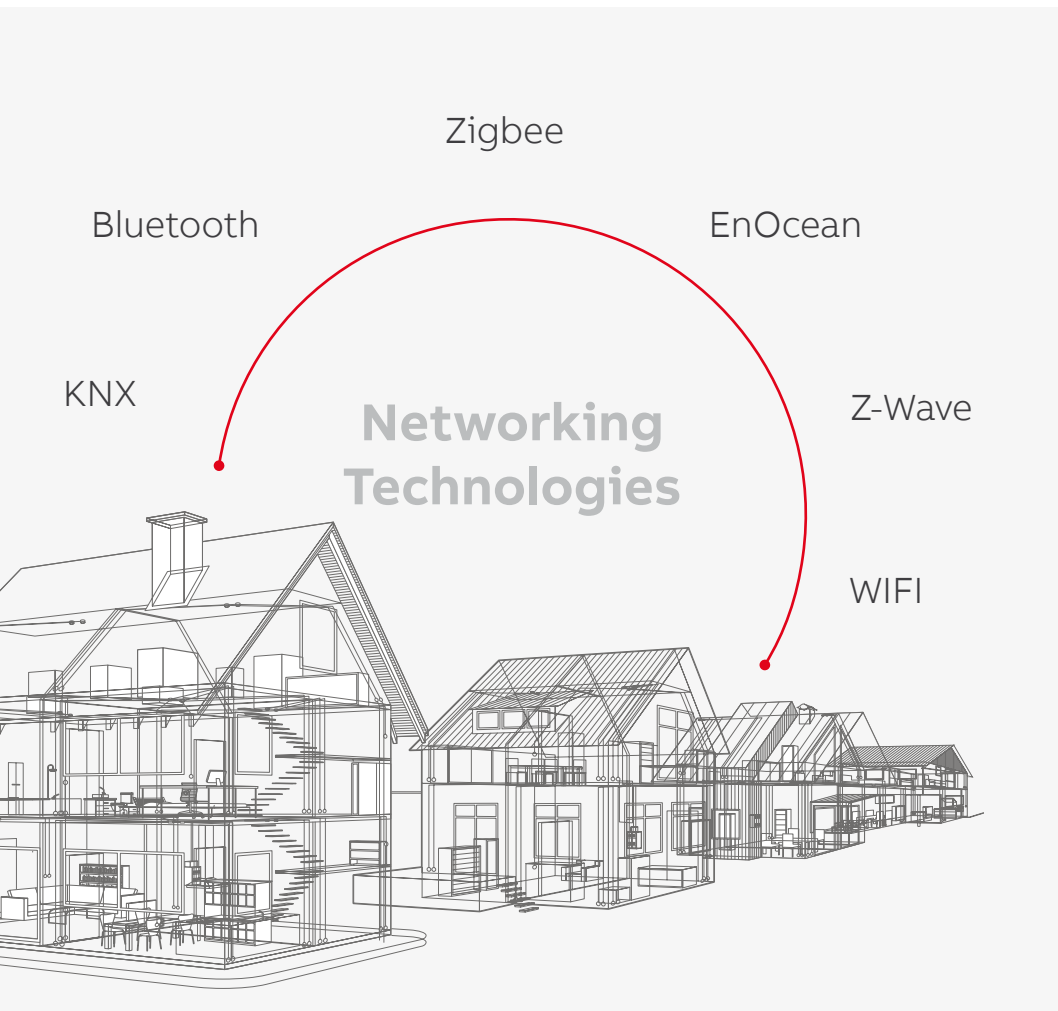
Bluetooth

Bluetooth is a short-range, wireless connectivity standard operating in the unlicensed ISM band at 2.4 GHz. The twonway communication technology is designed to enable ad-hoc connectivity between devices such as mobile phones, headsets, PCs, mice, keyboards and printers, as well as remote controls and gaming controllers.
In recent years been expanded to more broadly comprise local wireless networks for the Internet of Things, including application areas such as smart homes.

EnOcean

EnOcean is a low-power wireless communication technology for home and building automation. Smart home products enabled by EnOcean wireless technology include self-powered wireless switches, self-powered wireless sensors, actuators & controllers and gateway & building management systems. A major advantage of the technology is that it uses energy harvesting. Due to this, switches and sensors do not require replaceable batteries or wired sources of electricity to work. This can allow EnOcean devices to be essentially maintenance-free.

Residential Vertical Profile
Smart Home Networking Technologies

KNX

KNX is a standard for home and building control that is owned by the KNX Association. Members of the KNX association include original equipment manufacturers from a wide variety of home and building control verticals such as lighting, shutter control, security, heating, ventilation, air conditioning, monitoring, alarming, water control, energy management and metering.

WIFI

The IEEE MAN/LAN Standards Committee (IEEE 802) has developed a set of standards for wireless local area networks (WLAN). Include several modulation techniques using the same core protocol. The Wi-Fi Alliance, a non-profit industry association that has established testing and certification programmes to ensure interoperability of WLAN devices, has developed a set of additional and slightly overlapping specifications. Moreover, in early 2013, the Wi-Fi Alliance merged with the WiGig Alliance that developed the WiGig Protocol Adaptation Layers and MAC-PHY standardised as IEEE 802.11ad. The total number of Wi-Fi device shipments surpassed 15 billion by the end of 2016. In June 2016, the Wi-Fi Alliance expanded the certification program Wi-Fi CERTIFIED ac to include new features that provide a higher-performance mobility experience.

Zigbee

Zigbee is an open global standard for the IoT that enables reliable, cost-effective, low-power, wirelessly networked monitoring and control products. Since 2002, the Zigbee Alliance has developed the Zigbee specifications that add profile layers, security and network layers. Most Zigbee products rely on the 2.4 GHz band which is available worldwide. The sub-gigahertz bands, which vary by region, are used primarily by utilities and other companies that benefit from the increased communication range that the lower frequencies provide.

Z-Wave

Z-Wave is a proprietary wireless mesh networking communications protocol designed for remote control applications in residential and light commercial environments. The technology was originally developed by Zensys that subsequently was acquired by Sigma Designs, a fabless semiconductor company specialized in providing highly integrated SoC solutions for home networking and automation. Z-Wave operates on sub-gigahertz ISM frequency bands in all regions of the world.

Residential Vertical Profile
Customer needs

For the residential vertical, we have identified 11 customer needs to be addressed, all of which are anchored in the 4 core needs.

Environmental Footprint

Increased use of renewables:
To increase self-sufficiency and take control of energy supply, there is a rising demand for integrating renewable sources in the energy mix. Conscious homeowners also care about reducing the carbon footprint of households, hence looking to use solar, wind and ground energy sources.

Low energy consumption:
Reducing consumption of utilities, whether it be electricity, gas, water, or other sources presents both financial and environmental advantages for residential owners, who want to keep a good overview of their utility spending.

## Health and Comfort

Enhanced comfort & convenience:
Occupiers want to have more and better control of their home environment, even when they are away. Because it is a subjective matter, achieving the correct level of comfort also demands high levels of customization and flexibility.

Safety & Security:
Securing home & residential property is more than just about protecting valuable possessions. It's about delivering peace of mind for homeowners and their family. Residents need to be able to enjoy their home when there and remotely manage their home security.

Ease of operation:
With the omnipresence of smart homes technology providers, users look for straightforward solutions with as little different interfaces as possible. They aim for simple installation and commissioning of devices which are easily managed through intuitive interfaces designed for all age groups.
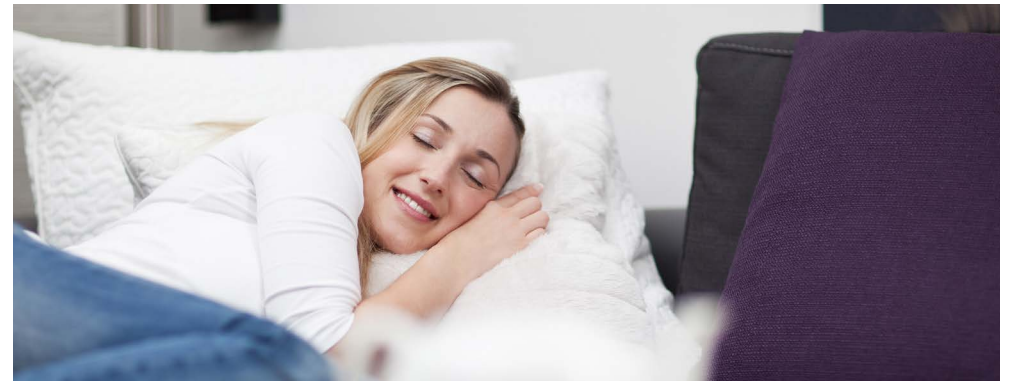
Residential Vertical Profile
Customer needs

Life cycle cost and value

Increased lifespan:
Whether investing in a long-term home, operating residential buildings over decades, complying to building standards, or reducing the need for maintenance, the need for high quality and reliable equipment that will last is a priority for many stakeholders.

Reduced energy bills:
Facing rapid and unpredictable increases of utility prices, owners and occupiers are challenged to keep their buildings and homes operational under constrained budgets affected by inflation. The need to monitor and control those expenditures is vital.

Augmented building value:
Modern residential buildings need to offer current owners and prospective buyers a safe, streamlined, and straightforward experience in their homes. To achieve this and maintain the value of real estate assets, the state of facilities needs to be monitored and maintenance

### Future proof assets

Connected homes:
With the advances made for smart grids to better manage energy supply and demand, future business models will require residential buildings to share operational information with each other, and with grid operators. As more countries require more granular energy monitoring, buildings have this capability will be ready to take advantage of opportunities.

Open-source ecosystem
As more innovative companies get involved in the smart home sector, new technologies emerge in different areas like home entertainment, security, and appliances. For systems to stand the test of time, simplified integrations of open-source interoperable standard components are requested by homeowners and operators.

Data privacy & security:
Data security and privacy breaches are a major concern for homeowners and effectively hinder the adoption of smart home devices. Customers should not be required to forfeit their right to privacy, safety, and personal preferences to benefit from connected technologies. For these reasons, all data needs to be secure and private, in the face potential cyber-attacks, and to prevent abusive surveillance activities.
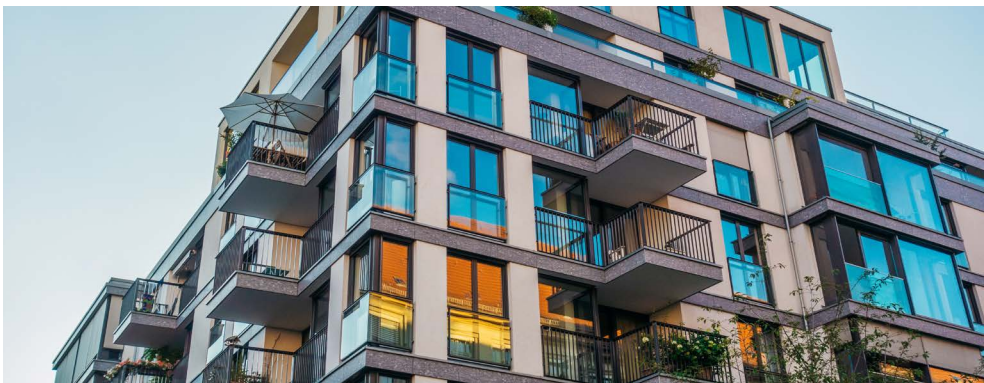
Building segment performance for residential

The 7 building performances exist to ensure that the solutions deployed in a residential building is holistic and cater to the core needs of involved stakeholders. In other words, this is a people & planet first approach, and the careful selection of ABB building technology serve the purpose of enabling the performances to achieve our common goals.

Sustainability

Total Cost of Ownership

Efficiency

Flexibility

Well-being

Productivity

Connectivity
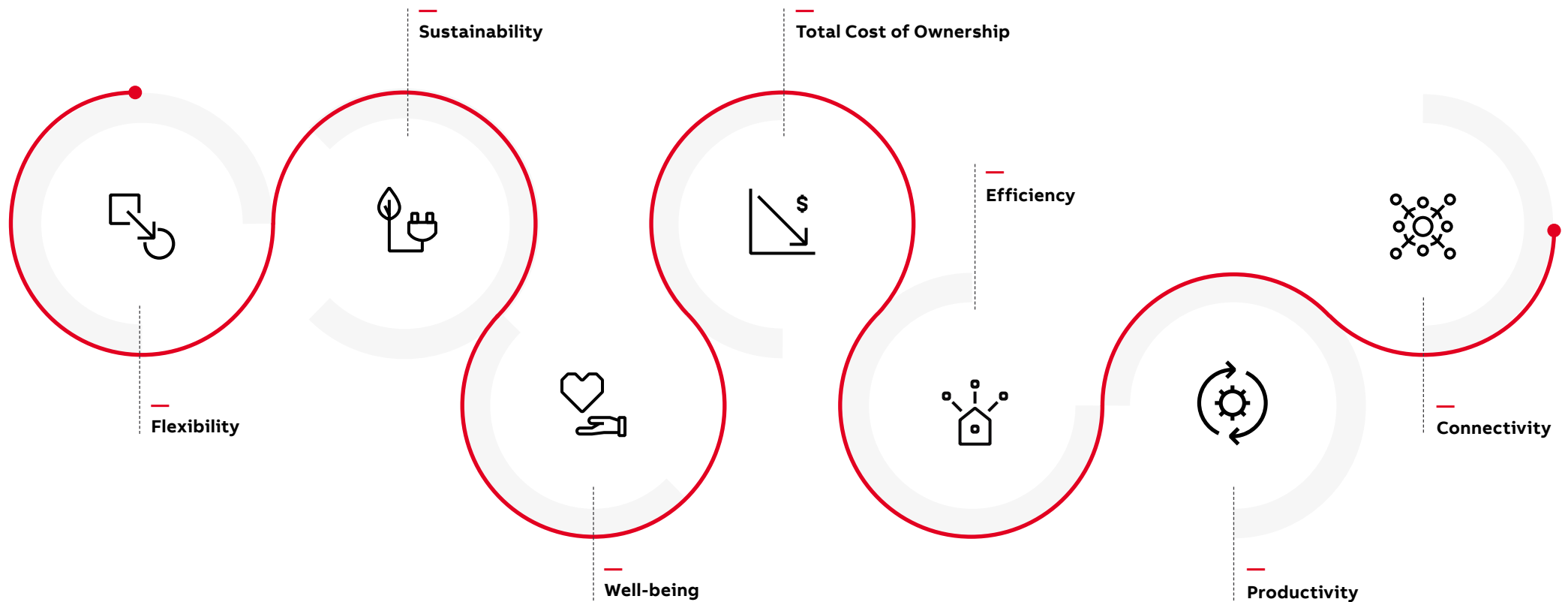
Building segment performance for residential
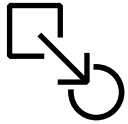
Flexibility

Use of wired & wireless technology for different application like Lighting, HVAC, entertainment, security, safety, door entry, CCTV, access control, irrigation system, etc. provides complete flexibility to installer and homeowner for future expansion and satisfy their requirements, with flexibility to interface, control, and customize systems from a single touch of a button or from an app remotely

One example is Home Connect which helps many appliances companies to integrate different appliances with simple QR integration with Smart Home manufacturers.

Sustainability

Sustainable building requirements are now mainstream in the residential sector, emerging from national or regional directives, global building performance certifications or market incentives. As energy efficiency passports become mandatory for both new and existing buildings,

With energy management during peak hour, use of EV use of solar will have huge impact of CO_2 Emission. Use of rainwater for irrigation, reduction in water consumption, increase the use of renewable. A sustainable home is built or retrofitted in a way that respects resources, optimizes energy and water use, and will last longer with quality systems. Sustainable homes use low-impact, high-performance materials. They're efficient in terms of manufacturing, shipping and installing.
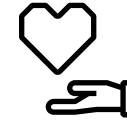
Well-being

For a home to feel a healthy, comfortable, and safe, the environment in and around the building must be tailored to its occupiers. Optimal air quality, ideal lighting scenarios, personalized thermal comfort parameters, and embedded security systems all contribute to giving occupiers that peace of mind and feeling free at home every single day. An intuitive and responsive experience with systems also contributes to occupier well-being as entire homes can be controlled onsite via touch and voice control, or remotely via smart device applications.

Building segment performance for residential
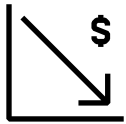
Total Cost of Ownership

Having an integrated home system that monitors home security & safety and check energy consumption by appliances, EV chargers. Provide remote alarms for extreme weather conditions and actions which can taken remotely provides complete cost of ownership to end users and residents. The energy conservation measures become not only desirable but necessary in the context.
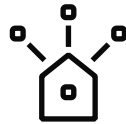Use of efficient cooling, and heating system based on external temperature, sun, wind, etc. Precise monitoring of electricity, water & gas during peak & off-peak hour and continuously updating it to a dashboard, touch screen, etc.

Efficiency

Using resources efficiently, whether it be energy, water, food, or other consumables, was already a top priority for households. As more people work from home, the impact on consumption load profiles is significant, and doing more with the same resources becomes necessary. Precise monitoring and control of indoor conditions, based on varying occupier needs, can generate substantial electricity, water, and gas savings. Renewable energy storage, alongside EV charging, also allows efficiency gains and improves the overall performance of the building.

Productivity

Over the last years, the workplace has evolved radically, and homes have become the primary working environment for a large proportion of the global population. All services expected from commercial office spaces, such as professional lighting, thermal comfort management, and maintaining air quality with increased occupation patterns, must be accommodated within the living spaces of workers. Further opportunities to balance professional and personal life emerge by integrating various home systems and using connected appliances.

Building segment performance for residential

Connectivity

Elaborate functions with ease and simplicity, so your home is safer, more comfortable, and more enjoyable. That's smarter than smart home living. Wired, wireless and hybrid options mean that people can even start with just a few areas of their home and run the system via the app, choice can be truly tailored and extended at any point

Trends in smarter homes such as voice control, geofencing, digitalization, and artificial intelligence, which are increasingly connecting products and markets.

Features expected from residential solution
Smart Home concept and main features

Smart home is considered as one of the biggest innovations in the real estate sector today. Some real estate companies are teaming up with technology giants such as Amazon and Google to offer smart home services along with new homes - Amazon Turnkey services is an example.

Smart speakers are currently the driving force behind the adoption of other smart home devices and this trend will continue in 2020 as well. Frost & Sullivan estimates the unit shipment of smart speakers to be 127.0 million by the end of 2020. Amazon will lead the competition, but Chinese companies are slowly eating into the market share of US firms.

The demand for smart home security products is gaining momentum in India as people realize the importance of home security with increasing incidents of organized crimes. Motion sensing cameras, video doorbells, smart burglar alarms and smart door locks will be in high demand in 2020
Technology giants such as Amazon, Google and Xiaomi will compete hard to reach critical mass in India through partnerships with real estate, telecom and retail companies. However, in terms of pricing, these giants will face a tough challenge from Reliance Jio which has disrupted the telecom sector in the country.
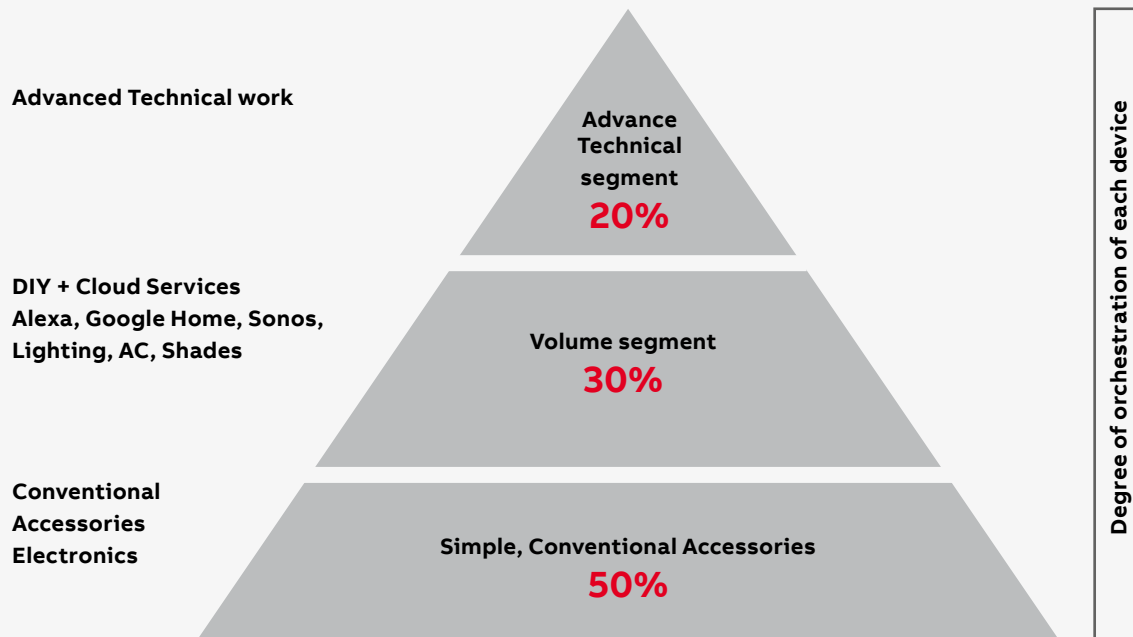
Features expected from residential solution
Smart Home concept and main features

The smart homes market is divided into 5 key elements: home energy management, home automation and control, home safety and security, home entertainment, and health and wellness.

Smart home can be categorized in three parts based on the degree of complexity of technical works as shown below:

Advanced Technical work

**DIY + Cloud Services
Alexa, Google Home, Sonos, Lighting, AC, Shades**

Conventional Accessories Electronics

Advance Technical segment
20%

Volume segment
30%

Simple, Conventional Accessories
50%

Degree of orchestration of each device

- Conventional accessories are simple wiring accessories, socket outlets, USB chargers, electric chargers such installed by general electrical contractor or by homeowners

- DIY-Do it yourself are mainly focused on home entertainment, doorbell, lighting & shading control, leaders in this segment are google, apple home kits, fibaro, amazon, sonos etc. As the name suggest most installation and programming are carried by Homeowners/occupiers.

- Advanced technical work provides complete home automation from HVAC, Dimming by DALI, Security, home entertainment, etc.. mainly carried out by professional system integrators, or technical staffs
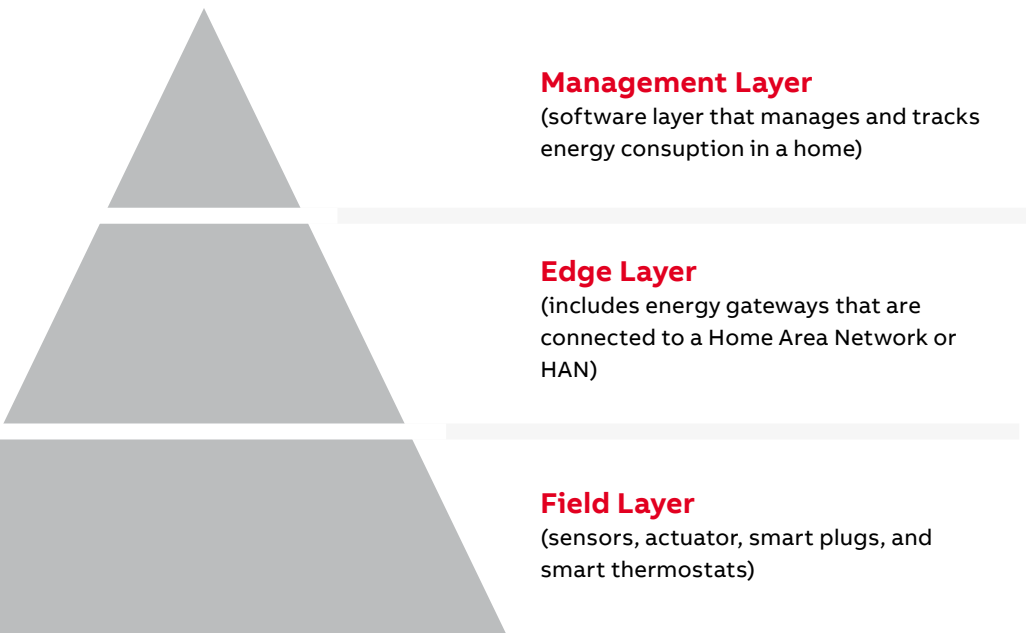
Features expected from residential solution
Smart Home concept and main features

Home Energy Management Systems (HEMS)

HEMS is a technology platform that monitors, manages, and controls home functions, such as HVAC, lighting, solar PV and other appliances in a residential building. The scope of the study covers both hardware and software. Hardware includes 'hub' devices, smart plugs, smart thermostats, smart clamps, and in-home displays (IHDs), which are interconnected in a wireless mesh network called the Home Area Network (HAN). Indoor climate, daylight, and fresh-air applications are covered in this segment.

The entire platform bi-directly communicates with the end user and sometimes to the utility, often through a smart meter. Software includes the dashboard application, which allows access to monitor and control home functions remotely through a desktop or mobile device, thereby managing overall energy consumption in a home. The software part is not sold separately, as its cost is usually bundled along with hardware costs.

Management Layer
(software layer that manages and tracks energy consuption in a home)

Edge Layer
(includes energy gateways that are connected to a Home Area Network or HAN)

Field Layer
(sensors, actuator, smart plugs, and smart thermostats)

Features expected from residential solution
Smart Home concept and main features
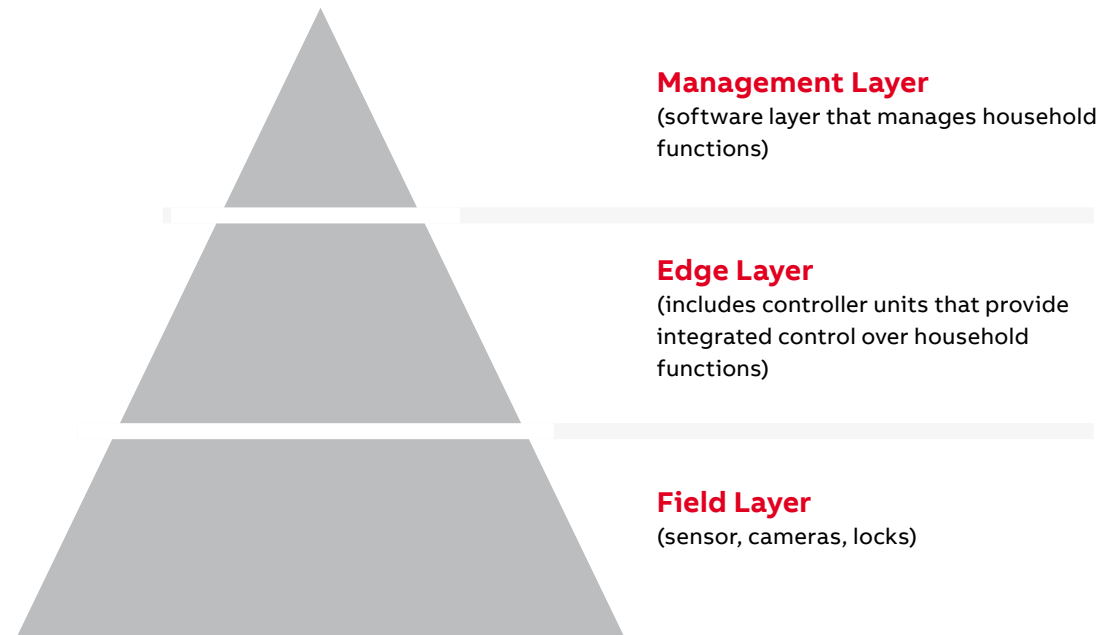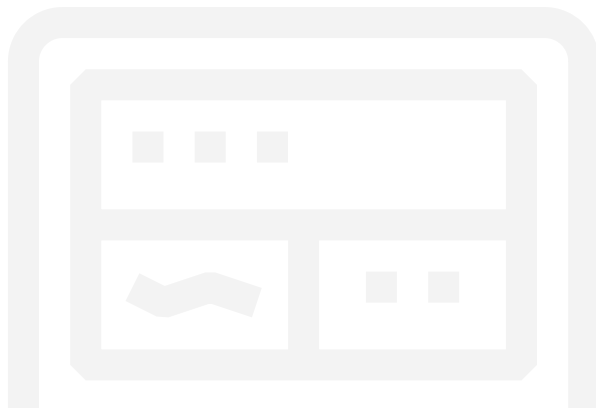
Home Automation & Control:

A home automation system is a centralized system that controls and automates at least 2 home functions from remote locations, thereby providing an assisted and connected living environment to end users.

Simple automation products include sensors and controllers such as occupancy sensors, light sensors, daylight dimming sensors, carbon-dioxide sensors, air quality sensors, humidity sensors, lighting and HVAC controllers, home gateways, smart AC vents, smart kitchen appliances, and management software and mobile applications.

Advanced automation products include smart windows, automated window blinds, shutters, garage doors, roof windows, and shutter controllers.

Home Safety & Security:

Home safety and security products include smart IP cameras (such as the Google Nest Cam and the Ring device) alarm system, smart locks, motion sensors, water leakage sensors, door/window sensors, and smoke sensors

Management Layer
(software layer that manages household functions)

Edge Layer
(includes controller units that provide integrated control over household functions)

Field Layer
(sensor, cameras, locks)

Features expected from residential solution
Smart Home concept and main features

Home Entertainment:

Home entertainment system is a multi-room system that controls and automates home entertainment devices and provides highly quality audio/video experience for end users.
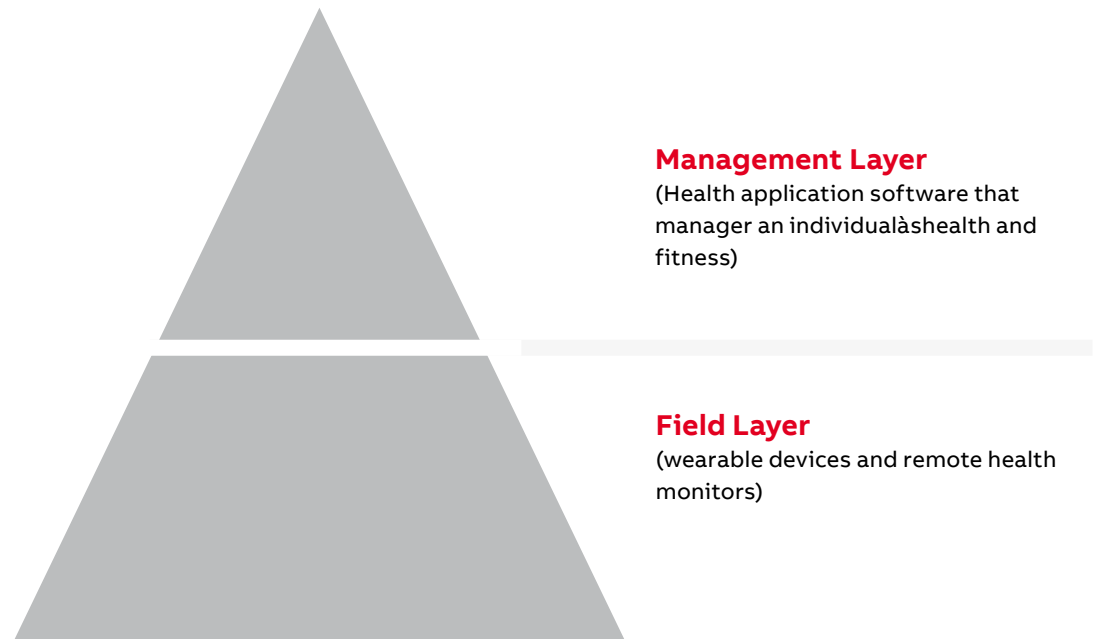Home entertainment is a combination of both hardware and software products as shown in the chart.
Home entertainment products include smart TVs, smart speakers, connected audio systems, and digital media streamers
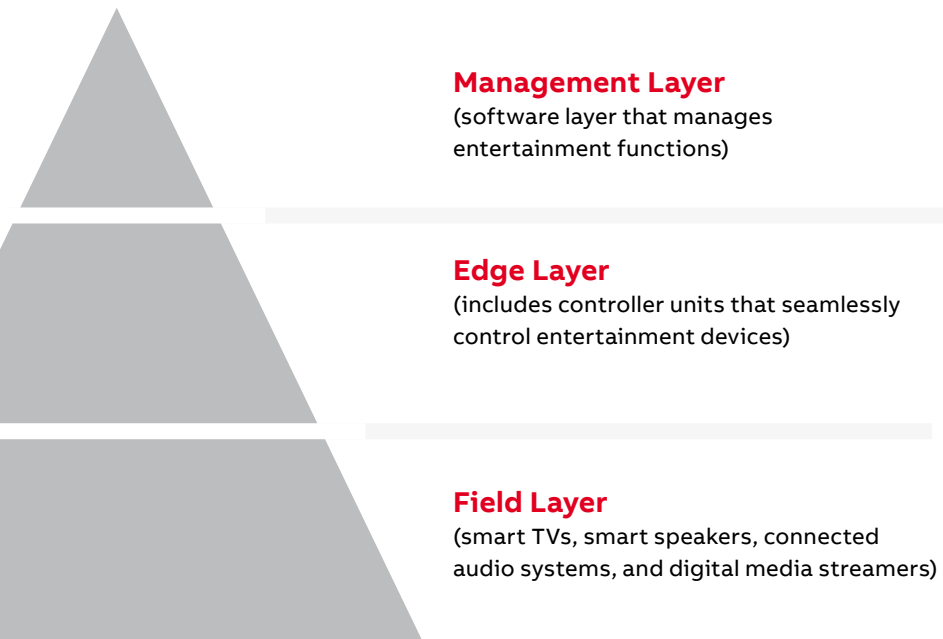
Technology-enabled care:

Health and wellness is also known as technology-enabled care (TEC) and involves mobile health, digital health, and telehealth. Health and wellness is a combination of hardware and software as shown in the chart.
Health and wellness products include wearable devices that track vitals, sleep, and physical activities and remote health monitors. Software and services include health and fitness management applications, telehealth and mHealth, health education, health engagement, and virtual care.

Management Layer
(software layer that manages entertainment functions)

Edge Layer
(includes controller units that seamlessly control entertainment devices)

Field Layer
(smart TVs, smart speakers, connected audio systems, and digital media streamers)

Management Layer
(Health application software that manager an individualàshealth and fitness)

Field Layer
(wearable devices and remote health monitors)

Testimonials from ABB technology users

Testimonials from ABB technology users

SRI LANKA

**ABB SOLUTIONS
LIGHT UP SKYLINE
OF SRI LANKA'S
COMMERCIAL
CAPITAL**

—

The development project created a luxurious 68-story vertical tower and a 63-story leaning tower.
With construction completed, Altair Skyscraper is one of the tallest buildings to illuminate Colombo's skyline.

ABB contributed to this important development project by providing safe and reliable lighting and plant engineering products and services.
The Emergi-Lite lighting system for Altair Skyscraper is powered by EMEX Power central battery cabinets. The supply also includes two EMEX Power 10.5 KVA cabinets and two EMEX Power 7.5 KVA cabinets, which benefit from a 3-hour battery backup.
ABB also includes dry-type transformers, medium voltage switchgear and components for low voltage switchboards, as well as four LeanGear ZN1 panels, perfectly compliant with the customer's requirements for a medium voltage switchgear solution that can be expanded and upgraded over time. The transformers supplied meet stringent parameters, with respect to the needs of the electrical system and operation in areas with climatic conditions found in cities such as Colombo.

ABB as a technology leader contributes to the digital transformation of industries. With a history of innovation spanning over 130 years, it is developing customer-based activities such as electrification, industrial automation, motion and robotics and discrete automation, supported by the ABB Ability ™ digital platform.

Testimonials from ABB technology users

SWITZERLAND

RESIDENTIAL NEIGHBORHOOD IN MAENNEDORF

—

Carbon-neutral residential neighborhood in Maennedorf, Switzerland, thanks to ABB smart technology.

Living without costs for electricity or heating

The new residential complex in Maennedorf, Switzerland, was built by the Umwelt Arena Schweiz in collaboration with Empa, the University of Applied Sciences in Rapperswil, and the Klimastiftung Schweiz (Swiss Climate Foundation). It meets the demand for low carbon emissions raised by young people already today - including carbon neutral energy production and no costs for electricity or heating for the tenants.

Carbon-neutral living
The two apartment buildings in Maennedorf, located at the Lake Zurich, offer space for 16 families. With photovoltaic modules installed on the facades and the roofs plus the two wind turbines, renewable electricity is produced locally. The production covers the energy demand for heating and cooling and the production of hot water for all residents. The future-oriented apartment buildings combine a variety of innovative, future-proof solutions that are already available today and enable the carbon-neutral operation of the residential neighborhood Maennedorf.

Smart home technology from ABB
The apartments are equipped with ABB's smart home solutions. With the ABB-free@home® system, the entire home can be controlled with either a switch, a touch panel on the wall, a smartphone or a tablet and via voice control. In addition, the ABB-Welcome door communication system can be integrated into the ABB-free@home® system. Both door communication and home control can be used together with the ABB-free@homeTouch 7" panel.

Testimonials from ABB technology users

GERMANY

VILLA FREISING (BAVARIA)

—

Modern residential house as a flagship project

Situated between a wooded range of hills to the north and an unobstructed view in the southern direction is a modern single-family home in the outskirts of Freising (Bavaria).

A wooden terrace with adjacent lawn, as well as a spacious and sunny roof terrace facing the edge of the woods beckons you to stay and relax.
Convenient building automation control using ABB-free@home. Thanks to the fingerprint module of the ABB-Welcome Video Outdoor Station, residents can enter the house without the need for keys. Once in the building, you are welcomed by a spacious wardrobe area with built-in cabinets and the central control panel of the Smart Home: the ABB-free@homeTouch 7". Through this control panel, you can set up effective lighting scenes, as well as call up individual time programs to control heating and blinds. The touch panel also provides access to the ABB-Welcome Video Outdoor Station. The video shows pictures of visitors who, for example, had been at the door and rang the bell while the homeowners were absent - for improved security in your own home.
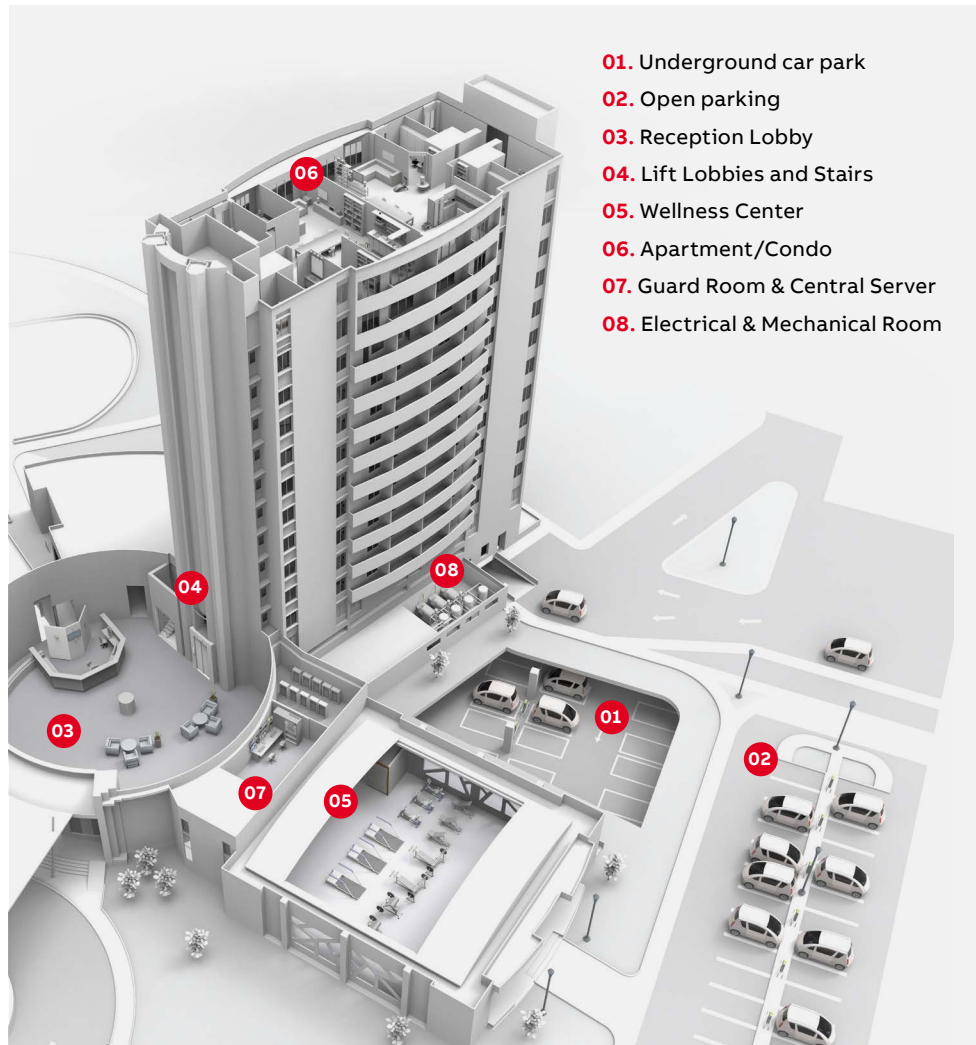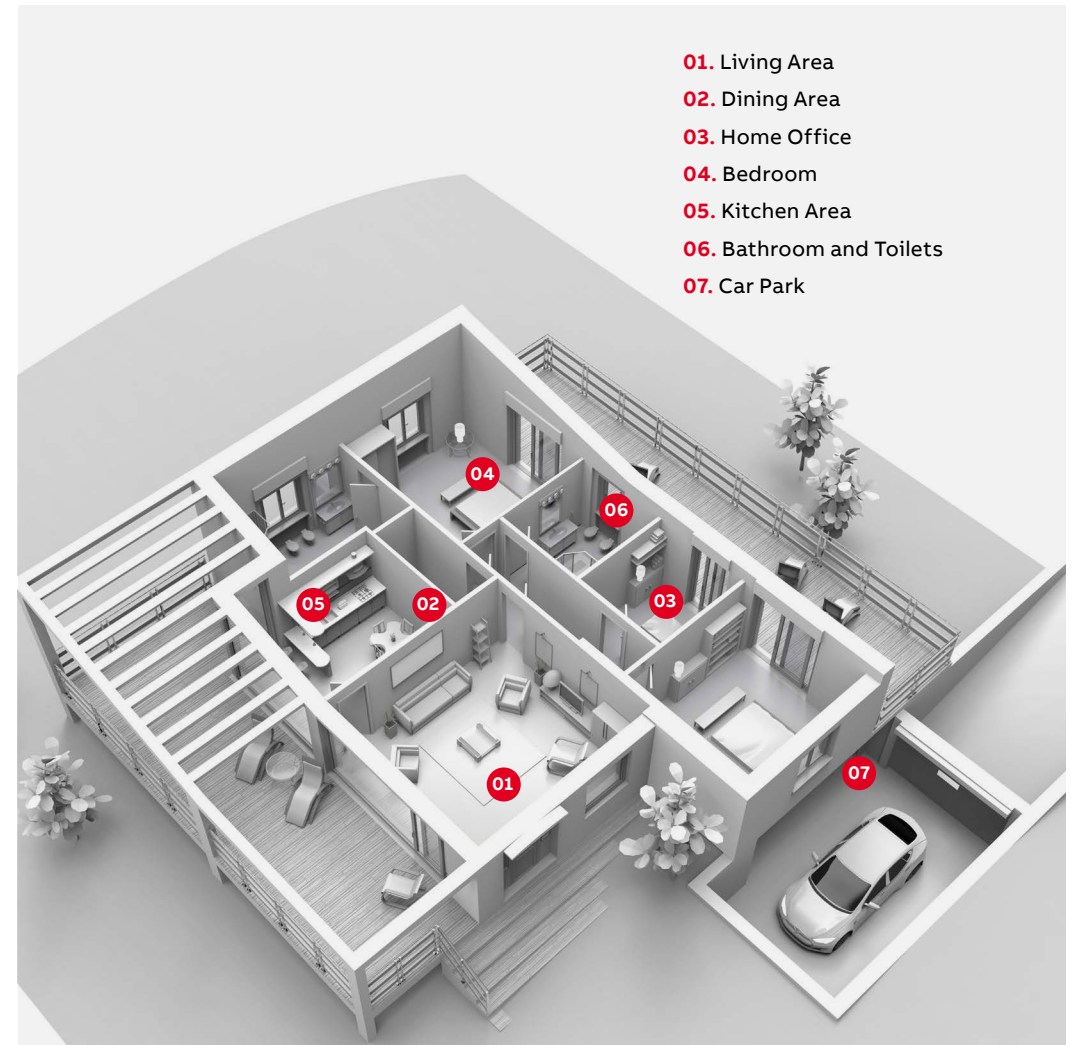
Solution
architecture

Building typology

High rise apartment/Condominium enviroment

01. Underground car park
02. Open parking
03. Reception Lobby
04. Lift Lobbies and Stairs
05. Wellness Center
06. Apartment/Condo
07. Guard Room & Central Server
08. Electrical & Mechanical Room

Single Family Home / Villa / Townhouse enviroment

01. Living Area
02. Dining Area
03. Home Office
04. Bedroom
05. Kitchen Area
06. Bathroom and Toilets
07. Car Park

Building typology
High rise apartment/Condominium enviroment - Parking spaces

—

Underground car park

In a residential tower a car park is a cleared area that is intended for parking vehicles for residents and guests. Underground car parks are always fully enclosed and requires mechanical ventilation.
The air quality and temperature in a car park needs to be managed to ensure those using the car park are not exposed to unsafe conditions with harmful gases. In the absence of proper ventilation, car parks present several indoor air quality problems. The most serious is the emission of high level of carbon monoxide.
Apart from air quality, fully enclosed car parks must maintain appropriate level of light to allow people and vehicles move around easily and safely. Lighting may come from natural or artificial sources, or a combination of both.
Residents, families, and guests begin with convenient parking so it's very important to parking should be simple and easy. With right infrastructure in place, car parks can be also installed with chargers for electrical vehicle. The car parking system is in integrated to EV system and if you want to utilize EV Charging once can show the car park access at EV charger it can start charging his/her car.

—

Open parking

An open car park is a cleared area that is intended for parking vehicles, bike and motorbike for shorter duration mainly for visitors or in some cases longer duration. Open car park does not require any mechanical ventilation, but it must have lighting in place to ensure safe movement of people and vehicle during nighttime. Open car park can also be used for vehicle and motorbike charging.

Most of the new malls have reserved parking for EV Care to promote and these parking are marked with special sign live charging sign.

Building typology
High rise apartment/Condominium enviroment

—
Reception Lobby

Reception lobby is the first area of interaction of the residents, family members, guests & visitors in a Residential Tower and because of which require proper visibility & welcoming, home feeling is required in this area, to achieve this proper lighting, diming level, temperature & air quality of such area should be achieved at an optimum level.

Also, its important this area doesn't consume a high amount of energy bills as this will increase the maintenance fees of the residents and thus the use of LED's light fixture, constant brightness diming, use of occupancy sensors and optimum cooling or heating is recommended in such areas.

Security, access, and monitoring is also to provide unauthorized access to the residential tower.
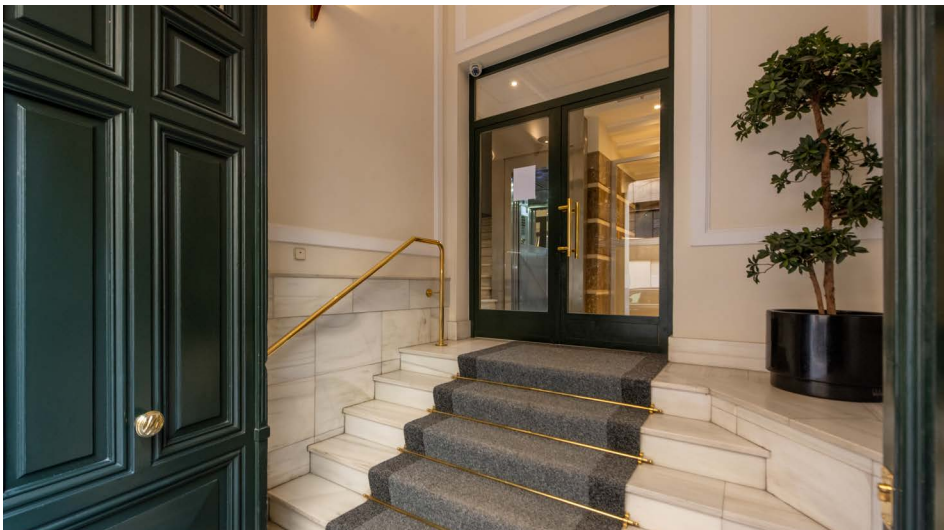
—
Lift Lobbies and Stairs

Lobbies provide warm ambience residents & visitors by maintaining set lighting intensity and temperature, air quality at the same time providing energy efficiency with the use of occupancy detection to set the light & temperature at levels to provide maximum comfort and energy efficiency. Depending on the size of the lobby multiple occupancy sensors are installed and these sensors are programmed with master & slave features, which enables corridor lighting to be even managed based on multi sensor occupancy & its timing.

From the central sever Stairs & corridors are continuously monitored for different alarms like fault in light fixtures, if the set temperature demand is not achieved, higher level of CO2, humidity and based on those corrective actions are taken example is CO2 level increases FAHU or Ventilation is opened to bring in fresh air.
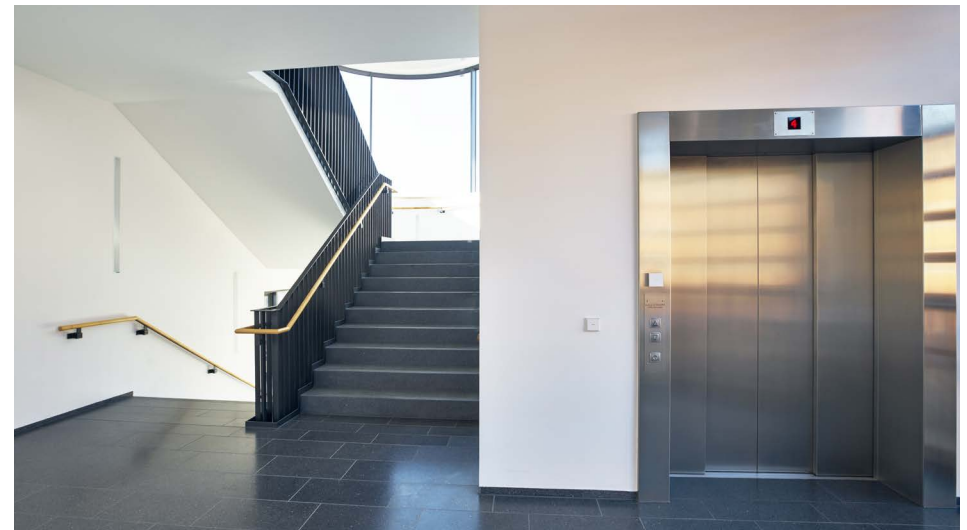
Building typology
High rise apartment/Condominium enviroment

—
Wellness Center

One of an important part of condominium tower is the wellness center which comprises of Gym, spa, sauna, massage, swimming pool, sports, etc. These areas are equipped with different ABB Building Automation Application from access control providing access to residents and family members to Lighting & HVAC to have attractive ambiance and better air quality, especially for gym and pool area where the measure and control humidity & CO_2 level are critical.

These areas are also equipped with sub metering solution to monitor the amount of electricity, water and gas consumption and this can be historically recorded and monitored using ABB active energy management software.

—
Apartment/Condo

ABB smart home application ABB-free@home® transforms the condo or an apartment into an intelligent home. Whether blinds, lights, heating, air conditioning, door communication or scenes. Easy to remote control via a switch on the wall, with the laptop or with the smartphone. Very convenient. Extremely comfortable. Very energy efficient. Especially attractive: Only minimal costs are involved when compared with conventional electrical installations.

Building typology
High rise apartment/Condominium enviroment

—

Guard Room & Central Server

Guard Room in a residential tower is mainly responsible for the security & safety of the residents and visitors. The guard room monitors for the different systems running in a residential tower from front access to CCTV & fire system. For security concern, guard unit can act as a panic reception center, receiving emergency call from any indoor station by activating the "SOS" signal. What is more, the interception in day/night mode can be set with customized timeline and receivers (for all or just VIPs), the call will be directed to the guard unit for monitoring purpose when the visitor call the resident directly from the gate/outdoor station. Finally, when the outdoor station or gate station's "call guard" function is activated, for example by a one-button video gate station, the operator in the guard unit will intercede all the calls from the visitors and transfer the filtered call to the dedicated indoor station.

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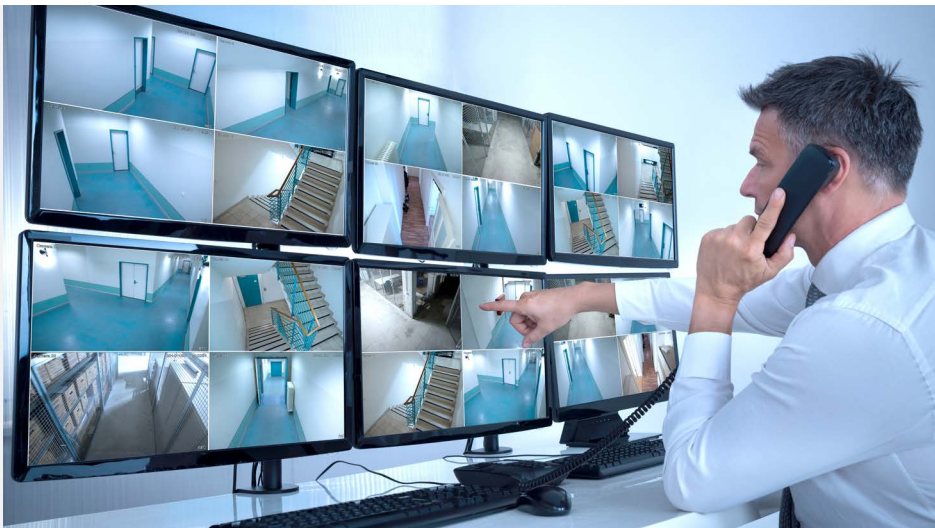
Electrical & Mechanical Room

Electricity is vital in a Residential Tower. When it comes to providing a high-quality living experience, there's essentially no margin for error. Electrical requirements for residential facilities are strict and adhering to them always is of the utmost importance. Electrical service shall include provision of normal, essential (30 sec.), instantaneous (1 sec.), electricity supplies and switchgear and circuit protection to safely operate and control the supplies.

High voltage and low voltage devices are installed in electrical room for distribution of electricity to various part of the residential complex. Some critical areas like lift, door communication, safety and security systems are equipped with backup power supply. Any electrical device or system installed in a residential complex must comply with local NEMA or IEC standards.

Building typology
Single Family Home / Villa / Townhouse enviroment

—
Living Area

The ABB smart home unites the functions of building control and entertainment center with a beautiful masterpiece. With the ABB-Welcome, homeowners can switch or dim the lights, control your venetian blinds, regulate the ambient temperatures, or control scenes from a combination of the abovementioned functions - even by remote control. Homeowners increase the safety of your home with presence simulation and alarm or information messages.
• Home Entertainment
• Home Automation & Controls
• Access control (ABB Welcome access & Door Entry System)
• Remote operation

—
Dining Area

As an area not typically occupied outside of the meal hours, the dining area is the center of sharing around the table. This is where nuances in lighting, thermal comfort and voice-controlled operation come together to create the dining experience.
• Lighting & diming controls with Philips Hue
• Curtain control
• Audio control
• Scenes
• HVAC control
• Voice control

—
Home Office

A dedicated office at home provides a professional working environment, complete with fast and reliable network connectivity, adequate lighting, ergonomic design and environmental quality that supports concentration and productivity. The purpose of this space can be modified outside of working hours to provide additional leisure spaces within homes.
• Lighting & diming controls
• Audio control
• Scenes
• HVAC control
• Access control
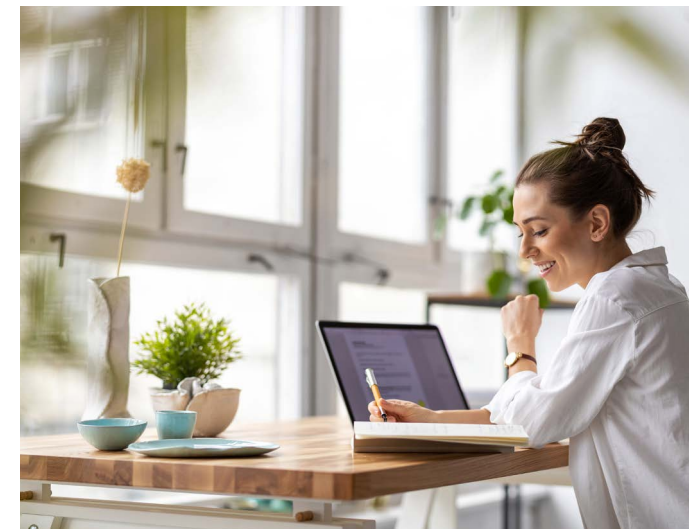
Building typology
Single Family Home / Villa / Townhouse enviroment

Bedroom

The bedroom is mainly used by residents for resting, and it can be equipped with systems that support healthy sleeping patterns in line with the circadian rhythm. Access to home safety and security from the bedroom alleviates concerns of homeowners in the occurrence of unexpected situations.
- Lighting & diming controls with Philips Hue
- Curtain control
- Audio & Video control
- Scenes
- HVAC control
- Access control
- Voice control
- Touch panel
- Security & safety Monitoring & control

Kitchen Area

This area is not only dedicated to the preparation of meals but also storage of ingredients, food and equipment involved in the cooking process. Appliances typically include sink, dishwasher, oven, cooking plate, microwave, fans, refrigerator, and freezer. Network enabled, connected appliances, as well as air quality and safety devices are typically found in a smart home.
- Lighting & diming controls
- Audio & Video control
- Scenes
- HVAC control
- Access control

Bathroom and Toilets

Room that contains either a bathtub and/or shower and wash basin. The toilet is either included in the same room or in a dedicated room depending on design choices or regions.
- Lighting & diming controls
- Audio & Video control
- Scenes

Car Park

Hub for storage, maintenance and charging of various e-mobility vehicle, the car park typically includes equipment and tools to keep home systems and vehicles in good working order. Electrical components used for power delivery are hosted in this space.
- Lighting & diming controls
- Access control
- Security & safety setting keypad
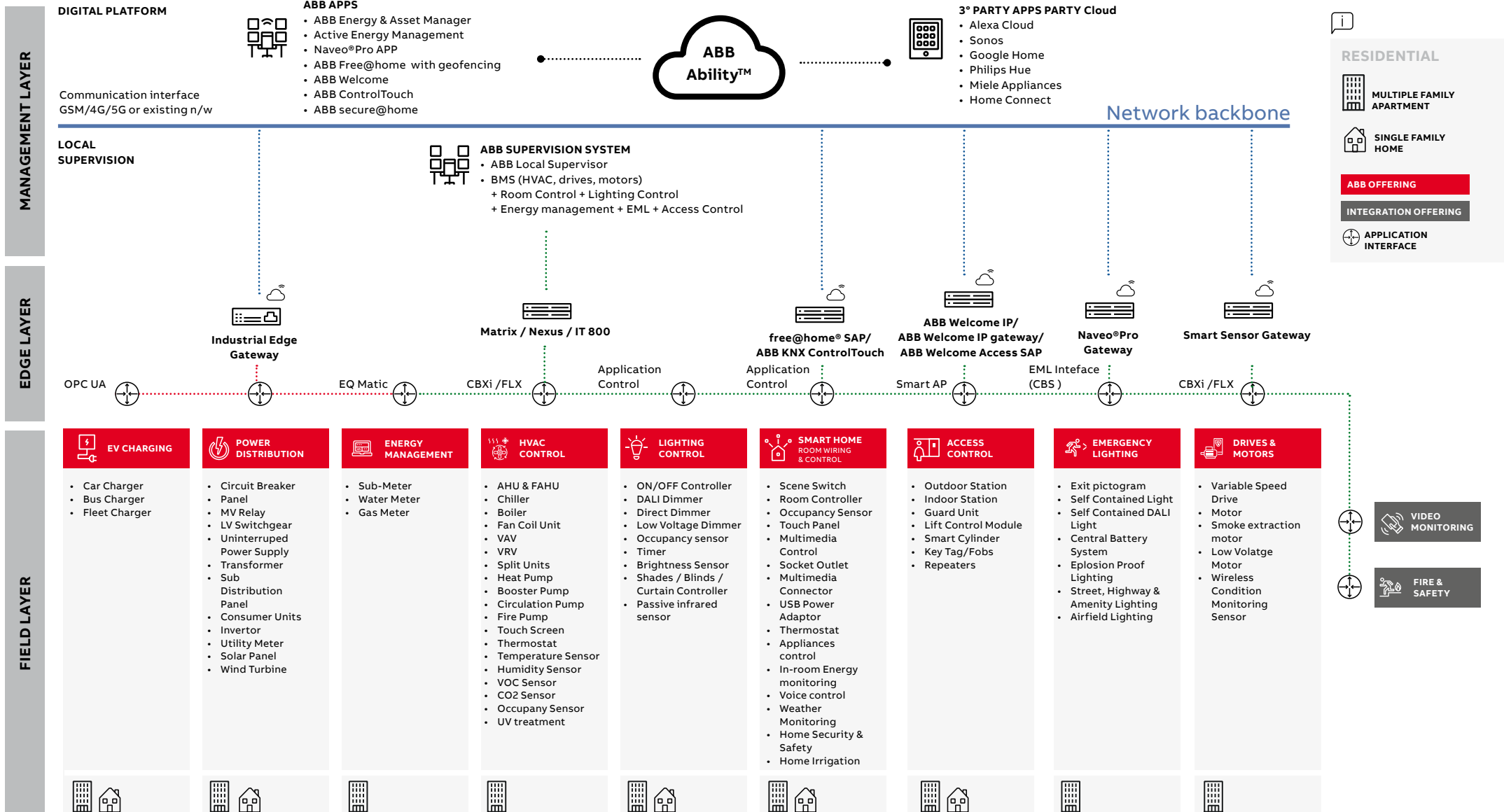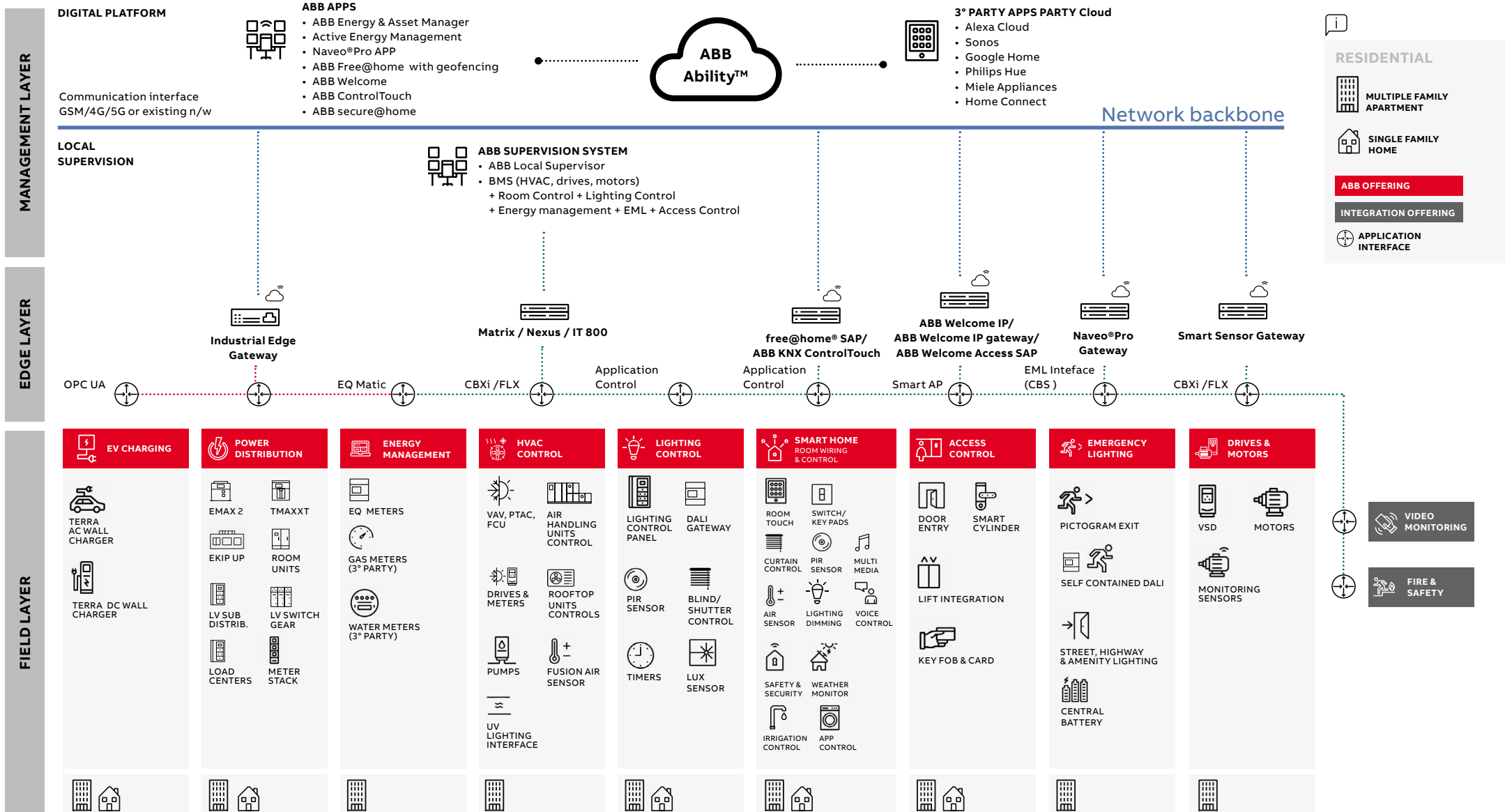- Energy management (EV, Sub-meters, etc…)

Portfolio Overview

Power
Distribution

Lighting
Control

Energy
Management

Emergency
Lighting

Motor & Variable
Speed Drives

Solution Portfolio Overview

Smart Home

EV Charging

Access Control

HVAC
Control

Reference Architecture
Residential

MANAGEMENT LAYER

DIGITAL PLATFORM

ABB APPS
- ABB Energy & Asset Manager
- Active Energy Management
- Naveo®Pro APP
- ABB Free@home with geofencing
- ABB Welcome
- ABB ControlTouch
- ABB secure@home

ABB Ability™

3° PARTY APPS PARTY Cloud
- Alexa Cloud
- Sonos
- Google Home
- Philips Hue
- Miele Appliances
- Home Connect

Communication interface
GSM/4G/5G or existing n/w

Network backbone

LOCAL SUPERVISION

ABB SUPERVISION SYSTEM
- ABB Local Supervisor
- BMS (HVAC, drives, motors)
  + Room Control + Lighting Control
  + Energy management + EML + Access Control

RESIDENTIAL

MULTIPLE FAMILY APARTMENT

SINGLE FAMILY HOME

ABB OFFERING

INTEGRATION OFFERING

APPLICATION INTERFACE

EDGE LAYER

Industrial Edge Gateway

Matrix / Nexus / IT 800

free@home® SAP/ ABB KNX ControlTouch

ABB Welcome IP/ ABB Welcome IP gateway/ ABB Welcome Access SAP

Naveo®Pro Gateway

Smart Sensor Gateway

OPC UA   EQ Matic   CBXi /FLX   Application Control   Application Control   Smart AP   EML Inteface (CBS)   CBXi /FLX

FIELD LAYER

EV CHARGING	POWER DISTRIBUTION	ENERGY MANAGEMENT	HVAC CONTROL	LIGHTING CONTROL	SMART HOME ROOM WIRING & CONTROL	ACCESS CONTROL	EMERGENCY LIGHTING	DRIVES & MOTORS
• Car Charger • Bus Charger • Fleet Charger	• Circuit Breaker • Panel • MV Relay • LV Switchgear • Uninterruped Power Supply • Transformer • Sub Distribution Panel • Consumer Units • Invertor • Utility Meter • Solar Panel • Wind Turbine	• Sub-Meter • Water Meter • Gas Meter	• AHU & FAHU • Chiller • Boiler • Fan Coil Unit • VAV • VRV • Split Units • Heat Pump • Booster Pump • Circulation Pump • Fire Pump • Touch Screen • Thermostat • Temperature Sensor • Humidity Sensor • VOC Sensor • CO2 Sensor • Occupany Sensor • UV treatment	• ON/OFF Controller • DALI Dimmer • Direct Dimmer • Low Voltage Dimmer • Occupancy sensor • Timer • Brightness Sensor • Shades / Blinds / Curtain Controller • Passive infrared sensor	• Scene Switch • Room Controller • Occupancy Sensor • Touch Panel • Multimedia Control • Socket Outlet • Multimedia Connector • USB Power Adaptor • Thermostat • Appliances control • In-room Energy monitoring • Voice control • Weather Monitoring • Home Security & Safety • Home Irrigation	• Outdoor Station • Indoor Station • Guard Unit • Lift Control Module • Smart Cylinder • Key Tag/Fobs • Repeaters	• Exit pictogram • Self Contained Light • Self Contained DALI Light • Central Battery System • Eplosion Proof Lighting • Street, Highway & Amenity Lighting • Airfield Lighting	• Variable Speed Drive • Motor • Smoke extraction motor • Low Volatge Motor • Wireless Condition Monitoring Sensor

VIDEO MONITORING

FIRE & SAFETY

Reference Architecture
Residential

MANAGEMENT LAYER

DIGITAL PLATFORM

ABB APPS
- ABB Energy & Asset Manager
- Active Energy Management
- Naveo®Pro APP
- ABB Free@home with geofencing
- ABB Welcome
- ABB ControlTouch
- ABB secure@home

ABB Ability™

3° PARTY APPS PARTY Cloud
- Alexa Cloud
- Sonos
- Google Home
- Philips Hue
- Miele Appliances
- Home Connect

Communication interface
GSM/4G/5G or existing n/w

Network backbone

LOCAL SUPERVISION

ABB SUPERVISION SYSTEM
- ABB Local Supervisor
- BMS (HVAC, drives, motors)
  + Room Control + Lighting Control
  + Energy management + EML + Access Control

RESIDENTIAL

MULTIPLE FAMILY APARTMENT

SINGLE FAMILY HOME

ABB OFFERING

INTEGRATION OFFERING

APPLICATION INTERFACE

EDGE LAYER

Industrial Edge Gateway

Matrix / Nexus / IT 800

free@home® SAP/
ABB KNX ControlTouch

ABB Welcome IP/
ABB Welcome IP gateway/
ABB Welcome Access SAP

Naveo®Pro Gateway

Smart Sensor Gateway

OPC UA   EQ Matic   CBXi /FLX   Application Control   Application Control   Smart AP   EML Inteface (CBS)   CBXi /FLX

FIELD LAYER

EV CHARGING	POWER DISTRIBUTION	ENERGY MANAGEMENT	HVAC CONTROL	LIGHTING CONTROL	SMART HOME ROOM WIRING & CONTROL	ACCESS CONTROL	EMERGENCY LIGHTING	DRIVES & MOTORS

EV CHARGING
- TERRA AC WALL CHARGER
- TERRA DC WALL CHARGER

POWER DISTRIBUTION
- EMAX 2
- TMAXXT
- EKIP UP
- ROOM UNITS
- LV SUB DISTRIB.
- LV SWITCH GEAR
- LOAD CENTERS
- METER STACK

ENERGY MANAGEMENT
- EQ METERS
- GAS METERS (3° PARTY)
- WATER METERS (3° PARTY)

HVAC CONTROL
- VAV, PTAC, FCU
- AIR HANDLING UNITS CONTROL
- DRIVES & METERS
- ROOFTOP UNITS CONTROLS
- PUMPS
- FUSION AIR SENSOR
- UV LIGHTING INTERFACE

LIGHTING CONTROL
- LIGHTING CONTROL PANEL
- DALI GATEWAY
- PIR SENSOR
- BLIND/ SHUTTER CONTROL
- TIMERS
- LUX SENSOR

SMART HOME ROOM WIRING & CONTROL
- ROOM TOUCH
- SWITCH/ KEY PADS
- CURTAIN CONTROL
- PIR SENSOR
- MULTI MEDIA
- AIR SENSOR
- LIGHTING DIMMING
- VOICE CONTROL
- SAFETY & SECURITY
- WEATHER MONITOR
- IRRIGATION CONTROL
- APP CONTROL

ACCESS CONTROL
- DOOR ENTRY
- SMART CYLINDER
- LIFT INTEGRATION
- KEY FOB & CARD

EMERGENCY LIGHTING
- PICTOGRAM EXIT
- SELF CONTAINED DALI
- STREET, HIGHWAY & AMENITY LIGHTING
- CENTRAL BATTERY

DRIVES & MOTORS
- VSD
- MOTORS
- MONITORING SENSORS

VIDEO MONITORING

FIRE & SAFETY

Power Distribution

With a changing world and more focus on sustainability and efficiency, the electrical infrastructure in a modern residential tower requires more than a simple power distribution, technologies to transform in flexible a scalable way traditional power distribution system are now more than ever needed. In addition, there is the requirement to reduce carbon emissions and meet the latest efficiency requirements.

Power Distribution
IEC Market

Multiple Apartment Reference Architecture

ROOM 1010

ROOM 1001

ROOM 110

ROOM 101

Lobby

Stairs

Wellness Center

ATS

Generator

LV SWG

LV SWG

UPS

TX SS

Legend:

Lift

HVAC

Transformer

EV charging station

Main switchboard

Distribution Board

UPS

Emergency Board

Floor Mounted Main Distribution Board
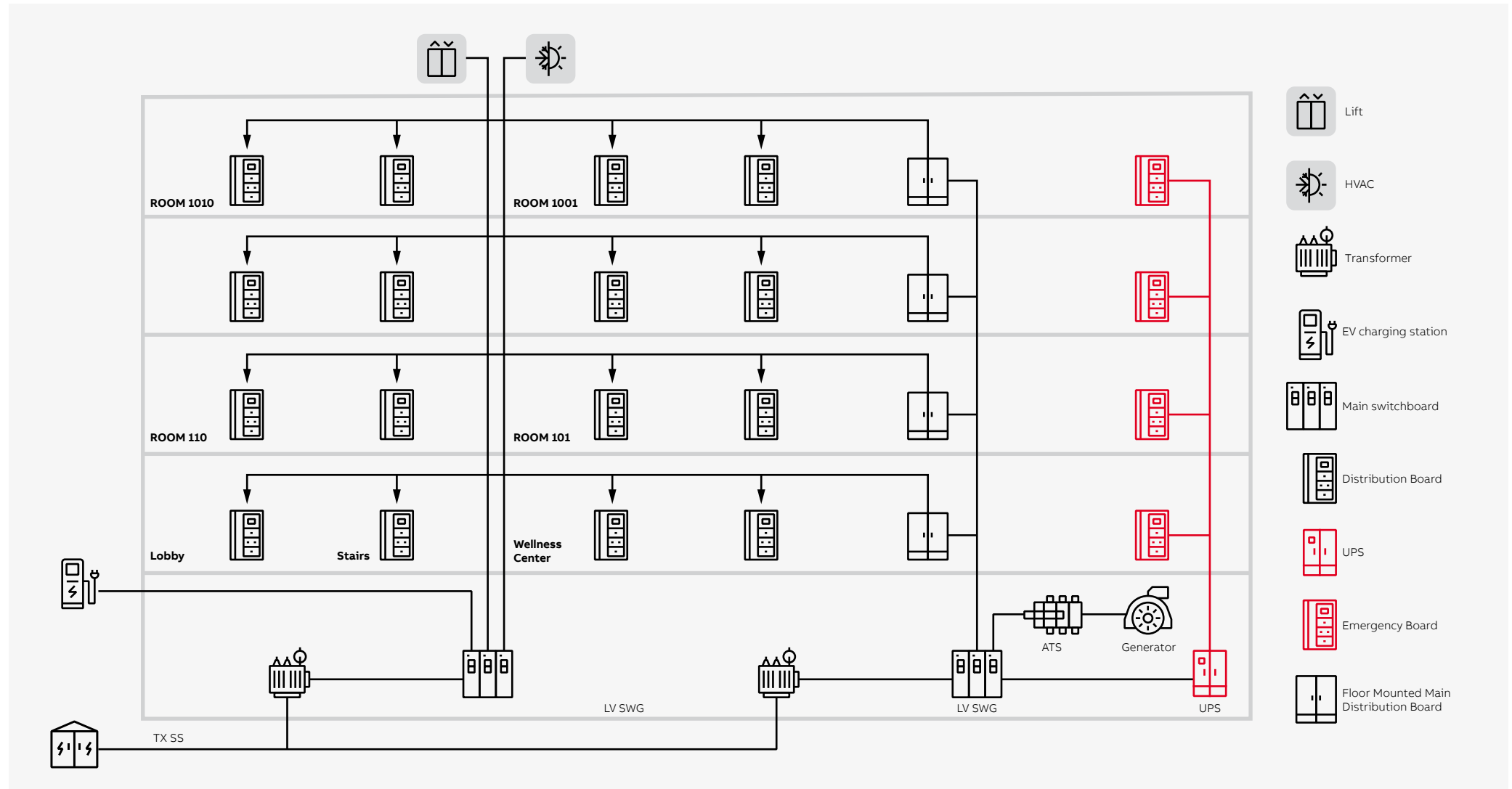
Power Distribution
IEC Market

Multiple Apartment - Digital diagram of Floor sub-distribution switchboard
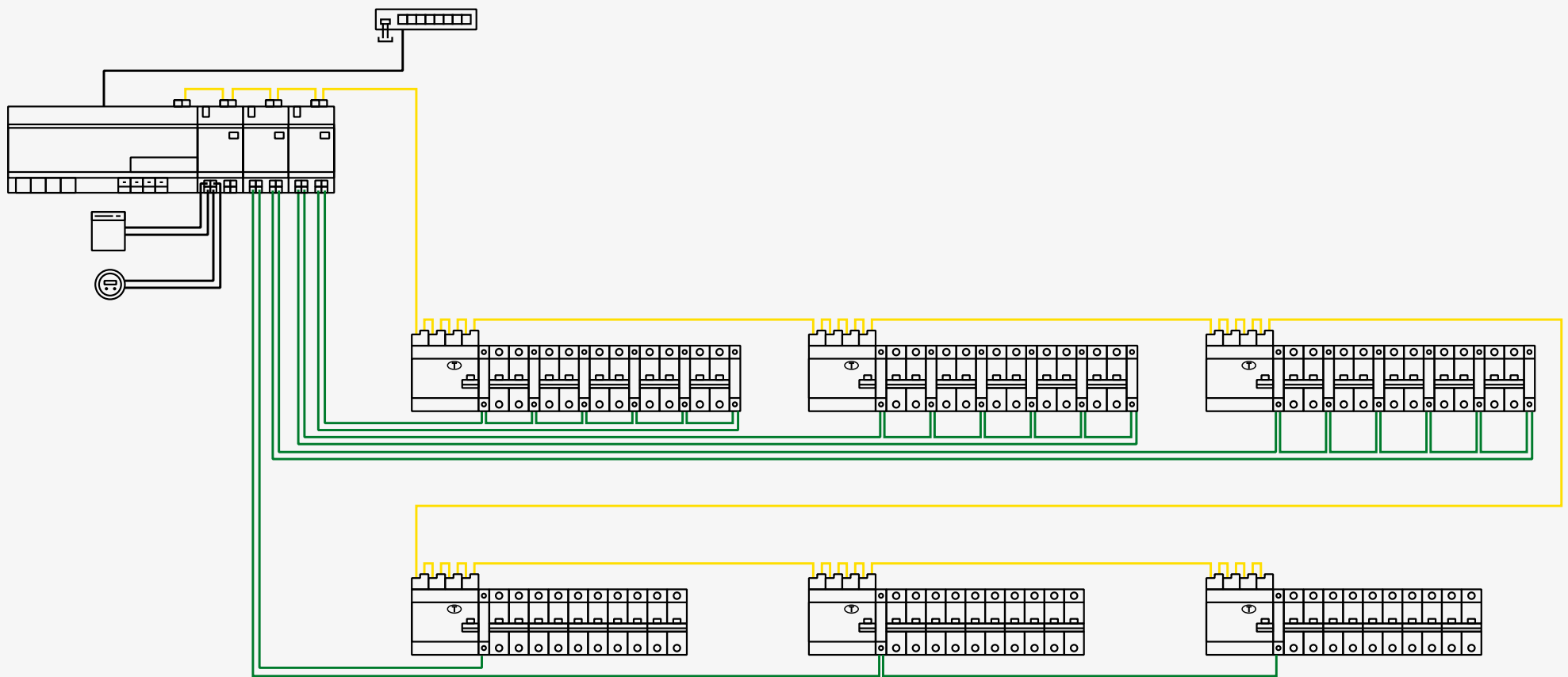
Power Distribution
IEC Market

Multiple Apartment - Room Consumer Unit
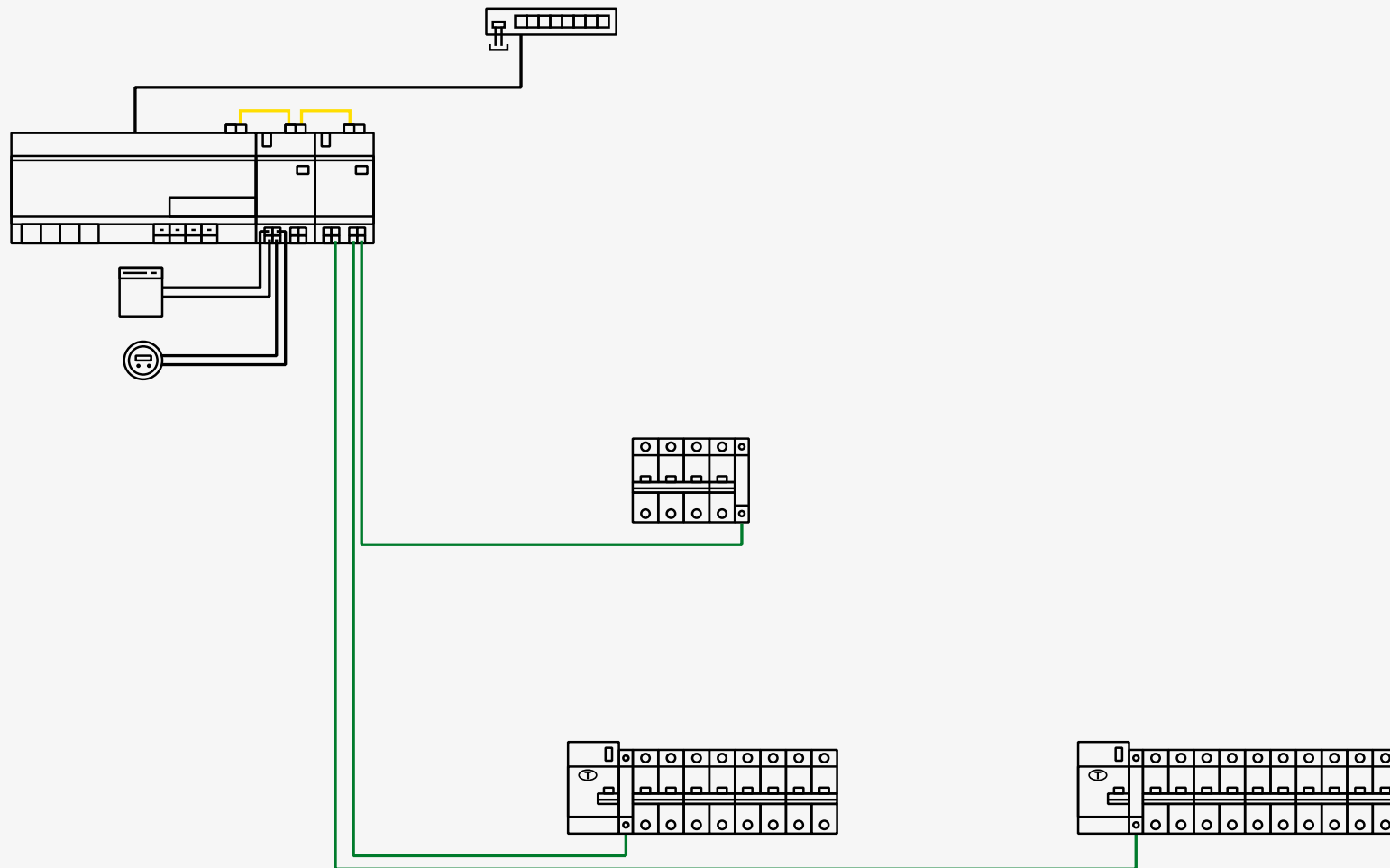
Power Distribution
IEC Market

Reference architecture for single family home

Grid / Local
RMU
Substation

First Floor

Home
Automation
Panel

Lounge DB

Ground Floor

Home
Automation
Panel

Main Distribution
Board

Living Area
DB

Garage and
Swimming Pool
DB
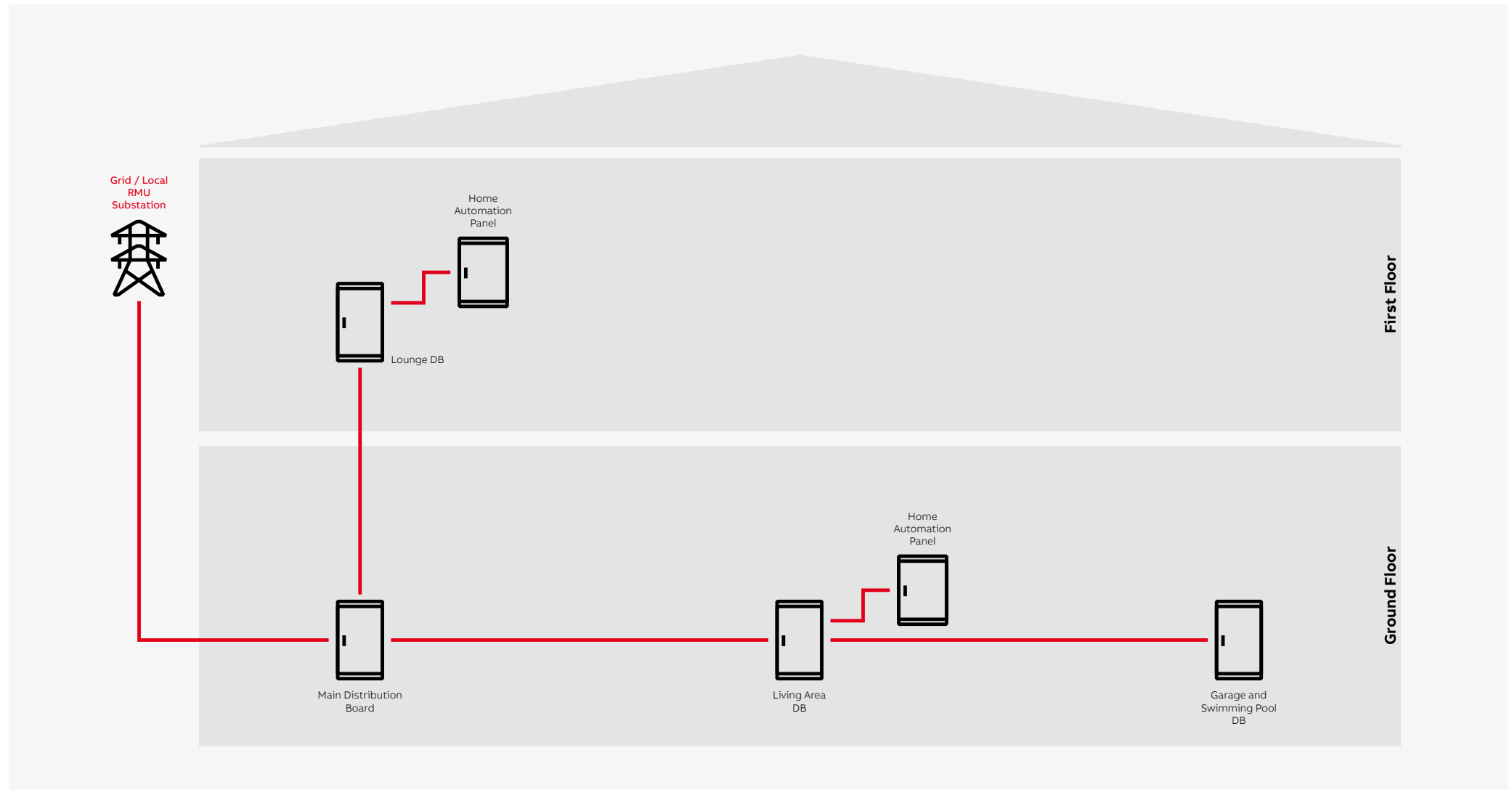
Power Distribution
NEMA Market

Reference architecture for Residential Tower

- AC Disconnects

- Load Centers
- Circuit Breakers
- Electric Circuit Interrupters
- Surge Suppression Devices

- Lighting and Appliance Panelboards
- LV Transformers
- Modular Metering
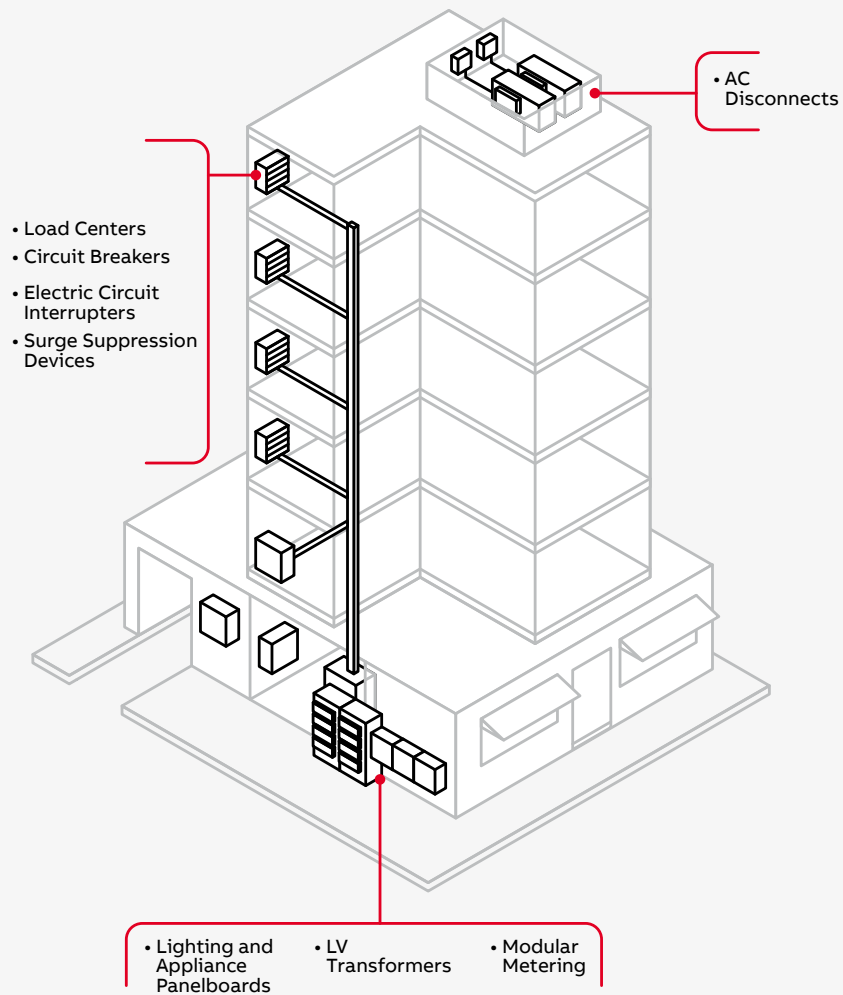
Power Distribution
NEMA Market

Residential Tower – Modular Metering

Utility Tranformer

Residential

Single-Family

Meter Soccket Load Centers

Modular Metering

Multi-Family

Load Centers & Circuit Breakers

AC Disconnect

Spa Panel

Interlock

Generator Panel

THQLSURGE

Low Volatage (208/240V)
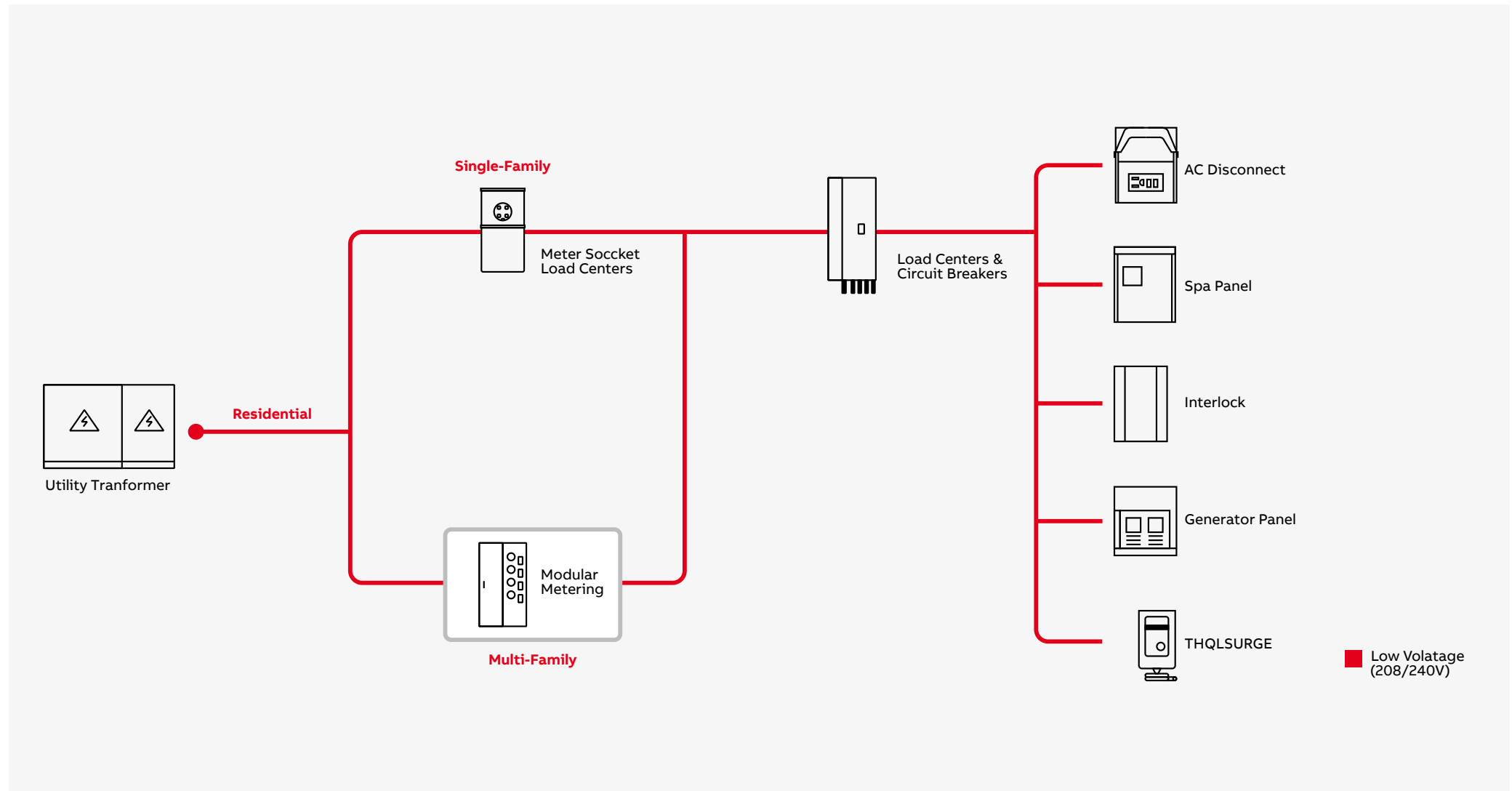
Power Distribution
NEMA Market

Residential Tower – Component Layout
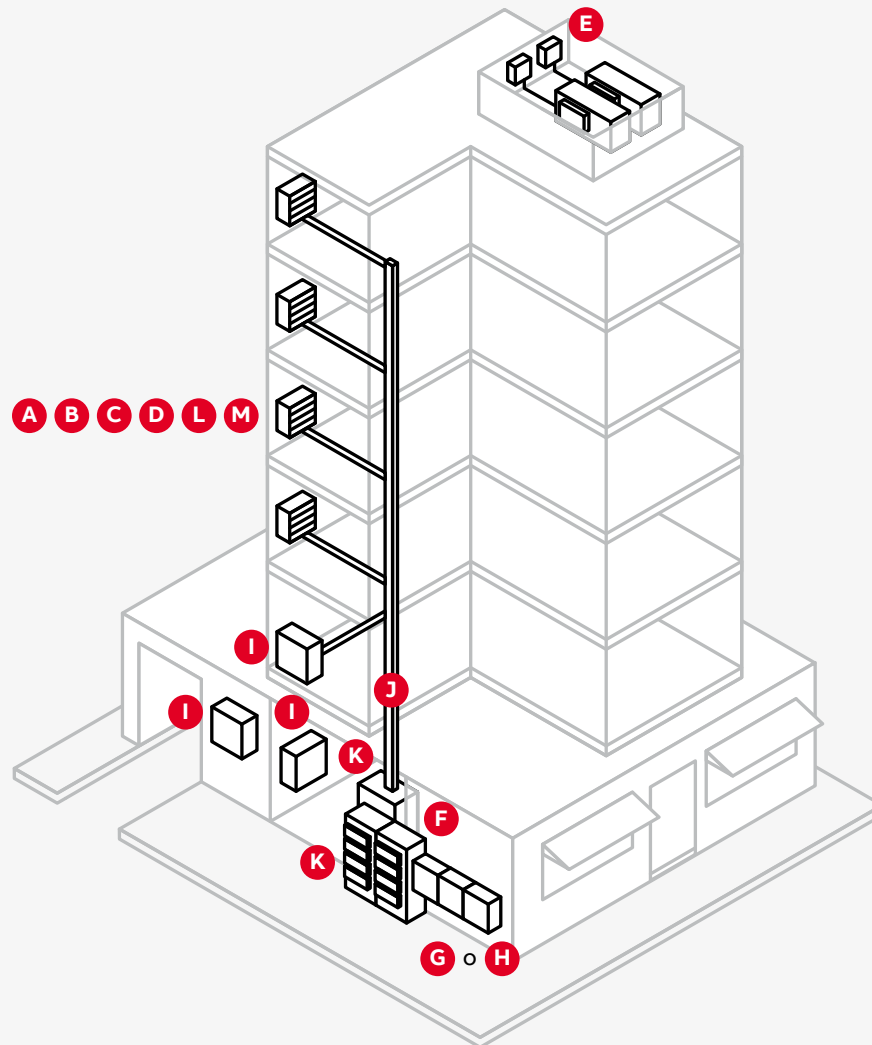
A Load Centers

B Standard Circuit Breakers

C Dual Function Circuit Interrupter

D Arc Fault Circuit Interrupter

E AC Disconnects

F Meter Mod III / Modular Metering

G General Duty Safety Switches

H Heavy Duty Safety Switches

I Panelboards

J Busway

K Switchboards

L Surge Suppressor

M Ground Fault Circuit Interrupter with Selt-Test

Power Distribution
NEMA Market

Reference architecture for Single Home

Main lug only
load centre

Main breaker
load centre
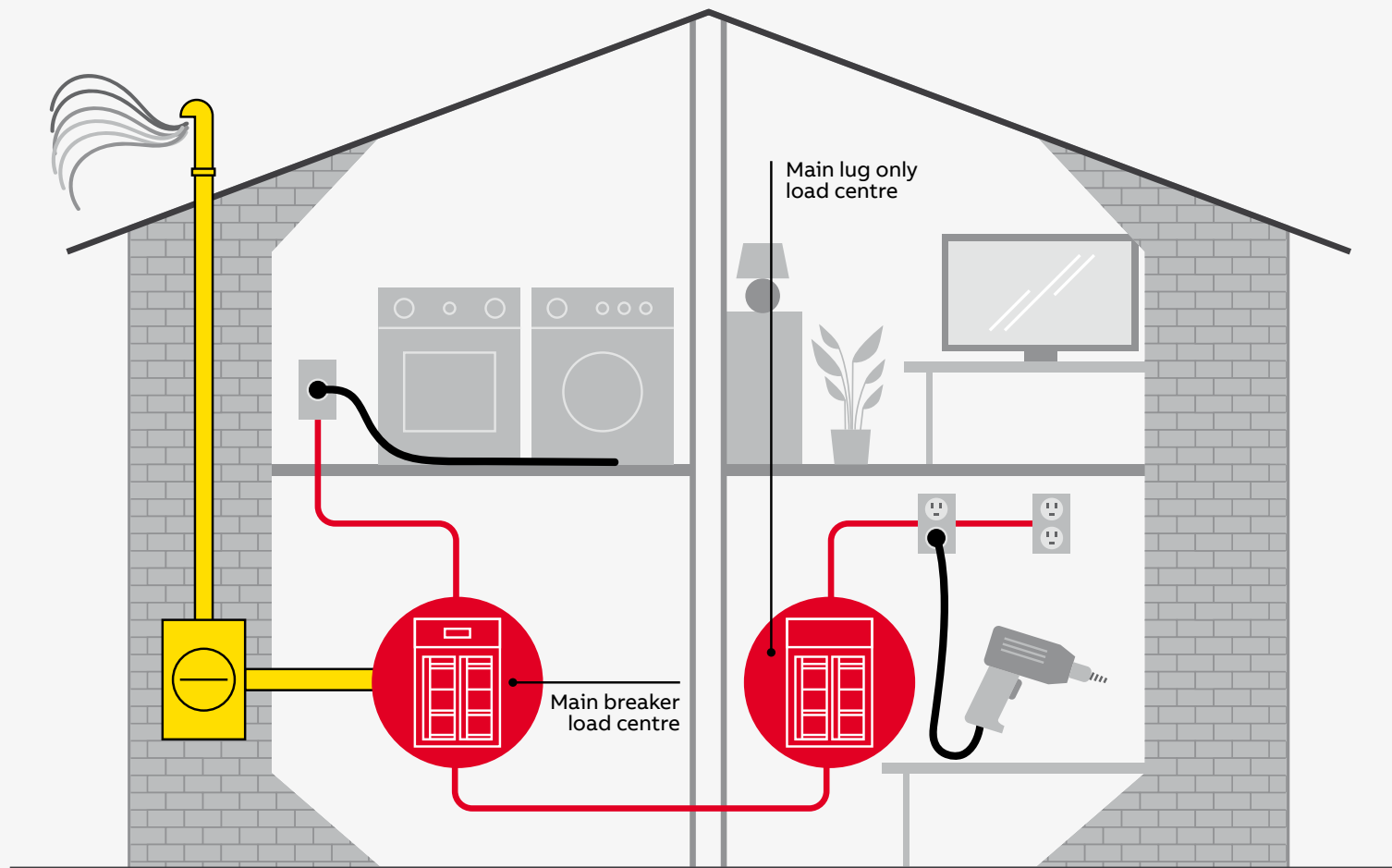
Power Distribution
NEMA Market

Single Family – Component Layout

A Meter Socket Load Centers

B Load Centers

C Standard Circuit Breakers

D Surge Suppressor

E Arc Fault Circuit Interrupter

F Dual Function Circuit Interrupter

G AC Disconnects

H Spa Panel

I Ground Fault Circuit Interrupter with Self-Test
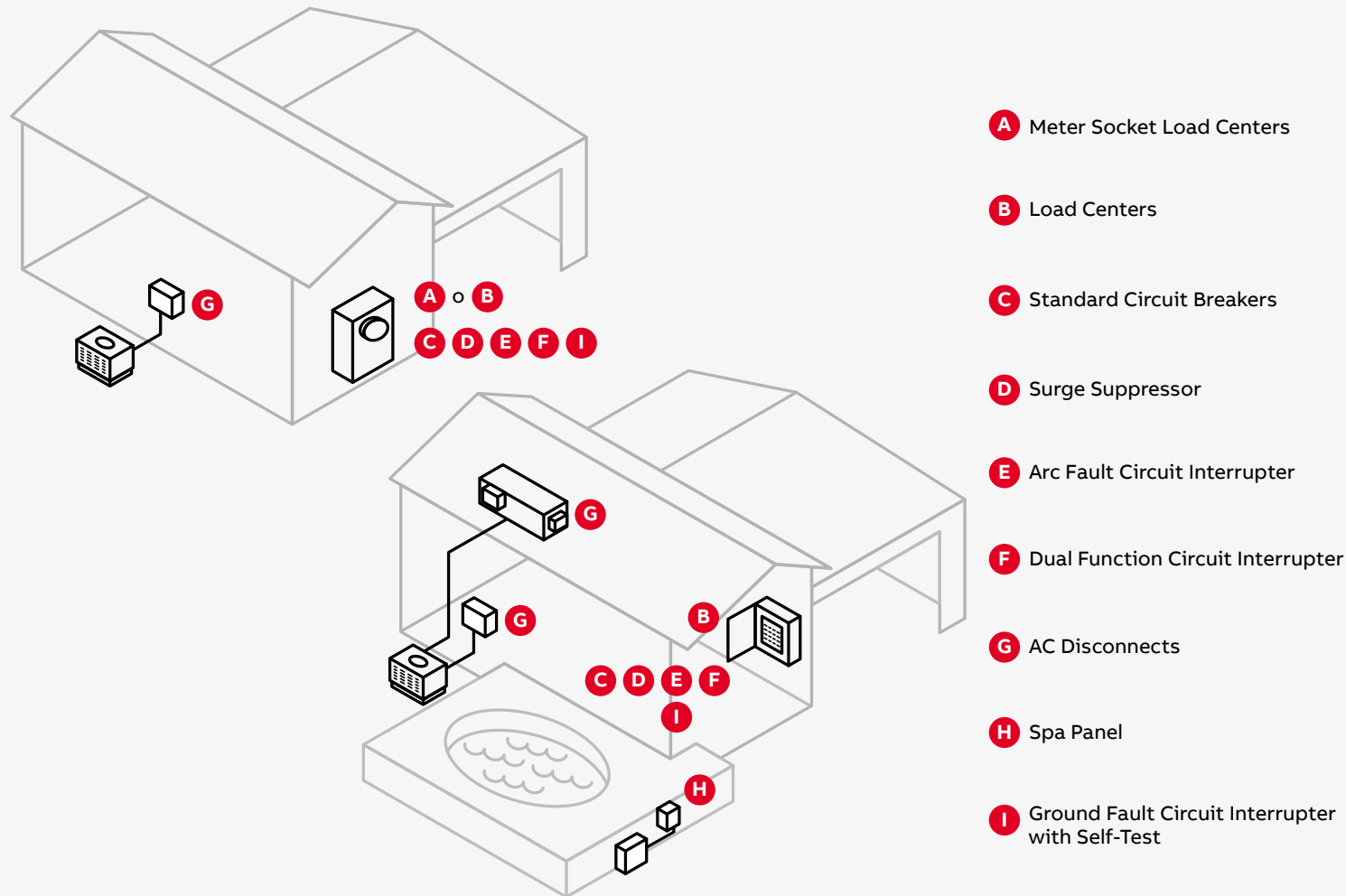
Power Distribution
NEMA Market

Town House – Component Layout
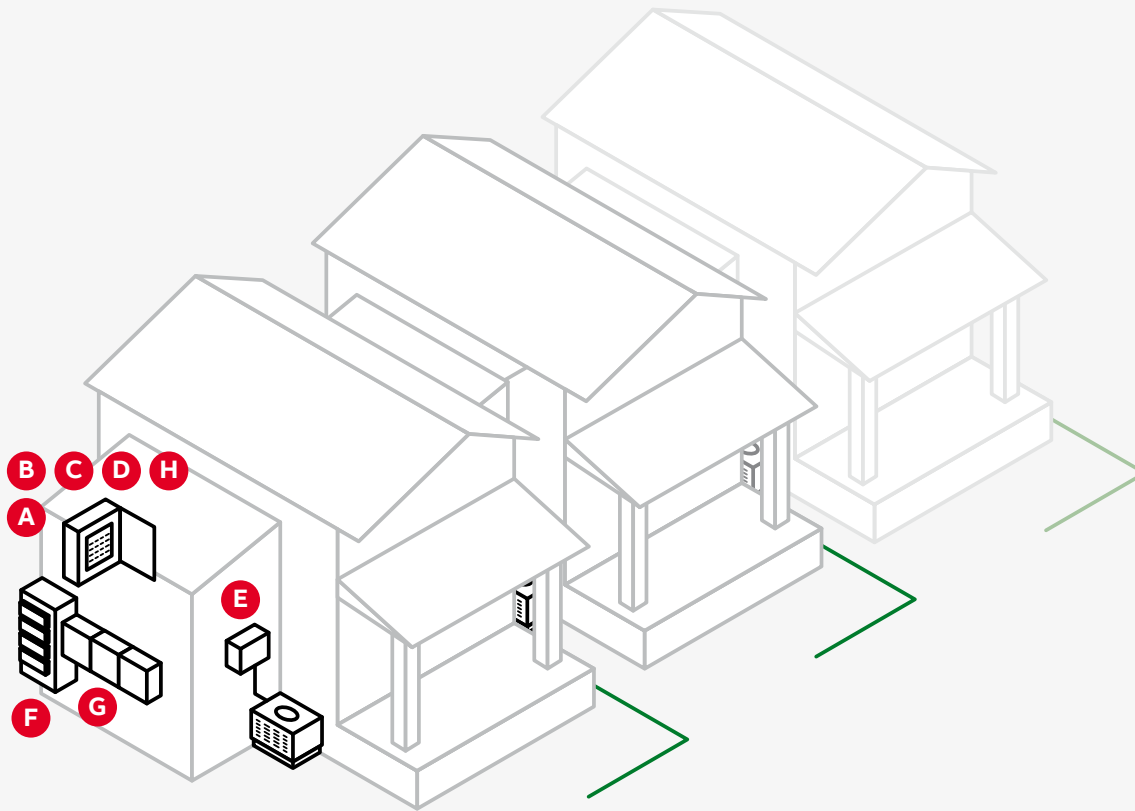
A Load Centers

B Standard Circuit Breakers

C Dual Function Circuit Interrupter

D Arc Fault Circuit Interrupter

E AC Disconnects

F Mini Mod III / Modular Metering

G Genral Duty Safety Switches

H Ground Fault Circuit Interrupter with Self-Test

Power Distribution
Low Voltage Switchgear and Components

Emax 2
Air circuit breakers

SACE Emax 2 air circuit breakers up to 6300A are designed to increase efficiency in different types of systems: from industrial applications to naval applications, to power generation, advanced tertiary uses, including hospitals, datacenters, and commercial buildings. They are the only switches that protect electrical circuits reducing power consumption at the same time based on user demand. This series is equipped with integrated breaker release and Power Controller, which measures and assesses power consumption, managing loads to maintain constant power or reduce power surges absorbed by users. The exclusive load management reduces absorbed power by up to 20%. Integrated multimeters measure voltage (0.5% precision), current (1% precision) and power (2% precision), and provide for remote monitoring.
These devices offer a complete integration in intelligent networks, buildings, and industrial structures. Simplified wiring allows time savings up to 30%.
SACE Emax 2 air circuit breakers are available in four different envelopes.

Tmax XT
Series molded case circuit breakers

Tmax XT are moulded case circuit breakers wich guarantee an extremely high performance level while being progressively smaller in size, simple to install and able to provide increasingly better safety.
Range is complete with four frame sizes, suitable for applications from 160 A to 1.600 A.

Power Distribution
Low Voltage Switchgear and Components

Ekip UP

Ekip UP is the low-voltage digital unit able to monitor, protect and control the next generation of plants. Thanks to the built-in software-based function, Ekip UP is the unit that digitalizes the plant performance. Sharing all the electronics solutions of "all-in-one" platform, Ekip UP completes the ecosystem to fit all the market opportunities.
The result is a unit suitable for all the different applications including all the needed functionalities without the need of additional external devices.

Ekip UP in the best way, will be able to:
- UP-date old facility with the latest innovation in the fastest way.
- UP-grade plant and get more functionalities in order to cover all the opportunities.
- UP-load measures and enable true energy management function.
- Maximize UP-time thanks to easy commissioning without impact on switchboard design.

TruONE - Network/Group switches

This new ATS (Automatich transfert switch) is the first real automatic switch available on the market, especially developed to offer switching and control functions in a single unit. With tested capabilities far beyond the standard, this series always guarantees power supply in critical power applications.
The adopted design solutions significantly reduce the number of wires and connections, guaranteeing rapid installation, reducing the risk of connection errors to a minimum, and offering superior reliability. Diagnostic maintenance and modular components reduce standby times and service costs.
In contrast to other traditional ATS solutions, TruONE allow to perform manual emergency operations under voltage, making it possible to quickly restore power supply in the case of equipment faults.

Power Distribution
Low Voltage Components

Manual transfer switches

ABB offers a wide variety of manual change-over switches, from 16 to 3200 Amperes in range. Manual change-over switches are available with three different transition types; Open, fast or closed. Change-over switches by ABB are extremely well suited for heavy duty applications. They are equipped with CTI (comparative tracking index) of over 600 V, making them great for use in tropical environments.

Our switches come with a real one pole construction in even higher ratings (one line per power line), creating savings in terms of energy consumption by reducing power loss. A single terminal per pole across the entire range also eliminates the need to use additional fixing sets to do connections.

The modular and flexible construction, which can even include an adjustable periscopic shaft, allows for different arrangements of the poles and handle, providing you with the opportunity to create unique space saving solutions for your customers.

To complement our wide range of manual change-over switches, we also offer open transition manual change-over switches designed according to UL/CSA certification standards in a power range from 160 to 800 Amperes.

Motorized transfer switches

Uninterrupted power supply with motorized functionality
ABB offers a wide variety of open transition motorized change-over switches from 40 to 3200 Amperes in range. All of our motorized change-over switches come equipped with a cover with clear operating instructions and improved motor operator performance.
ABB motorized change-over switches are fast and easy to install. The voltage sensing connectors have been designed to save time, as there is no need to drill holes into the busbars. Also, the control and power cables are screw mounted, providing a safe and secure connection that stays tight even during transportation.
Our switches come equipped with a comprehensive range of inbuilt safety features such as mechanical interlock, which ensures the isolation of the two asynchronous power supplies. This eliminates risk of short-circuiting between them. The motorized change-over switches are also equipped with a handle for manual operation in case of emergency.

Power Distribution
Low Voltage Components

Compact ATS

Compact without compromise
The Compact ATS by ABB is an all-in-one device that delivers all the safety and performance you would expect from an automatic transfer switch… and more. 100% ease and efficiency in a 40% more compact package.

The Compact ATS range includes automatic transfer switches from 40 to 125 Amperes (IEC) and will be in two versions:
- OTM_C20D - For Network/Network application, with fixed version with pre-defined delay times and voltage thresholds.
- OTM_C21D - For Network/Network and Network/Genset applications, with configurable transfer and back-switching delays and Adjustable over and under-voltage thresholds. New: Modbus RTU communication is now available.

Contactors and relays

ABB offers a comprehensive selection of contactors for simple and extreme application as well as products with specific purposes. The AF contactor technology revolutionizes how we use contactors and allows use in all parts of the world and in all network conditions. Furthermore, mini-contactor range offers compact dimensions and specific connection possibilities. The AS contactor is efficient and allows you to optimize your equipment design. You can choose terminals between screw, push-in spring and ring tongue through our ranges. So whatever your need of a contactor might be, ABB will have a variant meeting just that.

Power Distribution
Low Voltage Components (NEMA market)

Load Center

ABB offers a wide range of residential and commercial load centers under the brand name PowerMark. There are different load center models for single housing, multi-housing and high-rise towers.

All of these products are built with the highest quality construction. They come in an "ultra-rigid galvanized, commercial-quality enclosure" that won't corrode and assures a long life.

For any type of residence, whether it's a single-family home, a multiplex or a condo towers, ABB offers "PowerMark Single Phase Load Center" as main breaker load center.

Load centers come in standard with a factory-installed main breaker and the all the parts ready to accommodate any type of breakers and service connections. Depending on the need for a specific home, the electrician will determine the capacity required, and which breakers are required for each circuit. The breakers are ordered separately from the load center.

Residential Breakers

Plug-in Circuit Breakers are standard breakers. They come in single-pole, two-pole and three-pole versions.

Single poles circuit breakers are available in two different widths. The THQL modules are 1-inch-wide. The THQP modules are 1/2-inch wide. Both models have catalogue numbers ranging from 15 amps to 50 amps. For the same capacity, both models have the same qualities. They are both tested to the same CSA and UL specifications as 1-inch wide breaker. The advantage of using the 1/2 -inch model is that it takes half the space in the load center. Therefore, you can install double the number of circuits

Two-pole circuit breakers are used for bigger loads like for heaters, Owens, washers and dryers, etc. They incorporate an internal common trip bar. They are available both in THQL 1-inch module and THQP 1/2-inch module. The -inch module ranges from 15 to 50 amps, where as the 1-inch module ranges from 15 to 125 amps

Three-pole circuit breakers are used for some appliances they also incorporate an internal common trip bar. They are available in THQL 1-inch module and range from 15 amps to 100 amps.

THQL1120   THQP130   THQL2140   THQL32020

Power Distribution
Low Voltage Components (NEMA market)

Arc Fault Interrupter

Arc-fault circuit interrupters – or AFCI – are circuit breakers with more advanced features that provides more protection against an electrical shock. In addition to trip if the amperage exceeds the operating capacity, for example 15 amps, they can interrupt the circuit if an arc occurs in the wiring. It detects both series and parallel arcs. There is a trip indicator on the breaker, and a push-button test to validate the arc-detection capability of the breaker.
They are ideal for dining room, living room, bedrooms, closets, offices, library. etc.
Since 2008, the National Building code requires that load centers in new homes must use AFCI breakers instead of standard breakers.
The capacity to interrupt an arc is indicated in AIC rating, which indicates, as we saw earlier , the maximum fault current that can be interrupted by a circuit breaker without failure of the circuit breaker.

Ground-fault circuit interrupters

Ground-fault circuit interrupters add safety compared to a standard breaker. They have the capacity to interrupt current in case of a ground fault. 10,000 AIC rated models are available in 15, 20 or 30 amps. 22,000 AIC rated models are available in 15 or 20 amps.
A GFCI breaker has a trip flag, and the breaker automatically tests itself. An LED light indicates selt-test compliance.
GFCI circuit breakers come with the option of a traditional or short pigtail. They are available in both 1-pole and 2-pole modules. They are ideal for kitchen, bathroom, garage, laundry room, pool, porch, etc.

Power Distribution
Low Voltage Components (NEMA market)

Surge Protector

Finally, a last product to mention is the Surge protector. Surge protection helps protect the entire home or office, computers, TV, appliances and all other sensitive electronic equipment from damages which may happen as a result of dangerous lightning and utility-produced power surges.

- AC power surge protection for the entire home or office – computers, TV, appliances and all other sensitive electronic equipment
- Helps protect against dangerous lightning and utility-produced power surges
- Up to 60,000 amps of surge protection
- Meets newest UL 1449 3rd edition surge protection requirements

Generator Panel

SPA Panel
For single houses, we also offer a Spa panel. This panel comes with a factory-installed neutral and ground bar, in a NEMA-3R enclosure, in either 50 or 60 amps.

Generator Panel
ABB also offers generator panels. These products are usually used for a garage, workshop or generator. If the house has a generator backup power.
Generator panels are offered with maximum capacity of either 30 or 60 amps with the additional possibility of 8 additional circuits for other applications. The NEMA-1 enclosure model is either flush or surface mount. A NEMA-3R enclosure is also available.

Power Distribution
Low Voltage Components (NEMA market)

Modular Metering

ABB Metering Modules are bundled, pre-tested solutions for your fiscal metering, blending and pressure reduction applications. They are easy to implement and ensure the measurement accuracy of oil and gas products being sold. Our modular approach helps ensure consistent quality, predictable performance, simple operation and easy maintenance.

Product Features
- A main disconnect or service main (main module)
- One or more-meter stacks (meter stack module)
- Tenant Breakers
- Main service module provides a utility service termination point. Can be main breaker, main fusible switch or main terminal box (MLO - Main Lug Only)
- Up to 2000A incoming, 1P3W 120/240V or 3P4W 208Y/120
- Residential Sockets - 125A, 200A (1PH)
- Commercial Sockets – 225A, 400A (1PH or 3PH)
- Expandable - any number of meter stacks can be ganged together to meet application needs
- Each meter socket has provision for a tenant branch breaker

Power Distribution
Sub Distribution Boards and Components

TwinLine wall-mounted and floor-standing cabinets

TwinLine N44 and N55 series of wall-mounted and floor-standing sheet steel cabinets offer protection degrees against dust and water up to IP44 and IP55 as well as a common interior fitting CombiLine N.

Continuity is the guiding principle for these cabinets for distribution board assembly – from their high degree of protection and their ease of installation to a portfolio which can meet all requirements in the field. Innovative flange technology with tool-free installation and more usable area for cable entry facilitate assembly.

With our digital platform ABB Connect Partner Hub TwinLine N can be configured faster and with all relevant information at hand.

System pro E Energy

System pro E energy is a complete range of switchboards for standard energy distribution inside any building, from main distribution switchboards to floorboards, to department cabinets. The range is available both for wall installation (up to 400A) and floor installation (up to 800A) with over 400 sizes. The overall dimensions are reduced thanks to a depth of 200 mm for the wall versions and 240 mm for the floor versions. All versions can be placed side by side with other structures or cable housing columns. Kit solutions and a fully open structure simplify all assembly steps.

Power Distribution
Sub Distribution Boards and Components

Meterboards

We can provide you with the right, practical solution for every application from our wide range of double insulated (protection class II) flush-mounting (U series), wall-mounting cabinets (A series) and floor standing cabinets (HS series).

Main benefits
- Wide range of flush-, wall-hanging and floor-standing cabinets
- Quick and easy fixing of the cables, due to standard cable strain relief at the top and bottom.
- Generous wiring space on both sides and behind the DIN rails plus sophisticated wiring system
- One interior fitting for all enclosure types, CombiLine N

ComfortLine distribution boards and wall-mounting cabinets

Smart ideas are needed in today's home installations. Assembly and installation should be easy and comfortable, but at the same time it is good to be prepared for the solutions of the future already today. The new ComfortLine distribution boards and wall-mounting cabinets provide the perfect solutions to make everything possible. With a broad portfolio for every application. Thanks to the comprehensive and consistent product portfolio in protection classes I and II, exemplary ease of installation and intelligent smart home solutions, the new ComfortLine cabinets from ABB meet all requirements in the best possible way. The repertoire of communication and media devices in living and working environments is constantly growing, and residential, commercial and industrial buildings are increasingly connected.

Numerous useful features of the ComfortLine series, such as the increased flange size and the unique locking technology, support you in your daily business, making electrical installations quick and simple as well as prepared for any future requirement.

Power Distribution
Sub Distribution Boards and Components

Fire protection enclosures

Enclosures for preventative fire protection, A2, F30/F90, I30/I90, E30/E90

Preventive fire protection is not only a matter for those constructing a building. In planning and designing their installations, expert electrical planners and engineers or switchgear manufacturers are responsible for ensuring that those installations do not become the cause of a fire. ABB offers an innovative enclosure system for fire prevention, which is constructed of fireproof materials, features optimum technology and is available in a variety of economical designs. A wide range of wall enclosures (flush/surface/enclosure) and floor-standing enclosures (surface) are available in a variety of enclosure sizes. ABB has expanded its range to include fire protection Mantle Enclosures,and Fire Protection Doors which, in addition to having a fire resistance duration that conforms to DIN 4102 Part 2 (F30/F90), also guarantee to check fire load (I30/I90) and maintain functionality (E30/E90).

System pro M DIN-Rail products

TSystem pro M portfolio modular DIN-Rail products
System pro M, is a complete assortment of first-class quality products for controlling and monitoring electricity as well as protection of the end users life, property and for energy efficiency. The portfolio includes miniature circuit breakers, residual current devices, surge protection devices, control, signaling, measuring and smart accessories.

Power Distribution
Sub Distribution Boards and Components

System pro M compact® InSite

System pro M compact® InSite is a solution specifically developed to monitoring and controlling the energy flow in sub distribution boards. The InSite range collects data of devices such as energy and power meters, network analyzers, protection devices like MCBs and RCDs that are equipped with current sensors and the integration of additional digital Input and Output modules. Thanks to its scalability the system can easily be integrated in existing installations without replacing any components.
It can be installed as a standalone solution or integrated into any IT infrastructure, such as the cloud-based ABB Ability™ Energy and Asset Manager.

SMISSLINE TP
Plug-in connection system

SMISSLINE TP is the complete solution for line protection in applications that require high availability, simplicity, and rapid installation. SMISSLINE TP is the first plug-in connection that allows inserting and disinserting unpowered devices and components without having to use other individual protection devices. The possibility to make changes and additions during ongoing operation or future extensions makes this system ideal for hospitals, especially when changes are required during mission critical situations or emergencies and downtime needs to be minimized. Five different protection devices (breaker switches, differential switches, overvoltage dischargers, softstarter for motors and switches for maneuvering-disconnection) can be directly connected to the system with plug-in terminals. International certifications and approvals. Complete IP2XB protection against accidental contacts.
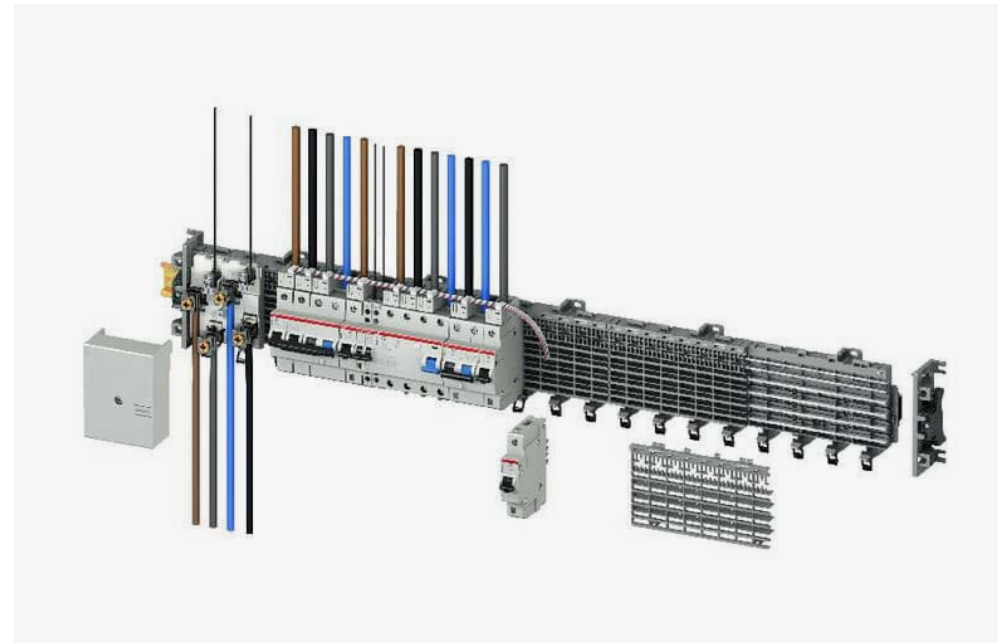
Power Distribution
Bill of Materials

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Single Family Home Panel NAM (Option1)

Product Details	Qty
TMC4020CCAW	1
THQL1115DF	2
THQL1115AF2	10
THQL1120AF2	2
THQP115	6
THQL1120	3
THQP220	6
THQL2130	2
THQL2140	1

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Single Family Home Panel NAM (Option2)

Product Details	Qty
TMC4020CCAW	1
THQL1115AF2	18
THQL1120AF2	5
THQP220	6
THQL2130	2

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Apartment Tower (NAM)

Product Details	Qty/Apartment	Qty/Tower
TLC1612CCA	1	40
THQL1115DF	2	80
THQL1115AF2	5	200
THQL1120AF2	1	40
THQP115	3	120
THQL1120	1	40

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Sub distribution Board Apartment Tower IEC

Switchboard	Code	Description	Qty
Incoming breaker	1SDA067417R1	XT1N 160 TMD 125-1250 3p F F	1
sub-distribution board	2CDS273001R0634	Miniature Circuit Breaker - S200 - 3P - C - 63 ampere	3
sub-distribution board	2CSF204101R1250	F204 A-25/0,03 Residual Current Circuit Breaker	6
sub-distribution board	2CDS251001R0104	Miniature Circuit Breaker - S200 - 1P - C - 10 ampere	18
sub-distribution board	2CSR255140U1164	DS201 C16 A30 U - RCBO	9
sub-distribution board	2CDS251001R0065	Miniature Circuit Breaker - S200 - 1P - B - 6 ampere	6
sub-distribution board	2CDD284101R0040	SD204/40 Switch Disconnector 4P, 40A	6
sub-distribution board	2CDS251001R0164	Miniature Circuit Breaker - S200 - 1P - C - 16 ampere	6
sub-distribution board	2CDS273001R0164	Miniature Circuit Breaker - S200M - 3P - C - 16 ampere	6
sub-distribution board	2CCG000244R0001	Connector set (35pcs)	2
sub-distribution board	2CCG000243R0001	Flat Cable 5 m	3
sub-distribution board	2CCG000242R0001	SCU100 Sub-Distribution Control Unit	1
sub-distribution board	2CCA880211R0001	CMS-121PS Sensor	48
sub-distribution board	2CCG000245R0001	DM11 - Digital input modules	4
sub-distribution board	2CDS200912R0001	S2C-H6R Auxiliary contact 1CO	50
sub-distribution board	4NWP100102R0001	UPS PowerValue 11 RT 3kVA B	3
sub-distribution board	4NWP100107R0001	External Battery PowerValue 11 RT 3kVA	12

Power Distribution
Bill of Materials

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MV Panel IEC Market

Product Code	Description	Quantity
1SDA070889R1	E1.2N 1600 Ekip Hi-Touch LSIG 3p F F	1
1STQ001679M0000	4 GALVANIZ. SHEET CROSSPIECES W=400MM	1
1STQ001680M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=500MM	1
1STQ002875M0000	GALVANIZED SHEET METAL UPRIGHT H2000	1
1STQ002877M0000	N.1 INT.UPRIGHT H=2000	2
1STQ005493M0000	AL.CABLE ENTRY FLANGE W500	1
1STQ004055M0000	AR.BOT PLATE WITH FL.500D600	1
1STQ004116M0000	AR.TOPPLATE 500D600	1
1STQ002413M0000	IP31 AERATED REAR PANEL W500 H2000	1
1STQ002414M0000	IP31 AERATED REAR PANEL W600 H2000	1
1STQ002406M0000	4 GALV. SHEET CORNERS PLINTH H=100MM	1
1STQ007051A0000	2 F/R PLINTH FLANGES H=100MM W=400MM	1
1STQ007052A0000	2 F/R/S PLINTH FLANGES H=100MM W/D=500MM	1
1STQ005606M0000	KIT E1.2/XT7F 3P 500 M	1
1STQ005232M0000	PAN.LE XT7E1.2 F 3P W500-S	1
1STQ005304M0000	BL.PAN.COL BOT H750W500 ARC	1
1STQ005297M0000	BL.PAN.COL TOP H750W500 ARC	1
1STQ001355M0000	2 BUSBAR HOLDERS H=200MM	3
1STQ001356M0000	SUPPORT FOR SHIFTED BUSBARS	1
1STQ001498M0000	N.2 RBS BRACKET FOR PE/N BUSBAR	2
1STQ001558M0000	CYL 20+CLOS.ELEM+SCREW 5070 x3	1
1STQ001559M0000	2 CLOSING COVER FOR HOLDERS H=200MM	3
1STQ005154M0000	GPO3 1xXT7 P2 1250A/1600A 3P	1
1STQ003834M0000	ISOLATOR 40X40MM M10	6
1STQ004628M0000	1xX7/T7/E1.2F P2 800/1000A 3P D6/8/1000 S Anch.	1
1STQ004631M0000	1xX7/T7/E1.2F P2 1250/1600A 3P D6/8/1000 S Anch.	1
1STQ002527M0000	MOUNTING SCREWS 2 BUSBARS PER PHASE	3
1STQ002655M0000	12 SPACERS H=20MM	3
1STQ003629M0000	BUSBAR HOLDER F. 60X10MM	2
1STQ001376M0000	N_PE BUSBAR 1000A; W=500/1X30X10	1
1STQ004510M0000	sep.N 1000A W500 1X40x10	1
1STQ001693M0000	MAIN BUSBAR 1000A;W=500/2X20X10 SHIFT	3
1STQ005061M0000	X7E1FP2 125/1600A3PD6/8/1 CO	1
1STQ008708B0000	MBBS JOINT 1000A 3P+N PE25% S-S	1
1STQ002573M0000	RBS CO.T7/E1 F 3P 1250/1600A_P1_D600SHIFT	2
1STQ003754M0000	CABL. FAST RAIL W500	1
1STQ005273B0000	MIXED KIT FOR JOINING STRUCTURES	1
1SDA070694R1	E1.2N 250 Ekip Touch LI 3p F F	1
1STQ001679M0000	4 GALVANIZ. SHEET CROSSPIECES W=400MM	1
1STQ001680M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=500MM	1
1STQ002875M0000	GALVANIZED SHEET METAL UPRIGHT H2000	1
1STQ002877M0000	N.1 INT.UPRIGHT H=2000	2
1STQ005493M0000	AL.CABLE ENTRY FLANGE W500	1
1STQ004055M0000	AR.BOT PLATE WITH FL.500D600	1
1STQ004116M0000	AR.TOPPLATE 500D600	1
1STQ002413M0000	IP31 AERATED REAR PANEL W500 H2000	1
1STQ002406M0000	4 GALV. SHEET CORNERS PLINTH H=100MM	1
1STQ007051A0000	2 F/R PLINTH FLANGES H=100MM W=400MM	1
1STQ005606M0000	KIT E1.2/XT7F 3P 500 M	1
1STQ005232M0000	PAN.LE XT7E1.2 F 3P W500-S	1
1STQ005304M0000	BL.PAN.COL BOT H750W500 ARC	1
1STQ005297M0000	BL.PAN.COL TOP H750W500 ARC	1
1STQ001355M0000	2 BUSBAR HOLDERS H=200MM	3
1STQ001356M0000	SUPPORT FOR SHIFTED BUSBARS	1
1STQ001498M0000	N.2 RBS BRACKET FOR PE/N BUSBAR	2
1STQ001558M0000	CYL 20+CLOS.ELEM+SCREW 5070 x3	1
1STQ001559M0000	2 CLOSING COVER FOR HOLDERS H=200MM	3
1STQ005154M0000	GPO3 1xXT7 P2 1250A/1600A 3P	1
1STQ003834M0000	ISOLATOR 40X40MM M10	6
1STQ004628M0000	1xX7/T7/E1.2F P2 800/1000A 3P D6/8/1000 S Anch.	1
1STQ004631M0000	1xX7/T7/E1.2F P2 1250/1600A 3P D6/8/1000 S Anch.	1
1STQ002527M0000	MOUNTING SCREWS 2 BUSBARS PER PHASE	3

Power Distribution
Bill of Materials

Product Code	Description	Quantity
1STQ002655M0000	12 SPACERS H=20MM	3
1STQ003629M0000	BUSBAR HOLDER F. 60X10MM	2
1STQ001376M0000	N_PE BUSBAR 1000A; W=500/1X30X10	1
1STQ004510M0000	sep.N 1000A W500 1X40x10	1
1STQ001693M0000	MAIN BUSBAR 1000A;W=500/2X20X10 SHIFT	3
1STQ005061M0000	X7E1FP2 125/1600A3PD6/8/1 CO	1
1STQ008708B0000	MBBS JOINT 1000A 3P+N PE25% S-S	1
1STQ002573M0000	RBS CO.T7/E1 F 3P 1250/1600A_P1_D600SHIFT	2
1STQ003754M0000	CABL. FAST RAIL W500	1
1STQ005273B0000	MIXED KIT FOR JOINING STRUCTURES	1
1SDA070699R1	E1.2N 250 Ekip Hi-Touch LSIG 3p F F	1
1STQ001679M0000	4 GALVANIZ. SHEET CROSSPIECES W=400MM	1
1STQ001680M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=500MM	1
1STQ002875M0000	GALVANIZED SHEET METAL UPRIGHT H2000	1
1STQ002877M0000	N.1 INT.UPRIGHT H=2000	2
1STQ005493M0000	AL.CABLE ENTRY FLANGE W500	1
1STQ004055M0000	AR.BOT PLATE WITH FL.500D600	1
1STQ004116M0000	AR.TOPPLATE 500D600	1
1STQ002413M0000	IP31 AERATED REAR PANEL W500 H2000	1
1STQ002406M0000	4 GALV. SHEET CORNERS PLINTH H=100MM	1
1STQ007051A0000	2 F/R PLINTH FLANGES H=100MM W=400MM	1
1STQ005606M0000	KIT E1.2/XT7F 3P 500 M	1
1STQ005232M0000	PAN.LE XT7E1.2 F 3P W500-S	1
1STQ005304M0000	BL.PAN.COL BOT H750W500 ARC	1
1STQ005297M0000	BL.PAN.COL TOP H750W500 ARC	1
1STQ001355M0000	2 BUSBAR HOLDERS H=200MM	3
1STQ001356M0000	SUPPORT FOR SHIFTED BUSBARS	1
1STQ001498M0000	N.2 RBS BRACKET FOR PE/N BUSBAR	2
1STQ001558M0000	CYL 20+CLOS.ELEM+SCREW 5070 x3	1
1STQ001559M0000	2 CLOSING COVER FOR HOLDERS H=200MM	3
1STQ005154M0000	GPO3 1xXT7 P2 1250A/1600A 3P	1
1STQ003834M0000	ISOLATOR 40X40MM M10	6
1STQ004628M0000	1xX7/T7/E1.2F P2 800/1000A 3P D6/8/1000 S Anch.	1

Product Code	Description	Quantity
1STQ004631M0000	1xX7/T7/E1.2F P2 1250/1600A 3P D6/8/1000 S Anch.	1
1STQ002527M0000	MOUNTING SCREWS 2 BUSBARS PER PHASE	3
1STQ002655M0000	12 SPACERS H=20MM	3
1STQ003629M0000	BUSBAR HOLDER F. 60X10MM	2
1STQ001376M0000	N_PE BUSBAR 1000A; W=500/1X30X10	1
1STQ004510M0000	sep.N 1000A W500 1X40x10	1
1STQ001693M0000	MAIN BUSBAR 1000A;W=500/2X20X10 SHIFT	3
1STQ005061M0000	X7E1FP2 125/1600A3PD6/8/1 CO	1
1STQ008708B0000	MBBS JOINT 1000A 3P+N PE25% S-S	1
1STQ002573M0000	RBS CO.T7/E1 F 3P 1250/1600A_P1_D600SHIFT	2
1STQ003754M0000	CABL. FAST RAIL W500	1
1STQ005273B0000	MIXED KIT FOR JOINING STRUCTURES	1
1SDA070699R1	E1.2N 250 Ekip Hi-Touch LSIG 3p F F	1
1STQ001679M0000	4 GALVANIZ. SHEET CROSSPIECES W=400MM	1
1STQ001680M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=500MM	1
1STQ002875M0000	GALVANIZED SHEET METAL UPRIGHT H2000	1
1STQ002877M0000	N.1 INT.UPRIGHT H=2000	2
1STQ005493M0000	AL.CABLE ENTRY FLANGE W500	1
1STQ004055M0000	AR.BOT PLATE WITH FL.500D600	1
1STQ004116M0000	AR.TOPPLATE 500D600	1
1STQ002413M0000	IP31 AERATED REAR PANEL W500 H2000	1
1STQ002406M0000	4 GALV. SHEET CORNERS PLINTH H=100MM	1
1STQ007051A0000	2 F/R PLINTH FLANGES H=100MM W=400MM	1
1STQ005606M0000	KIT E1.2/XT7F 3P 500 M	1
1STQ005232M0000	PAN.LE XT7E1.2 F 3P W500-S	1
1STQ005304M0000	BL.PAN.COL BOT H750W500 ARC	1
1STQ005297M0000	BL.PAN.COL TOP H750W500 ARC	1
1STQ001355M0000	2 BUSBAR HOLDERS H=200MM	3
1STQ001356M0000	SUPPORT FOR SHIFTED BUSBARS	1
1STQ001498M0000	N.2 RBS BRACKET FOR PE/N BUSBAR	2
1STQ001558M0000	CYL 20+CLOS.ELEM+SCREW 5070 x3	1
1STQ001559M0000	2 CLOSING COVER FOR HOLDERS H=200MM	3
1STQ005154M0000	GPO3 1xXT7 P2 1250A/1600A 3P	1

Power Distribution
Bill of Materials

Product Code	Description	Quantity
1STQ003834M0000	ISOLATOR 40X40MM M10	6
1STQ004628M0000	1xX7/T7/E1.2F P2 800/1000A 3P D6/8/1000 S Anch.	1
1STQ004631M0000	1xX7/T7/E1.2F P2 1250/1600A 3P D6/8/1000 S Anch.	1
1STQ002527M0000	MOUNTING SCREWS 2 BUSBARS PER PHASE	3
1STQ002655M0000	12 SPACERS H=20MM	3
1STQ003629M0000	BUSBAR HOLDER F. 60X10MM	2
1STQ001376M0000	N_PE BUSBAR 1000A; W=500/1X30X10	1
1STQ004510M0000	sep.N 1000A W500 1X40x10	1
1STQ001693M0000	MAIN BUSBAR 1000A;W=500/2X20X10 SHIFT	3
1STQ005061M0000	X7E1FP2 125/1600A3PD6/8/1 CO	1
1STQ008708B0000	MBBS JOINT 1000A 3P+N PE25% S-S	1
1STQ002573M0000	RBS CO.T7/E1 F 3P 1250/1600A_P1_D600SHIFT	2
1STQ003754M0000	CABL. FAST RAIL W500	1
1STQ005273B0000	MIXED KIT FOR JOINING STRUCTURES	1
1SDA070699R1	E1.2N 250 Ekip Hi-Touch LSIG 3p F F	1
1STQ001679M0000	4 GALVANIZ. SHEET CROSSPIECES W=400MM	1
1STQ001680M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=500MM	1
1STQ002875M0000	GALVANIZED SHEET METAL UPRIGHT H2000	1
1STQ002877M0000	N.1 INT.UPRIGHT H=2000	2
1STQ005493M0000	AL.CABLE ENTRY FLANGE W500	1
1STQ004055M0000	AR.BOT PLATE WITH FL.500D600	1
1STQ004116M0000	AR.TOPPLATE 500D600	1
1STQ002413M0000	IP31 AERATED REAR PANEL W500 H2000	1
1STQ002406M0000	4 GALV. SHEET CORNERS PLINTH H=100MM	1
1STQ007051A0000	2 F/R PLINTH FLANGES H=100MM W=400MM	1
1STQ005606M0000	KIT E1.2/XT7F 3P 500 M	1
1STQ005232M0000	PAN.LE XT7E1.2 F 3P W500-S	1
1STQ005304M0000	BL.PAN.COL BOT H750W500 ARC	1
1STQ005297M0000	BL.PAN.COL TOP H750W500 ARC	1
1STQ001355M0000	2 BUSBAR HOLDERS H=200MM	3
1STQ001356M0000	SUPPORT FOR SHIFTED BUSBARS	1
1STQ001498M0000	N.2 RBS BRACKET FOR PE/N BUSBAR	2
1STQ001558M0000	CYL 20+CLOS.ELEM+SCREW 5070 x3	1
1STQ001559M0000	2 CLOSING COVER FOR HOLDERS H=200MM	3

Product Code	Description	Quantity
1STQ005154M0000	GPO3 1xXT7 P2 1250A/1600A 3P	1
1STQ003834M0000	ISOLATOR 40X40MM M10	6
1STQ004628M0000	1xX7/T7/E1.2F P2 800/1000A 3P D6/8/1000 S Anch.	1
1STQ004631M0000	1xX7/T7/E1.2F P2 1250/1600A 3P D6/8/1000 S Anch.	1
1STQ002527M0000	MOUNTING SCREWS 2 BUSBARS PER PHASE	3
1STQ002655M0000	12 SPACERS H=20MM	3
1STQ003629M0000	BUSBAR HOLDER F. 60X10MM	2
1STQ001376M0000	N_PE BUSBAR 1000A; W=500/1X30X10	1
1STQ004510M0000	sep.N 1000A W500 1X40x10	1
1STQ001693M0000	MAIN BUSBAR 1000A;W=500/2X20X10 SHIFT	3
1STQ005061M0000	X7E1FP2 125/1600A3PD6/8/1 CO	1
1STQ008708B0000	MBBS JOINT 1000A 3P+N PE25% S-S	1
1STQ002573M0000	RBS CO.T7/E1 F 3P 1250/1600A_P1_D600SHIFT	2
1STQ003754M0000	CABL. FAST RAIL W500	1
1STQ005273B0000	MIXED KIT FOR JOINING STRUCTURES	1
1STQ001678M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=300MM	1
1STQ001680M0000	4 GALVANIZ.SHEET CROSSPIECES W/D=500MM	1
1STQ002874M0000	4 GALVANIZED SHEET UPRIGHTS H=2000MM	1
1STQ002877M0000	N.1 INT.UPRIGHT H=2000	2
1STQ004054M0000	AR.BOT PLATE WITH FL.400D600	1
1STQ007487B0000	Vented Top W400 D600	1
1STQ002412M0000	IP31 AERATED REAR PANEL W400 H2000	1
1STQ002414M0000	IP31 AERATED REAR PANEL W600 H2000	1
1STQ002406M0000	4 GALV. SHEET CORNERS PLINTH H=100MM	1
1STQ007050A0000	2 F/R/S PLINTH FLANGES H=100MM W/D=300MM	1
1STQ001355M0000	2 BUSBAR HOLDERS H=200MM	3
1STQ001356M0000	SUPPORT FOR SHIFTED BUSBARS	1
1STQ001498M0000	N.2 RBS BRACKET FOR PE/N BUSBAR	2
1STQ001559M0000	2 CLOSING COVER FOR HOLDERS H=200MM	3
1STQ002527M0000	MOUNTING SCREWS 2 BUSBARS PER PHASE	3
1STQ002655M0000	12 SPACERS H=20MM	3
1STQ003629M0000	BUSBAR HOLDER F. 60X10MM	2
1STQ001374M0000	N_PE BUSBAR 1000A; W=400/1X30X10	1
1STQ004509M0000	sep.N 1000A W400 1X40x10	1

Power Distribution
Bill of Materials

Product Code	Description	Quantity
1STQ001692M0000	MAIN BUSBAR 1000A;W=400/2X20X10 SHIFT	3
1STQ004186M0000	CEP N/PE sep - 30x10 D600	2
2CPX046166R9999	RZ55 Earthing set for 180° hinges	1
1STQ001809M0000	BLIND DOOR VCE IP40 H=2000 W=300 NO HAN	1
1STQ001915M0000	KEY HANDLE LEVER	1
1SDA066799R1	XT1B 160 TMD 16-450 3p F F	1
2CPX010031R9999	TG212G TG floor stan PCI IP55	1
2CPX010450R9999	TZ101 FLANGE FOR 52 ENTRIES	2
2CPX010573R9999	TZG205 plinth D=225mm 2PW H=50mm	1
2CPX041473R9999	MA200ALXB Breaker Module Tmax XT 200A	1
2CPX041260R9999	Touch Guard Module	1
2CPX041266R9999	Touch Guard Module	1
2CPX041337R9999	MH150 Modular Panels	1
2CPX041409R9999	Busbar Module	6
2CPX010787R9999	TZ601A carrier rail D=225mm a	2
2CPX042849R9999	WRM181 WR-Mounting Structure 1PW OH8 V2	2
2CPX041480R9999	Copper Bar 12x5mm L:250mm	18
2CPX042453R9999	ZXM2040 Copper Bar 12x5mm L:195mm	4
FAIWOFNP0	Switchgear using withdrawable incoming and fixed outgoing feeders to balance service continuity and competitiveness.	
Front accessibility allows wall standing installation to optimize foot print; all the routine and maintenance operations can be performed from the front.		1

—
Switchboard Unisec

Description	Qty	Weight (Kg)	Width (mm)	Depth (mm)	Heigth (mm)
SBR (630 A) H01	1	514.73	750	1070	1700
SBC 1 (630 A) H02, H03, H04	3	514.73	750	1070	1700
		2108.92	3054	1070	1700

Power Distribution
Bill of Materials

—

LV Main distribution board components and UPSs

Product Code	Description	Quantity
1SDA101131R1	XT7S M 1000 Ekip Touch LSIG In1000 3p FF	3
1SDA073668R1	YO E1.2..E6.2-XT7-XT7M 24 VAC/DC	6
1SDA073681R1	YC E1.2..E6.2-XT7M 24 VAC/DC	6
1SDA104919R1	M XT7M 24-30 V AC/DC	6
1SDA104824R1	AUX S33 M/2 24V DC XT7M	4
1SDA073772R1	RTC EKIP 24VDC E1.2-XT7M	4
1SDA073777R1	S51 24V E1.2-XT7-XT7M	4
1SDA073744R1	YR 24 VDC E1.2-XT7M	4
1SDA107495R1	KLC-S Key lock open N.20005 XT7M	4
1SDA073854R1	PBC Prot. Pushbuttons AP/CH E1.2-XT7M	4
1SDA074216R1	Up. Int. outlets INST E1.2..E6.2-XT7/MEx	3
1SDA074173R1	EKIP SUPPLY 24-48VDC E1.2..E6.2-Tmax XT	5
1SDA105167R1	EKIP COM MODBUS TCP Tmax XT	5
1SDA074166R1	EKIP COM ACTUATOR E1.2..E6.2-XT7-XT7M	4
1SDA105209R1	Measuring for XT5-XT7	4
1SDA107493R1	Class 1 Power & Energy Metering XT5-XT7	4
1SDA105212R1	Voltages Protection for XT5-XT7	3
1SDA085693R1	Ekip Signaling 3T-1 for PT100 / PT1000	3
1SDA101414R1	XT7S M 800 Ekip G Touch LSIG In800 3p FF	2
1SDA101912R1	XT7D M 1000A 4p FF	
1SDA100551R1	XT5N 630 Breaking part 3P	1
1SDA100593R1	Ekip Touch LSI In=630 XT5 3p	1
1SDA104925R1	YO XT5-XT6 24...60 Vac/dc	1
1SDA104879R1	MOE XT5 24V DC	1
1SDA105204R1	Ekip Cartridge 4 slots XT2-XT4-XT5	1
1SDA068173R1	XT4N 250 BREAKING PART 3p F F	6
1SDA100281R1	Ekip Touch LSI In=250A XT4 3p	6
1SDA105177R1	EKIP COM MODBUS TCP XT2-XT4 INT	28
1SDA105208R1	Measuring for XT2-XT4	28
1SDA068126R1	XT4N 250 Ekip LS/I In=250A 3p F F	2
1SDA068163R1	XT2N 160 BREAKING PART 3p F F	22
1SDA100103R1	Ekip Touch LSI In=160A XT2 3p	7

Product Code	Description	Quantity
1SDA100102R1	Ekip Touch LSI In=100A XT2 3p	3
1SDA100101R1	Ekip Touch LSI In=63A XT2 3p	12
1SCA153435R1001	OXB200E3X3QT AUTOMATIC TRANSFER SWITCH	2
1SCA148926R1001	OXEA1 AUXILIARY POWER SUPPLY MODULE	2
1SDA104052R1	Ekip Com Modbus TCP-OX	2
1SFA664001R1004	TVOC-2-48-C Arc Monitor	2
1SFA664003R1060	TVOC-2-DP6 Detector	8
1SFA664003R1040	TVOC-2-DP4 Detector	10
1SFA664003R1020	TVOC-2-DP2 Detector	10
1SFA664002R1001	TVOC-2-E1 Extension	2
2CSG524000R2021	TMD-T4/96 temperature monitoring	2
1SVR360663R1001	CP-C.1 24/10.0	3
	UPS 1kVA	
	PowerWave 33 S3 100kW	2
	ST 120 Modular UPS 5x20kW Modules	1
	ABB Ability Edge industrial gateway	3
	License ABB Ability Energy Manager	1

Lighting Control

Lighting management is a fundamental part of the safety and comfort.
By automatically adjusting the temperature and light intensity, guests will feel more comfortable
and reduce running costs.

Lighting Control

Overview - Motivation & Key Elements

Lighting, Dimming & shading System are provided for the specified common areas of the residential tower like entrance lobby, lift lobbies, stairs Meeting, receptions area, wellness center, open & underground car park etc.

The proposed building automation system for lighting, diming and shading control in the reference building enables the realization of a complete solution according to the wishes of project partners and customer, whether they are developers, tenants, or operators.

Deploying a single system instead of separate control solutions will yield more comfort, more economy, and more safety. Cost advantages can be realized throughout the entire lifetime of the building: from planning and implementation, through the building phase, sale, or rental right up to operations and administration.

The proposed building automation system is based on the KNX protocol which is the first open worldwide standard for home and building control. Utilizing a truly open bus technology and being supported by more than 500 KNX manufacturers worldwide, thousands of KNX products enable several fully compatible applications.

Lighting Control

The bus-based control system based on the KNX standard will allow the following control types:

Switching & Dimming of lobbies, reception area, wellness center

The dimming control system is ideally based on DALI (Digital Addressable Lighting Interface) according to the technical standard IEC 62 386 in combination with KNX. To control DALI equipment, such as ballasts, transformers, LED converters, etc., a KNX/DALI Gateway is used. DALI allows the addressing of 64 ballasts which can be freely assigned to 16 DALI lighting control groups or controlled individually. Up to two DALI lines with each up to 64 ballasts in one KNX/DALI Gateway must be possible. The DALI control line can be installed together with the mains cable (e.g. by using a 5-wire standard cable). Functionalities achieved by DALI: light scenes, day light control, feedback regarding the connected DALI equipment (e.g. lamp or ballast failure), light scenes, tunable white functions like Dim2Warm or Human centric Lighting (HCL), etc. These functions can be extended with constant light control, in this case the ceiling-mounted presence detectors work in addition also as light sensor and light controller. Furthermore to save electrical energy standby shutdown is adjustable, means DALI ballasts switched off when all ballasts are in standby mode.

In addition, ABB also provides a wide variety direct/ universal dimmer ranging from 210VA to 2400VA with +-10% derating these direct dimmers are used for loads such as Incandescent, Low voltage halogen, Halogen, Cold cathode, Xenon…etc. All direct dimmers are DIN rail-mounted self-contained with driver PCB, Transistors, filters and related circuitry providing noise free dimming and protection against round control pulses for higher loads with logic operations for partitioning (separation of space) specially used in banquet halls

Self-contained Emergency Lighting for stairs, hallways(Country Specific DALI with Self-contained Emergency Lighting)

It shall be feasible to integrate self-contained emergency lighting to provide minimum brightness in case of malfunction of the general artificial lighting in a building. To reduce cost and installation effort this must be based on DALI technology, as the DALI Gateways Premium are emergency lighting capable together with emergency converter according to IEC 62386. Function- and duration test as well as partial duration test can be triggered by the KNX DALI Gateway, test results are to be transferred to the superior Building Management System for further processing. Route escape signs can be also integrated in this solution.

Lighting Control
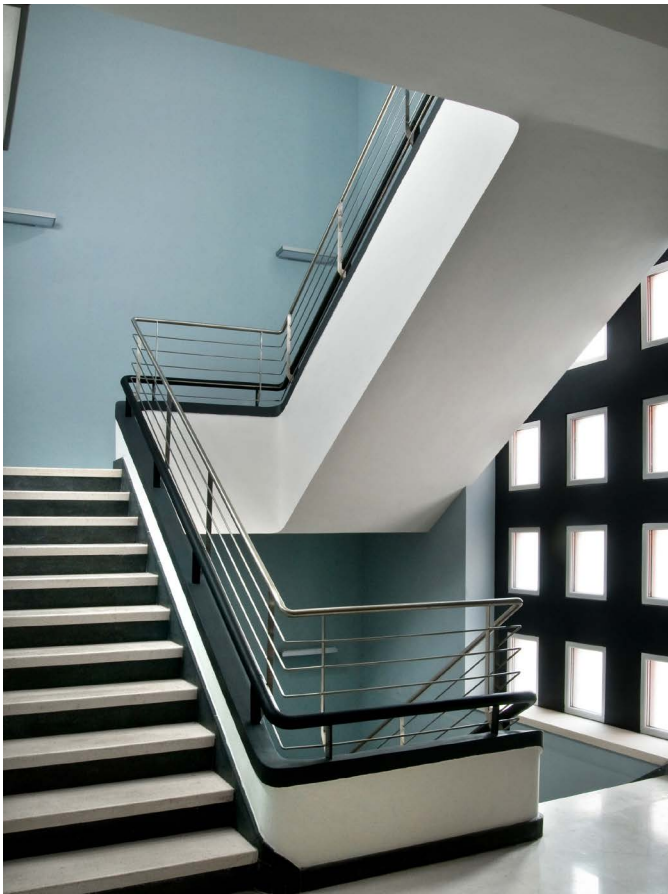
Time-Based, external brightness and Occupancy-Dependent Control for Stairs, Car Parks, locker areas

For further automation, the lighting shall be controlled via predefined time schedules according to the usage of the building. A dedicated KNX radio time switch shall execute this with the possibility to change time schedules directly on the device without programming tools. The time can be obtained via a connectable GPS sensor or a DCF signal receiver. If a BMS/visualization software is used, the time program can be realized on software basis.

An occupancy-dependent control is a control form that uses motion or presence detectors. It detects the movement of persons in the building or in external areas and switches the corresponding lighting. If dimmable lighting circuits are used, the light value can be reduced to a certain level (e.g. 30%), if no movement is detected (optional). The presence detector shall have a KNX interface in order to connect it to the KNX bus directly. The KNX bus then transmits the appropriate signals to switch actuator channels carrying out the command.

Blind/Curtain/Shutter Control for banquet halls, Wellness Center, Restaurants & Coffee Shops, etc.

Curtain and blind control shall be possible via local operation with switches/push-buttons or touch screen. Motors are interfaced to the appropriate actuators. Furthermore, the integration into scenes shall be possible. The system shall also be capable of integrating values of a KNX weather system to react on a wind alarm, for example. Furthermore, the outside brightness value provided by the brightness sensor of the weather system can be used to realize basic automated shading functionality. This can be also used to optimize HVAC for example in summer by lowering blinds, which can help to reduce cooling demand and hence saving energy
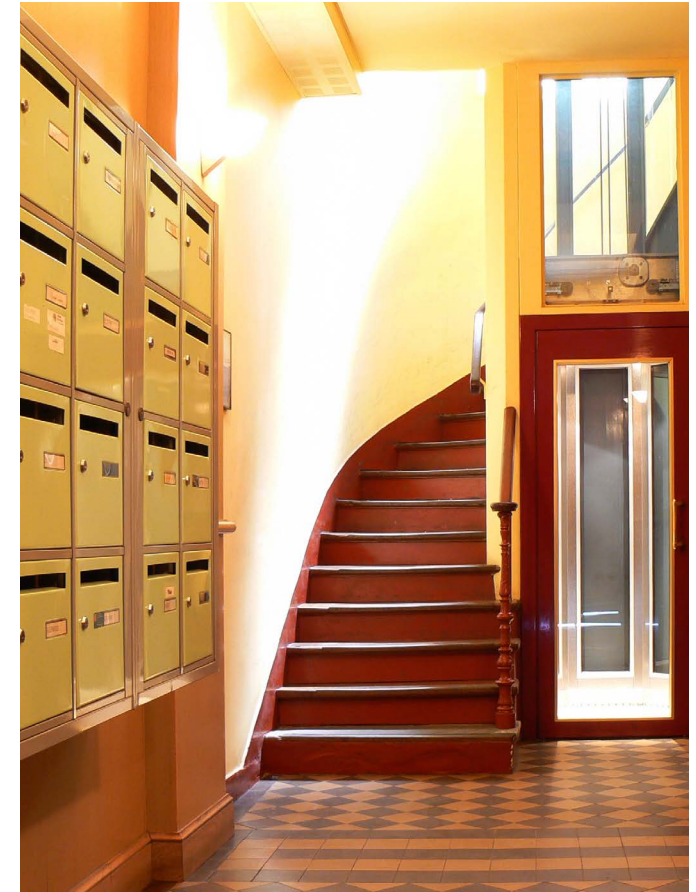
Lighting Control

Operation via Switches/Push-buttons or localized for Stairs and Wellness centers

Bus control elements shall be used to control various building applications, such as lighting control including dimming, curtain and blind control. The local operation with bus control elements shall be only applicable if a manual override of the automatic control is required. Conventional switches/push-buttons with floating contacts shall be integrated in the bus system via binary inputs with contact scanning by means of universal interfaces which can be directly mounted in back boxes. The binary input shall be configurable in terms of sending various types of commands, e.g. switching, dimming and values in order to fit several applications. Alternatively, direct KNX coupling units shall be installed. The coupling units shall be configurable to send various types of commands, e.g. switching, dimming, shading and values in order to be pairable with several applications.

Operation via PIR Sensors for stairs, lift lobbies& underground car parks, common area toilets, rest rooms etc.
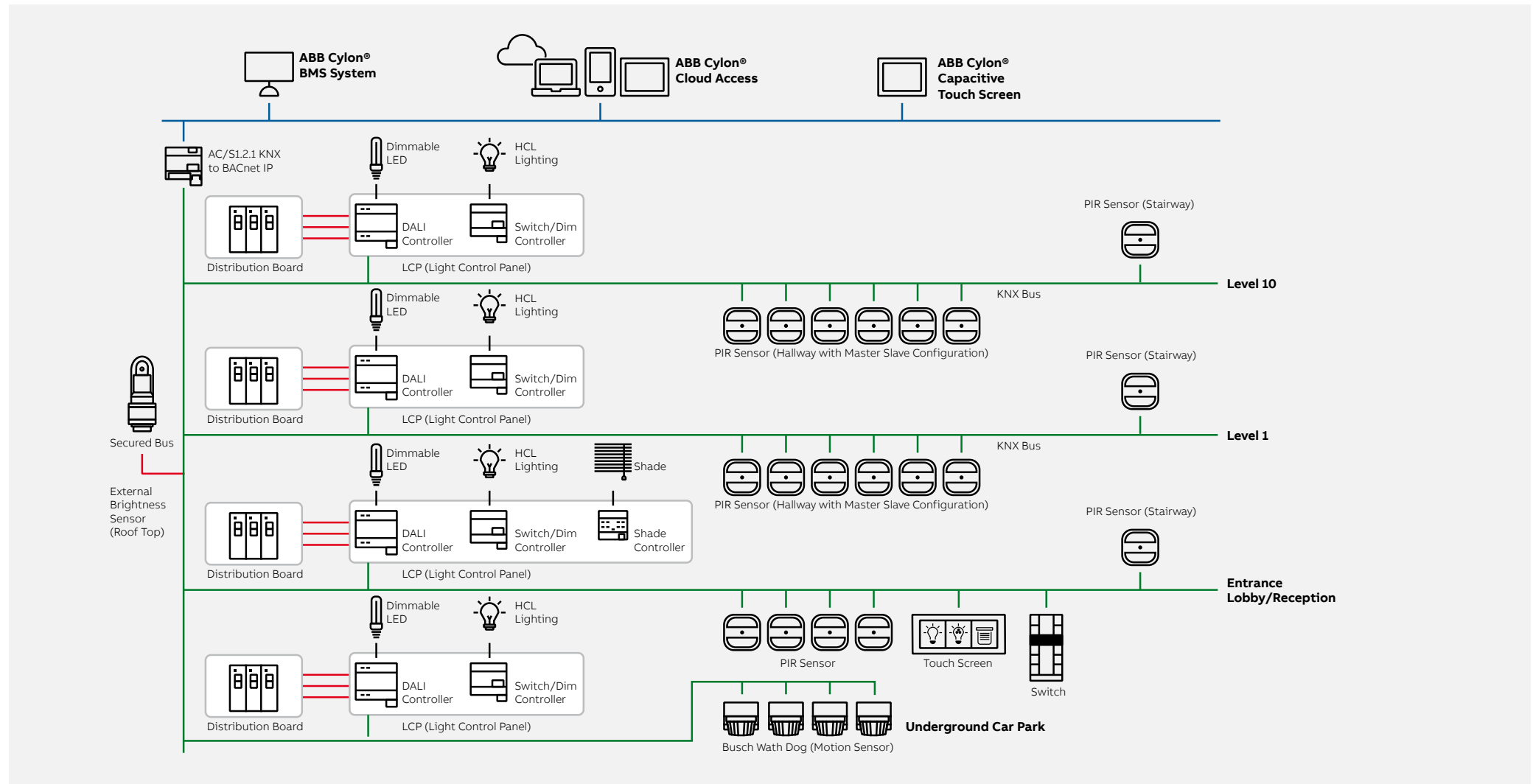
PIR/motion sensors ceiling or wall mounted with/without override button are provided for stair, lift lobbies with detection range from 8m to 24m (24-30m for corridor sensor) depending on the area of application sensors can be IP20 or IP55 (for underground car parks). All these sensors are on KNX bus and their status monitored from central sever. In additional these sensors can be also enabled or disabled depending on the time of the day from timer or from central sever. These sensors also provide Constant Brightness Control for diming loads LUX thresh-hold (between 5-1000 LUX) for various offices, stairs, lobbies can be defined, so that at any time of the day/night the same LUX level will be maintained by dimming UP/DOWN either Fluorescent dimmers or Direct dimmers light levels to the required brightness value
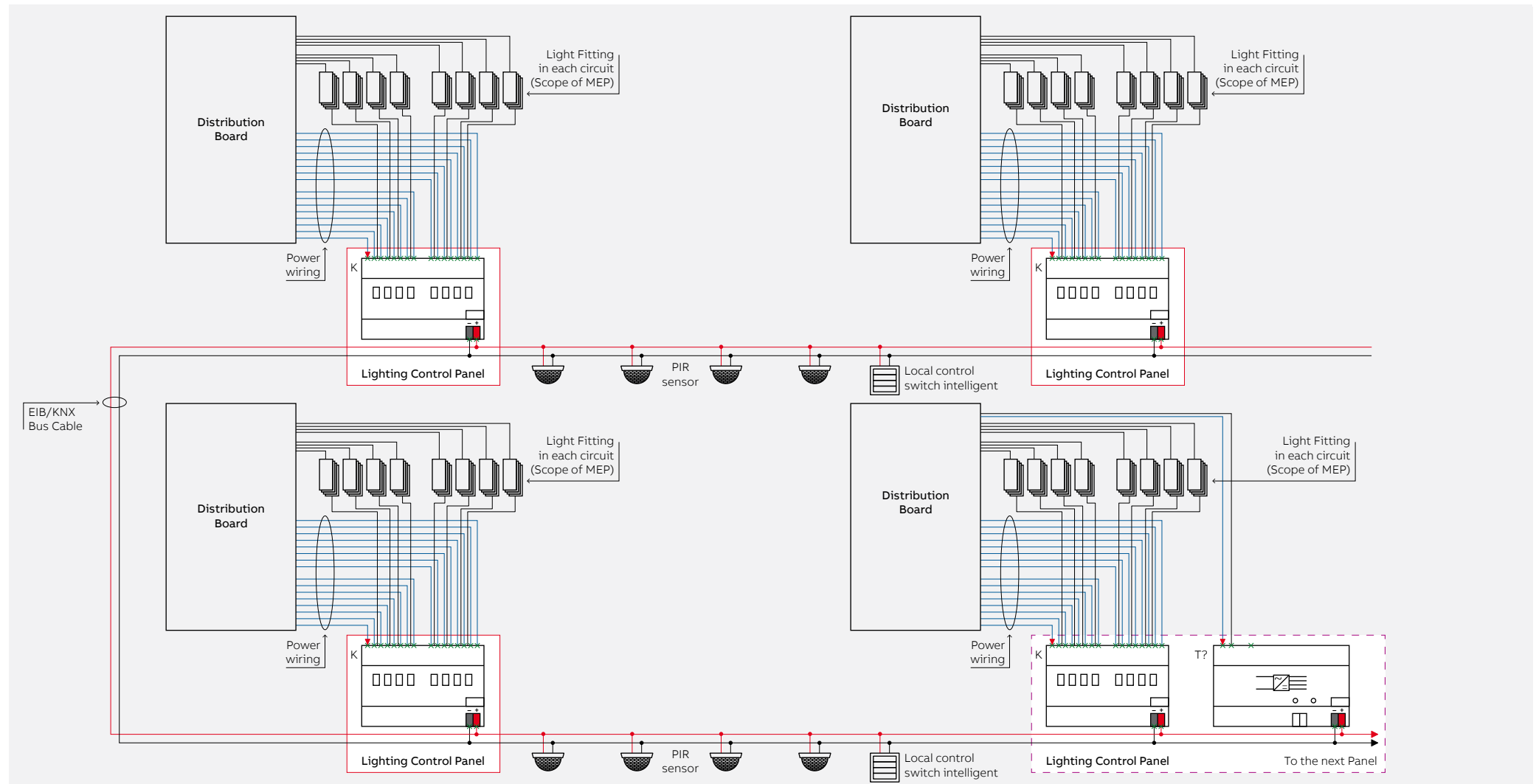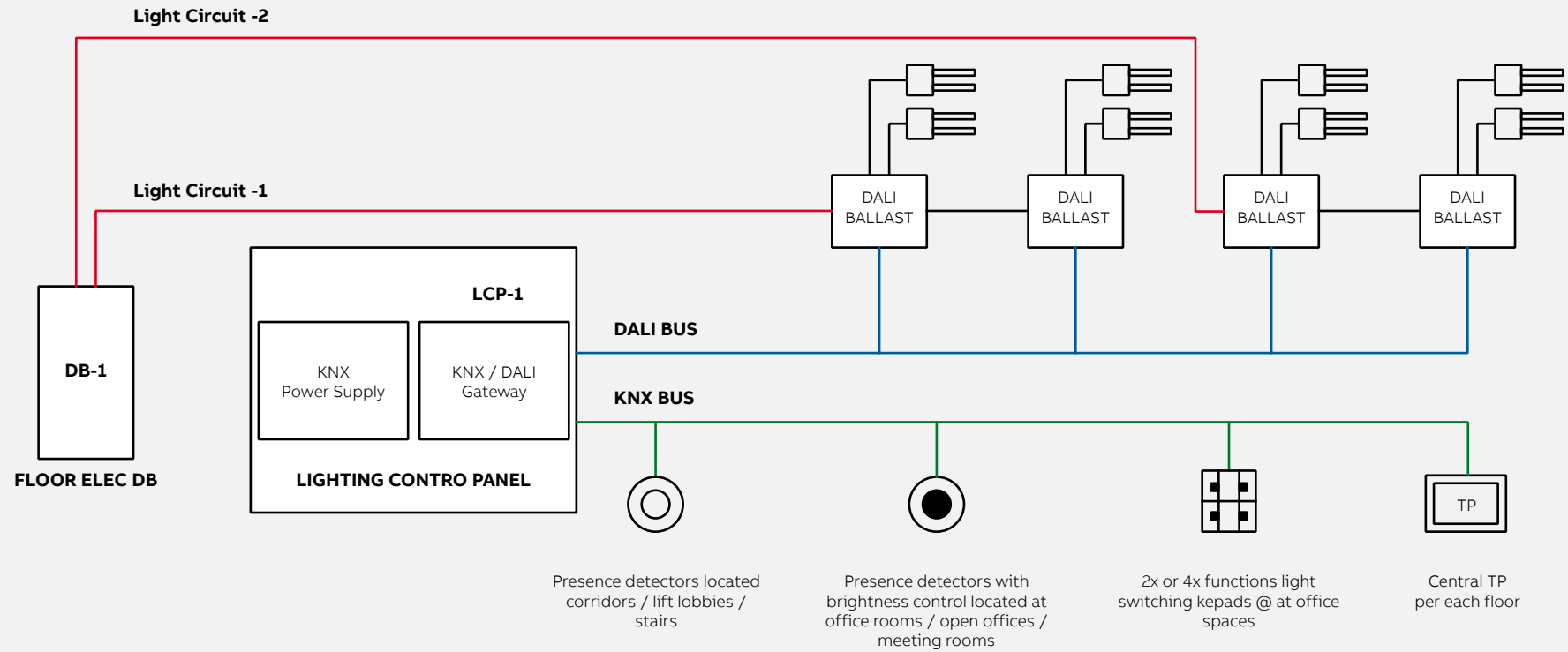
Lighting Control

Multiple Apartment

ABB Cylon®
BMS System

ABB Cylon®
Cloud Access

ABB Cylon®
Capacitive
Touch Screen

AC/S1.2.1 KNX
to BACnet IP

Dimmable
LED

HCL
Lighting

PIR Sensor (Stairway)

DALI
Controller

Switch/Dim
Controller

Distribution Board

LCP (Light Control Panel)

Level 10

KNX Bus

Dimmable
LED

HCL
Lighting

DALI
Controller

Switch/Dim
Controller

PIR Sensor (Hallway with Master Slave Configuration)

PIR Sensor (Stairway)

Distribution Board

LCP (Light Control Panel)

Level 1

Secured Bus

KNX Bus

External
Brightness
Sensor
(Roof Top)

Dimmable
LED

HCL
Lighting

Shade

DALI
Controller

Switch/Dim
Controller

Shade
Controller

PIR Sensor (Hallway with Master Slave Configuration)

PIR Sensor (Stairway)

Distribution Board

LCP (Light Control Panel)

Entrance
Lobby/Reception

Dimmable
LED

HCL
Lighting

DALI
Controller

Switch/Dim
Controller

PIR Sensor

Touch Screen

Switch

Distribution Board

LCP (Light Control Panel)

Busch Wath Dog (Motion Sensor)

Underground Car Park

Lighting Control

Panel Schematic Switch Actuator

Lighting Control

Panel Schematic DALI Gateway

Light Circuit -2

Light Circuit -1

DALI BALLAST

DALI BALLAST

DALI BALLAST

DALI BALLAST

DB-1

LCP-1

KNX Power Supply

KNX / DALI Gateway

DALI BUS

KNX BUS

FLOOR ELEC DB

LIGHTING CONTRO PANEL

TP

Presence detectors located corridors / lift lobbies / stairs

Presence detectors with brightness control located at office rooms / open offices / meeting rooms

2x or 4x functions light switching kepads @ at office spaces

Central TP per each floor

Lighting Control

Corridor sensor

Curtains control	Light and presence sensors	Thermostats	Control via Smartphone/Panel
Fancoil control	Lighting fixtures	Gas detector	Detector presence water
IR detector	Air quality		
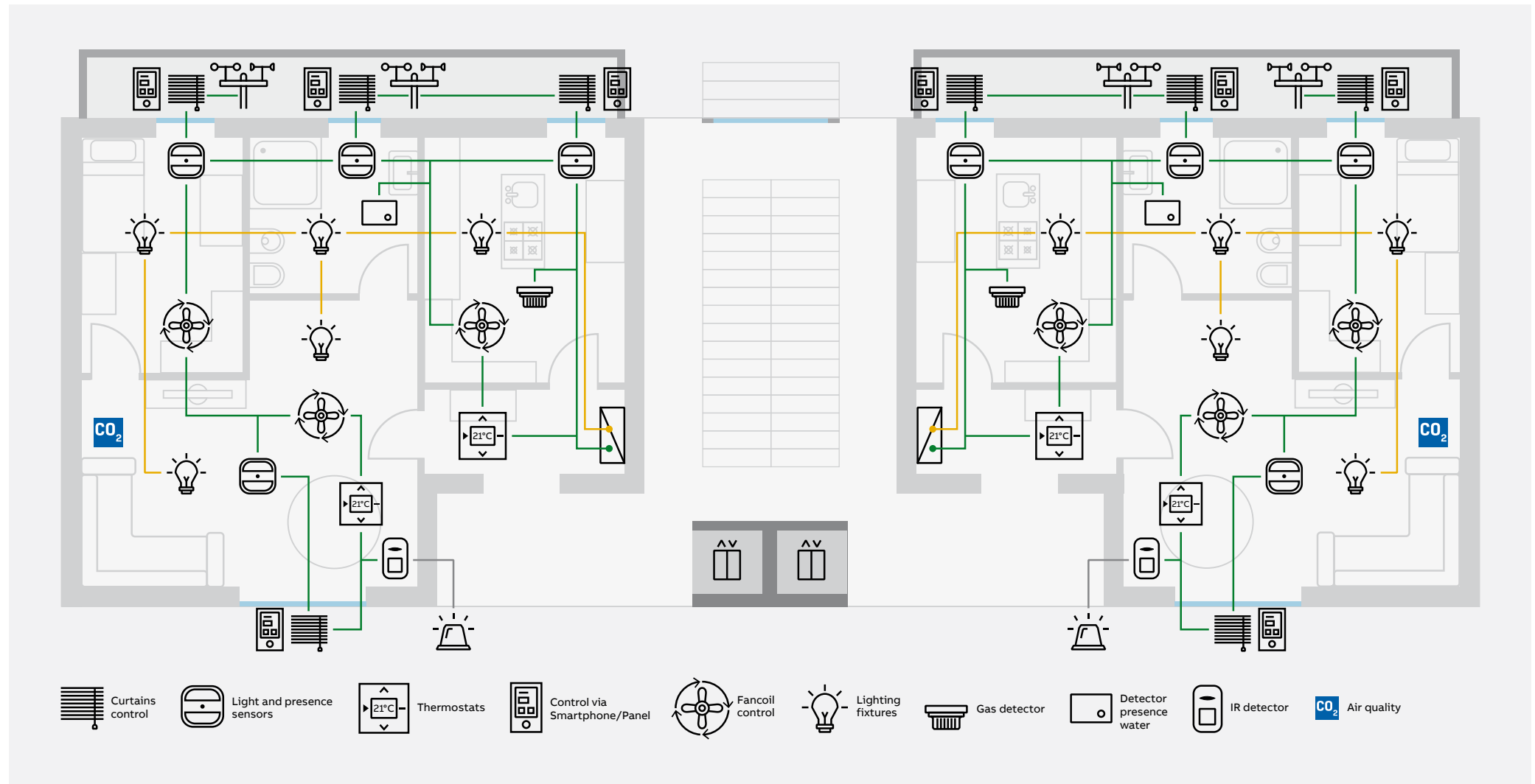
Lighting Control

High quality presence detector 6131/31 a nd Dali DG/S gateway

This group of devices can perfect the lighting levels in different work environments by adjusting the system based on the presence of occupants or on different distribution of the light within the environment itself.
This ensures the best level of lighting comfort and a significant reduction in consumption. It can be supported with a thermoregulation system which activates or deactivates the cooling or heating function based on the same parameters.
The platform can be integrated with the anti-intrusion systems to switch automatically off all the lights when the alarm system is activated.

Premium DALI Gateway

Together with the KNX building automation systems, this unit offers the most innovative solution for lighting control and management in all buildings during normal activities.
ABB's Gateway Premium allows for variable adjustment of the color temperature of artificial light according to natural light variation over the day.
When the color temperature and illuminance are correctly dosed, artificial light can improve people's well-being for all day. The system also allows to track the working period of the lamps, programming maintenance cycles in advance.

Lighting Control

KNX Room Display

Networked structures work much more efficiently than individual systems. In residential buildings and on business premises, they reduce energy consumption and operating costs. At the same time, they provide added comfort and security. Busch-Jaeger KNX control elements form the interface between this state-of-the-art technology and the user.

Main benefits
- Control and monitoring of functions for the entire room
- Control of light, heating, blinds and scenes
- The integration of media technology and the internet is also possible

Presence Detection

Knowing if people are in or moving around the building is a valuable asset for the efficient automation of any property. The ABB i-bus® KNX range of innovative motion and presence detectors helps to control and manage daily tasks in every sector of the building – indoors and outdoors. Whether lighting, heating, air-conditioning or security related functions, this portfolio of premium design, high quality detectors can significantly improve levels of safety, efficiency and comfort throughout the building.

Main benefits
- Reliable and comprehensive detection
- Unique and ageless design, seamlessly integrating into the design ranges
- Flexible functionality providing highest comfort levels for users

Lighting Control
Bill of Materials

The bill of material for the Lighting Control equipment in the reference architecture is summarized in the following tables:

Purpose	Type	Order Code	Description	Qty	Additional information / assumptions:
Complete BOM					
KNX Gateway	IPS/S 3.1.1	2CDG110175R0011	KNX Gateway	5	
KNX Power Supply	SV/S 30.640.3.1	2CDG110167R0011	KNX power supply	5	
Shading Control	JRA/S 4.24.5.1	2CDG110125R0011	Shading Controller	9	
Presence Detector	6131/40-24-500	2CKA006132A0350	Presenece Detector	10	1 detector per lift lobby
Busch-Presence detector					
Corridor KNX	6131/50-24-500	2CKA006132A0344	Presenece Detector	40	4 detector per floor
Busch-Presence detector mini premium KNX	6131/21-24-500	2CKA006132A0344	Presenece Detector	20	1 detector stair floor
KNX Lighting Control	DG/S1.64.5.1	2CDG110273R0011	Lighting Controller	4	
KNX BACnet Gateway	AC/S 1.2.1	2CDG110206R0011	BACnet gateway	1	
Sample Wellness Center BOM					
KNX Gateway	IPS/S 3.1.1	2CDG110175R0011	KNX Gateway	1	
KNX Power Supply	SV/S 30.640.3.1	2CDG110167R0011	KNX power supply	1	
Presence Detector	6131/40-24-500	2CKA006132A0350	Presenece Detector	6	
KNX Lighting Control	DG/S1.64.5.1	2CDG110273R0011	Lighting Controller	2	2 controllers for lighting control
KNX BACnet Gateway	AC/S 1.2.1	2CDG110206R0011	BACnet gateway	1	

Purpose	Type	Order Code	Description	Qty	Additional information / assumptions:
Sample Car Park BOQ					
KNX Gateway	IPS/S 3.1.1	2CDG110175R0011	KNX Gateway	1	
KNX Power Supply	SV/S 30.640.3.1	2CDG110167R0011	KNX power supply	1	
Busch-Presence detector					
Corridor KNX	6131/50-24-500	2CKA006132A0344	Presenece Detector	12	6 detector per wing
KNX Lighting Control	DG/S1.64.5.1	2CDG110273R0011	Lighting Controller	2	One controller/ wing
KNX BACnet Gateway	AC/S 1.2.1	2CDG110206R0011	BACnet gateway	1	
Sample Entrance Lobby BOM					
KNX Gateway	IPS/S 3.1.1	2CDG110175R0011	KNX Gateway	0	
KNX Power Supply	SV/S 30.640.3.1	2CDG110167R0011	KNX power supply	0	
Busch-Presence detector					
Corridor KNX	6131/50-24-500	2CKA006132A0344	Presenece Detector	4	
KNX Lighting Control	DG/S1.64.5.1	2CDG110273R0011	Lighting Controller	1	
Shading Control	JRA/S 4.24.5.1	2CDG110125R0011	Shading Controller	1	4 shade control
KNX BACnet Gateway	AC/S 1.2.1	2CDG110206R0011	BACnet gateway	0	

HVAC Control

Heating, ventilation and air conditioning (HVAC) systems have a significant impact on both comfort and costs in any building. Modern buildings require smart HVAC systems that create comfortable, healthy and safe environments for the occupants, while minimizing energy consumption and increasing sustainability. HVAC Control for common area for the residential tower are based on ABB Cylon Product There are different controllers offered by ABB Cylon based on different application HVAC Control.

HVAC Control

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There are two software for building supervision one is NTEGRA-Supervisor and second is ASPECT. In any project the system will be design based on the selection of these two software. There is one more software which is only being in NA – North America and that is eBuilding. We shall discuss in detail about all controller and software application in below.

ABB Cylon® CB LINE series of BACnet® field controllers, CBXi Series, CBX Series, CBT controllers, and CBV Series are designed to work as part of the ABB Cylon dual-platform offering and can be used as field level BACnet IP and BACnet MS/TP controllers for ASPECT® and INTEGRA™ building management solutions. ABB Cylon seamlessly integrates room automation, central HVAC functions, and management and automation into one system – a significant step towards increasing energy efficiency and reducing operational costs

By integrating the ABB Cylon web-enabled building management system, HVAC equipment can easily be adjusted according to weather conditions. Occupancy and setpoint values for common areas or a residential building like entrance lobby, lift lobby, gymnasiums, wellness centers, etc. can be adjusted remotely with everyday software like Microsoft Outlook or with mobile devices in the hands of facility managers.

ABB Cylon can help you integrate smart building solutions into the new residential tower planning phase, or through retrofitting to upgrade an existing facility to optimize return on investment. With an ABB Cylon HVAC control system, tower environment performance can be quickly accessed, viewed, and modified including trends, setpoints, schedules, and more from any web-enabled device anywhere, any time.

HVAC Control

Improving Operational Efficiency

ABB Cylon front end solution collects data every 5 seconds and can give instant alerts. Facility managers can monitor equipment performance, track anomalies of operation outside of setpoints and acceptable parameters, and react to resolve any issues quickly, thus reducing downtime and ensuring consistent levels of occupant comfort.

ABB Cylon Smart building solutions can identify faults before they occur. Early alerts enabling service teams to be on site quicker with the correct tools and equipment to take appropriate action and provide first time fix. ABB Cylon systems facilitate a faster reaction time and efficient repairs. Considerably reducing maintenance costs over time and delivering more reliable and efficient systems. The installation of an ABB Cylon integrated HVAC control system can reduce time spent on analysis across mixed platforms ABB Cylon ASPECT® includes a customizable user interface. Site dashboards are easily user-customizable, allowing equipment, schedules, trends and more to be added as favorites for quick access.
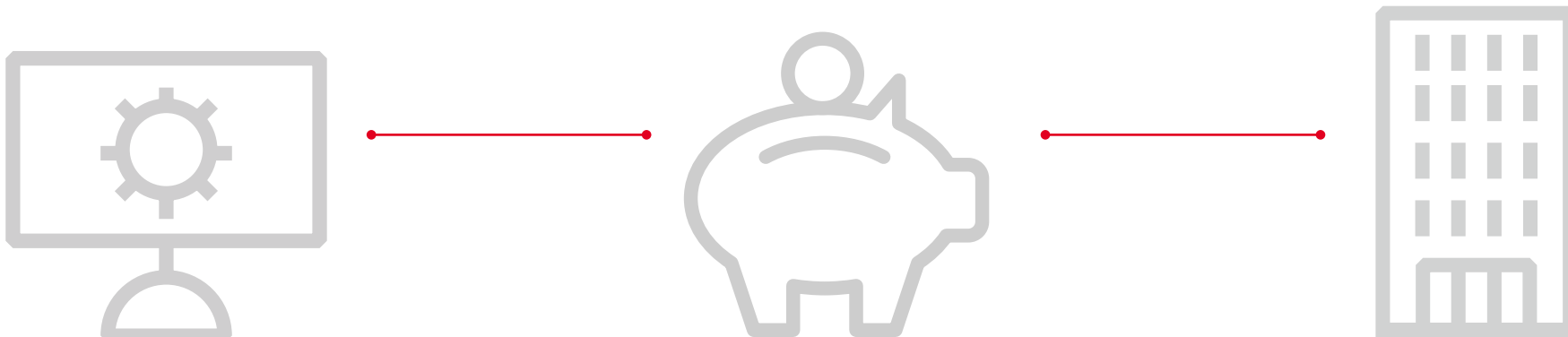
Optimizing Revenue

The high level of configurability of the ABB Cylon system enables the building owner to accommodate multi-tenants' requirements very quickly and with minimum cost. An ABB Cylon Smart building solution will ensure building systems are operational only when needed, thus reducing operational costs.

ABB Cylon front end solutions help to resolve issues quickly with monitoring and control. Provides alerts in real-time enable building managers to monitor equipment performance, track anomalies of operation outside of setpoints and scheduling, and react to resolve any issues quickly, reducing downtime.
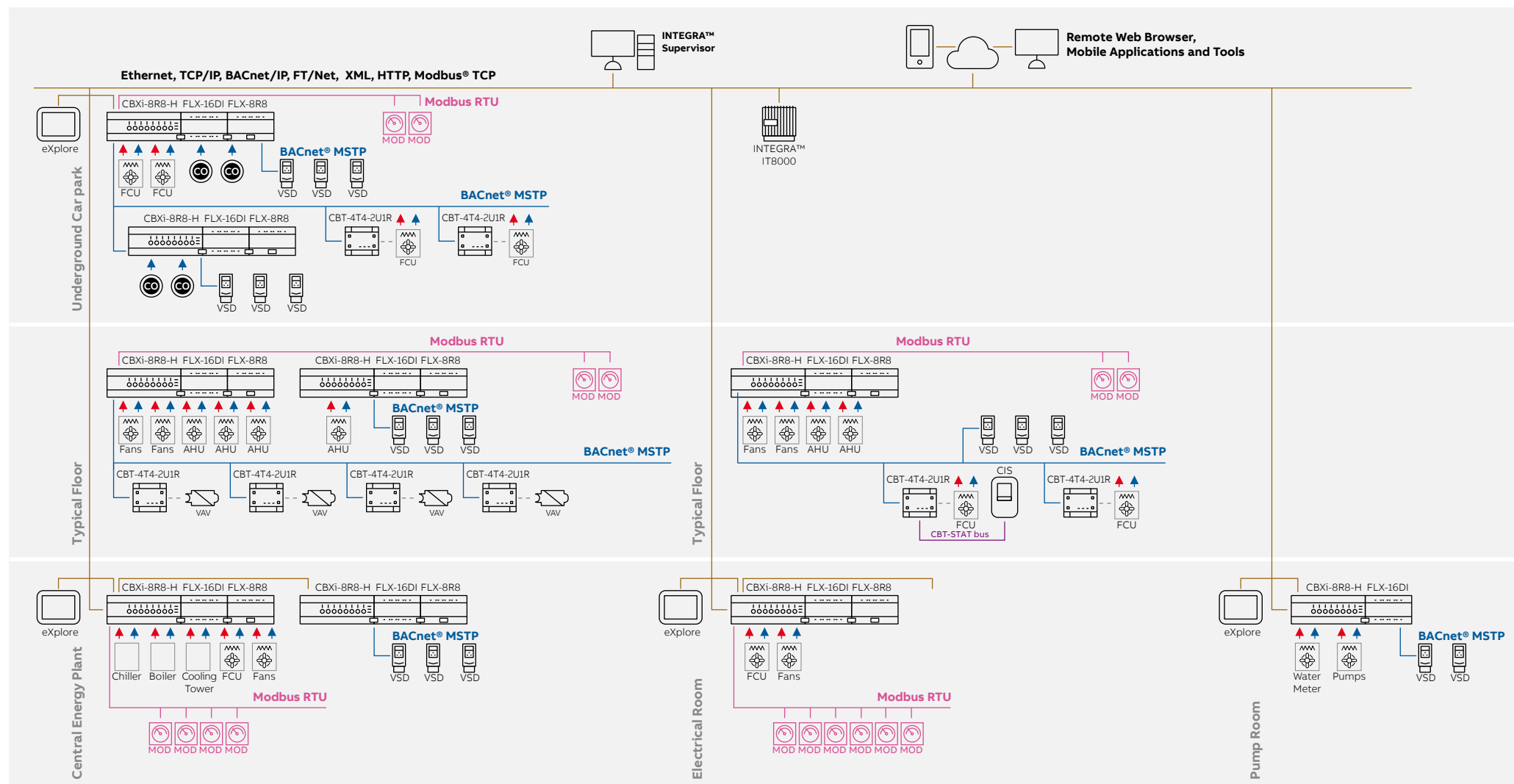
ABB Cylon Smart building solutions provides simple integration through an open protocol solution supporting: BACnet/IP, BACnet MS/TP, Modbus TCP and Modbus RTU. This can be used to integrate other systems like:
• Fire Alarm System
• IP Television & Audio Video Systems

HVAC Control

Reference Architecture

INTEGRA™ Supervisor

Remote Web Browser, Mobile Applications and Tools

Ethernet, TCP/IP, BACnet/IP, FT/Net, XML, HTTP, Modbus® TCP

INTEGRA™ IT8000

Underground Car park

eXplore

CBXi-8R8-H FLX-16DI FLX-8R8 — **Modbus RTU** — MOD MOD

FCU FCU CO CO

BACnet® MSTP — VSD VSD VSD

CBXi-8R8-H FLX-16DI FLX-8R8

BACnet® MSTP — CBT-4T4-2U1R FCU — CBT-4T4-2U1R FCU

CO CO — VSD VSD VSD

Typical Floor

CBXi-8R8-H FLX-16DI FLX-8R8 — CBXi-8R8-H FLX-16DI FLX-8R8 — **Modbus RTU** — MOD MOD

Fans Fans AHU AHU AHU — AHU — **BACnet® MSTP** VSD VSD VSD

CBT-4T4-2U1R VAV — CBT-4T4-2U1R VAV — CBT-4T4-2U1R VAV — CBT-4T4-2U1R VAV — **BACnet® MSTP**

Typical Floor

CBXi-8R8-H FLX-16DI FLX-8R8 — **Modbus RTU** — MOD MOD

Fans Fans AHU AHU — VSD VSD VSD

CBT-4T4-2U1R FCU CIS — CBT-4T4-2U1R FCU — **BACnet® MSTP**
CBT-STAT bus

Central Energy Plant

eXplore

CBXi-8R8-H FLX-16DI FLX-8R8 — CBXi-8R8-H FLX-16DI FLX-8R8

Chiller Boiler Cooling Tower FCU Fans — **BACnet® MSTP** VSD VSD VSD

Modbus RTU — MOD MOD MOD MOD

Electrical Room

eXplore

CBXi-8R8-H FLX-16DI FLX-8R8

FCU Fans

Modbus RTU — MOD MOD MOD MOD MOD MOD

Pump Room

eXplore

CBXi-8R8-H FLX-16DI

Water Meter Pumps — **BACnet® MSTP** VSD VSD

HVAC Control

ABB CYLON® NEXUS-3 Series

The NEXUS-3 is an Internet of Things (IoT) integrated ASPECT® control engine designed to provide flexible site control applications for medium to large building automation systems. It can be used for connection to the Cylon CB series and AAM NB series of BACnet® MS / TP field level controllers. The NEXUS-3 supports serial communication protocols such as BACnet®, AAM PUP and Modbus®. Additionally, TCP / IP communications using Cylon's FT / Net, BACnet®, Modbus® and Unitron protocols (when used with UC32.netK) are available when using the RJ-45 connection.
When implemented with the integrated ASPECT® Runtime Engine, the NEXUS-3 is capable of performing supervision-based control functions, including but not limited to energy management routines, custom sequences, alarm and event announcements, alarms and trends history and planning of the main control. ASPECT® uses secure web technologies to enrich the user experience through common Internet applications for the announcement and programming of alarms.

ABB CYLON® MATRIX Series

MATRIX is an Internet of Things (IoT) integrated ASPECT® control engine designed to provide flexible site control applications for medium to large building automation systems. It can be used for connection to the Cylon CB series and AAM NB series of BACnet® MS / TP field level controllers. MATRIX supports serial communication protocols such as BACnet®, AAM PUP and Modbus®. Additionally, TCP / IP communications using Cylon's FT / Net, BACnet®, Modbus® and Unitron protocols (when used with UC32.netK) are available when using the RJ-45 connection.
A capacity-based licensing model makes the MATRIX controller family scalable for medium to large building applications, including a campus environment when combined with ASPECT®-Enterprise server software. When implemented with the integrated ASPECT® Runtime Engine, MATRIX is capable of performing supervision-based control functions, including but not limited to energy management routines, custom sequences, alarm and event announcements, historical alarms and trends, and planning main control. In addition, streaming of connected data in real time is displayed in rich HTML5 graphics using a web browser.

HVAC Control

ASPECT®

ASPECT® is an award-winning scalable building energy management and control solution designed to allow users seamless access to their building data through standard building protocols (BACnet, Modbus, Ethernet, etc.) and common IT technologies, available on a wide array of computers and smart devices, both iOS, and Android.

ASPECT® provides all the tools to gain intelligence into buildings' performance with the ability to rapidly react to any situation that may adversely affect energy costs and business performance. eXplore touchscreen display provides users an intuitive experience to view system status, override setpoints and schedules, and much more.
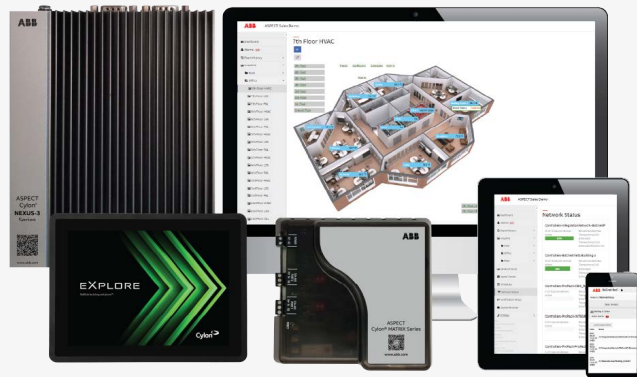
INTEGRA supervisor

INTEGRA™ is a compact, embedded Internet of Things (IoT) controller and server platform for connecting multiple and diverse devices and sub-systems, the IT-8000 controller provides integrated control, supervision, data logging, alarming, scheduling and network management, and streams data and rich graphical displays to a standard Web browser via an Ethernet or wireless LAN, or remotely over the Internet.

Main features
- Protocol Integrator
- Scheduling
- Datalogging
- Supervision
- Alarming
- Network Management

HVAC Control

ABB CYLON® CBXI Series

The CBXi Series is a freely programmable range of BACnet® Controllers with native BACnet/IP communications support. The controllers are BTL listed BACnet Building Controller (B-BC) and are ideally suited for a wide range of applications for intelligent control of HVAC equipment, and electrical systems including lighting control and metering applications.

The CBXi-8R8 and CBXi-8R8-H controllers support multi-protocol communications simultaneously including BACnet/IP, BACnet MS/TP, Modbus® TCP and Modbus RTU. Part of Cylon's CB Line of BACnet field controllers, the CBXi-8R8 controller features 8 UniPuts™ with Relay, 8 Universal Inputs, as well as support for up to five FLX (Field Level eXpansion) series extension modules providing up to 96 points of control, and a dedicated input for Cylon's CBT-STAT or UCU Room Display intelligent room sensors.

ABB CYLON® CBX Series

CBX-8R8 and CBX-8R8-H are fully programmable BTL-listed BACnet® Advanced Application Controllers (B-AAC) that communicate on an RS-485 local area network using the BACnet MS/TP and feature support for Modbus® RTU devices. Modbus allows the integration of devices into control strategies such as motor drives, meters, and other sensors.

HVAC Control

ABB CYLON CBT Series

The CBT-4T4-2U1R is a freely programmable BACnet® Unitary Controller with native MS/TP communications support. The controller is BTL listed as a BACnet Advanced Application Controller (B-AAC) and is ideally suited for the control of Fan Coil Units with ECM motors, Heat Pumps, Unit Ventilators, Unit Heaters, Chilled Ceilings/Beams and custom unitary equipment.

The HVAC field controller accommodates available pre-engineered strategies or can be tailored to custom applications using the CXpro▯▯ programming software.

This controller provides the connectivity and flexibility needed for unitary applications as well as automation of miscellaneous points such as exhaust fans and unit heaters and provides operators the tools they need to help reduce energy consumption, improve occupant comfort and achieve sustainable building operations.

ABB CYLON® CBV Series

The CBV-2U4-3T features 2 UniPutsTM, 4 Universal Inputs, 3 Digital (Triac) Outputs, 1 on-board Airflow Sensor and an integrated Belimo Actuator with brushless DC motor. The CBV-2U4-3T can be used in new building or retrofit applications. The fully programmable CBV-2U4-3T and CBV-2U4-3T-N controllers are designed to control any variable air volume box application with a pre-loaded and configurable application shipped from the factory pre-programmed into the controller.

With the CBV-2U4-3T and CBV-2U4-3T-N controllers you can add a demand ventilation application, and occupancy sensors or lighting control to further enhance your energy savings. The CBV Series is part of ABB Cylon's CB line of controllers. The new VAV controllers are designed to work as part of our dual-platform offering and can be used as a field level BACnet® MS/TP controller for the ASPECT® Control Engine (MATRIX™ and NEXUS™) or INTEGRA™ N4 (IT-8000).

HVAC Control

FUSIONAIR® Series

Balancing the health and safety of building occupants while delivering a comfortable and productive environment with touch free control is now here. The FusionAir Smart Sensor series provides a slim, compact, and visually appealing room control display with a high-definition capacitive touch backlit LCD display for use with ABB Cylon® FBXi and CB Line BACnet® field controllers. The intelligent temperature and humidity sensor allow users to view and adjust selected parameters within the field controller to which it is connected. Other sensing options available for integration with the CXproHD control strategy are CO2 or Volatile Organic Compound (VOC) sensing.

Important features
- Temperature sensor
- Relative humidity sensor
- CO_2 sensor or Volatile Organic Compound sensor
- Touch-free virus safe operation

HVAC-Control
Bill of Materials

The bill of material for the HVAC Control equipment in the reference architecture
is summarized in the following table:

Purpose	Type	Order Code	Description	Qty	Additional information / assumptions:
Front End Solution					
Ascpect	ASP-ENT-12	2CQG103201S3021	ASPECT-Enterprise software with support for 12 FT/Net connections	1	Runs on VMWare. Field upgrade-able to support a maximum of 256 TCP/IP connections or 100,000 points
Explore	EXP-C10	2CQG202002R2021	10.1" touchscreen for use with either ASPECT® HTML interfaces	3	easy to use menu-based SiteGuide user interface for basic supervision of a Cylon BMS site.
Underground Parking					
BACnet/IP					
Controller	CBXi-8R8	2CQG201001R10211	BACnet/IP Controller	1	CBXi-8R8 CBXi-8R8 IP B-BC: 16 I/O+12 Modbus
BACnet Controller	CBX-8R8	2CQG201003R1021	Field Controller	1	CBX-8R8 CBX-8R8 B-AAC: 16 I/O+4 Modbus
Terminal Application Controller	CBT-3T6-5R	2CQG201309R1021	Flexible automation control and management of HVAC.	2	CBT-3T6-5R CBT-3T6-5R B-AAC TU control: 14 I/O
Guard Room/Server Room					
BACnet/IP					
Controller	CBXi-8R8	2CQG201001R10211	BACnet/IP Controller	0	Part of Mechanical Plantroom
VAV Controller	CBV-2U4-3T-FA-IMP	2CQG201515R1011	CBV-2U4-3T-FA-IMP incl act IMP) FusionAir support	4	VAV Controller for classroom
Electrical Room					
Terminal Application Controller	CBT-3T6-5R	2CQG201309R1021	Flexible automation control and management of HVAC.	2	Duty/standby FCU

Purpose	Type	Order Code	Description	Qty	Additional information / assumptions:
Networking Room					
Terminal Application Controller	CBT-3T6-5R	2CQG201309R1021	Flexible automation control and management of HVAC.	2	Duty/standby FCU
Wellness Center					
BACnet/IP					
Controller	CBXi-8R8	2CQG201001R10211	BACnet/IP Controller	1	CBXi-8R8 CBXi-8R8 IP B-BC: 16 I/O+12 Modbus
Terminal Application Controller	CBT-3T6-5R	2CQG201309R1021	Flexible automation control and management of HVAC.	2	For rooms in Auditorium
Lift Lobbies					
BACnet					
Controller	CBX-8R8	2CQG201001R10211	Field Controller	1	CBXi-8R8 CBXi-8R8 IP B-BC: 16 I/O+12 Modbus
Terminal Application Controller	CBT-3T6-5R	2CQG201309R1021	Flexible automation control and management of HVAC.	2	For offices
VAV Controller	CBV-2U4-3T-FA-IMP	2CQG201515R1011	CBV-2U4-3T-FA-IMP	4	For Open area
Lobby and common area					
BACnet Controller	CBX-8R8	2CQG201001R10211	Field Controller	0	Part of Mechanical Plantroom for AHU Control
Mechanical Plantroom					
BACnet/IP Controller	CBXi-8R8	2CQG201001R10211	BACnet/IP Controller	1	CBXi-8R8 CBXi-8R8 IP B-BC: 16 I/O+12 Modbus
Field Controller	CBX-8R8	2CQG201001R10211	BACnet/IP Controller	0	Part of Mechanical Plantroom for AHU Control
Expnaion Module	FLX-8R8	2CQG200706R1021	Expnaion IO Module	1	

Smart Home

Smart Home can impact your day-to-day in a positive way, and make your life safer and easier, from comfort, security, design and energy efficiency. Controlling the heart of the home can be done at the touch of a button remotely or from the comfort of your armchair.

Smart Home

## SMART HOME MULTIFAMILY TOWER ARCHITECTURE FREE@HOME

ABB-free@home® combines all the useful functions of comfortable home automation and door communication into a single system that is easy to understand and operate. The initial configuration of the system by the electrician is carried out via an app. Commissioning is particularly fast and saves valuable working hours

With ABB-free@home®, the entire home can be controlled not only with switches, but now even more practically: by smartphone or tablet and via touch or voice control. This allows home automation to be managed in a way that's mobile and smart, precise, and flexible. For example, if the light atmosphere needs to be changed, tapping on the touchscreen or a simple voice command moves the blinds or changes the colors of the lights. Experience the future of smart living today.

ARCHITECTURE ABB FREE@HOME ECO SYSTEM FOR APARTMENT BUILDING

free@home USB-Gateway allows to create a seamless solution for Weather stations in multi-dwelling units that builds up on otherwise unchanged free@home products.

The electrical planning phase is greatly simplified, as similar rules apply to the central Bus line, as does for the single apartment. The integration of the weather station in each apartment works the same as if the weather station was installed within each apartment, which greatly reduces training effort.
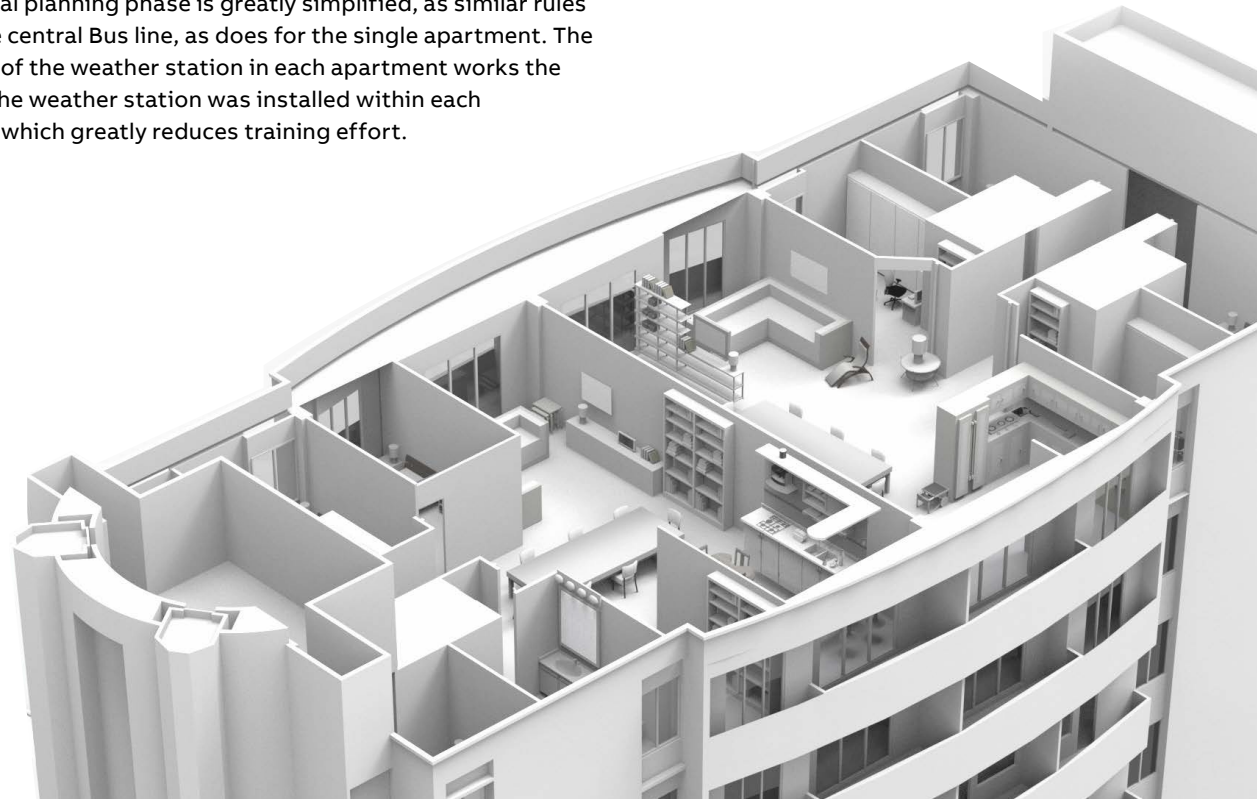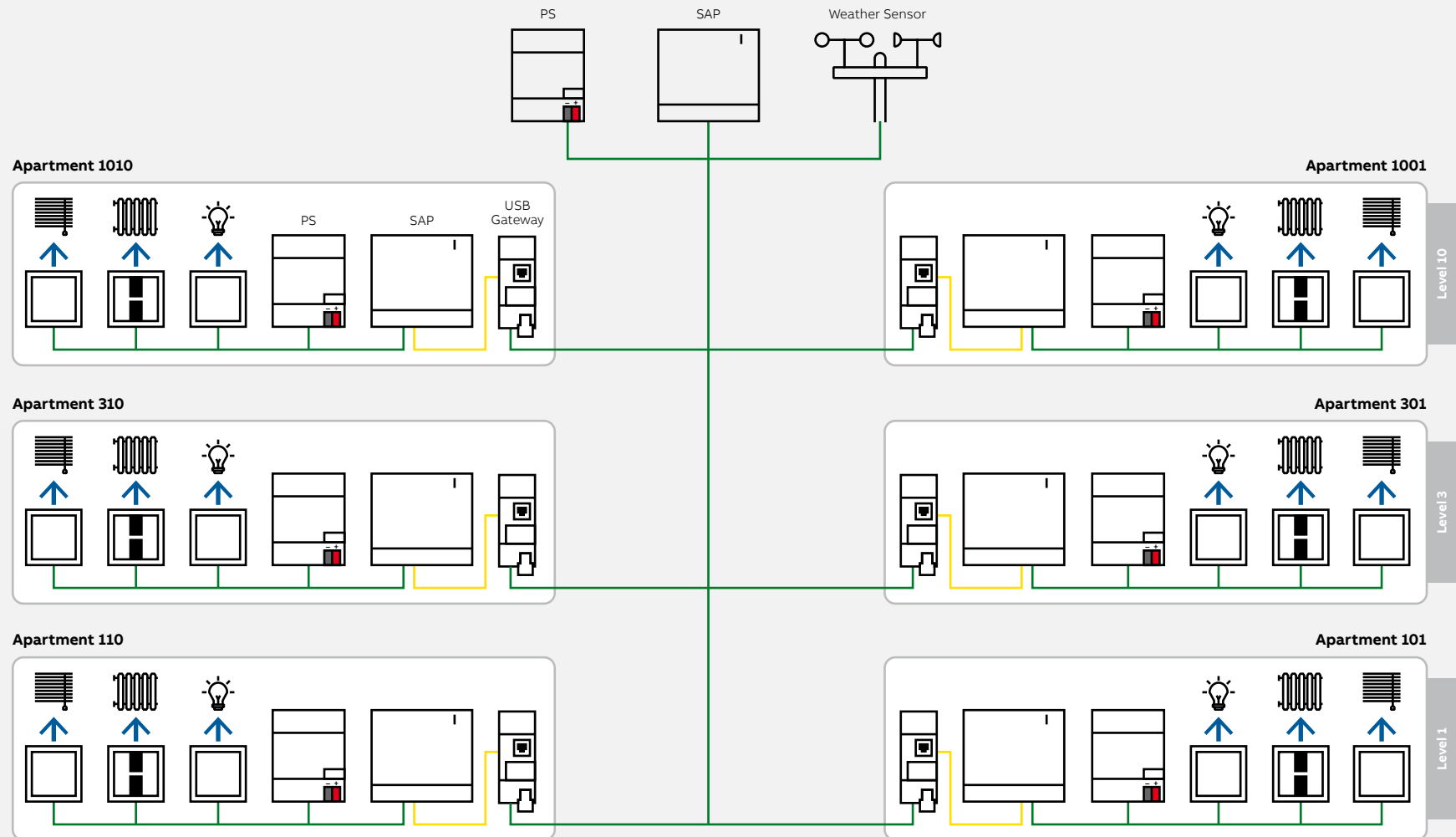
Smart Home
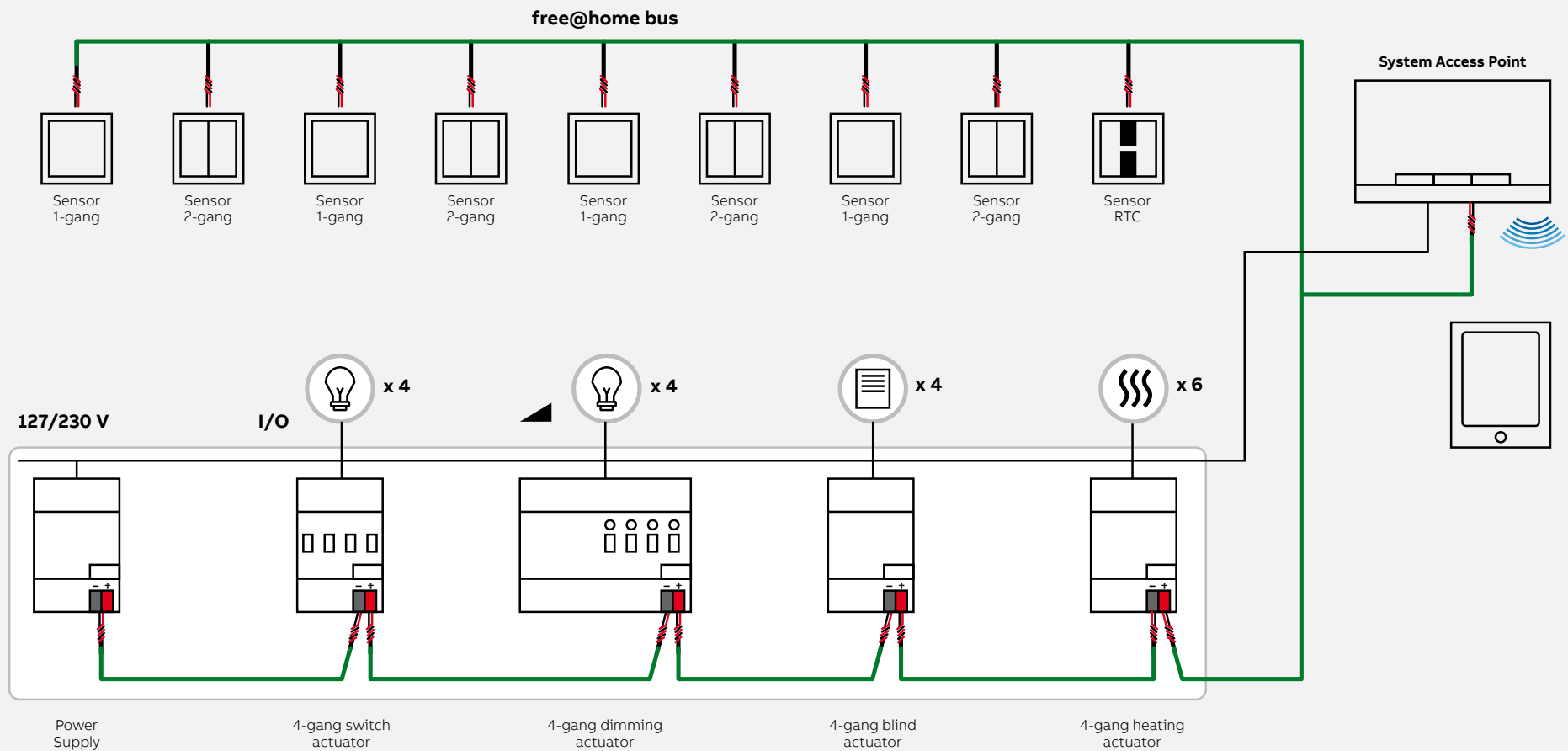## Multiple Apartment Solution with free@home

Reference Architecture

Smart Home
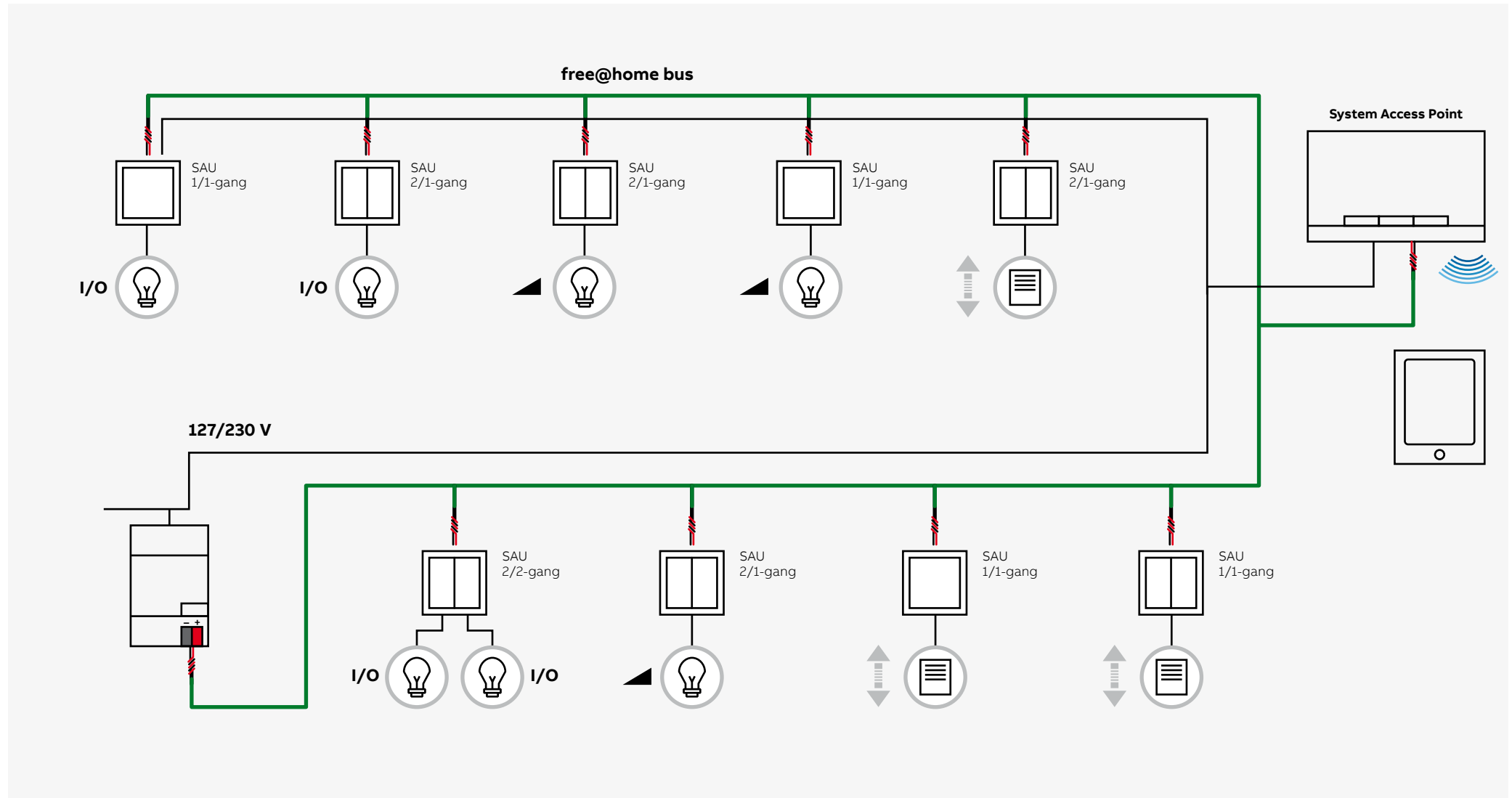## Multiple Apartment Solution with free@home

free@home centralized infrastructure

free@home bus

Sensor 1-gang | Sensor 2-gang | Sensor 1-gang | Sensor 2-gang | Sensor 1-gang | Sensor 2-gang | Sensor 1-gang | Sensor 2-gang | Sensor RTC

System Access Point

x 4 | x 4 | x 4 | x 6

127/230 V | I/O

Power Supply | 4-gang switch actuator | 4-gang dimming actuator | 4-gang blind actuator | 4-gang heating actuator

Smart Home
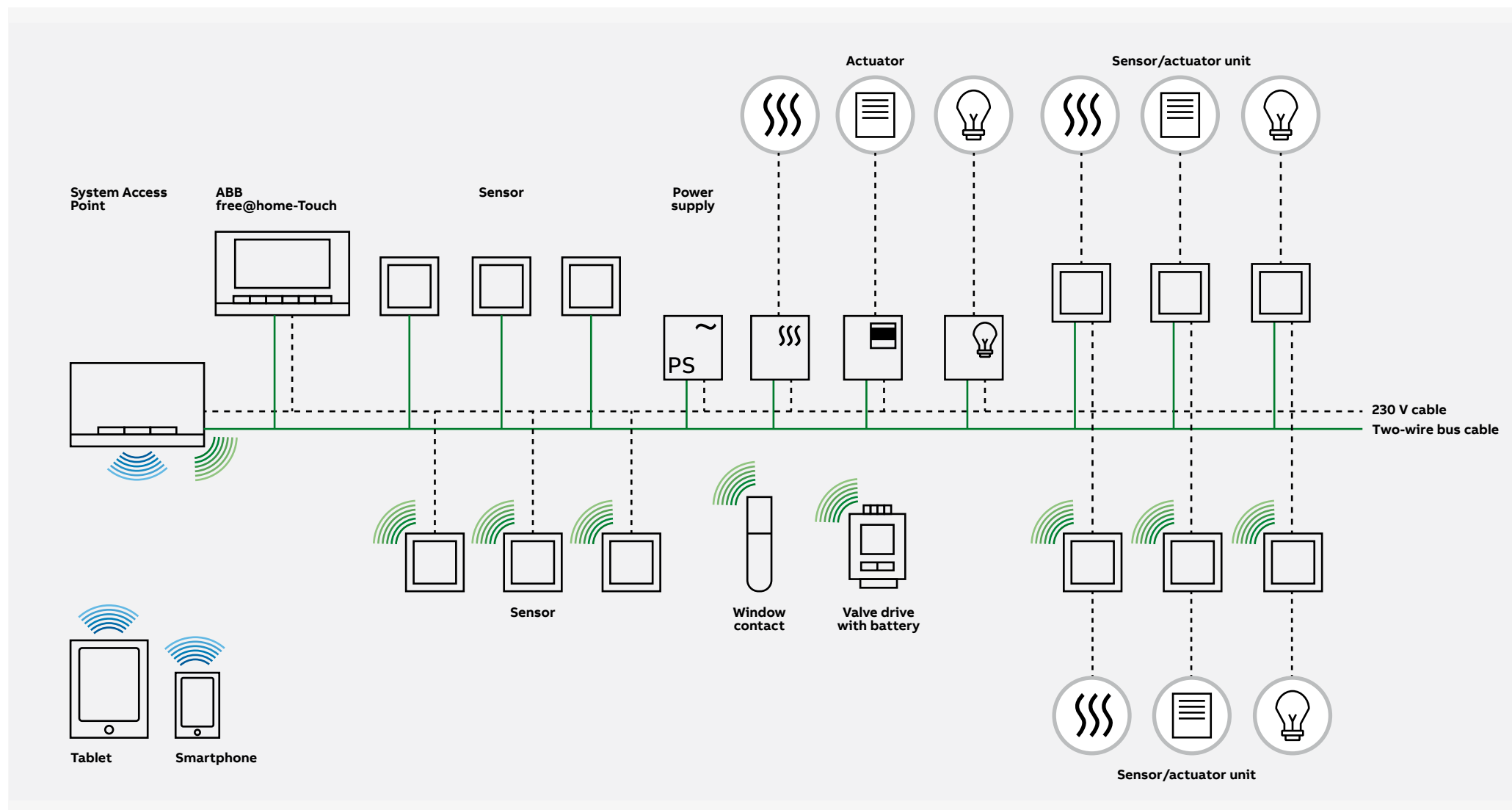## Multiple Apartment Solution with free@home

free@home decentralized infrastructure

Smart Home

Multiple Apartment Solution with free@home

free@home wired & wireless infrastructure

Smart Home
Single Family Solution with free@home

Below schematic is designed for a typical 2 bedroom single family house with two floors using free@home wire, wireless hybrid model & also interfaced with DALI, Split unit, Philips Hue, Sonos & Alexa devices in addition we have also shown welcome IP door entry interface with free@home

ABB Ability

Single family house is connected to ABB Ability using SAP (System Access Point) via MyBuildings portal which provides features like:

Alexa integration

Remote Control using ABB Free@home APP

Timer control

Geofencing

Appliances Control (Miele & Home Connect)

Everything controllable Via the connection to the MyBuildings portal powered by ABB Ability, most functions of ABB-free@home® can now be controlled and activated via remote control.

This makes it possible to maintain control – even while on holiday, with maximum protection of one's privacy. Those who do not use a remote control can operate their ABB-free@home® system from the cloud. For Product information please refer to product details section free@home
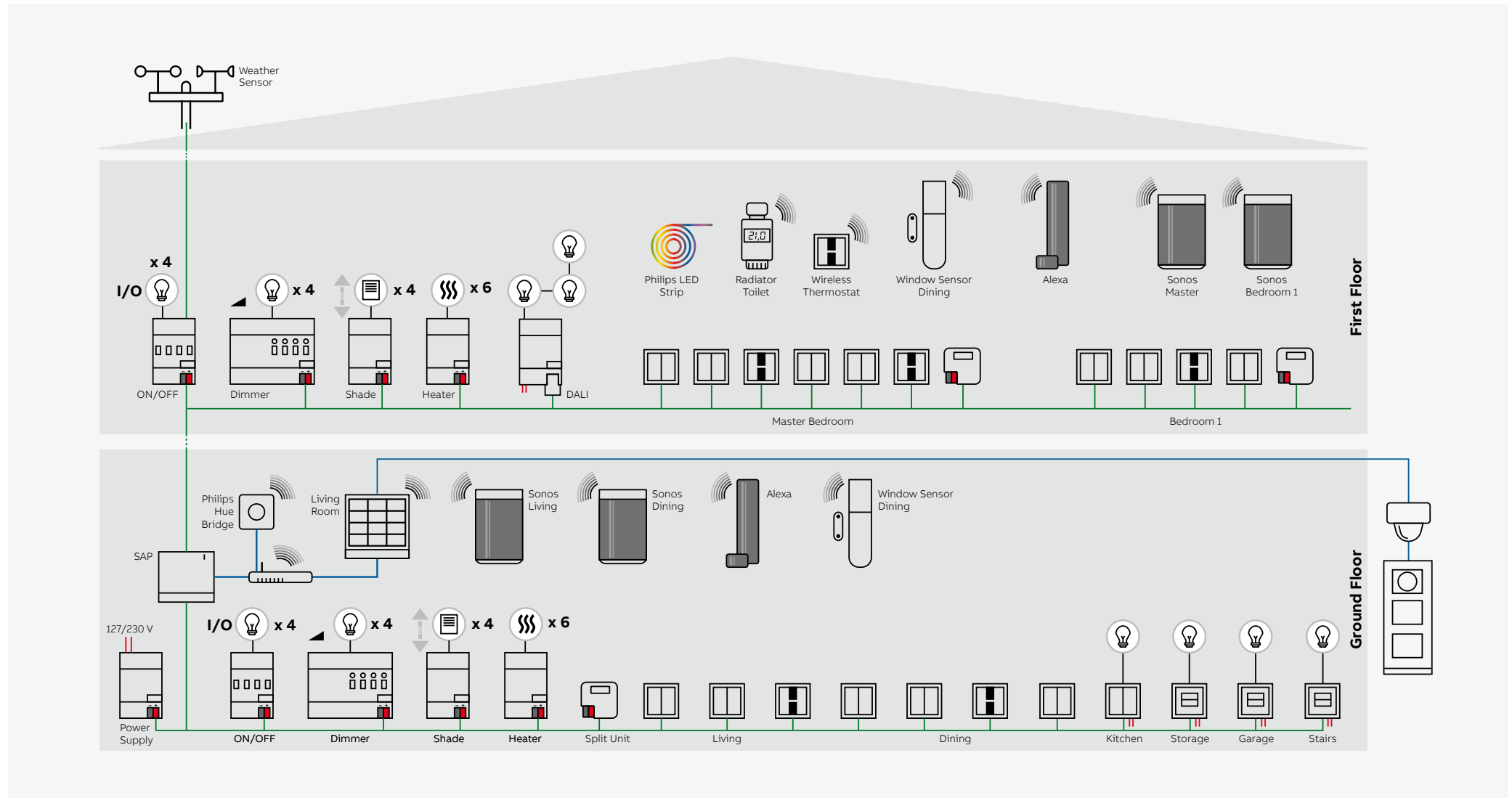
Smart Home
Single Family Solution with free@home

Reference Architecture

First Floor

Weather Sensor

x 4

I/O

ON/OFF

Dimmer x 4

Shade x 4

Heater x 6

DALI

Philips LED Strip

Radiator Toilet

Wireless Thermostat

Window Sensor Dining

Alexa

Sonos Master

Sonos Bedroom 1

Master Bedroom

Bedroom 1

Ground Floor

Philips Hue Bridge

Living Room

Sonos Living

Sonos Dining

Alexa

Window Sensor Dining

SAP

127/230 V

Power Supply

I/O x 4

Dimmer x 4

Shade x 4

Heater x 6

ON/OFF

Split Unit

Living

Dining

Kitchen

Storage

Garage

Stairs

Smart Home
Single Family Solution with KNX

ABB i-bus KNX Eco system provides two different types of solution for single family homes ABB free@home system which we have already seen above and ABB i-bus KNX system the use of ABB i-bus KNX system depend on the complexity and integration with other solution like chillers or boilers or energy management solution with sub meters, etc.
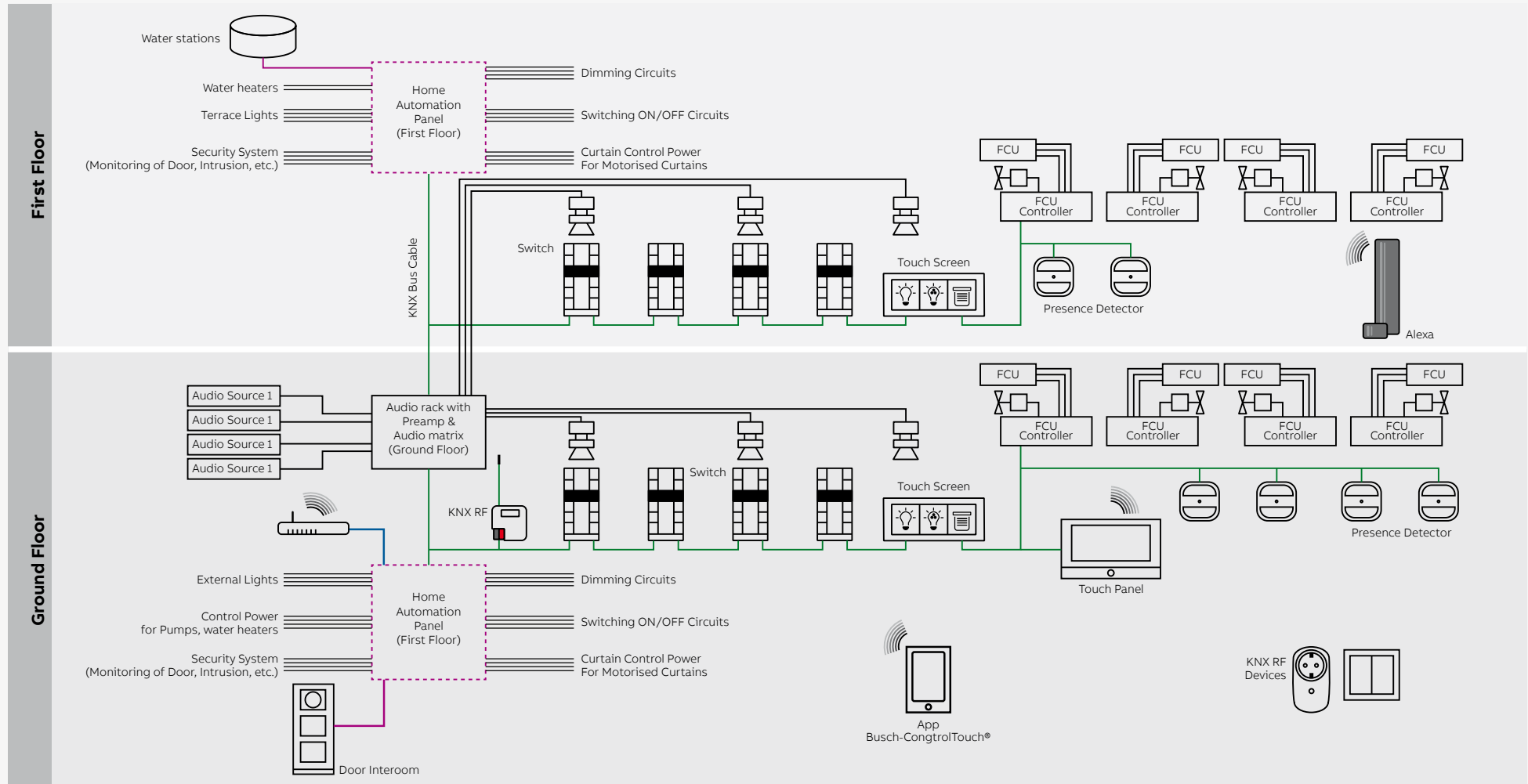Some of the features as listed below:

- **Lighting and color control with DALI** (RGBW & tunable white)
- **HVAC** (room temperature control)
- **Shading Control**
- **Smart Metering** (energy, water, and gas)
- **Security and Intrusion Alarm System**
- **Audio and Video**
- **Visualization, display and signaling**
- **Scene**
- **Remote control and access per smartphone ...**
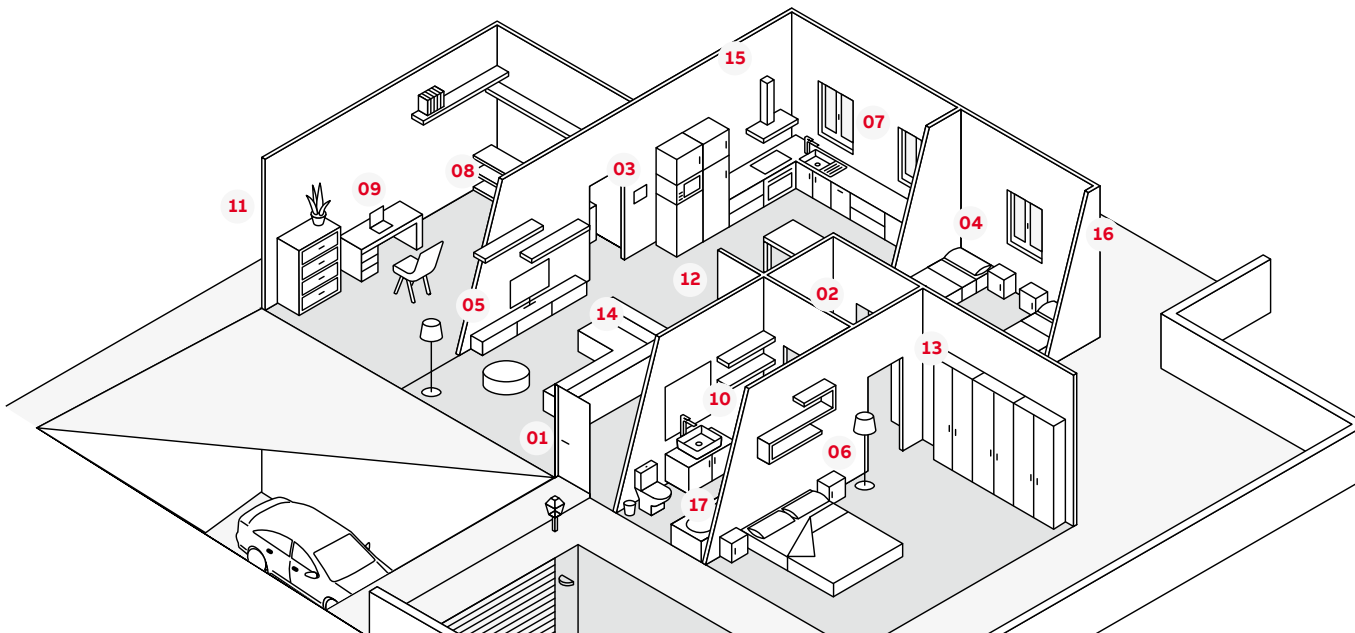- **KNX RF** (outside area)

Smart Home
Single Family Solution with KNX

Reference Architecture

First Floor

- Water stations
- Water heaters
- Terrace Lights
- Security System (Monitoring of Door, Intrusion, etc.)
- Home Automation Panel (First Floor)
- Dimming Circuits
- Switching ON/OFF Circuits
- Curtain Control Power For Motorised Curtains
- KNX Bus Cable
- Switch
- Touch Screen
- FCU / FCU Controller
- Presence Detector
- Alexa

Ground Floor

- Audio Source 1
- Audio Source 1
- Audio Source 1
- Audio Source 1
- Audio rack with Preamp & Audio matrix (Ground Floor)
- KNX RF
- Switch
- Touch Screen
- External Lights
- Control Power for Pumps, water heaters
- Security System (Monitoring of Door, Intrusion, etc.)
- Home Automation Panel (First Floor)
- Dimming Circuits
- Switching ON/OFF Circuits
- Curtain Control Power For Motorised Curtains
- Door Interoom
- App Busch-CongtrolTouch®
- Touch Panel
- FCU / FCU Controller
- Presence Detector
- KNX RF Devices

Smart Home
Solution with free@home - Overview

Smart Home
Solution with free@home

System Access Point

For commissioning and remote control of the ABB-free @ home® system. Allows you to use the Astro function and time schedules. Commissioning and remote control are performed via web interface or app. No additional commissioning software required. Simple commissioning with ad hoc WLAN mode. Connection to the home network with WLAN client mode or CAT cable.

- For commissioning and remote control of the ABB-free@home® system
- With integrated free@home wireless antenna
- With integrated free@home bus connection
- Allows the execution of astro- and time programs
- Commissioning and remote control is executed via web interface or app
- No additional commissioning software is required
- Easy commissioning with WLAN ad-hoc mode
- Connection to the home network via WLAN client mode or via CAT cable

Actuators

The range includes:
- Switch Actuator
- Dimming Actuator
- Dali Gateway, Mdrc
- Blind Actuator
- Heating Actuator
- Fan Coil Actuator

Smart Home
Solution with free@home

Panels

ABB-free@homeTouch 4.3"
The new 4.3 '' ABB-free @ homeTouch, control panel for centralized management of functions, for example to raise or lower shutters, control scenarios or manage the thermostat as a derivative device. Up to a maximum of 16 different commands can be set up.

ABB-free@homeTouch 7"
For centralized management of the ABB-free @ home system, it allows the control of up to 16 system functions and the display of images of the video door entry system. The device is compatible with ABB Welcome and ABB Welcome M systems.
It features an SD memory card slot for image storage. It can be used for remote control of climate zones. Wall mounting with supplied bracket.

Temperature control

The range includes:
- Fan coil actuators
- Split Unit Interfaces
- Thermoelectric Valve Drives
- Thermostats

Smart Home
Solution with free@home

Movement detector

MSA-F-1.1.1-c-WL
With select lens for detection with animal access. Communication with the free@home system is carried out wireless. For automatic switching of ABB-free@home® actuators dependent on movement and brightness. Switch off delay of the actuator can be programmed via the web interface of the System Access Point. For switching 127 V~/230 V~ consumers

Room Thermostat

RTC-F-1-WL
Heating/cooling operation. Communication with the free@home system is carried out wireless. With room temperature controller function

Room thermostat/actuator, wireless
Control element with room temperature control function for controlling thermoelectric actuating drives in heating/cooling systems or electric floor heating systems. With display of set-value temperature. Only to be used with ABB-free@home® room temperature controller cover plates

Smart Home
Solution with free@home

Radiator Thermostat

HA-S-1-WL
For temperature regulation of water-bearing heaters. With integrated temperature sensor, controller and actuating drive. Local operation for the switchover between comfort mode and Off. No wire laying required. Communication with the free@home system is carried out wireless. Setpoint adjustment via the free@home app or a free@home extension unit. Integrated "Window open" detection or can be linked with WBI-S-X-W

Window sensor

WBI-S-1-XX-WL
For monitoring and transmission of the current window handle position (window open, closed, tilted). The status can be visualized on the free@home panel and in the free@home app. The window sensor is installed between the available window handle and the window frame. No wire laying required. Mounting accessories (square extension, screws, adapter for cams) for the window sensor are included in scope of delivery

BI-S-1-XX-WL
For monitoring and transmission of the state (open, closed) of dormer windows, skylights, doors and gates. Additional connection option for an external, potential-free sensor (choice of normally closed or normally open contact). The status can be visualized on the free@home panel and in the free@home app. Isolated evaluation and monitoring of channels. Accessories (adhesive foil, screws, magnet) included in delivery

Smart Home
Solution with free@home

Mounting frames

The range allow to design the living space wishes according to different design concept

Each sensor consists of:
- Sensor insert
- Rocker
- Cover frame

All standard design ranges are available:
- carat®
- Busch-dynasty®
- Busch-axcent®
- solo®
- pure stainless steel
- future® linear

Mounting frames, NEMA

Comprehensive modular range for all kind of homes and commercial facilities. A number of appreciated design and beautiful finishes that add value to the facility, with advanced features that provide greater comfort and performance level

- Zenit NEMA
- Zenit VDE
- Millenium
- Mylos
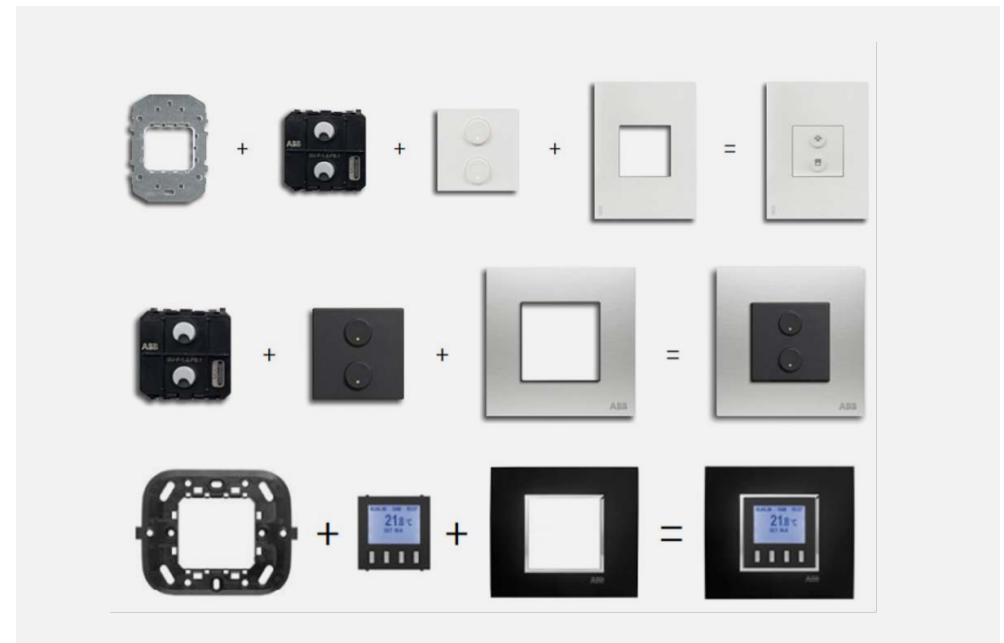
Smart Home
Solution with free@home

secure@home Central Unit

Who says a home security system shouldn't also be an object of beauty? ABB-secure@home central unit is a combination of state-of-the-art technology and pure, unobtrusive ergonomics. The elegant and stylish design reflects the simplicity of installation and programming. As for the complexity behind the panel, well, let us worry about that.

Main benefits
- Elegant design
- Allows commissioning of the system in a few easy steps
- Smarter Home integration with ABB-free@home
- Capacitive touch keypad for clean ergonomics

secure@home Outdoor alarm

Signalling devices are used for local alarming. All ABB-secure@home sirens combine acoustic and visual signaling to dissuade potential intruders to try to enter your house or to make the neighborhood aware of the intrusion.

Main benefits
Clean design available in white, anthracite and silver to fit all the facades

Smart Home
Solution with free@home

secure@home Remote control

ABB-secure@home puts the power of your anti-intrusion system directly into your hands in the most simple way possible with a stylish plug-and-play remote control. The most common functions are assigned to the four preconfigured keys.
For you who wants flexibility, a fully customizable remote control is also available, using five keys and five LEDs: each of them can be configured to fit best the context of the specific installation.

Main benefits
• Elegant, attractive design
• Compact, perfectly fits your keyring
• RGB LEDs for best status indication

secure@home Indoor security sensors

The range includes:
• Perimeter magnet reed contact detector
• Rolling door magnet reed contact
• Roller shutter sensor
• Magnet reed contact for surface/flush mounting
• Dual passive IR perimeter motion detector
• Indoor passive IR motion detector
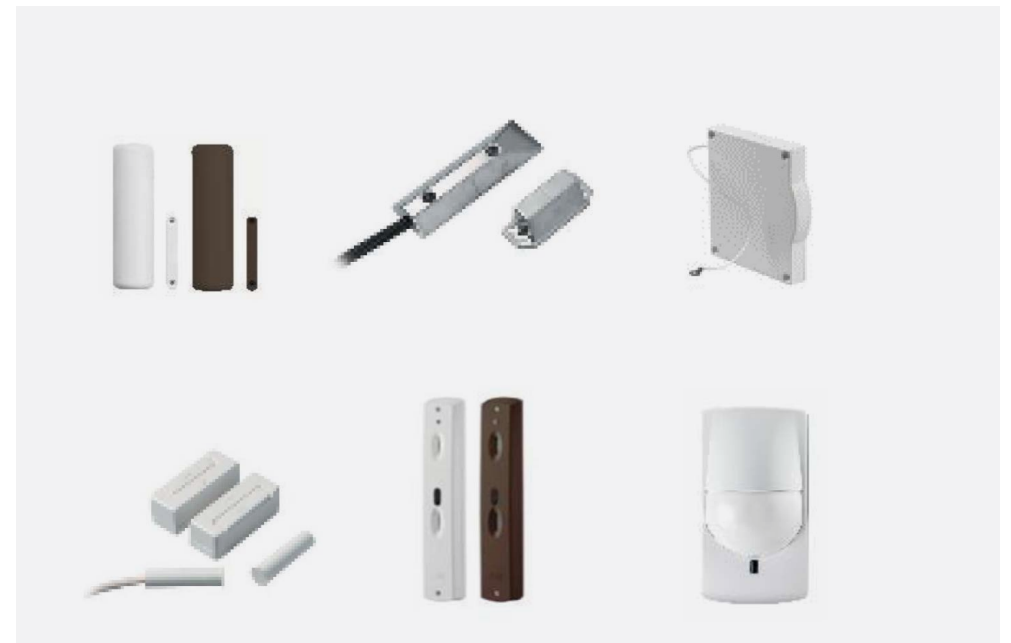
Smart Home
Solution with free@home

secure@home Outdoor security sensors

The range includes:
- Outdoor dual passive IR motion detector
- Perimeter bidirectional dual passive IR motion detector
- Compact dual passive IR perimeter motion detector
- Compact dual passive IR
- Outdoor dual passive IR motion detector for height
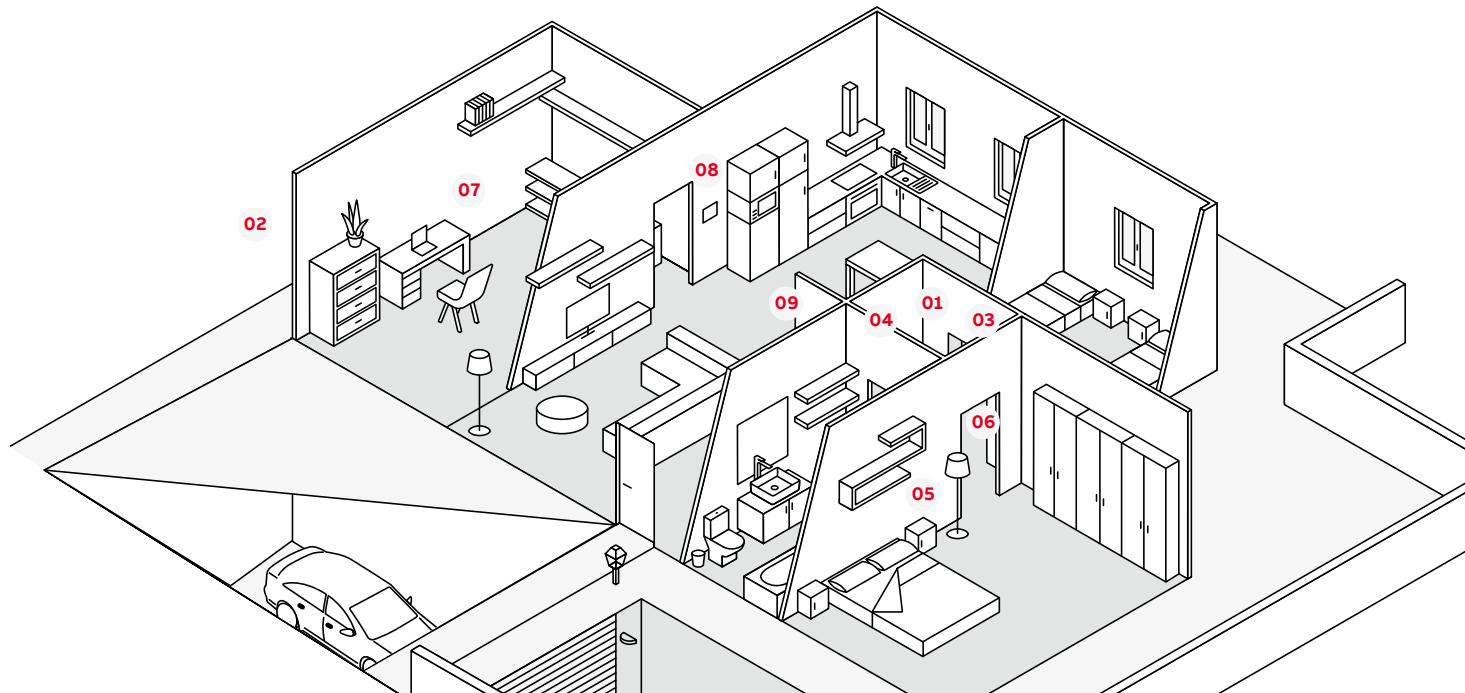
secure@home Home safety sensors

The range includes:
- Smoke detector
- Heat detector
- Water detector
- Wireless repeater

Smart Home
Solution with i-bus KNX - Overview

Smart Home
Solution with i-bus KNX

KNX Power Supply

KNX power supplies generate the KNX system voltage (SELV)
- The bus line is decoupled from the power supply by an integrated choke
- The voltage output is short-circuit proof and overload protected
- Optimized for world-wide applications: The KNX power supplies can be supplied with a rated voltage of 100–240 V AC
- Standard Power Supply (160, 320 mA and 640 mA)
- Power Supply with diagnostics by LED display and group objects for analysis of the operating state and the bus line (320 mA and 640 mA)
- Uninterruptible Power Supply (640mA): Buffering on mains failure and up to two 12 V DC sealed lead acid batteries connectable in parallel

SV/S 30.x.1.1
- 160 mA
- 320 mA
- 640 mA

SV/S 30.x.5.1
- 320 mA
- 640 mA
- With integrated bus coupler and diagnostics function

SU/S 30.640.1
- Uninterruptible 640 mA

+

AM/S 12.1
- Battery Module 12 V DC

or

Sealed Lead Acid Batteries
- Battery capacity 7 Ah, 12 Ah, 17 Ah
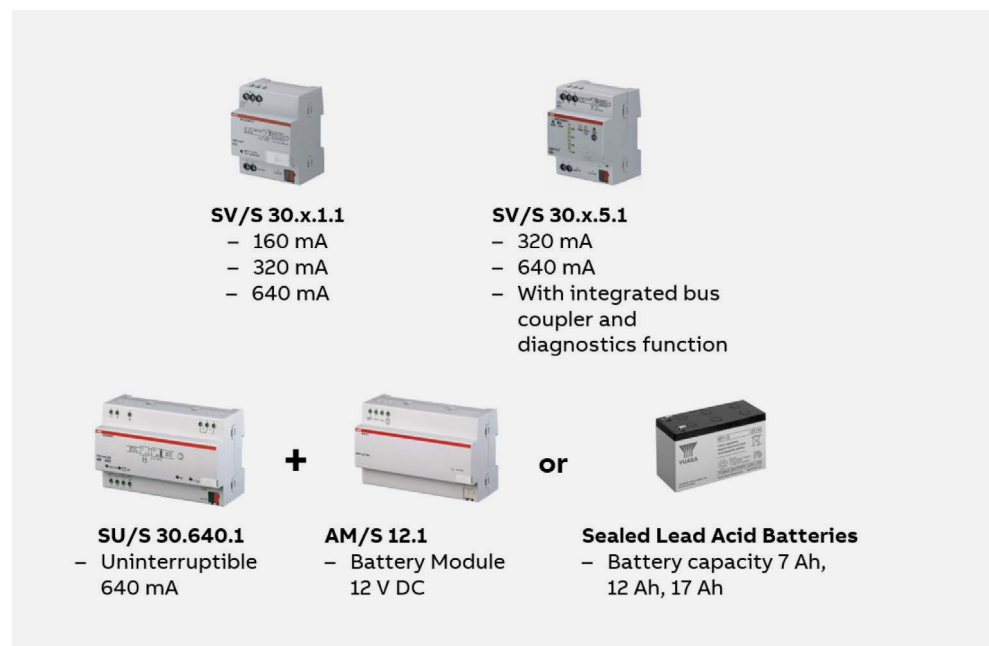
KNX Weather Station

Inputs - Weather
Weather Unit
- It is used to receive weather data from the weather sensor, to process it and to make it available on the KNX

Weather Sensor
- It detects data for twilight and brightness levels in 3 directions, rain, temperature, information on day/night, wind speed, date and time
- An additional input for the connection of a PT1000 sensor is provided
- Four value memories which can store up to 24 values each are available

Weather Station
- All common weather sensors for wind speed, wind direction, rain, amount of rain, brightness, light intensity, pyranometers, twilight, air pressure, humidity or

WES/A 3.1

+

WZ/S 1.3.1.2

WS/S 4.1.1.2

+

Smart Home
Solution with i-bus KNX

KNX Switch Actuator

Flexibility combined with compact design – the Combi Switch Actuators offer switching and shading functionality in a device half the size. Ideally suited to meet the dynamic requirements of modern residential projects.

The Combi Switch Actuators feature high channel density, freely selectable switching and shading functionality in a single device, increased safety and intuitive usage thanks to the unified manual operation concept – offering customers maximum flexibility and comfort in planning, installing and commissioning.

KNX Shutter actuator

Sensor controlled roller shutters, windows and blinds with sun position controlled louvres not only provide pleasant shading, they also allow optimal lighting and room climate conditions and assist in responsible use of energy.

Main benefits
- Eases the work of the intergrator thanks to the automatic travel detection and front-end control buttons
- More energy efficiency with the effective use of daylight and external temperature
- Quick, efficient and detailed device analysis without ETS software, even remotely, thanks to the ABB i-bus® tool

Smart Home
Solution with i-bus KNX

Touch Screen

ABB RoomTouch® KNX is a capacitive device for multiple control.
It allows intelligent control of all active and inactive functions in a room or area of a building, such as lighting, shutters, curtains, scenarios, temperature, external inputs, and so on. Every interaction can be easily controlled and managed from a single device. Up to 30 functions distributed on 10 pages can be supported.
Icons can be associated to switches, dimmers, sliders, actuators, thermostats, and complex commands like scenarios, display of a value, audio control, split unit control and more. Beyond integrated logic and timing functions, it features a temperature sensor, proximity and brightness sensors, binary input, and analog input.

Meter module

Energy Management
KNX Meter Interface Module
• Electronic energy meters make the current energy values available on the KNX bus system in conjunction with a KNX interface (remote meter reading via KNX)
• Consumption and measured values of electrical energy meters are collected via the Meter Interface Module and transferred via the ABB i-bus. KNX
• The device features an infrared interface which is used to read the data from ABB EQmatic energy meters
• The measured data can be intermediately stored, evaluated and visualized from here
• The information and data which is read can be used for example for billing purposes, energy optimization, vizualisation or monitoring of installations

ZS/S 1.1

ABB energy meters from the A series, B series, DELTA and ODIN

Smart Home
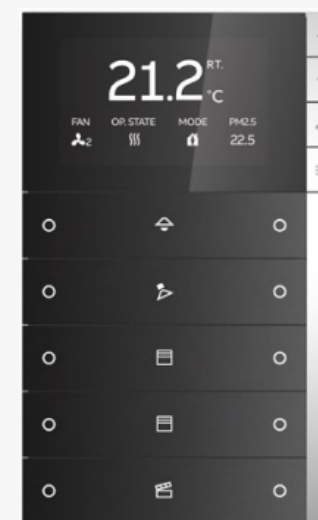## Solution with i-bus KNX

KNX Switches/Keypads

ABB-tacteo®

Millenium BS range

Peonia

Smart Home
Solution with i-bus KNX

ABB-tacteo®

The ABB tacteo® KNX Sensor is an individually-configurable control element for intelligent building management of luxury hotels, public buildings and high class residential buildings. This makes each sensor unique in design and function. ABB-tacteo® KNX meets all requirements in terms of modern design, first-class quality and, above all, maximum comfort: easy management of blinds, lighting, heating, multimedia and access control.

Features
- Integrated KNX bus coupler
- Commissioning/parametrisation from ETS4 onwards
- ABB-tacteo room temperature controllers must be additionally supplied via a separate 24 V DC power supply
- Standard and customized components available
- Customer can create individual devices via online configuration tool
- No extra cost by configuration
- For global markets
- VDE / British Standard / Chinese / Swiss type wallboxes / Italian standard wallboxes / NEMA type wallboxes

- Selection of the color among the standard colors available
- Every device can be freely configured by the customer using a library of ABB icons

- It is also possible to add for every icon/symbol a descriptive text using among a set of fonts provided

Smart Home
Bill of Materials

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Free@Home

S.No.	Order Code	Description	Total
FLOORS REF			
Switching & Dimming Control			
Switching Circuits		SA-M-8.8.1	3
Dimming Circuits		DA/M.6.210.2.1	2
		DG-M-1.16.11	1
Curtain Control			
Curtain Circuits		BA-M-0.4.1	8
HVAC Control			
HVAC points (for dx type)	2CDG510010R0011	FCA-M-2.3.1 , Fan coil Actuator PWM, MDRC	13
Wireless Free@home			
Motion Sensor	2CKA006200A0086	MSA-F-1.1.1-84-WL,WL-Mov. detector/act. 1g	7
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	7
Thermostat	2CKA006200A0081	RTC-F-1-WL,WL-Room thermostat	13
	2CKA006220A0181	CP-RTC-84, C-plate RT sensor unit	13
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	13
Door Sensor	2CKA006200A0101	WBI-S-1-64-WL,Windowcontact Handle	2
Wireless Switching Keypads (2 gang) with switching actuator (2 output)	2CKA006200A0076	SSA-F-2.2.1-WL,WL-Sensor/Switch act. 2/2	24
	2CKA006220A0154	SR-2-84, rocker 2gang	24
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	24
Wireless Switching Keypads (2 gang) without switching actuator	2CKA006200A0073	SU-F-2.0.1-WL,WL-Sensor Unit 2gang	4
	2CKA006220A0154	SR-2-84, rocker 2gang	4
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	4

S.No.	Order Code	Description	Total
Wireless Switching Keypads (1 gang) with switching actuator (1 output)	2CKA006200A0074	SSA-F-1.1.1-WL,WL-Sensor/Switch act. 1/1	10
	2CKA006220A0139	SR-1-84, rocker 1gang	10
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	10
Wireless Switching Keypads (2 gang) with switching actuator (1 output)	2CKA006200A0075	SSA-F-2.1.1-WL,WL-Sensor/Switch act. 2/1	1
	2CKA006220A0154	SR-2-84, rocker 2gang	1
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	1
Wireless Dimming Keypads (2gang) with dimming actuator (1 output)	2CKA006200A0078	SDA-F-2.1.1-WL,WL-Sensor/Dim act. 2/1g	5
	2CKA006220A0154	SR-2-84, rocker 2gang	5
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	5
Wireless blind control keypads with blind actuator (1 output)	2CKA006200A0079	SBA-F-1.1.1-WL,WL-Sensor/Blind act. 1/1g	8
	2CKA006220A0139	SR-1-84, rocker 1gang	8
	2CKA001754A4498	1721-184K-500,Cover Frame 1-gang	8
Free@home 7" touch screen	2CKA008300A0357	DP7-S-625, ABB-free homeTouch 7	1
System Devices and Accessories	2CDG510001R0011	PS-M-64.1.1 Power Supply 640mA, MDRC	1
	2CKA006200A0155	SAP/S.3, SAP/S.3 System Access Point 2.0 for ABB-free@home®	1
	102897-15	EIB BUS CABLE 2 X 2 X .8mm(500 Mt Drum)	1
	1SL1206A00	MISTRAL65 tr. door 36M 3R	1
	1SL1208A00	MISTRAL65 transparent door 54M	2

Smart Home
Bill of Materials

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KNX

S.No.	Order Code	Description	Total
FLOORS REF			
Switching & Dimming Control			
Switching Circuits			53
Dimming Circuits	2CDG110258R0011	SA/S 4.10.2.2, Switch Actuator	42
	2CDG110259R0011	SA/S 8.10.2.2, Switch Actuator	3
	2CDG110260R0011	SA/S 12.10.2.2, Switch Actuator	2
	2CKA006197A0057	UD/S4.315.2.1	10
Curtain Control			
Curtain Circuits			26
	2CDG110120R0011	JRA/S 2.230.2.1, Blind / Roller Shutter Actuator with Manual Operation, 2-fold, 230 V AC, MDRC	
	2CDG110121R0011	JRA/S 4.230.2.1, Blind / Roller Shutter Actuator with Manual Operation, 4-fold, 230 V AC, MDRC	2
	2CDG110122R0011	JRA/S 8.230.2.1, Blind / Roller Shutter Actuator with Manual Operation, 8-fold, 230 V AC, MDRC	2
HVAC Control			
HVAC points			11
	2CDG110213R0011	FCC/S1.2.2.1 FanCoilCtrl,2x0-10V,3st,mO	11
Operation-Millenium Range			
Thermostat	2CKA006134A0309	6124/08-981-500, Room Thermostat	7
	2CLA637100N1101	AMD5153-ST,Triple rocker/KNX Frame 1 gang	7
6 Fold sensor	2CKA006118A0104	6129/20-981-500, Switch Sensor 3/6gang	11
	2CLA637100N1101	AMD5153-ST,Triple rocker/KNX Frame 1 gang	11
	2CLA627190N1001	AMD5053,Special metal mounting plate for KNX sensors 1 gang	11
4 Fold sensor	2CKA006116A0218	6126/20-981-500, Switch Sensor 2/4gang	9
	2CLA637100N1101	AMD5153-ST,Triple rocker/KNX Frame 1 gang	9
	2CLA627190N1001	AMD5053,Special metal mounting plate for KNX sensors 1 gang	9

S.No.	Order Code	Description	Total
2 Fold sensor	2CKA006115A0443	6125/20-981-500, Switch Sensor 1/2gang	11
	2CLA637100N1101	AMD5153-ST,Triple rocker/KNX Frame 1 gang	11
	2CLA627190N1001	AMD5053,Special metal mounting plate for KNX sensors 1 gang	11
Smart touch 7"	2CKA006136a0206	6136/07-825-500 7" touch panel	4
	2CKA006136A0212	6136/07 UP-500,Flush Mounted Wall Box for SmartTouch	4
Control touch	2CKA006136A0202	6136/APP-500, Busch-ControlTouch	1
Busch-Voice Control	2CKA006136A0217	VCO/S99.1,Busch-VoiceControl	
Security System	2CDG110150R0011	GM/A 8.1, KNX Security Panel, SM	1
	GHQ3201972R0002	MRS/B, Magnet Reed Contact Set	6
	GHV9220004V0010	SPGS/B, Glass Break Sensor	4
	2CDG430079R0011	FC650/O, Optical Smoke Detector	1
	GHQ3050008R0001	SGL, Gas Detector	1
	GHQ3050018R0001	SSF/GB, Combination Signalling Device	1
	2CDG280001R0011	BT/A 1.1, Keypad for GM/A 8.1	1
	GHV9240001V0013	SAK17, Sealed Lead Acid Battery, 12 V DC, 17 Ah	1
	2CDG110178R0011	MG/E 4.4.1, Zone Module, 4fold	3
Door entry system	2TMA070010A0018	M21312P1-A, Mini outdoor station, one button, built-in ID card reader	1
	2TMA070080W0011	M2300, System controller, MDRC	1
	2TMA020060H0008	83342-500, IP-Gateway MDRC	1
System Devices and Accessories	2CDG110167R0011	SV/S 30.640.3.1, Power Supply Standard, 640 mA, MDRC	2
	2CDG110171R0011	LK/S 4.2, Line Coupler, MDRC	2
	2CDG110144R0011	SV/S 30.160.1.1, Power Supply Standard, 160 mA, MDRC	1
	102897-10	EIB BUS CABLE 2 X 2 X .8mm(500 Mt Drum)	2
	1SL1208A00	MISTRAL65 transparent door 54M	8

Access Control

Access Control allows to handle complex access management easily and user-friendly. Via the Smart Access Point the system can be used as a stand-alone solution or as part of a building system scalable for every requirement.

Access Control
Solution with Welcome IP

ABB-Welcome products allow the easy implementation of door entry system (video door phone) & access control features to all types of residential building.

Comprehensive product range and modular structure ensure that right products can be found for each building. Whether a single-family house or an apartment building, or a site requiring special security, renovation or a new building, ABB Welcome is a good solution. Thanks to the IP & 2-wire bus of the door entry system, the installation and commissioning are effortless.

The IP connectivity provides you with a comfortable life and smarter choice, regardless of the size and distance. The connectivity brings all systems together to create a smartIP ecosystem for a holistic building automation solution in residential buildings

Outdoor and indoor units have been designed to be highly functional and pleasing to the eye. Sleek forms and clean colors the color of indoor station suits wiring accessories and create a harmonious look to various home functionalities. ABB-Welcome outdoor units have undergone rigorous testing in simulated conditions. They must withstand tropical temperatures of +70 C and freezing temperatures of -40 C, salty sea air, heavy rain, and prolonged UV exposure without fading. The outdoor unit must meet the requirements of various directives and standards, e.g. for electromagnetic radiation, usability, and the use of harmful substances. The buttons, housings and seals must withstand hard, positively physical abuse thousands of times before they pass our strict quality criteria.

Benefits
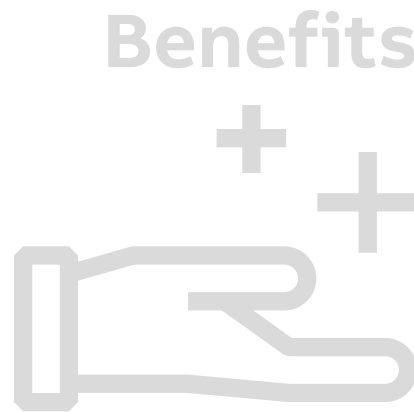
Comfort
ABB always takes pride in user experience and innovates common network technology to createa totally smarter solution that can perfectly meet your every need. We believe smart living andworking provide the basis for a more comfortable life.

Security
To make you safer and enjoy your own time, ABB combines all the security functions that keep you all day long with peace of mind. With powerful anti-hacker technology installed, there is no need to worry about cyber security issues
- Secure communication (AES 128 & RSA 2048)
- Forces to change password at first login.
- Avoid simple PW rules and brute force attack.
- Device Authentication base on credential
- Robustness testing by the ABB Device Security Assurance Center (DSAC).
- Fully meet EU-GDPR.

Simplicity
The door communication system ABB-Welcome can be retrofitted easily into given houses and systems or used for new constructions. It's easy commissioning and universal design create an atmosphere of comfort, harmony, and style.

Flexibility
ABB's IP innovation provides flexible solutions that can satisfy your own living habit and style. No matter the kind of building, ABB is your trustworthy partner.

Access Control
Solution with Welcome IP
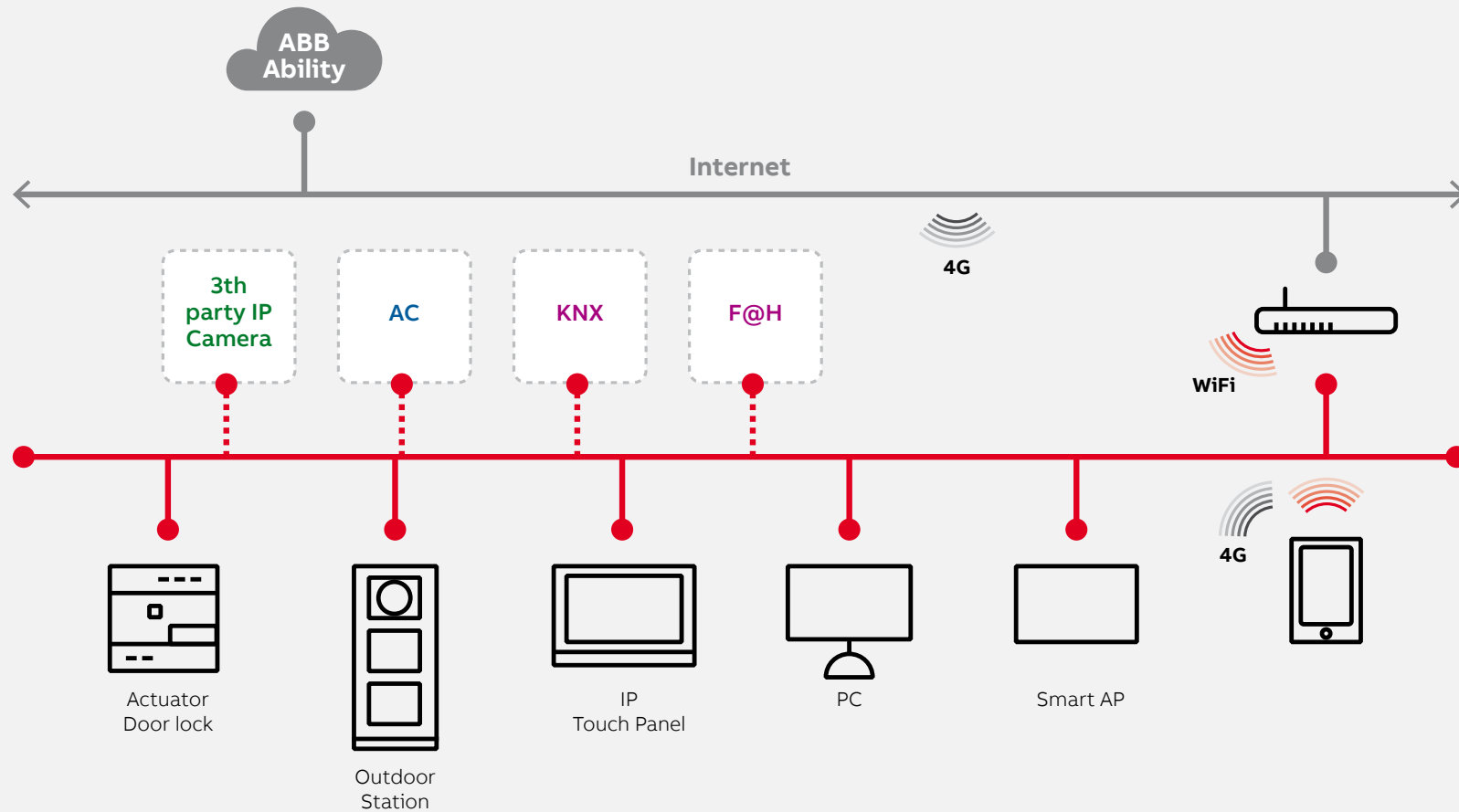
Reference Architecture

ABB
Ability

Internet

4G

3th
party IP
Camera

AC

KNX

F@H

WiFi

4G

Actuator
Door lock

Outdoor
Station

IP
Touch Panel

PC

Smart AP

Access Control
Solution with Welcome IP

Reference Architecture for Multi-family apartment

NOTE

All wiring shown is Cat5E or Cat6.

All POE Switches shall support IEEE802.3af and IEEE 802.3at.

ALL IP Cameras shall be ONVIF Compliant.

ALL Outdoor Stations and inside Stations can be Flush or Surface Mounted.

Smart Access Point

Guard Unit

Entrance #1

Entrance #2
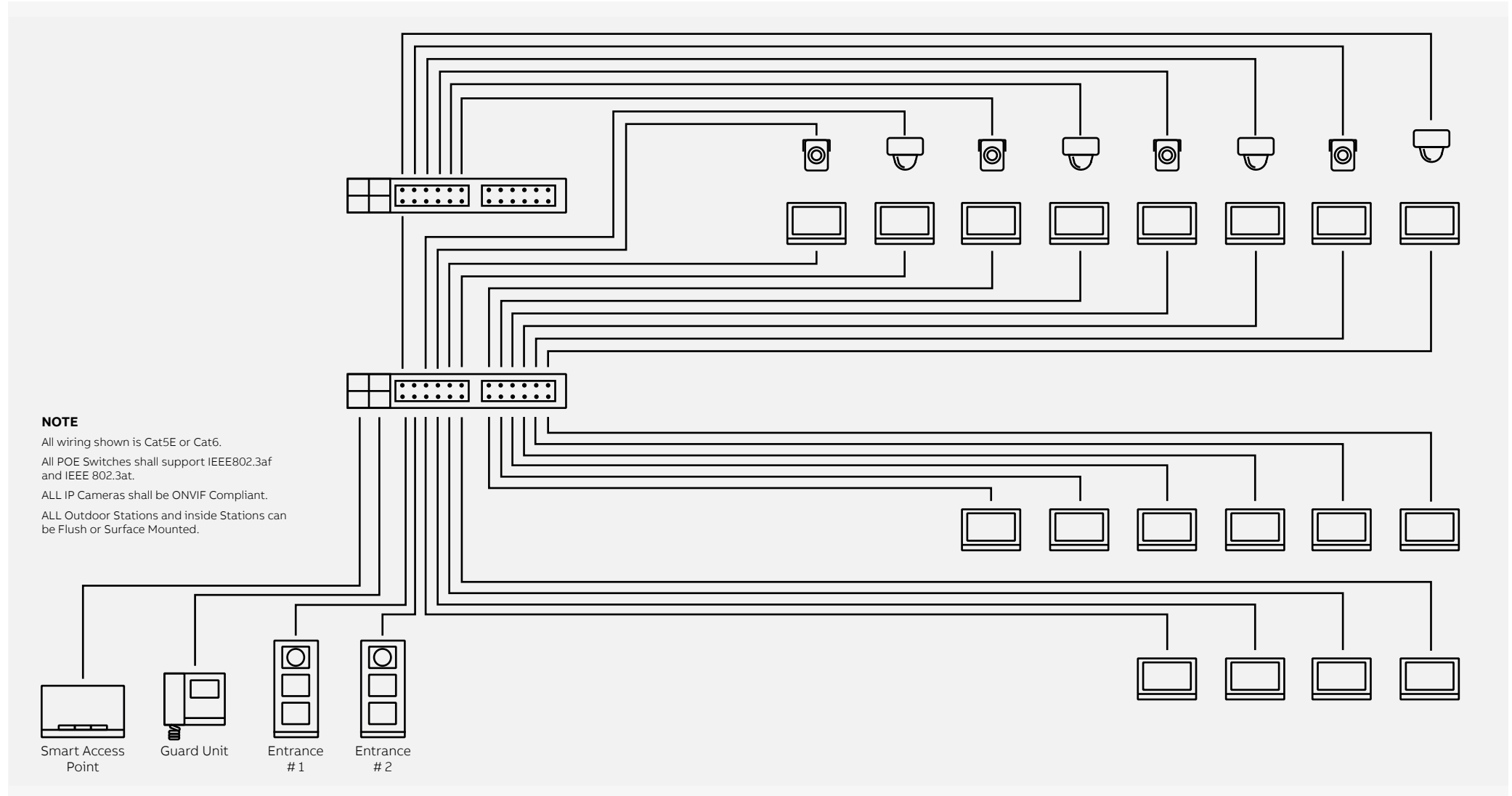
Access Control
Solution with Welcome IP

Welcome IP with POE Option for Garden Tower
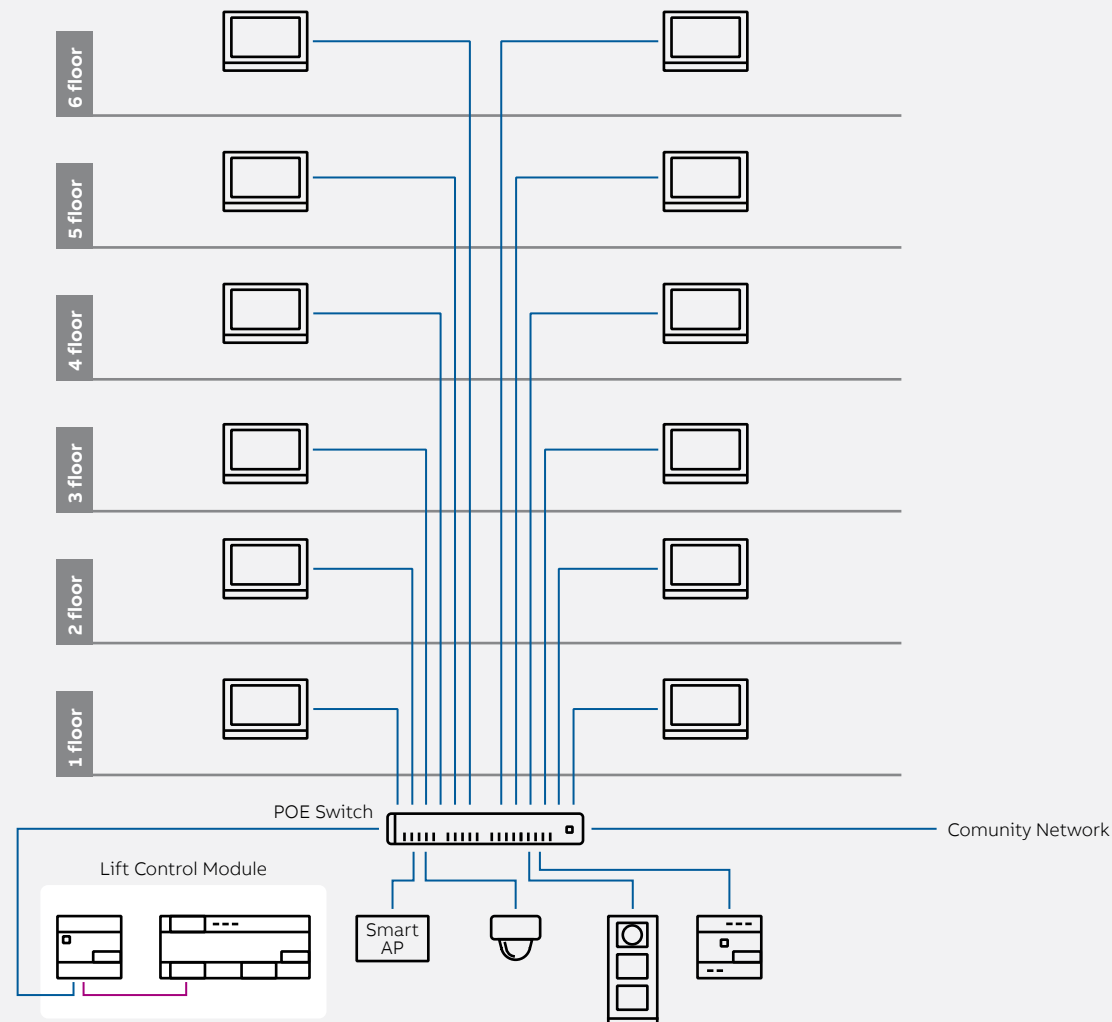
Access Control
Solution with Welcome IP

Welcome IP without POE Option for Garden Tower
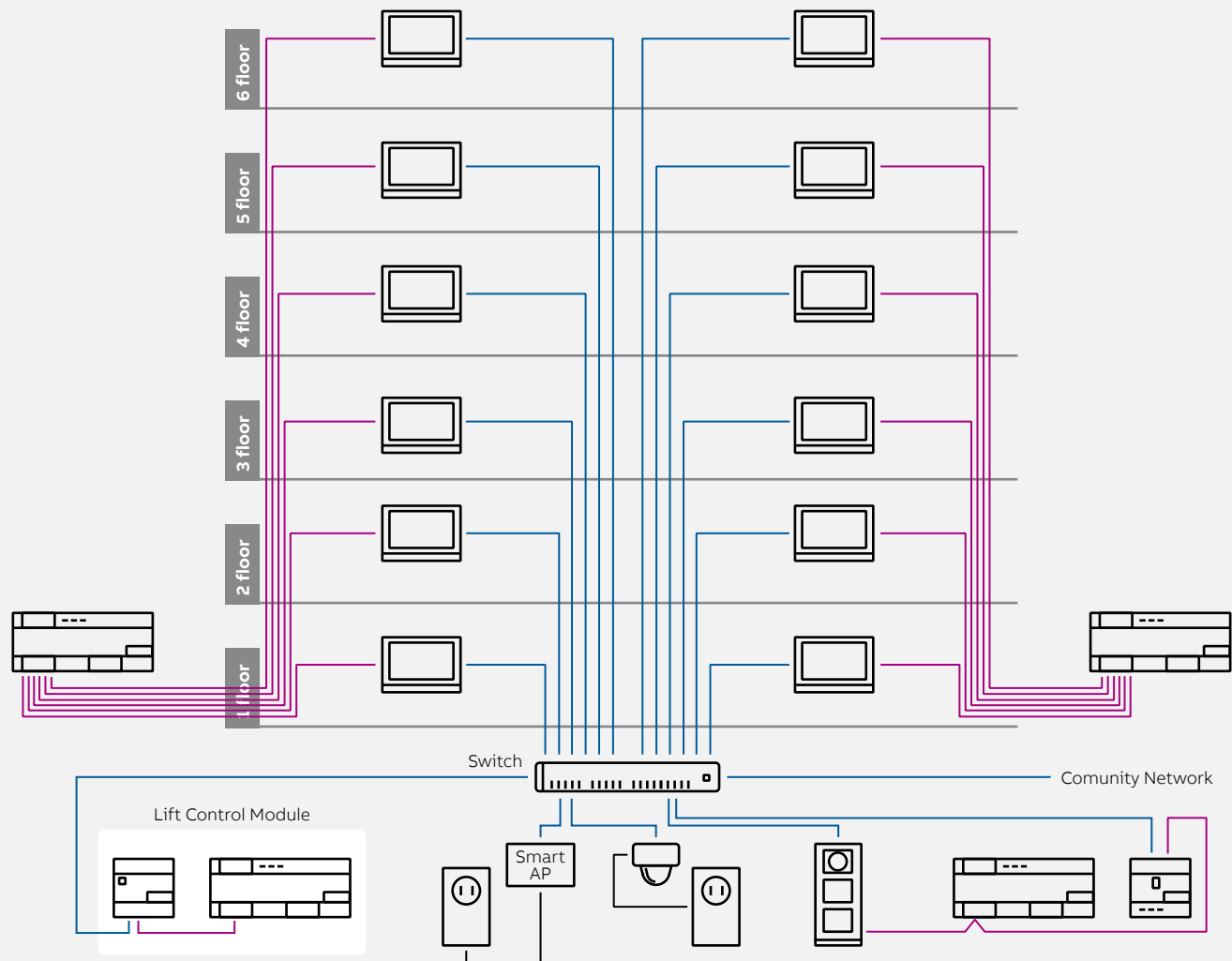
Access Control
Solution with Welcome IP

Welcome IP with Fiber Optics for Residential Community
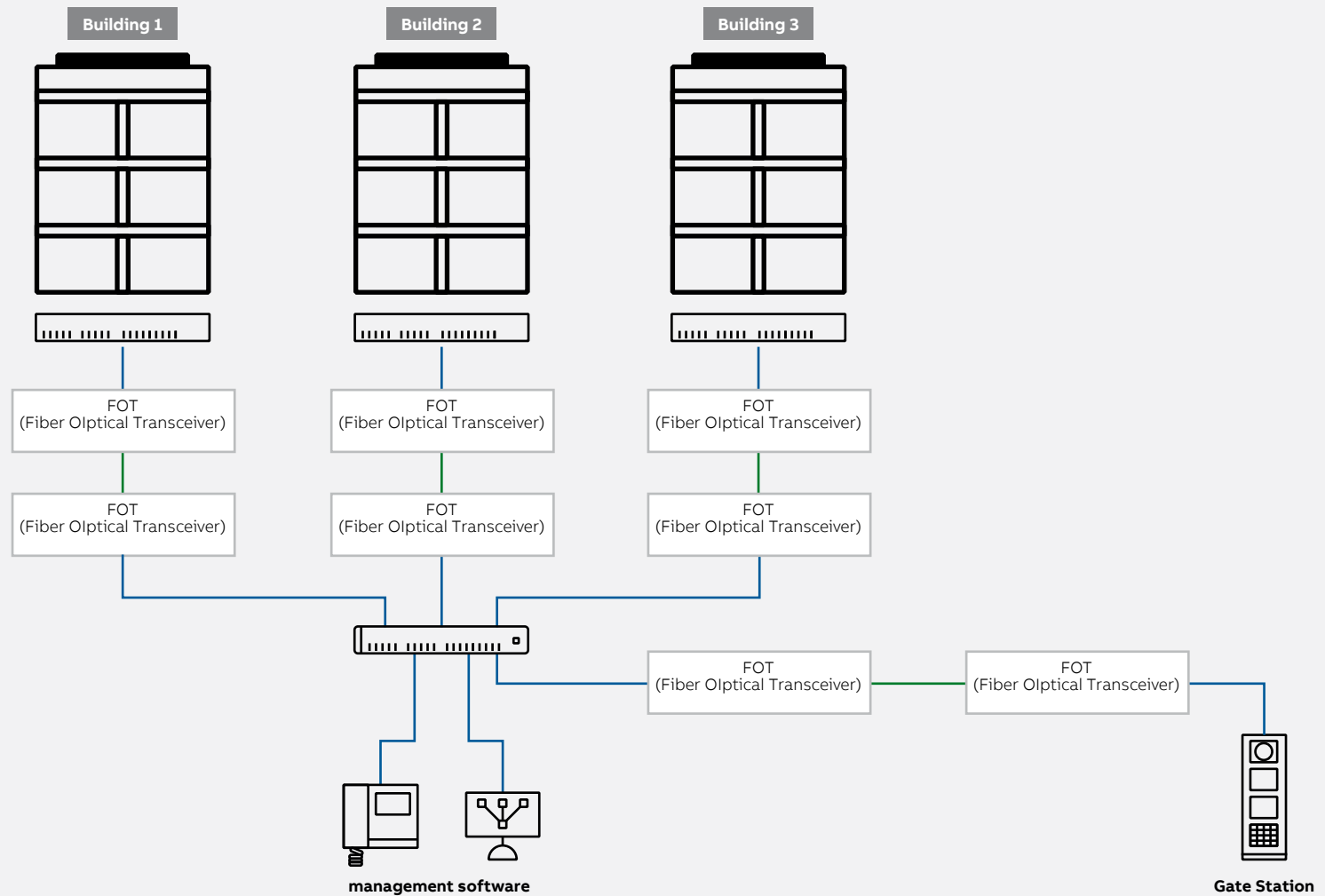
Access Control
Solution with Welcome IP
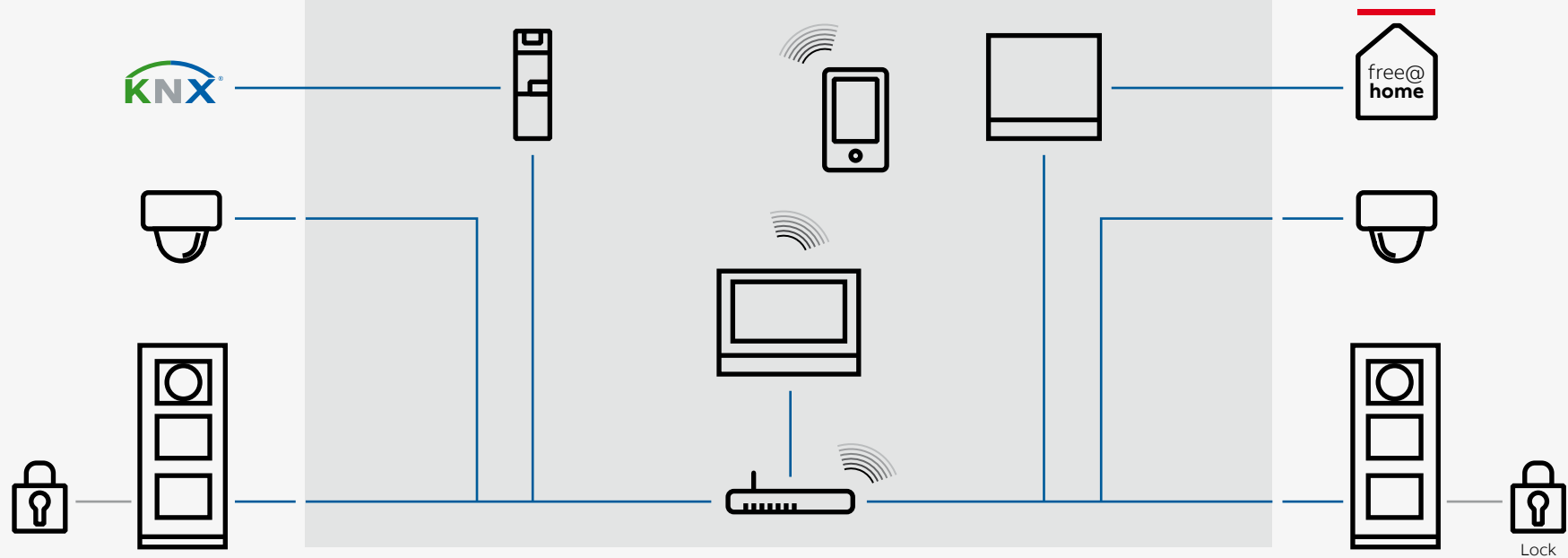
Reference Architecture for Single Family home

Access Control
Solution with Welcome IP

ABB Welcome IP Schematic for Single Family home Internal mode

Smart AP

Subsidiary Touch
Panel

LAN 1/WIFI

Master Touch Panel

LAN 1

LAN 2/WIFI

Switch
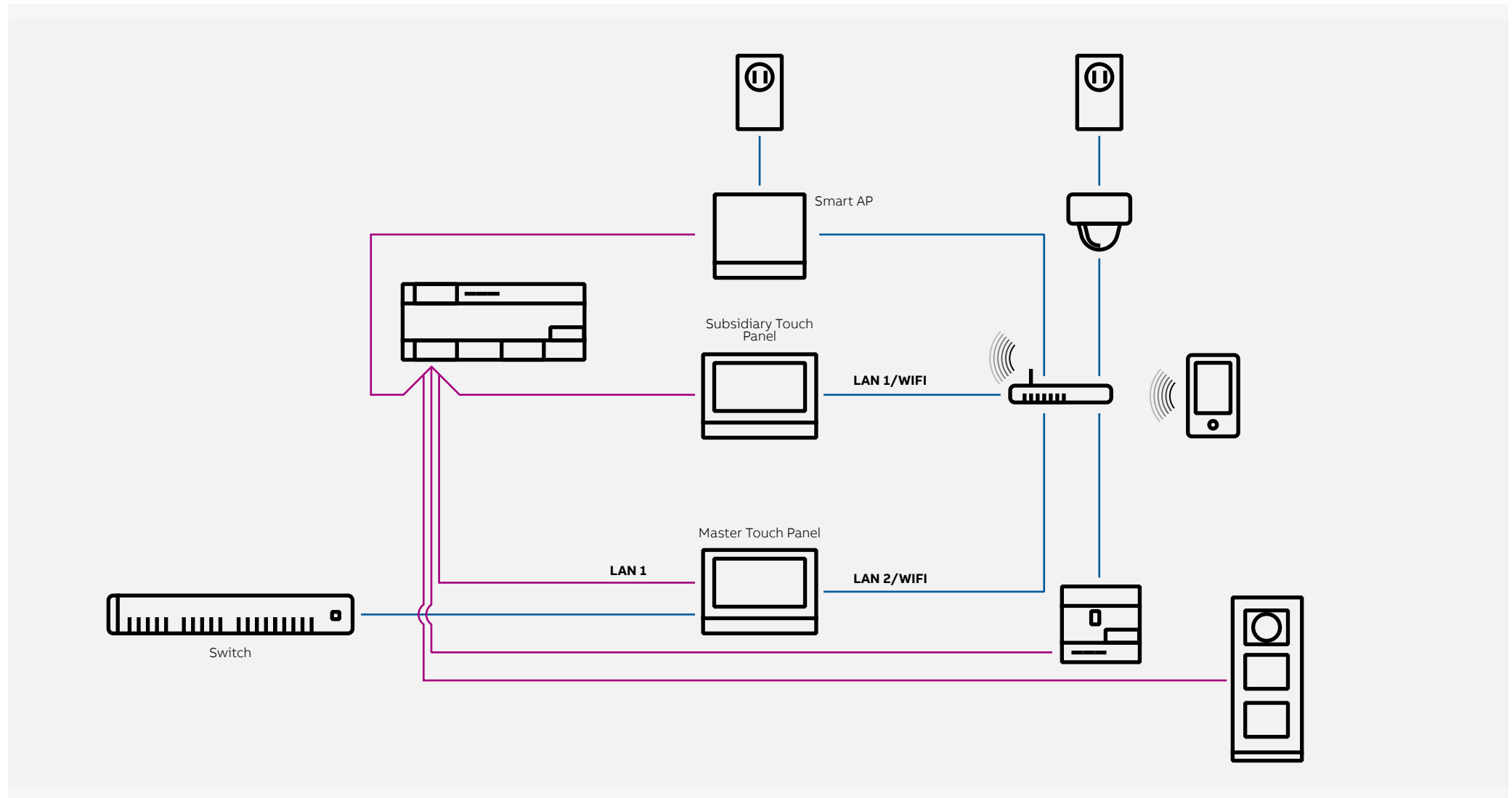
Access Control
Solution with Welcome IP

ABB Welcome IP Schematic for Single Family home External mode

Smart AP

Subsidiary Touch Panel

LAN 1/WIFI

Master Touch Panel

LAN 1

LAN 2/WIFI

POE Switch

Access Control
Solution with Welcome (2 wire solutions)

The simple 2-wire bus and modular design of outdoor stations, the installers will have a variety of choices for any kind of application of single-family house, multi-family buildings and residential complex, no matter for new buildings or renovation.

Thanks to the modular design and extremely versatile 2-wire bus system, the new Welcome M range is designed with the concept of flexibility, simplicity, and elegance. Therefore, installation and usage become much easier and more comfortable. With the wide range of well-designed products, Welcome M meets all your needs for door entry.

Access Control
Solution with Welcome (2 wire solutions)

Reference Architecture for Multi-family apartment (Audio only)
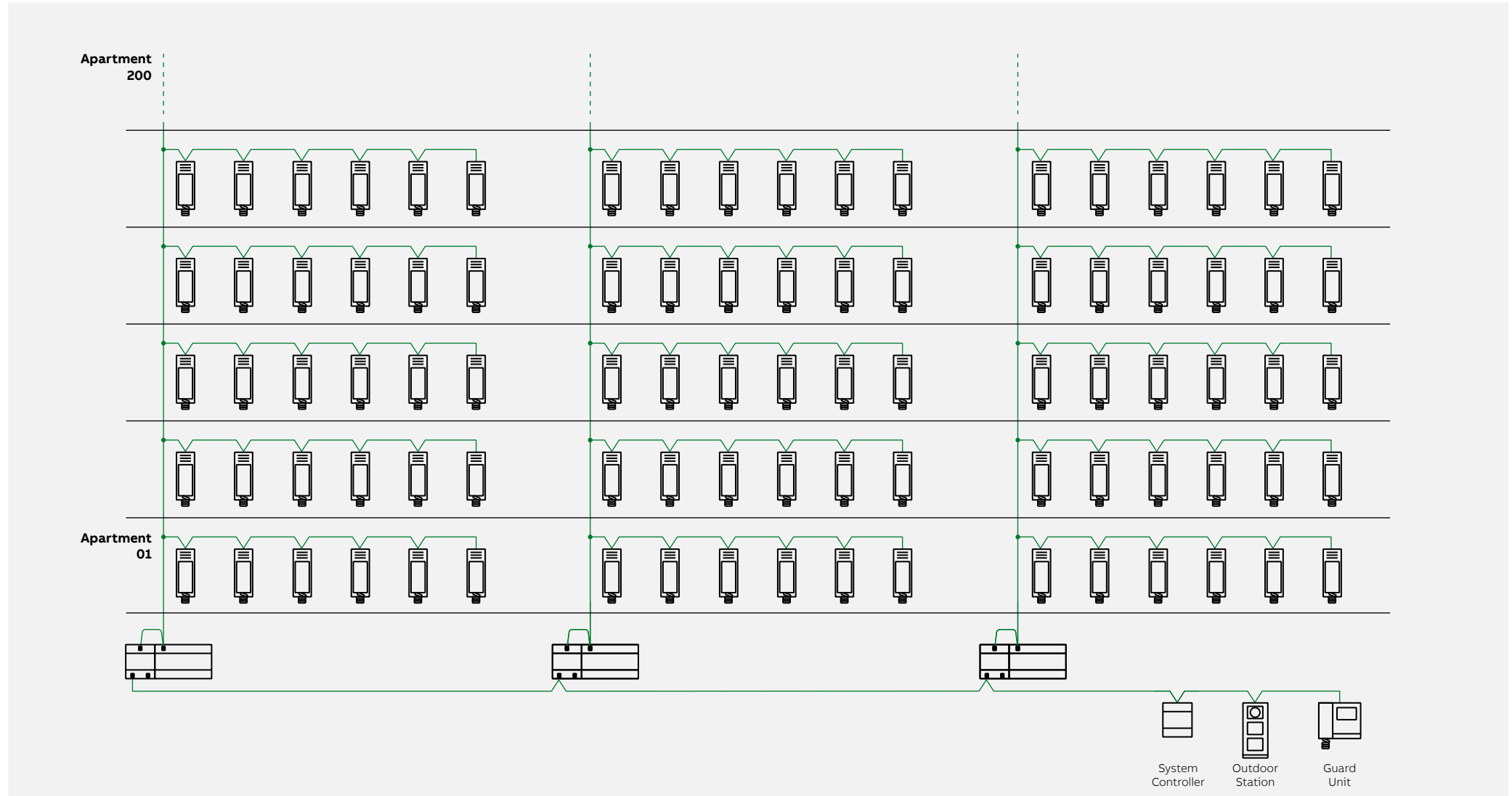
Apartment 200

Apartment 01

System Controller

Outdoor Station

Guard Unit

Access Control
Solution with Welcome (2 wire solutions)

Reference Architecture for Multi-family apartment (Audio & Video)

Apartment 200

Apartment 01

Video Distributor

System Controller   Outdoor Station   Guard Unit
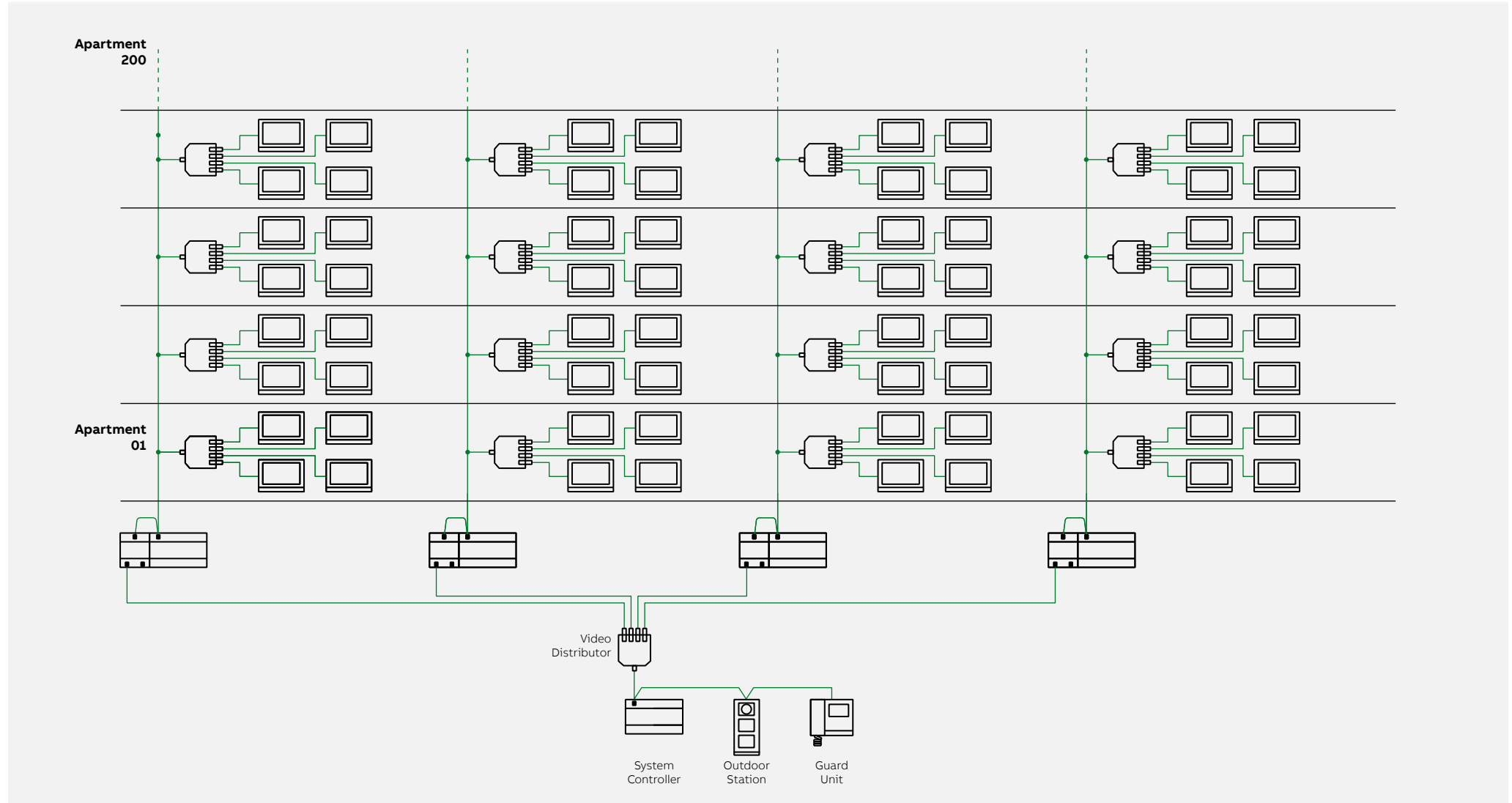
Access Control
Solution with Welcome IP

Reference Architecture for Garden House

8 Apartment Garden House:

Audio
Handset

Audio
Handset

Mini-system
Controller

Outdoor
Station

System
Controller

Outdoor
Station

4.3 inch
Handfree

System
Controller

Outdoor
Station

7 inch IB

Access Control
Solution with Welcome (2 wire solutions)

Reference Architecture for Single Family home
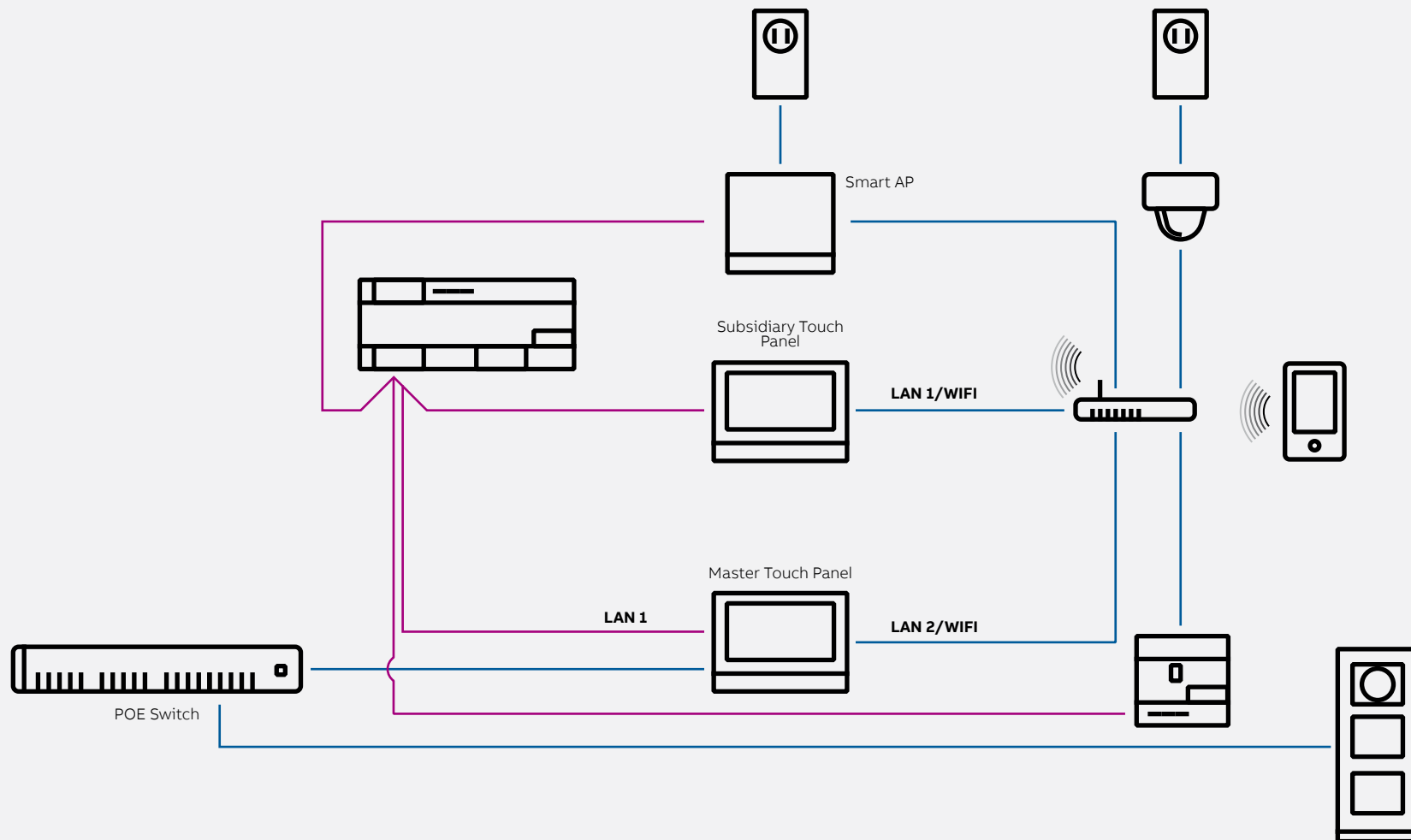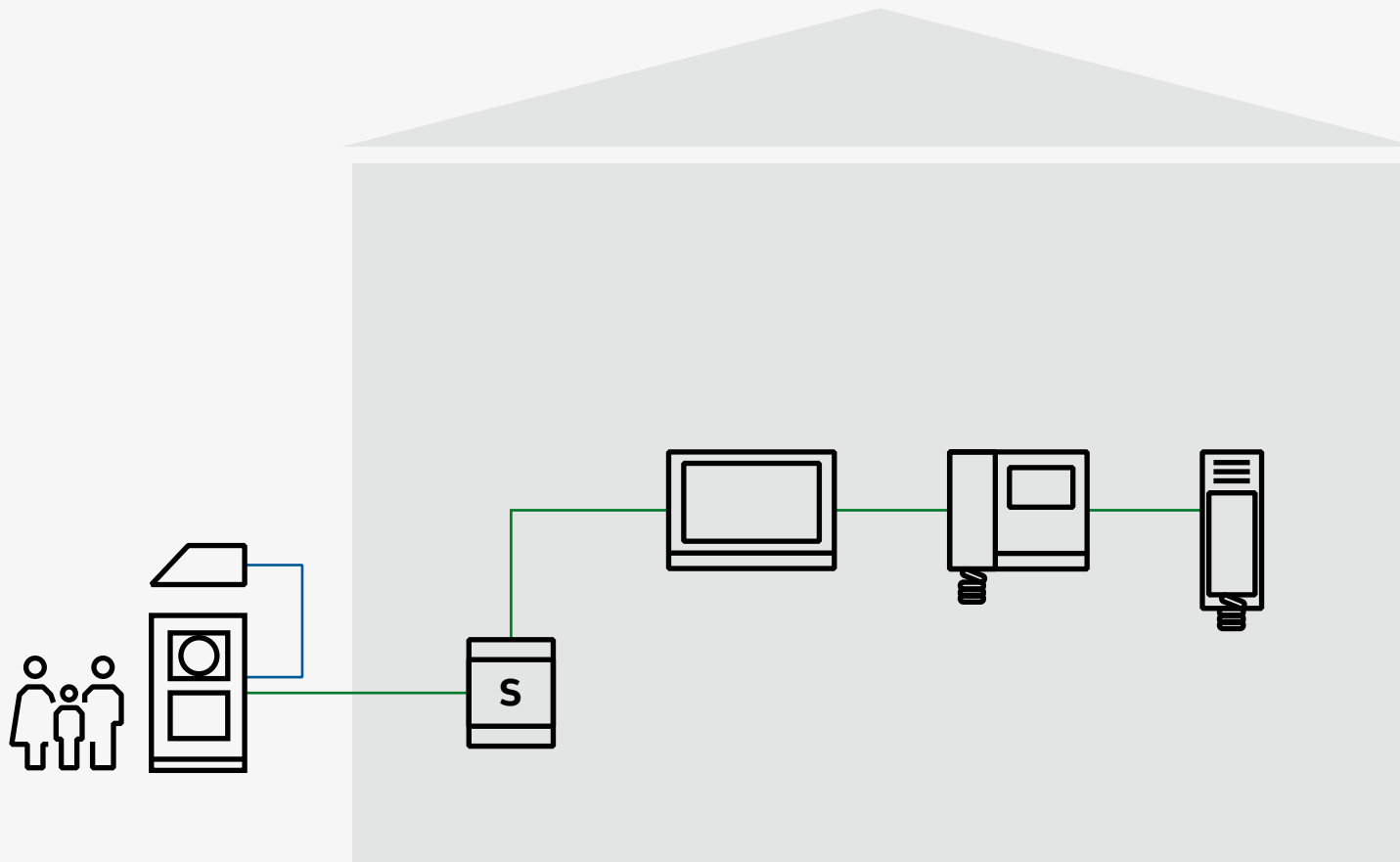
Access Control
Solution with Welcome Access

Access control via digital locking cylinders has long been the system of choice in both single family & multifamily residential building daily life. ABB-AccessControl ensures easy scalability, even for large-scale projects.

ABB-AccessControl comes along with maximum encryption transmission to ensure all cyber security demands. It can be planned as standalone solution or can be easily part of a bigger Building system due to smart connectivity via IP. ABB-AccessControl as professional solution supports remote access and management possibilities that makes people's lives easier, thus for operators and end-users. The MyBuildingportal powered by ABB Ability provides the right and secure remote service.

Features:
- Different lengths to match different door
- Fits EU, US, SWISS, standard with door
- In-built batteries
- Visual and acoustic indication
- Emergency unlock (only for administrator)
- Key fob with various colors
- Remote firmware upgrade
- IP55
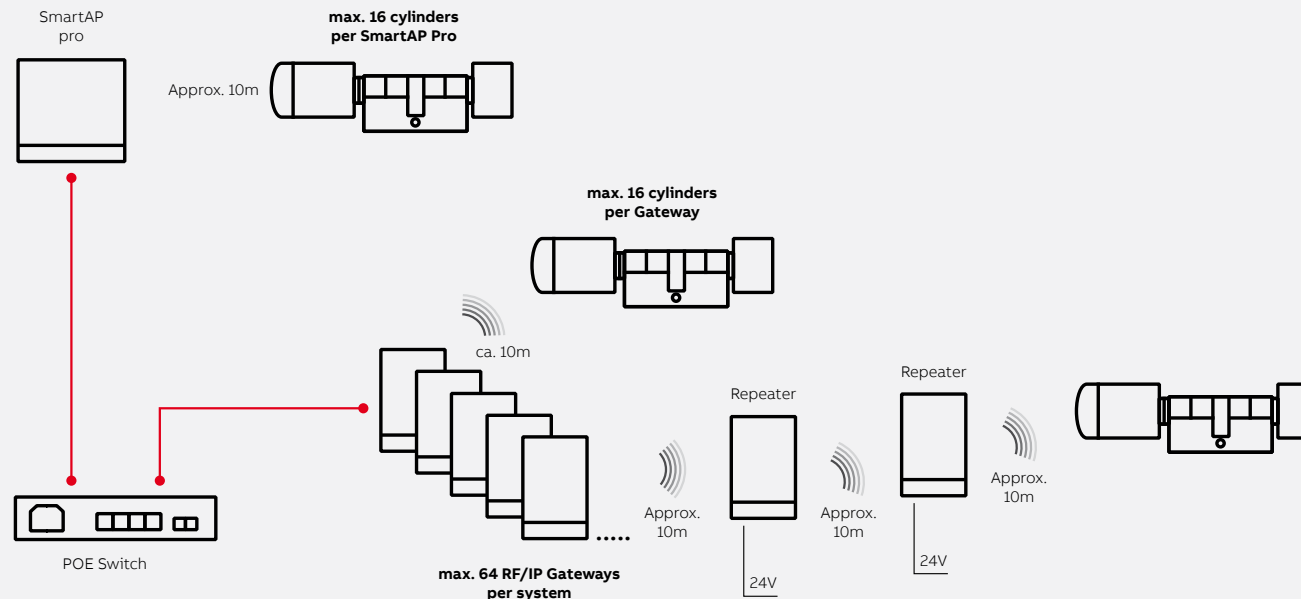
Access Control
Solution with Welcome Access

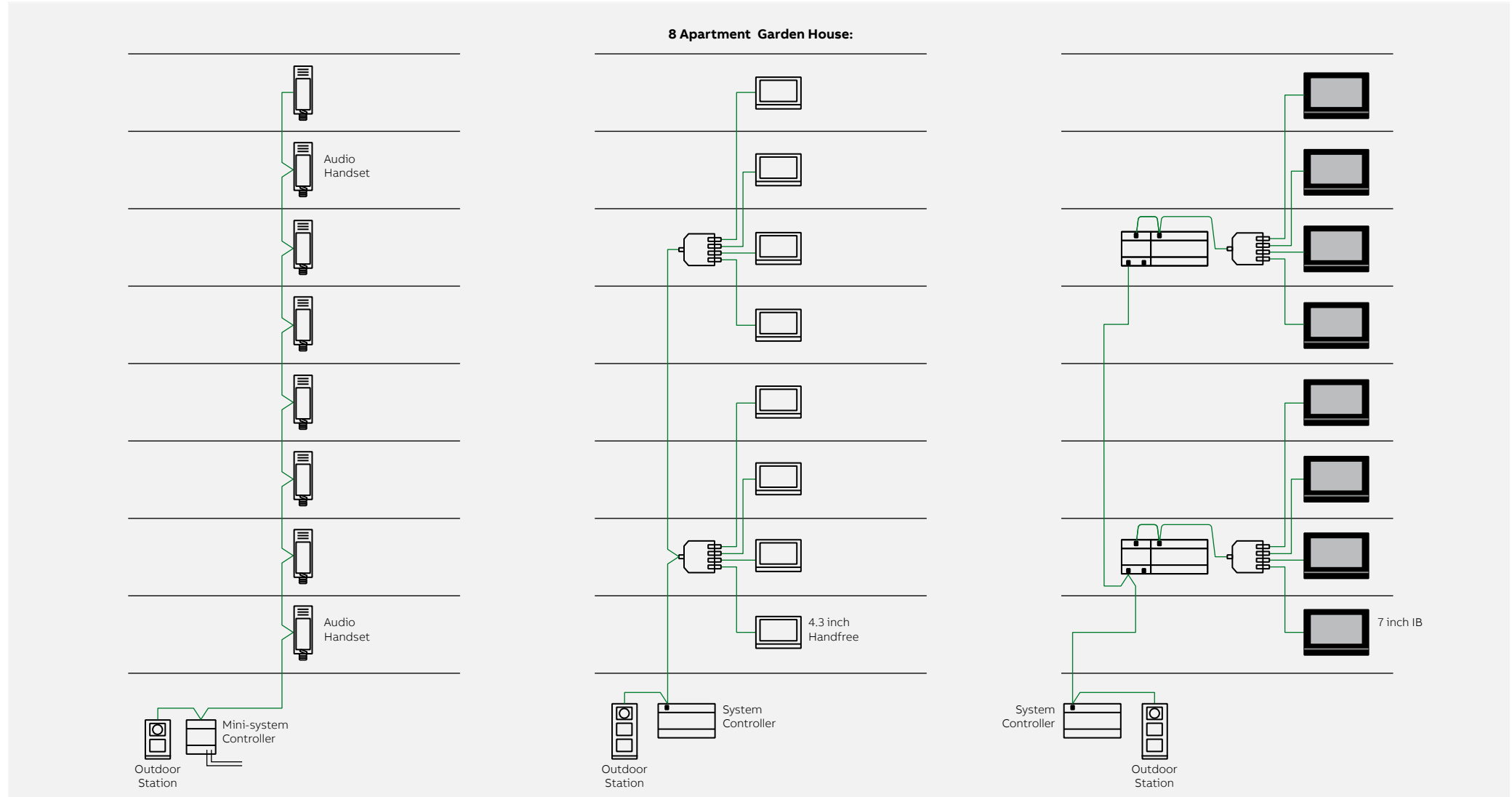**Reference Architecture for Multi-family apartment**
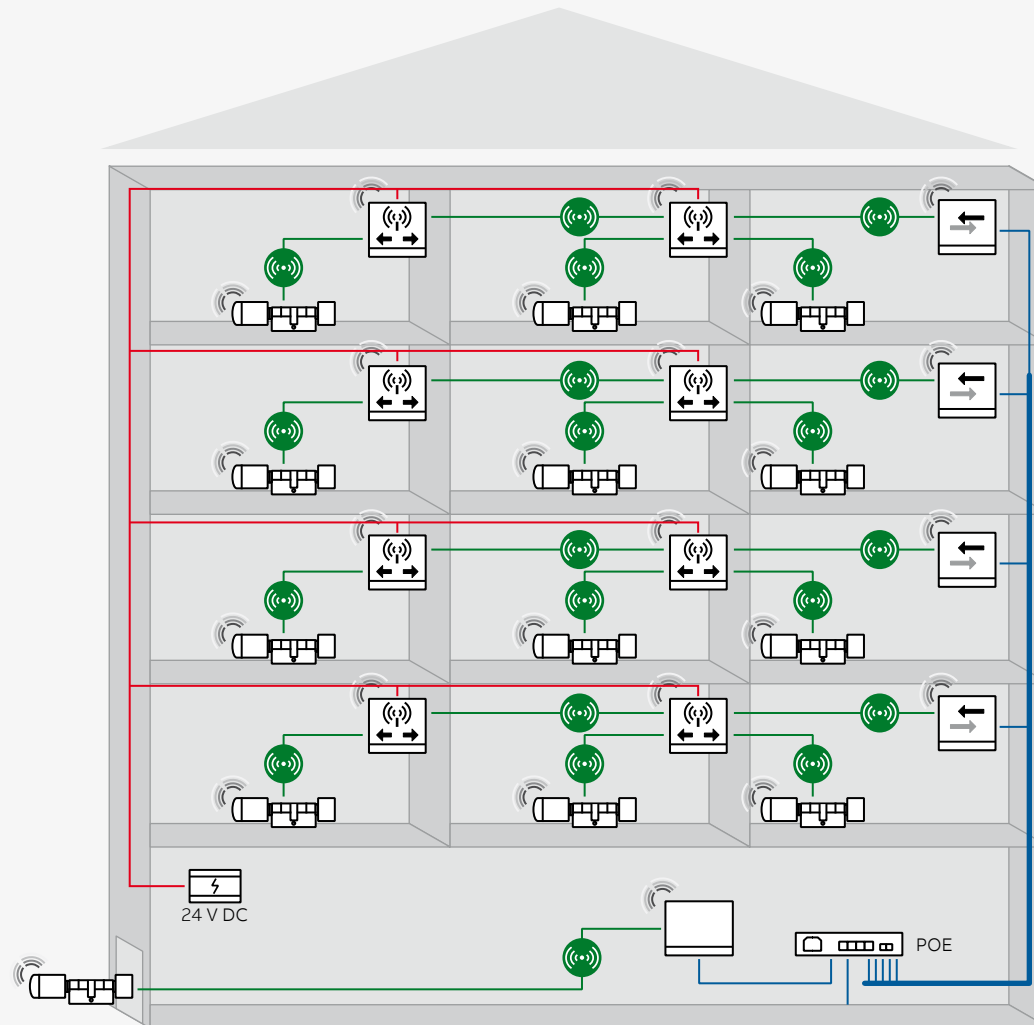
Access Control
Solution with Welcome Access

Reference Architecture for Single Home family
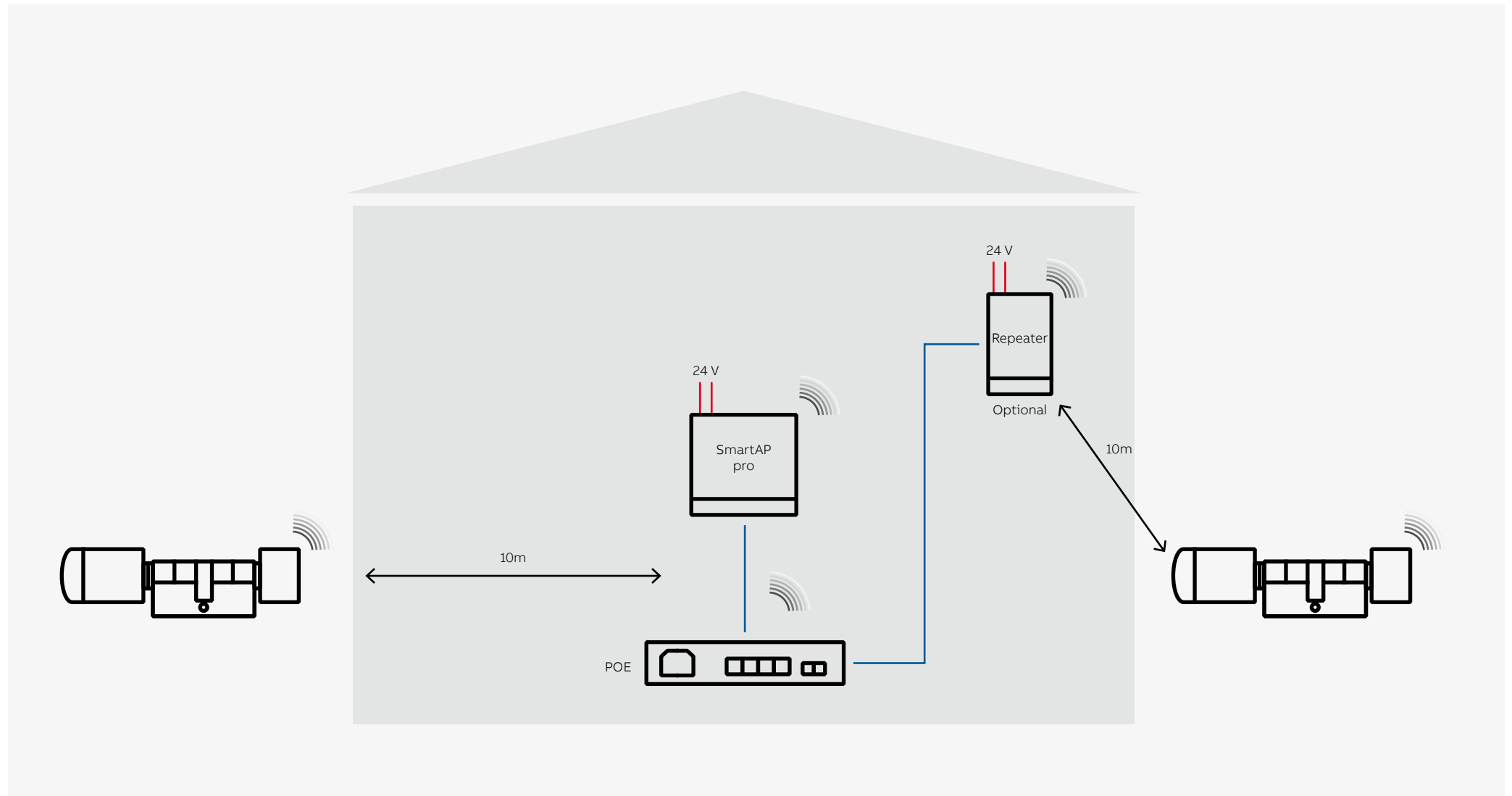
Access Control
Solution with Welcome

Video Indoor Stations

Video indoor stations perfectly match to the requirement of a Smart Home. It enables you to see what is happening in front of your door at any time. That makes your home a secure place. Thanks to the intuitive design, all functionalities are only a touch away, with additional programmable buttons enabling flexible customization to cover all your needs. Depending on the requirements of your smart home, you have the choice between different video indoor stations which differ in size and color but also in the functionalities that they offer.
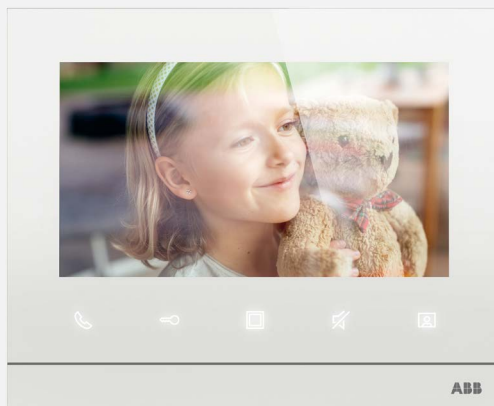
Video Outdoor Stations

Main advantages:
• Easily adaptable to design requirements
• Now the installation of the video door entry communication is easier
• The 5-inch outdoor station makes homes and buildings more intelligent than ever
• The IP platform makes the transmitted images more colorful, brighter and clearere

Main features
• Supports modular snap-in mounting design
• Wide range of installation boxes available
• One screen, all included
• HD quality in the multicommunication channel
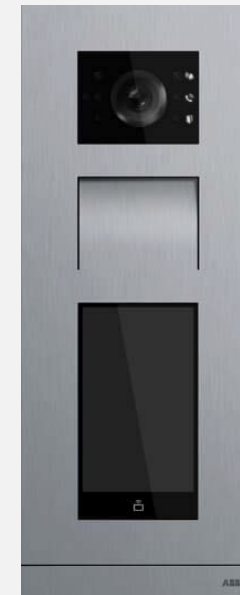
Access Control
Solution with Welcome

IP Actuator

For connecting lock or light
• Up to 2 locks connections
• The switching duration of unlock or switch on lighting is adjustable
• Setting via IP touch panel or PC management software
• DIN Rail mounted
• Remote firmware update
• PoE and local power supplier as an option

AccessControl

ABB-AccessControl as professional solution supports remote access and management possibilities what makes people life easier, thus for operators and end-users.
The MyBuildings portal powered by ABB AbilityTM provides the right and secure remote service.
Every door becomes smart
• Define who is allowed in, when and where
• Your smartphone becomes the key
• Control and open the door from anywhere
• See who opened the door
• Up to 600 doors can be managed centrally
• More then 2000 Users and 64 User groups
• Only ABB Tags (D081WH-0x, D081BK-0x, D081GY-0x) can be used in
• a AccessControl System

Access Control
Bill of Material

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Welcome IP 40 rooms with 2 Outdoor Stations

S.No.	Order Code	Description	Total
D04011		Smart Access Point Lite	1
H82364-W		IP Touch 7, LAN + WiFi	40
H81381T-S		OS, IP Touch 5, Desfire/IC	2
41384F-B		Flush-Mounted Box, Size 1/4	2

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Welcome M 40 Rooms with 2 Outdoor Station

S.No.	Order Code	Description	Total
M2301-101	2TMA210161W0002	Mini-system controller, MDRC	2
M21381K-A	2TMA210010A0051	Video outdoor station, with keypad, with ID card,Aluminum	2
M2300-101	2TMA210161W0001	System controller, MDRC	1
M2304	2TMA070070B0006	Video distributor	3
M22413-W	2TMA210051W0002	Video Indoor Station 7, T-loop	40

Emergency Lighting

The emergency lighting concept of ABB offers reliable and complete solutions for safe evacuation.
The buildings emergency lighting provides 24-7 protection.
ABB solutions provide harmony with the interior and reduced total cost of ownership throughout the building life cycle.

Emergency Lighting

Overview - Motivation & Key Elements

Emergency lighting is a vital and effective life safety tool, providing reassurance and guidance to people at critical times when they need to escape quickly and safely from a building.

Escape route signalization and lighting
- Escape route signalization uses pictograms to show the direction to the nearest (emergency) exit. These exit signs have different geometries, dimensions and colors to comply to local standards
- Escape route lighting illuminates this route to the (emergency) exit so that people can escape safely in the event of an emergency, as there is a high risk of damaging someone when the mains is off. Escape route luminaires can be permanently on or off

Central battery systems or self-contained lighting
- The power system must provide a secure power source in case of emergency to supply the evacuation systems
- A central battery system will normally be located in the basement of the building or in centralized place in each floor

Monitoring, testing and connectivity
- Advanced monitoring systems bring the benefit of a constant 24/7, 365 days per year monitoring scheme
- The automatic testing system comprises the light and the battery duration. Data logging software will keep the test results for up to four years, so that there is evidence to local regulators
- Connected luminaires allows for a remote installation, diagnostic and testing of the luminaires that translates into time and resource savings as well as safer buildings assuring the functionality of each luminaire

Emergency Lighting
DALI Emergency Lighting (Europe)

Integration for safe monitoring in smart buildings DALI emergency lighting from ABB can easily provide a safe and reliable solution to meet smart building emergency lighting requirements. Automatic testing to ensure your building is safely lit. With status information and test reports available to download. Low-cost installation with low-cost maintenance. ABB and DALI: the smart way to install emergency lighting. Ensuring building occupant safety, Touch screen to control, test and monitor emergency lighting. Simple to group and easy to install

Emergency Lighting has dedicated DALI codes for testing, monitoring and reporting of emergency luminaire status.

Function tests
A function test is a test that simulates a mains failure and checks the operation of the emergency light from the battery supply If there is a failure during a function test the local indicator LED changes its status.

Duration tests
A duration test simulates a mains power failure and checks the operation of the emergency light from the battery supply for the rated duration of product e.g. 3hrs

Local testing
Function and duration tests are initiated by the emergency light fitting itself. It performs automatic self-testing according to the locally stored settings.

Central testing
Function and duration tests are initiated by the ELDCS1/DALI if the automatic self-testing is disabled.

DALI Portfolio is suitable in most of the countries in Europe following EN1838, except France, Italy, Russia…. Please verify your local regulation

Advantages of using DALI with emergency lighting

1. Proven DALI technology specific for emergency lighting

2. Our DALI solution is based on non-proprietary systems. As long as all component of a system are DALI compliant, they will be able to communicate with each other

3. Cost-effective solution with reduced maintenance costs after commissioning

4. With the addiction of the ABB gateway, we can connect our DALI luminaires with KNX systems and BMS

5. DALI (DHA) Certified

Emergency Lighting
DALI Emergency Lighting (Europe)

Reference Architecture

Emergency Lighting
DALI Emergency Lighting (Europe)

Reference Architecture

Emergency Lighting
DALI Emergency Lighting (Europe)

DALI Control Unit (DCU)

- Ensuring building occupant saferty
- Touch screen to control, test and monitor emergency lightning
- Simple to group and easy to install

Escape Route Lights

- Compatible with DALI control unit to control, test and monitoring emergency lighting
- Injection moulded - high grade polycarbonate body ang geartray of aluminium die cast
- Specially designed lens for optimised light distribution
- Modular, First-Fix installation

Emergency Lighting
DALI Emergency Lighting (Europe)

Naveo®Pro

Naveo®Pro ensures to maintain and record the health status of emergency lighting in all types of buildings. Naveo®Pro is a way to install, monitor and maintain emergency lighting systems with the mobile device. The system provides a digital overview via the cloud, giving instant information to assist resource planning and enhance building safety.

Emergency luminaires can be easily installed and programmed into a building in a fast and intuitive way, offering various functionalities to reduce time and costs on inspection and maintenance.

Being part of the ABB Ability™ platform, this solution offers uncompromised cybersecurity and allows secure integration of data that enables key benefits for all users of the system.
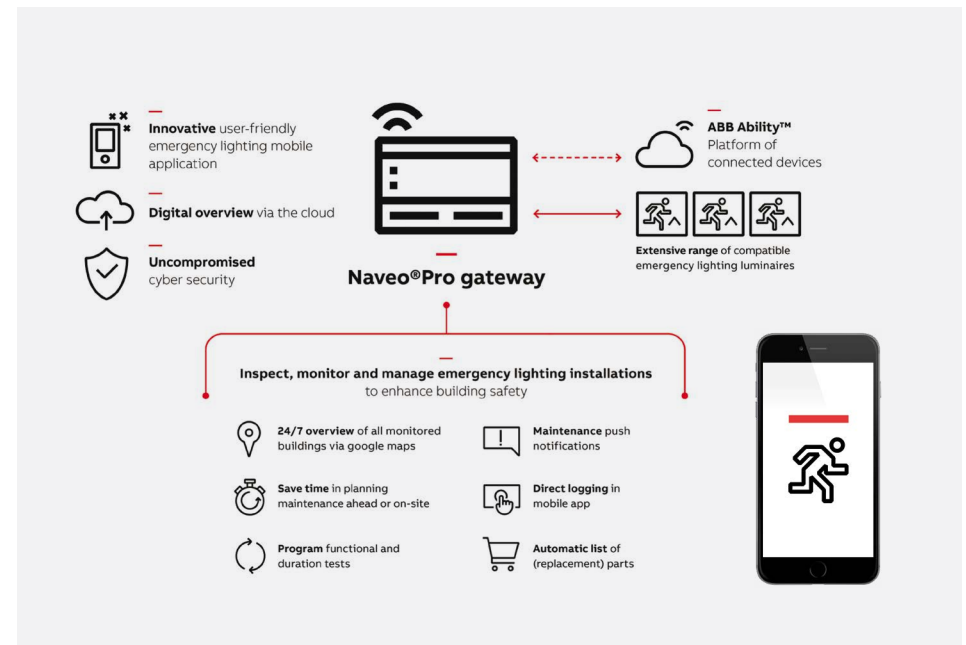
Emergency Lighting
DALI Emergency Lighting (Europe)

Naveo®Pro Gateway

Naveo®Pro being connected all the time, your emergency lighting system is always fully up to date. You can easily set up the connection. The Gateway continuously receives all luminaires data and pushes this information   to the Naveo®Pro app.
On continuous request from the cloud the Gateway automatically sends all (test) data to the Naveo®Pro app. With Naveo®Pro you   are therefore constantly in touch with your system status anytime and anywhere.

Naveo®Pro Gateway connects your emergency lighting to the Cloud
The Naveo®Pro Gateway is an IoT Gateway designed to deliver connectivity to all types of installations. The gateway acts as a networking device that connects the emergency lighting luminaires with the data stored in the cloud. The gateway is at all times connected to the cloud providing a realtime status of your safety systems.

02 The Naveo®Pro Gateway.

03 ABB offers an extensive range of compatible luminaires.

02

03

Naveo®Pro system components

Order Code	Description
51000040	Naveo®Pro GW 1.0
758740	Naveo®Pro Gateway mounting plate
51000041	Naveo®Pro GW 1.0 wired and iPad wifi
51000042	Naveo®Pro GW 1.0 wired and iPad cell
758730	Naveo®Pro antenna 5 GHZ wifi

Extensive range of compatible luminaires
ABB offers a broad range of lumminaires which are compatible with the Gateway and can enable your system to join the internet of things with all the benefits that an app and the Cloud can bring.

Emergency Lighting
Nexus®Pro (USA and Canada)

Reference Architecture

Nema4X and Steel	ABB Gateway	Router	ABB Cloud	App

EML Comm module   EML Charger board   EML battery

iOS App
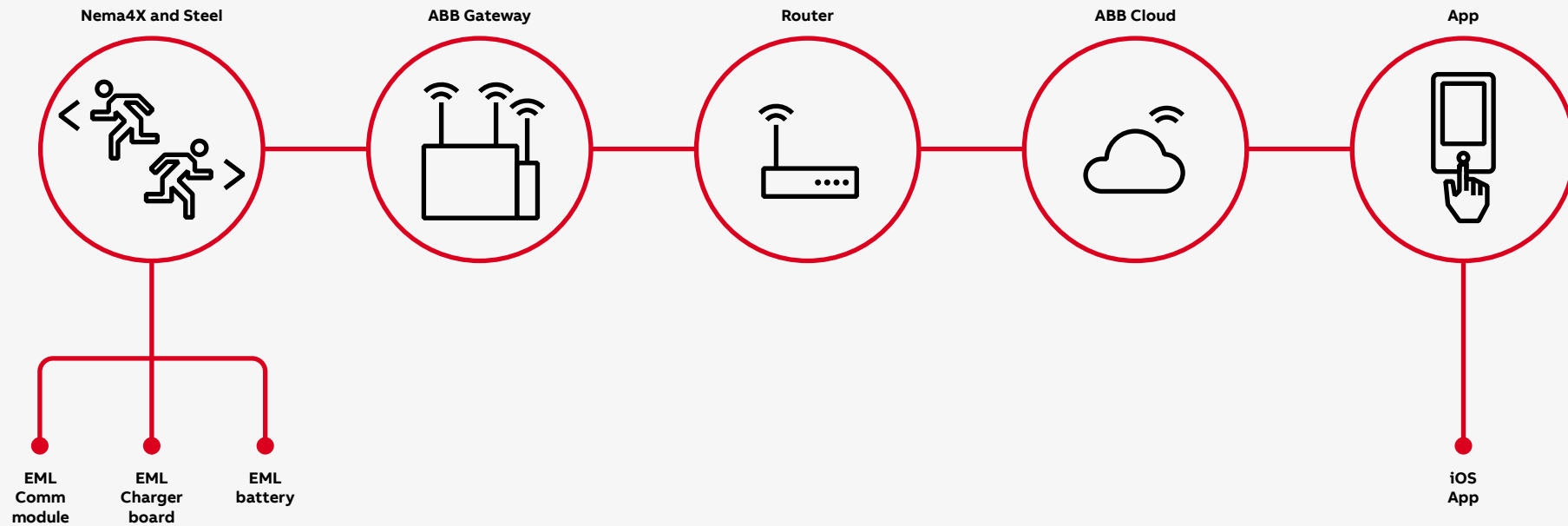
Emergency Lighting
Nexus®Pro (USA and Canada)

Building owners or managers cannot afford uncertainty when it comes to their building safety including their emergency lighting fixtures that need to be working properly so that people can easily be guided out to safety in case of an emergency evacuation. With the Nexus®Pro system, you can concentrate on what matters: letting your smart emergency lighting system manage itself and reduce monitoring and testing times. This will quickly reduce maintenance costs, allowing you to focus on problems quickly and as they happen right from your smart device.

Safety and protection
Reduce human error while enhancing safety for all building occupants by meeting code and compliance and 24/7 monitoring.

Cost-saving
Simple, user-friendly app makes emergency lighting management easier and more efficient while reducing maintenance costs.

Robust cybersecurity
Wireless ABB Gateway keeps fixtures secure with Bluetooth mesh technology to exchange data between emergency lighting devices.

Remote monitoring
Designed to easily maintain and test emergency lighting right from your smart phone, without the need to visually verify performance or disrupt the power supply.

Scalable and flexible
Gateway can establish a secure wireless connection with up to 200 units. Available offering for institutional, architectural, healthcare and industrial applications.

Nexus®Pro Value proposition:

Set-Up
Easily install and add new devices on your building through a or map

Maintain
Defective devices are automatically and reported on your interface in addiction to push notifications

Test
Run test instancly or program them to ensure that all your devices are working property

Share
Easily share the results of tests with team members, maintenance staff and technicians

2d floorplans make it easier to find emergency lighting devices that are not functioning

Schedule tests in advance and get reports sent straight to your smart devices

Get push notifications sent to your smart device when malfunctions

Emergency Lighting
Nexus®Pro (USA and Canada)

Nexus Pro Gateway

IoT Gateway designed to deliver Bluetooth® Mesh connectivity Gateway can be connected wired or wirelessly to WiFi Routers.

Nexus Pro Luminaries

Nexus®Pro is compatible with various emergency lighting devices. Based on the type of environment, you can select the right device for your application. Each device is equipped to act as a node in the Bluetooth mesh network.

Central System

Provide emergency power for multiple lighting units at a remote distance meeting the unique needs of emergency lighting loads with a high-efficiency pure sine wave inverter. Additionally minimizes maintenance and automates code compliance with optional advanced diagnostics and NEXUS® wired and wireless central monitoring system compatibility.

Emergency Lighting
EML-Central Battery (EMEA)

Reference Architecture

Internet/Intranet
Router/Firewall

Ethernet BACnet IP

EMEX CBS
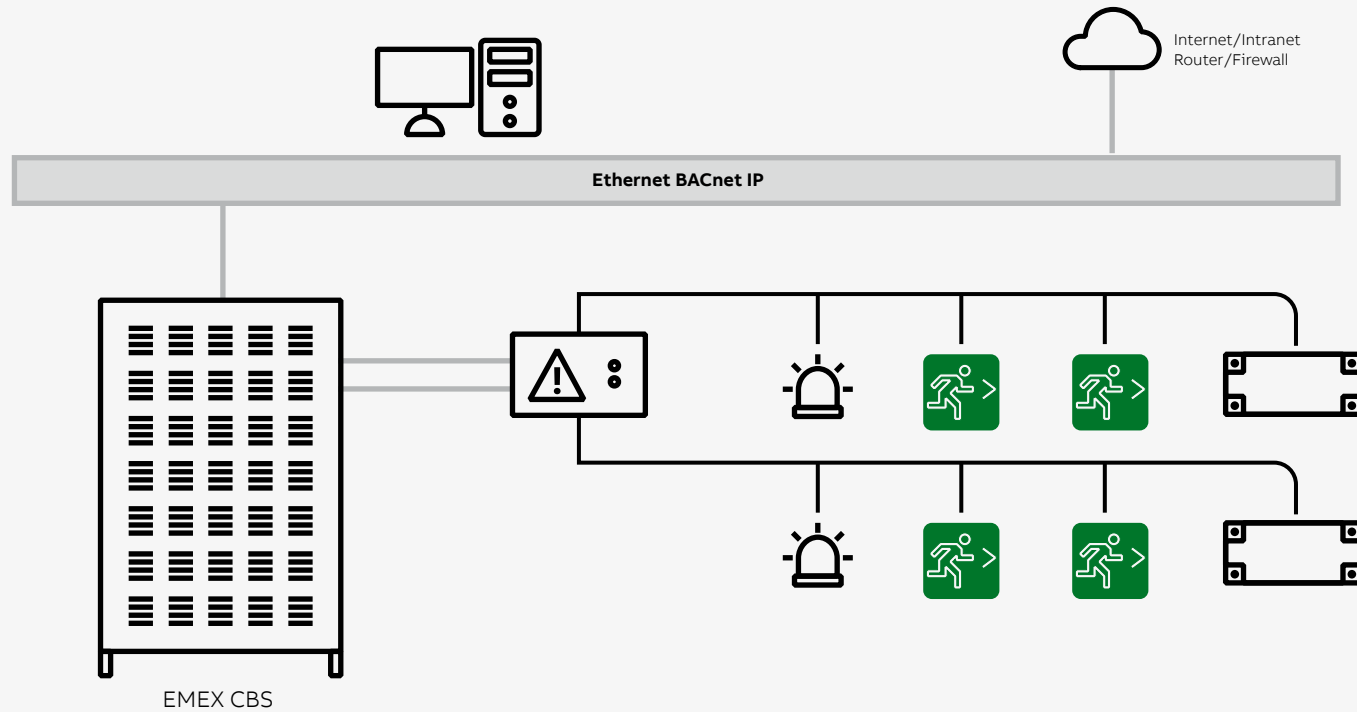
Emergency Lighting
EML-Central Battery (EMEA)

Reducing your total cost of inspection & maintenance
In addition to our portfolio of dedicated emergency lighting products, we offer a comprehensive range of central power supply systems that offer advantages for specific building types where inspection & maintenance time is critical and needs to be minimized.

With our central power supply system's, we offer reliable and high-quality products for AC/AC applications with advanced commissioning and testing functionality for easy operation

Static Inverter Systems (AC/AC)
Static Inverter Systems (AC/AC) Static inverter systems operate in a similar manner to AC/DC Central Power Supply Systems, with the exception that the system constantly gives a 230V AC output.
The advantages of this approach are numerous. Firstly, luminaires do not need to be converted, as any slave 230V luminaire can be used (there are some restrictions to this on the grounds of suitability for emergency lighting). Luminaires also operate at full light output, as they are being fed from a full mains voltage supply, meaning fewer luminaires are required for equivalent light outputs.

Advantages:
• Suitable for medium to large installations.
• Almost any luminaire may be used
• Easy to maintain • 10-to-25-year design life batteries
• Distribution is standard 230V AC (standard DBs)
• Reduced volt-drop problems on output cabling
• Luminaires operate at full light output • Ideal for modern LED lighting installations to capitalize on energy reduction

Constraints
• Bigger systems are physically large and may require a special battery room
• Smaller installations are ideal for EMEX mini-installations (See EMEX mini section for suitable solution)

Reference Projects:
• Riyadh metro - Saudi Arabia,
• Oman Hospital
• Doha Marriot Hotel – Qatar…

Product line Emergi-Lite

Emex Mini	**Emex Power**	**Emex 110**	**Emel**	**Emex Test**	**Guideway Serenga Weatherforce Navigator compact**	**Serenga 2**	**Hy-LED**	**Silver-Scape Weatherforce**	**Cordona Camarque**
Space saving & high performance central power supply system	Modular AC/AC central power supply system	110 volt AC/AC power supply system	110, 50 & 24 volt AC/DC central power supply system	Introduction					

Emergency Lighting
EML-Central Battery (EMEA)

Layout schematic - MXD4 substations

Seventh Floor

Max 5A (200 meters)
Max 5A (200 meters)

MXC substation

| Mains/EM | Mains/EM | Mains/EM | Mains/EM | Mains/EM | EXIT | Mains/EM | Mains/EM | Mains/EM | EXIT | Mains/EM | EXIT |

Maintained   Maintained   Maintained

On   Off

First Floor

MXC substation

| Mains/EM | Mains/EM | Mains/EM | Mains/EM | Mains/EM | Mains/EM | Mains/EM | Mains/EM | Mains/EM | EXIT | Non/Maint |

Maintained

On

Plant Room

Em lighting DB   Lighting DB

EMEX CBS   EMEX CBS

Incoming mains supply

Connection from LON or BacNet

Control Room

PC

■ AC Power
■ Data
■ Local inputs

6°
2°

Emergency Lighting
EML-Central Battery (EMEA)

Layout schematic - MXC substations

Emergency Lighting
EML-Central Battery (EMEA)

Omit Blue for Standard non dim operation

Dimming Controler

Dimmer Control Power Supply

Dimming Signal DALI/DSI/0-10 V etc.

General Lighting mains combined emergency

Standard Lighting Switch if applicable

E

Dimmable Ballast

General Lighting Distribution Board

Unswitched Supply

Multiple Monitored Inputs 5, 10, 15, 20 Way available

Length >1m Must be Fire rated

Change Over Relay

General Distribution Board

E   E   E

Non-Maintained Emergency

HOR/SCM

10 Way Emergency Lighting Distribution Board

Fire Resistant Cable

FP200 2CORE

Emergency Distribution Board

AC/AC Static Inverter System

E   E   E

Maintained Emergency

10 Way Emergency Lighting Distribution Board

Emergency Lighting
EML-Central Battery (EMEA)

LAMP

230 V ~

SWITCH LIVE

PERM LIVE

NEUTRAL

1

SI230DIM

L N	UNSWITCHED MAINS
L N	SWITCHED MAINS

OUTPUT TO LIGHT	L N

EMERGENCY LIGHTING SUPPLY	L N
	DIM DIM

3

| L | MAINS |
| N | INPUT |

HF BALLAST

| + | DIMMER |
| − | INPUT |

| 1 |
| 2 |
| 3 |
| 4 |

2

L E N

STATIC SUPPLY

4

FROM DIMMER

NOTES

1 Switched supply from light switch, and permanent supply providing local circuit monitoring

2 Permanent supply from static inverter

3 Output to lamp control gear

4 Dimmer in/out - if dimmer is used

Emergency Lighting
EML-Central Battery (EMEA)

Installation types – Automatic Installation

General mains Lighting

Emergency Lighting

General Lighting Distribution Board

Unswitched monitored Supply

Switched Input

MXD4/8

E

E

E

E

4 way outputs up to 4 luminaires

FP200 2CORE

FP200 2CORE

General Distribution Board

FP200 DATA INDEPENDENT DEDICATED 2 CORE NETWORK CABLE

Emergency C7W LTC conversion

max. 20 Luminaires

E

E

E

AC/AC Static Inverter with Emex Touchscreen PC

Emergency Distribution Board

Unswitched monitored Supply

Switched Input

MXC

Radial 1

Radial 2

DATA FP200 2CORE

E

E

E

max. 20 Luminaires

to next emergency

Emergency Lighting
Bill of Materials

The bill of material for all luminaires and required accessories in the reference architecture is sum-marized in the following table:

Part Code	Ref	
Central Power System		
ELD9310.060X		EMEX Power 6KVA 5100W 3 Hour Single Phase In/Out.
ELD9310.060B		Battery Kit for The Above System
Commissioning (1 Central Power Systems and 309 Luminaires)		
UK-EML-COMM (7TCA308010R0026)		Commissioning Days
UK-EML-O/N (7TCA308010R0031)		Commissioning Overnight
UK-EML-TRAV1 (7TCA308010R0029)		Travel 1
EMEX Test Components		
ELD9500.030		MXC Addressable Sub-Station, 2 x 5A Outputs
C-LTC70HF		Integral LTC Addressable Interface 13 – 70W, Conversion by ABB
C-LTC70HFRW		Remote LTC Addressable Interface 13 – 70W, Conversion by ABB
C-LTC230HF		Integral LTC Addressable Interface 230W, Conversion by ABB
C-LTC230HFRW	C1E. C2E, DE, NE, EXT BE, EXT FE	Remote LTC Addressable Interface 230W, Conversion by ABB
Slave & LTC Emergency Luminaires		
OW1L261LTC	EXIT (IP65)	Aqualux 230v AC IP65 EMEX Test Surface
XEN2W	EXIT (IP65)	Aqualux ISO7010 Format Arrow Down Legend
EG1LS1LTC-S22	EXIT	Guideway 230v AC 22M IP40 EMEX Test Surface/Wall
XEN2EG22	EXIT	Guideway ISO7010 Format Arrow Down Legend
XEN5EG22	EXIT	Guideway ISO7010 Format Arrow Up Legend
XEN3EG22	EXIT	Guideway ISO7010 Format Arrow Left Legend
XEN6EG22	EXIT	Guideway ISO7010 Format Arrow Right Legend
SR2-DAD-230LT	EAR	Serenga 2 230v AC Open Area IP42 EMEX Test Recess
SR2-DEA-230LT	EER	Serenga 2 230v AC Escape Route IP42 EMEX Test Recess
SR2-SA230LT-D1	EAS	Serenga 2 230v AC Open Area IP54 EMEX Test Surface
SR2-SE230LT-A1	EES	Serenga 2 230v AC Escape Route IP54 EMEX Test Surface

EV Charging

An electric vehicle charging service lays the foundations for a future of smarter, reliable, and emission-free mobility, accessible by everyone, everywhere.
ABB charging infrastructures can offer an efficient solution at all levels, for both short- and long-term stays.

EV Charging

MV

Integrated
with solar

Integrated
energy storage

LV

Permanent o relocatable
electrical infrastructure solutions

Terra
DC

Terra
AC

Daisy
Chain
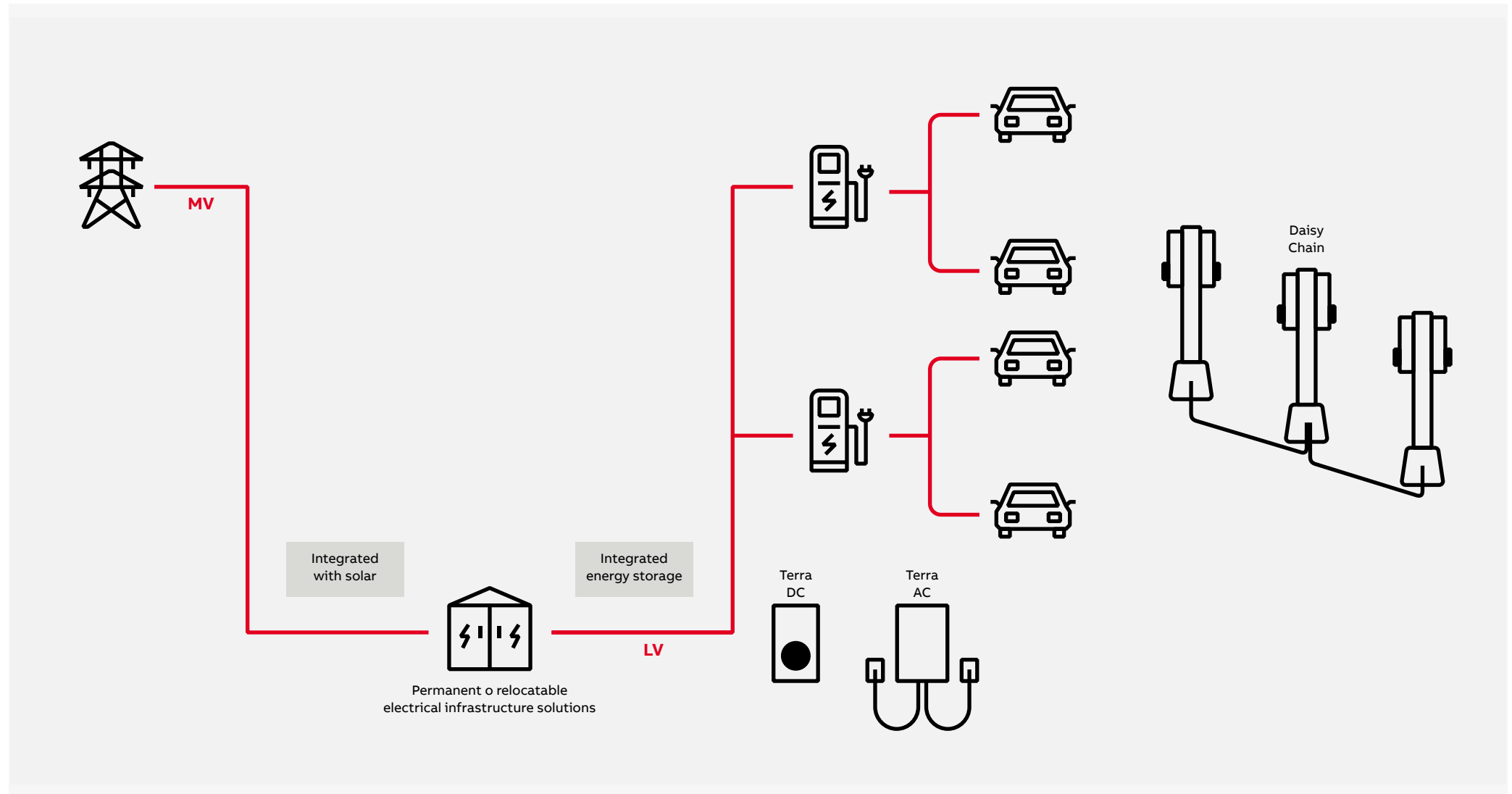
EV Charging
TERRA AC Wallbox

Terra AC wall box enables a slow charging perfect for employee cars.

The Terra wallbox can be connected to the internet via GSM, WiFi or LAN for perfect integration into smart building system and configuration via app. Simplified authentication via either RFID or App provides flexibility for public-use case applications.

Protection and safety of power supply are ensured by System Pro M compact protection devices and OT switches. Consumptions are kept under control thanks to Insite Pro M and energy meters that perfectly integrates into ABB Ability Energy and Asset Manager. For what concern status and consumption of eV chargers, an intuitive overview is available on website.

Explore the technical features of the Terra AC wallbox

Load management
- Build-in energy meter
- Set up for external energy meter integration for dynamic load management
- Ready for integration with advanced smart building energy system

Built-in safety
- Overcurrent
- Overvoltage and undervoltage
- Ground fault
- Surge protection
- PE (protective earth) continuity monitoring

Connectors
- Type 1 and type 2 cable
- Type 2 socket with or without shutter
- No need of extra hook, attached cable can be wrapped around the charger

Design
- IEC variants:
  – Single phase up to 7.4 kW / 32A
  – Three phase up to 22 kW / 32 A
- UL variants up to 19 kW / 80 A
- NEMA 3 enclosure
- All variants: IP54, IK10

Connectivity
- Ethernet RJ45
- Bluetooth
- Wifi
- 4G variants
- RS485 for connection to energy meter
- OCPP 1.6
- Authentication via ChargerSync™ app and portal or RFID
- Configuration through TerraConfig app and portal
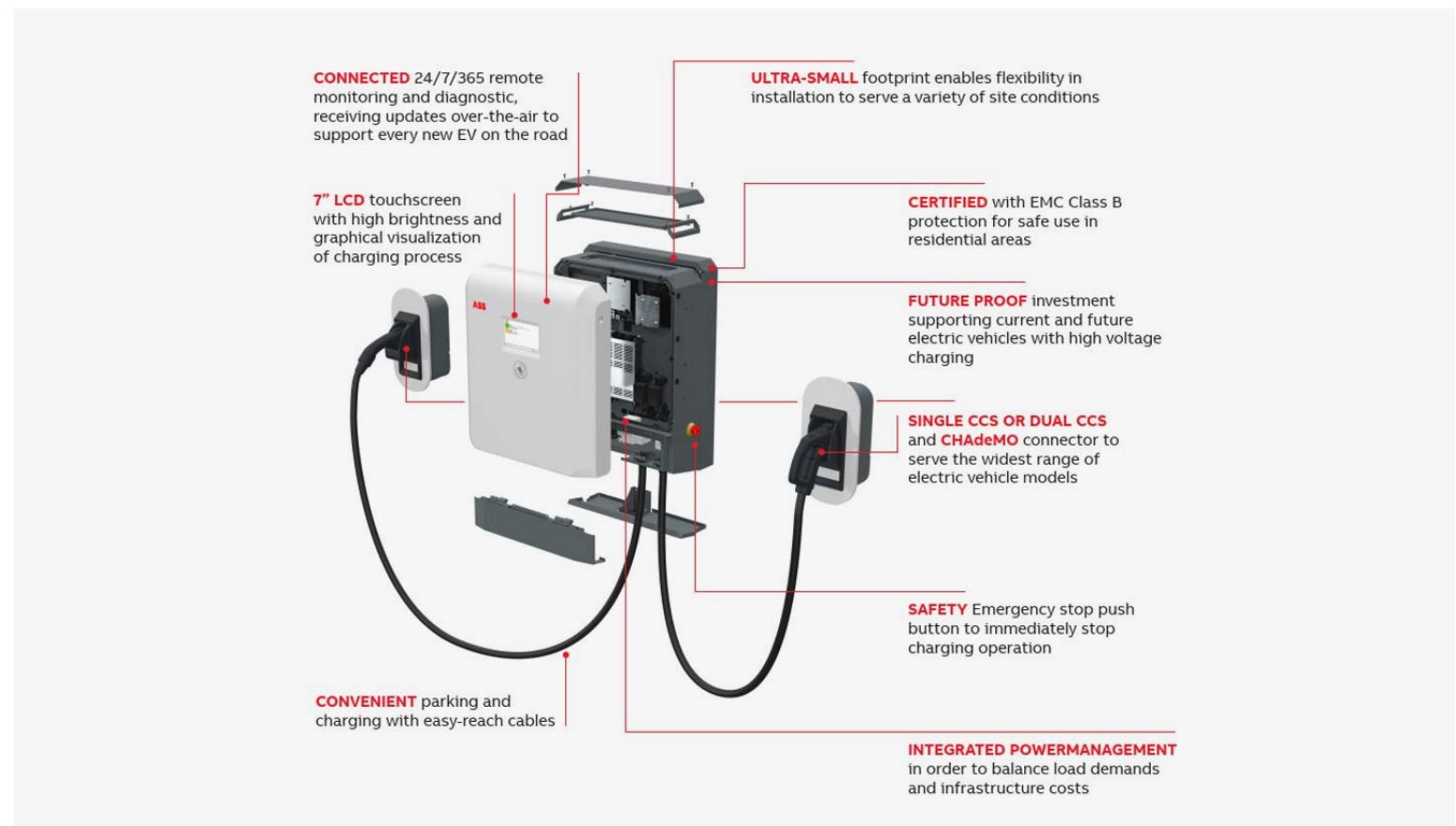
EV Charging
TERRA DC Wallbox

Destination DC offers a faster charging level than what AC chargers can typically achieve, but has a lower power, footprint, installation and investment cost than higher power DC fast charging systems often seen around metro regions and across highways.

Destination DC chargers usually offer 20-24kW in power rating, which falls efficiently between the typical 7-11kW charging power delivered by an AC charger yet below the 50kW to 350kW provided by public DC fast charging stations.

Terra DC wallbox is a futureproof investment supporting current and future EVs with high voltage charging, applicable to a wide variety of use cases, in an ultra-compact footprint, that is safe and reliable.

Main benefit
• Futureproof investment supporting current and future EVs with high voltage charging
• Space-savings with easy-to-install design
• Broad range of connectivity options
• Remote software updates

CONNECTED 24/7/365 remote monitoring and diagnostic, receiving updates over-the-air to support every new EV on the road

7" LCD touchscreen with high brightness and graphical visualization of charging process

ULTRA-SMALL footprint enables flexibility in installation to serve a variety of site conditions

CERTIFIED with EMC Class B protection for safe use in residential areas

FUTURE PROOF investment supporting current and future electric vehicles with high voltage charging

SINGLE CCS OR DUAL CCS and **CHAdeMO** connector to serve the widest range of electric vehicle models

SAFETY Emergency stop push button to immediately stop charging operation

CONVENIENT parking and charging with easy-reach cables

INTEGRATED POWERMANAGEMENT in order to balance load demands and infrastructure costs

EV Charging
Bill of Materials

The bill of material for all luminaires and required accessories in the reference architecture is sum-marized in the following table:

Purpose	Type	Order Code	Description	Qty	Additional information / assumptions:
Active Energy manager					
Terra AC Charger (IEC)	Terra AC W22-S-R-0	ABB6AGC082589	Socket, type 2	80	80 chargring points
Cable 5 m, type 2	Terra AC W22-G5-RD-MC-0	ABB6AGC081285	RFID, 4G, daisy-chain ethernet	80	80 chargring points
Terra AC Charger (UL)	Terra AC W7-P8-RD-MD-0	ABB6AGC081289	Cable 25 ft (7.6 m), type 1 RF	80	80 chargring points

Motor & Variable Speed Drives

ABB drives are flexible to optimize all processes and control, and reliable for less downtime.
Applications such as air handlers, water pumps, cooling towers and chillers - all use electric motors that ABB
variable speed drives (VFD) for HVAC, which ensure they run in the most efficient and reliable manner.
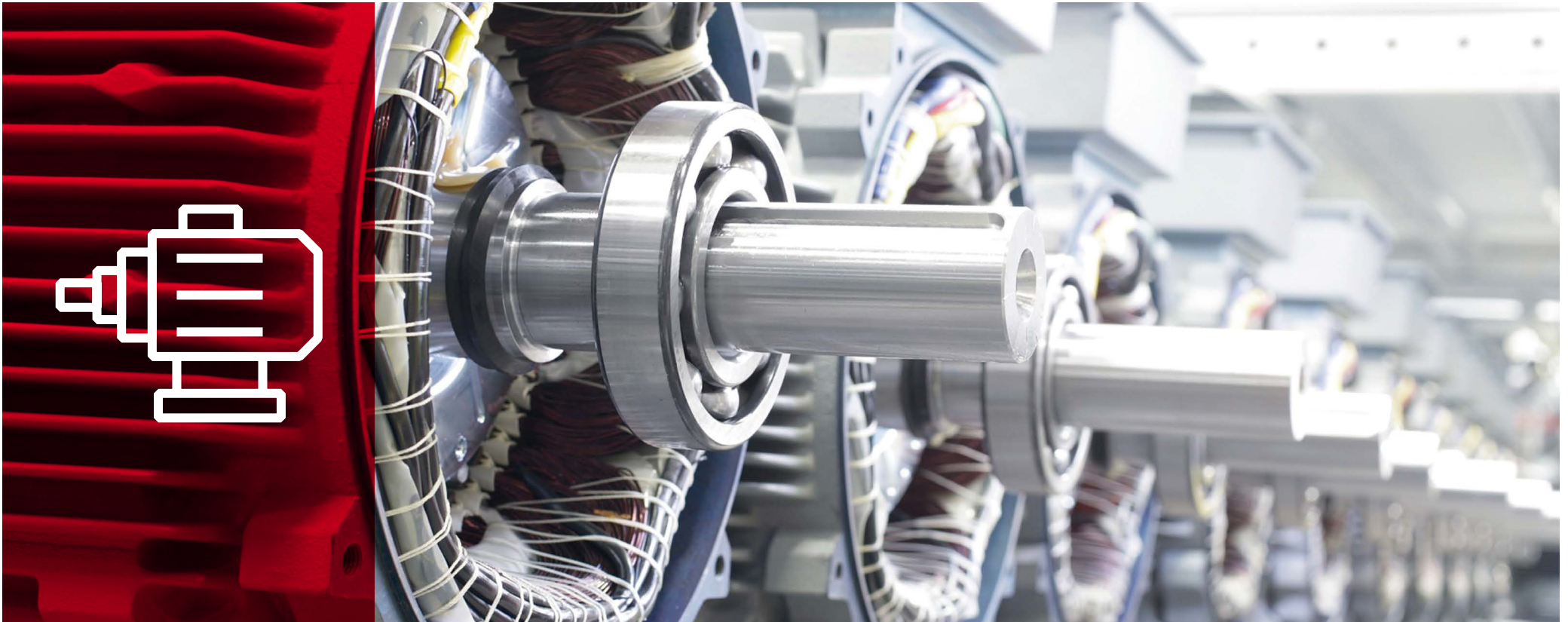
Motor & Variable Speed Drives

Overview - Motivation & Key Elements

Heating, ventilation, and air conditioning (HVAC) systems have a significant impact on both comfort and costs in any building. Modern residential multi-family buildings require smart HVAC systems that create comfortable, healthy, and safe environments for the occupants, while minimizing energy consumption and increasing sustainability.

ABB's variable speed drives for HVAC help save on average 20 to 60% of energy. Receiving the information from (Cylon) controllers /temperature, humidity, or CO2 sensors, they adjust the motor speed of fans, pumps, and compressors to a current residential building need.

- comfort of the occupants
- healthy environment thanks to supplying fresh air and keeping CO2 concentration low
- reduced fan motor noise and resonance control for increased comfort
- smooth start/stop of HVAC applications to reduce mechanical and electrical stress of the equipment to increase its lifetime and ensure HVAC process continuity
- filter clogging detection to ensure fresh air and avoid extra energy losses in the system
- application performance monitoring to alarm about possible upcoming failure so preventive measures could be taken
- seamless integration into any BMS with extensive support of all common building automation protocols including Modbus and BACnet

Fireman's override feature making ventilation applications ignore faults and warnings during emergency and run until destruction ensuring smoke extraction and evacuation route maintenance if possible, for the resident's highest safety.
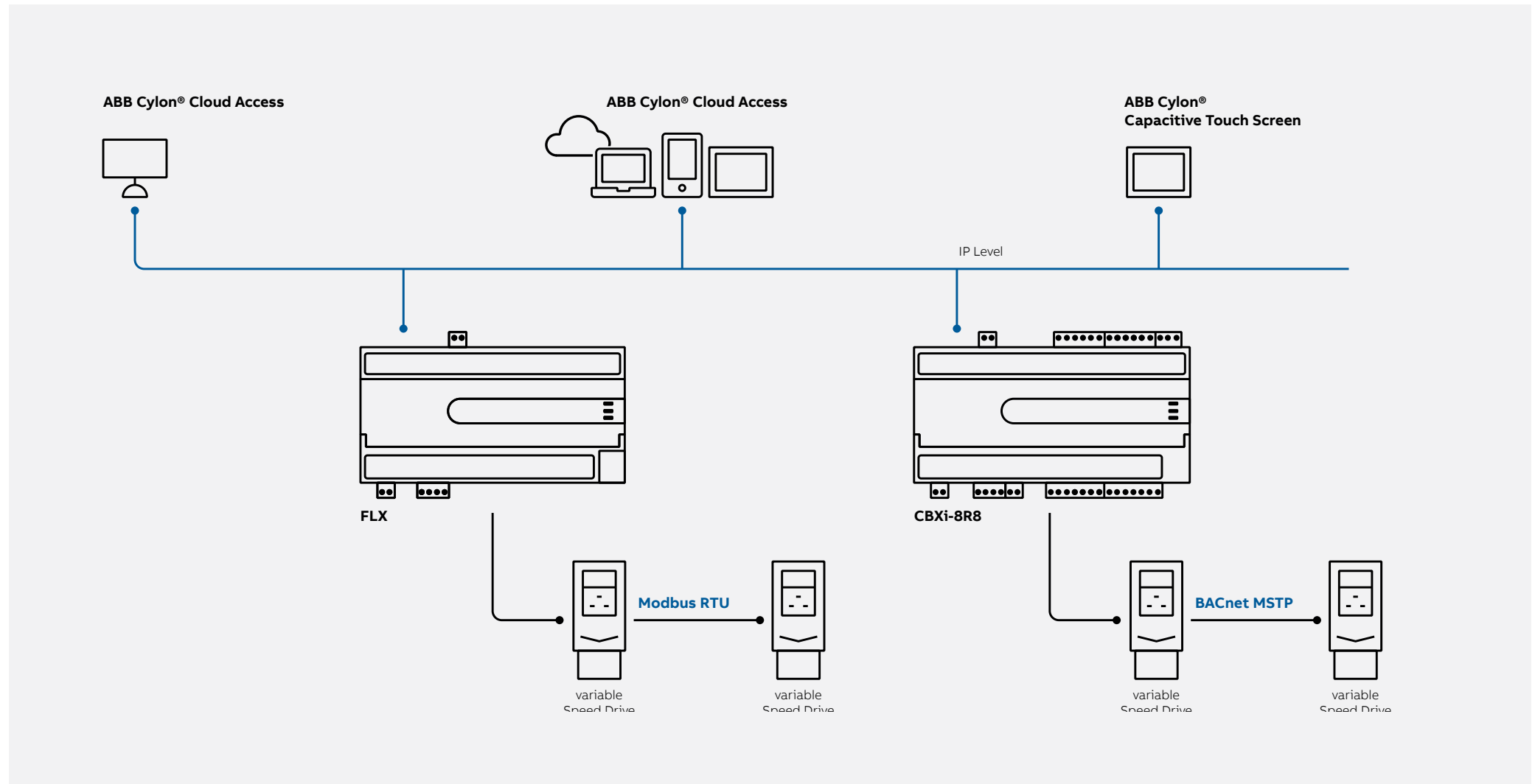
The ABB Ability™ Smart Sensor transmits data from assets, such as motors and pumps via a smartphone or gateway to a secure cloud service. Algorithms analyze the data and convert it into meaningful information, which is sent to the user's smartphone and customer portal.

The ability to gather and analyse the data can reveal information on the status and condition of the equipment, to intelligently maintain and manage the performance You can access data, without having to connect the CMD or Smart Sensor web portals via Internet browser. See the connections shown in the below block diagram.

Using the Cloud Interface, you can integrate data to own maintenance management system or transfer to a common maintenance system.

Motor & Variable Speed Drives

Reference Architecture
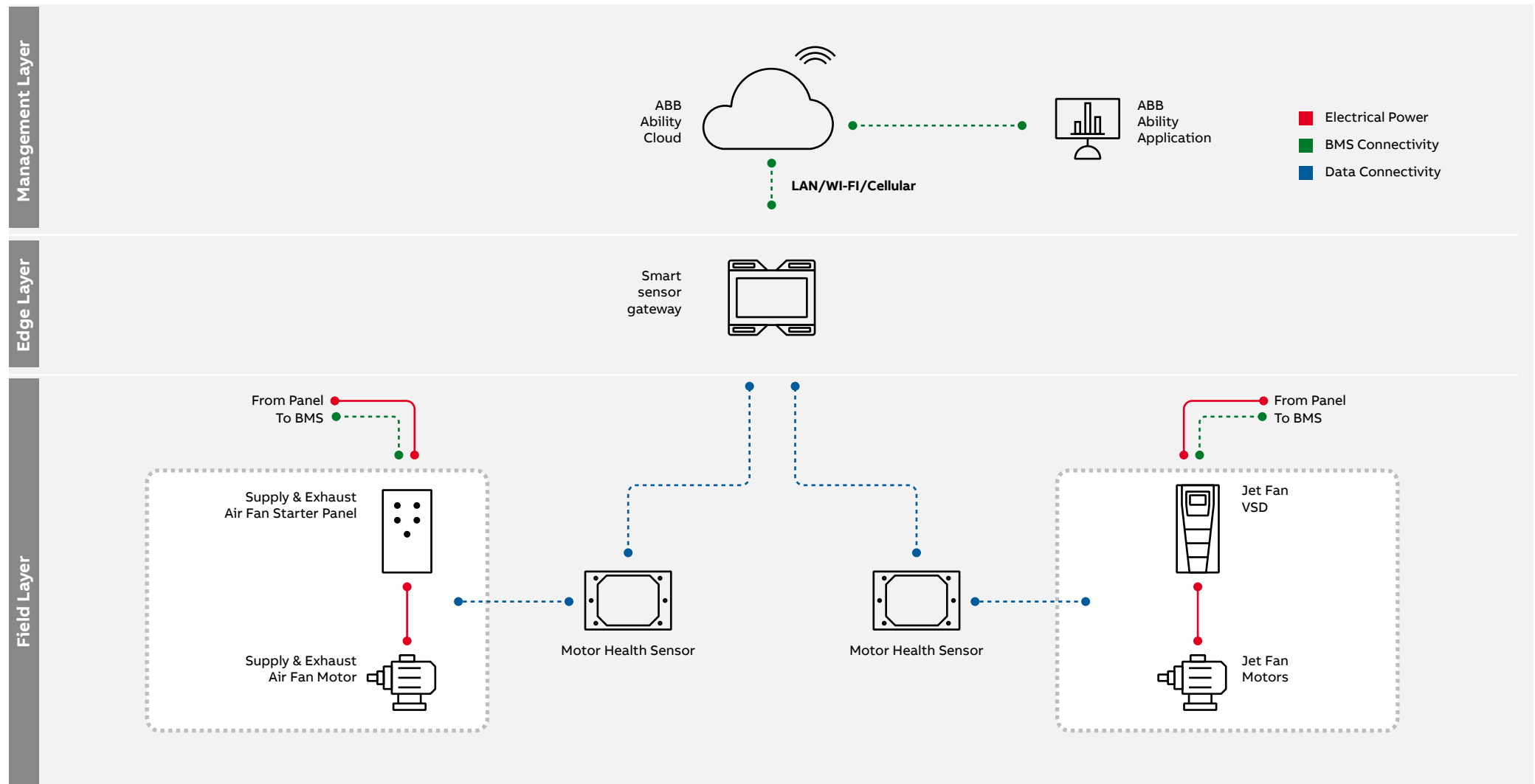

ABB Cylon® Cloud Access

ABB Cylon® Cloud Access

ABB Cylon®
Capacitive Touch Screen

IP Level

FLX

CBXi-8R8

Modbus RTU

BACnet MSTP

variable
Speed Drive

variable
Speed Drive

variable
Speed Drive

variable
Speed Drive

Motor & Variable Speed Drives
Motor and Pumps

Reference Architecture with Smart Sensors and VFD

Management Layer

ABB Ability Cloud

ABB Ability Application

LAN/WI-FI/Cellular

- ■ Electrical Power
- ■ BMS Connectivity
- ■ Data Connectivity

Edge Layer

Smart sensor gateway

Field Layer

From Panel
To BMS

Supply & Exhaust Air Fan Starter Panel

Supply & Exhaust Air Fan Motor

Motor Health Sensor

Motor Health Sensor

From Panel
To BMS

Jet Fan VSD

Jet Fan Motors

Motor & Variable Speed Drives

ABB motors run applications in shopping malls and retail stores – like HVAC, refrigeration, water supply or elevators – reliably and efficiently offering up to IE5 energy efficiency class in the portfolio. ABB drives are flexible to optimize the reliability and efficiency further adjusting the application speed based on the store need and saving massive amounts of energy.

HVAC Drives

Shopping malls and food stores often host large groups of visitors meaning the safe as well as comfortable environment is crucial. At the same time, to operate commercial buildings efficiently and decrease the carbon footprint, high efficiency solutions should be applied. It is well known, that about 50% of energy consumed by an average commercial building is used in HVAC. In food retail stores, over 50% of energy can go for refrigeration. So, making HVACR systems efficient is a priority.
ABB's variable speed drives help save on average 20 to 60% of energy in HVAC and refrigeration. Receiving the information from Cylon controllers or temperature, humidity and CO2 sensors directly, they adjust the motor speed of fans, pumps and compressors to a current store building need, making the environment comfortable and keeping food fresh, while saving energy.

Drive-based filter clogging detection ensures fresh air and limits the spread of airborne deceases in shopping malls.
Should a fire emergency occur, HVAC drives will act as part of fire suppression system cutting fresh air supply to the areas on fire, while extracting smoke and maintaining evacuation routes. Drive's Override mode allows to run the fans as long as possible ignoring faults and warning like overtemperature.

Multi pump or multi compressor control ensure efficient energy use in water supply and refrigeration. Drives start additional units as the load increases and run those as close to the best efficiency point as possible to maximize food retail store or shopping mall energy savings.

ABB Ability TM condition monitoring digital services increase the system reliability further allowing to track the equipment performance remotely and alarm about the upcoming failures before they occur, so predictive maintenance actions could be taken, and maintenance costs optimized.

ABB's ultra-low harmonic drives take a special care of power quality in store buildings, reducing power network disturbances to a minimum. This makes building power network reliable and allows to optimize electrical equipment size and go with smaller generators, transformers, switchgears and so on.

Seamless drive integration into any BMS is possible with extensive support of all common building automation protocols including Modbus and BACnet
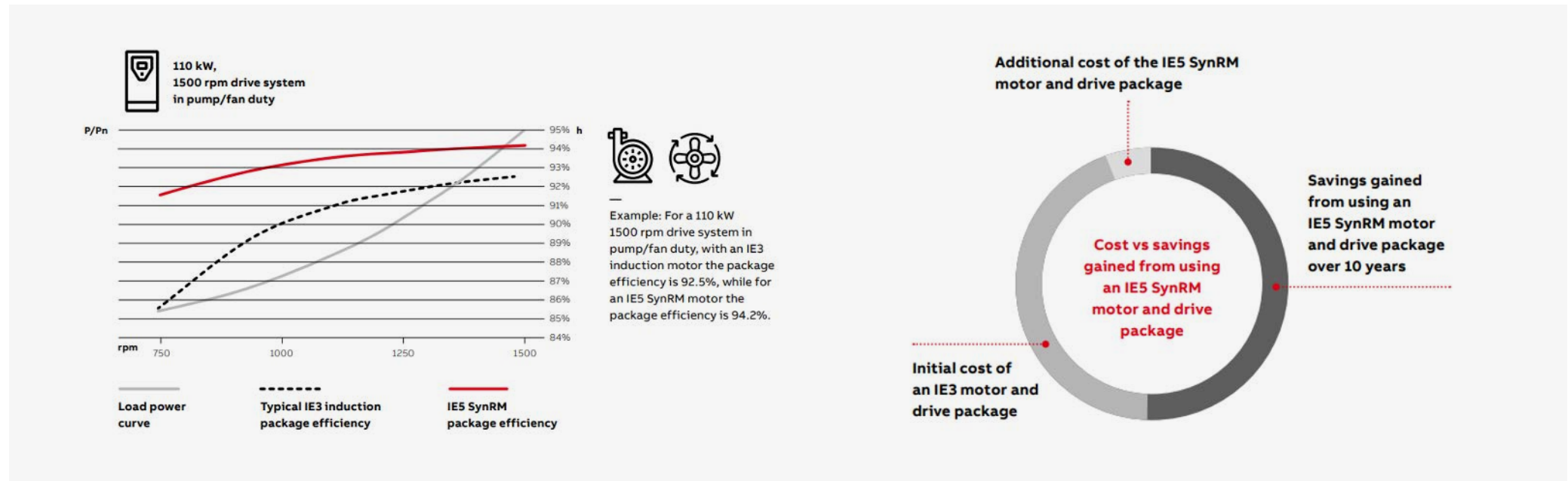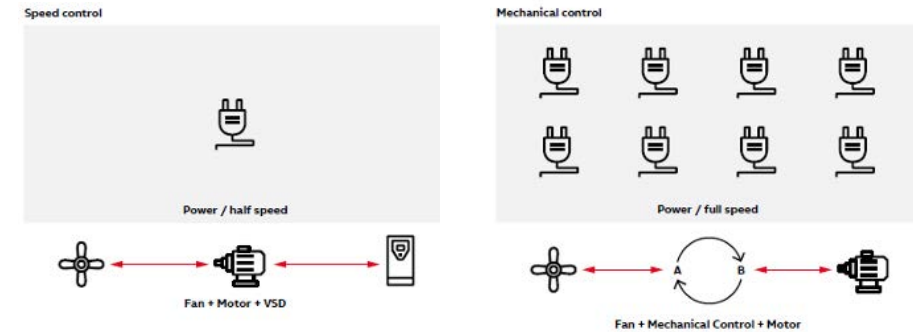
Motor & Variable Speed Drives

Motor Technology

Motor technology chosen for store building applications plays a big role as well. The optimal companion to variable speed drive is a high efficiency motor like ABB's IE5 synchronous reluctance motor (SynRM).
Compared to an IE3 energy efficiency class induction motor, it offers up to 40 percent reduced energy losses. This makes SynRMs the new first choice to meet the growing global demand for improved energy efficiency.
Synchronous reluctance motors offer even higher project sustainability in comparison to other motor technologies thanks to no rare earth magnets in the motor design.
The reliability is also increased. SynRM technology offers up to 30°C lower winding temperatures and up to 15°C lower bearing temperatures, which prolongs the motor lifetime and reduces the need for maintenance.

Speed control — Power / half speed — Fan + Motor + VSD

Mechanical control — Power / full speed — Fan + Mechanical Control + Motor

110 kW, 1500 rpm drive system in pump/fan duty

Example: For a 110 kW 1500 rpm drive system in pump/fan duty, with an IE3 induction motor the package efficiency is 92.5%, while for an IE5 SynRM motor the package efficiency is 94.2%.

Load power curve

Typical IE3 induction package efficiency

IE5 SynRM package efficiency

Additional cost of the IE5 SynRM motor and drive package

Savings gained from using an IE5 SynRM motor and drive package over 10 years

Cost vs savings gained from using an IE5 SynRM motor and drive package

Initial cost of an IE3 motor and drive package

Motor & Variable Speed Drives

LV Regenerative Drives

ACS880 regenerative drives are a compact and complete regenerative drive solution, with everything you need for regenerative operation in cyclic or continuous braking applications. Such applications include cranes, elevators, centrifuges, downhill conveyers and test benches.

With regenerative functionality, the braking energy of the motor is returned to the drive and distributed to the supply network so that it can be utilized by other equipment. Everything needed for regenerative operation, such as active supply unit and LCL line filter are included in the drive. The active supply unit allows full power flow in both motoring and generating modes.

LV Motors for HVAC and Water Supply

Motors designed to meet the demands of HVACR and water supply applications. These applications include air supply and return fans, exhaust fans, air handling units, cooling and refrigeration compressors, heat pumps, water supply pumps, circulators and many more. Up to IE5 motor energy efficiency ensures energy savings.

Motor & Variable Speed Drives

Smoke extraction motors

In case of fire, dispersing the toxic fumes quickly and efficiently can be lifesaving.
It is therefore necessary to use specialized, certified smoke extraction motors for fans
for special applications, like Strair ways. en-closed car parks etc.

Titanium Integrated Motor Drives

Integrated motor drive that combines synchronous reluctance and permanent magnet
technologies for an IE5 efficient, sustainable, wirelessly connected compact solution that
improves customers' bottom line while reducing installation effort.

Motor & Variable Speed Drives

Smart sensor for mounted bearing

ABB Ability Smart Sensor for mounted bearing is an easy-to-use, wireless sensor which monitors the health of your ABB Dodge mounted bearings, allowing users to reduce downtime, improve reliability and operate safely.

Changes in temperature and vibration can indicate potential problems in mounted bearings. Yet understanding the health of the bearing is usually overlooked, leaving problems unnoticed until the bearing fails. ABB now makes it easier and safer to know how your bearing feels
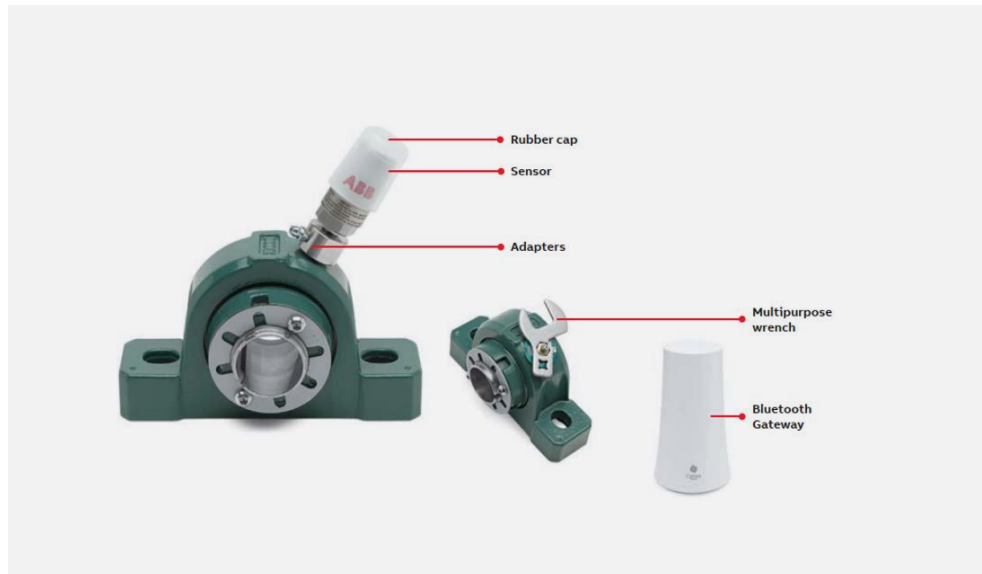
Smart sensor for motor

The ABB Ability Smart Sensor converts traditional motors into smart, wirelessly connected devices. It enables users to monitor the health of their motors and to plan maintenance in advance.
Unplanned downtime can be avoided, efficiency optimized, and safety improved.

# Motor & Variable Speed Drives
Bill of Material

| Purpose	Motor Type	Starter Type	Description	Qty
Car Park Fans	S3BAX90SB4	DOL	IE3 Smoke venting motors offered for parking.	18
Supply Air Fan	S3BAX160MLB4	ACH580-01-033A-4	IE3 Smoke venting motors offered for parking.	2
Exhast Air Fan	S3BAX160MLA4	ACH580-01-026A-4	IE3 Smoke venting motors offered for parking.	2
AHU Fan 5 HP	ECS101M0H3EF4	ACH580-01-09A5-4	EC Titanium motors for VFD starting	17
AHU Fan 3 HP	ECS101M0H2DF4	ACH580-01-04A1-4	EC Titanium motors for VFD starting	0
AHU Fan 2 HP	ECS101M0H3DF4	ACH580-01-05A7-4	EC Titanium motors for VFD starting	23
RAF Fan 2 HP	ECS101M0H2DF4	ACH580-01-03A4-4	EC Titanium motors for VFD starting	17
RAF Fan 2 HP	ECS101M0H3DF4	ACH580-01-05A7-4	EC Titanium motors for VFD starting	23
SAF Fan 3 HP	ECS101M0H2DF4	ACH580-01-04A1-4	EC Titanium motors for VFD starting	19
SAF Fan 2 HP	ECS101M0H2DF4	ACH580-01-04A1-4	EC Titanium motors for VFD starting	2
EAF Fan 2 HP	M2BAX80MLA4	DOL	IE3 Induction motor for DOL starting	5
EAF Fan 1.1 HP	M2BAX80MC4	DOL	IE3 Induction motor for DOL starting	7
TEF/KEF .75 HP	M2BAX71MLA4	DOL	IE3 Induction motor for DOL starting	6
TEF/KEF 0.5 HP	ECS101M0H15FF4	ACH580-01-026A-4	EC Titanium motors for VFD starting	26
Chilled Water Pump 15 HP	ECS101M0H15FF4	ACH580-01-018A-4	EC Titanium motors for VFD starting	3
Cooling Tower Pump 10 HP	M2BAX100LB4	DOL	IE3 Induction motor for DOL starting	4
Irrigation Water Pump 3 HP	M2BAX112MLA4	DOL	IE3 Induction motor for DOL starting	2
Fire Pump 5 HP	ECS101M0H3EF4	ACH580-01-09A5-4	EC Titanium motors for VFD starting	4
Condenser Pump 5 HP	S3BAX90SB4	DOL	EC Titanium motors for VFD starting	3

Energy Management

The first and most important step in energy management is to understand your baseline energy consumption. This includes measuring consumption of electricity, natural gas, steam, water, etc., which will enable you to ascertain your building's energy profile and help understand the operational aspects and overall building energy requirements. ABB metering devices connect with the building automation system providing the ability to acquire, store and analyze your key area within your facility.
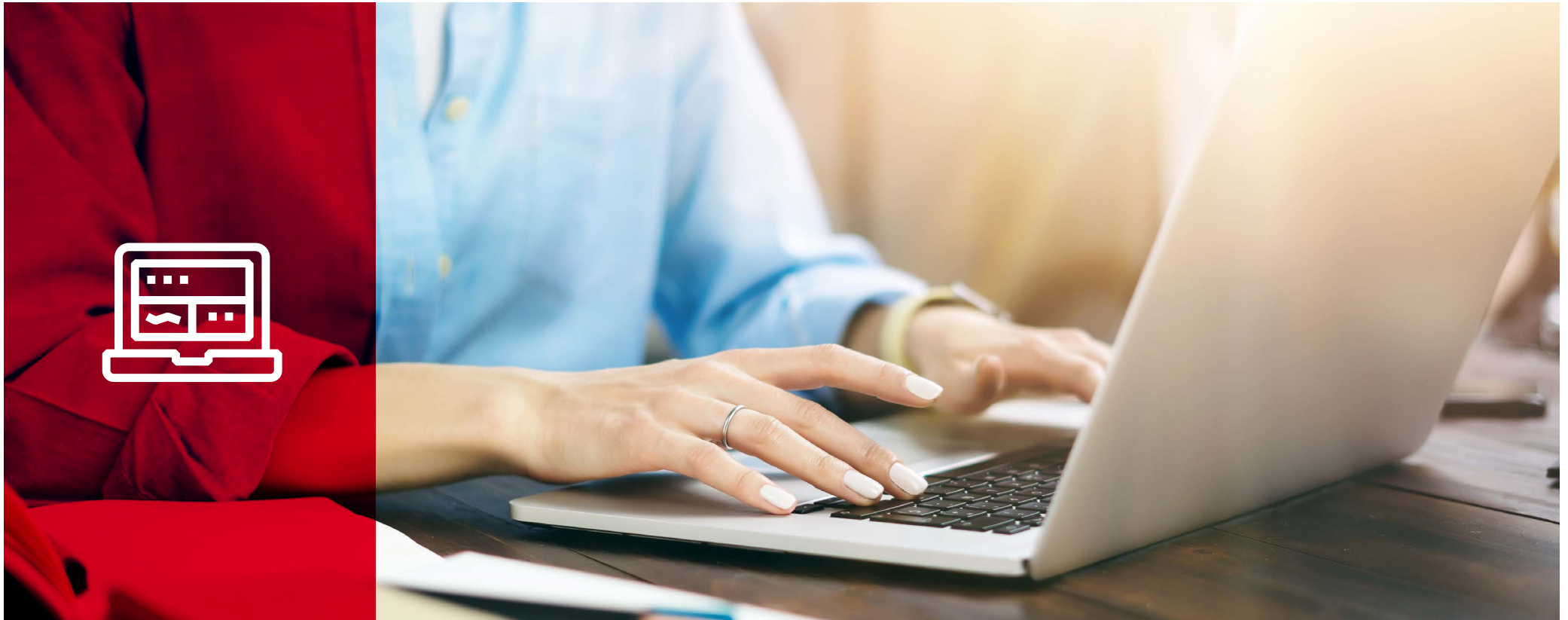
Energy Management
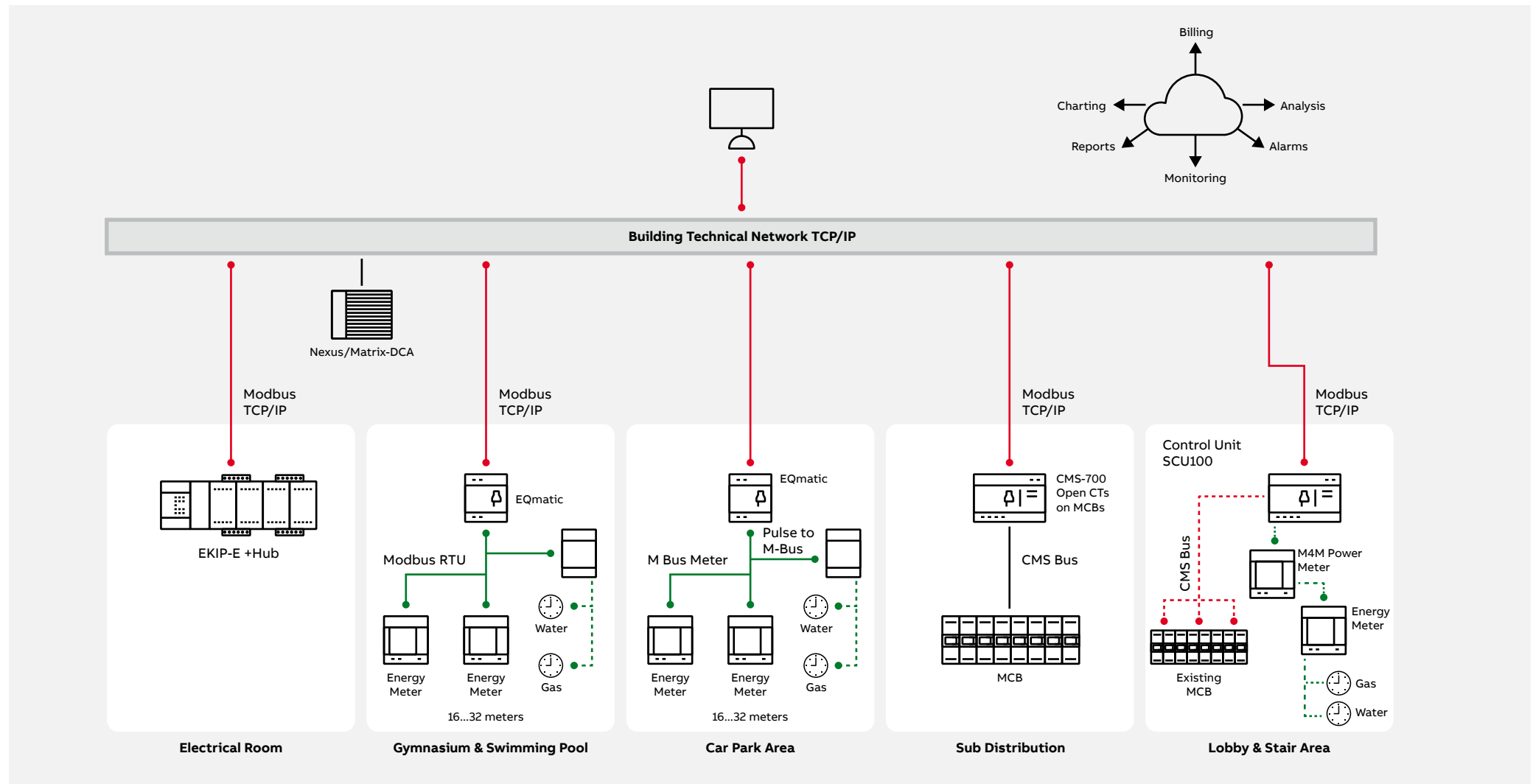## Active Energy Manager (for NAM)
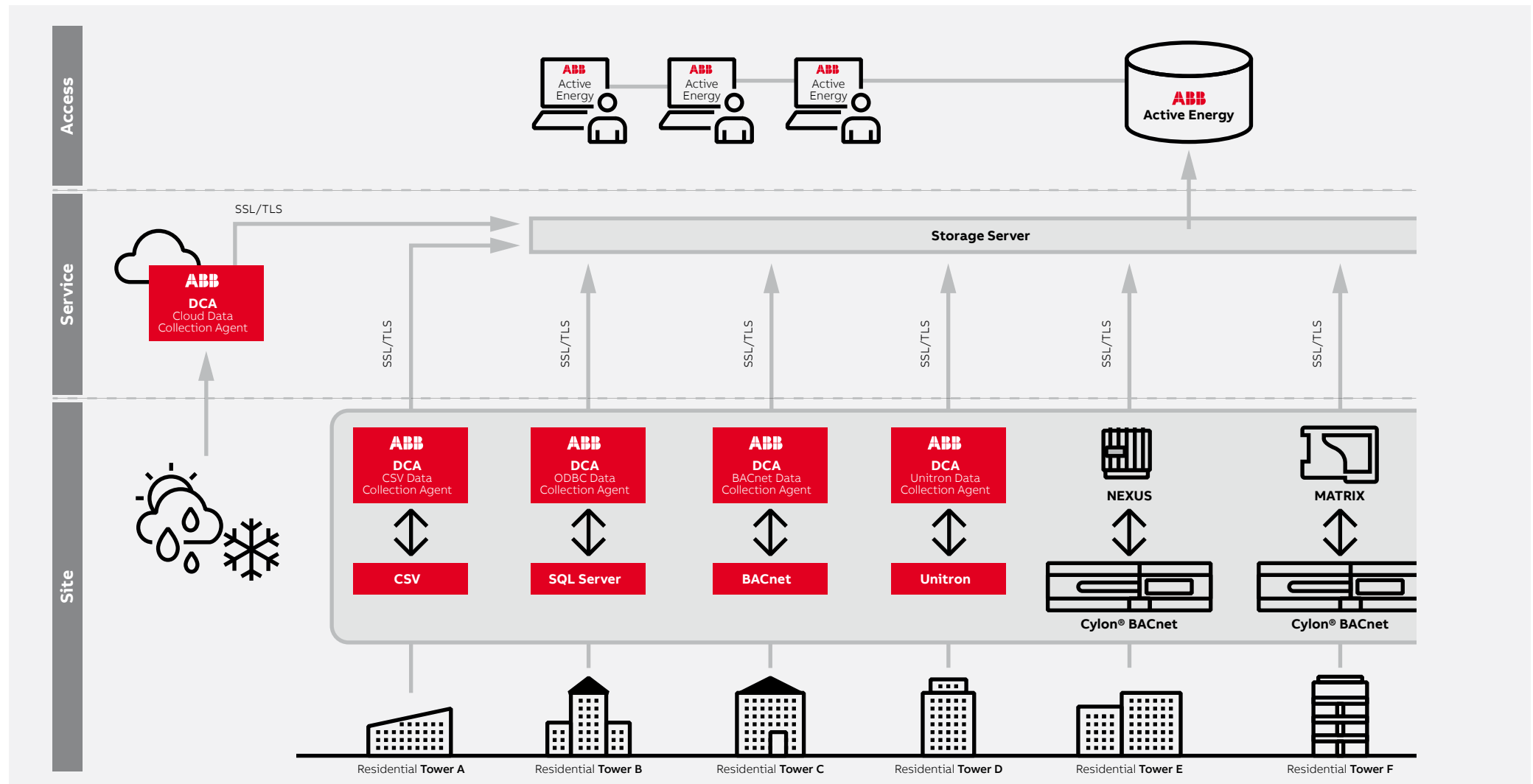
Reference Architecture

Energy Management
Active Energy Manager (for NAM)

Reference Architecture

Billing

Charting   Analysis

Reports   Alarms

Monitoring

Building Technical Network TCP/IP

Nexus/Matrix-DCA

Modbus TCP/IP

Modbus TCP/IP

Modbus TCP/IP

Modbus TCP/IP

EKIP-E +Hub

EQmatic

Modbus RTU

Energy Meter

Energy Meter

Water

Gas

16...32 meters

EQmatic

Pulse to M-Bus

M Bus Meter

Energy Meter

Energy Meter

Water

Gas

16...32 meters

CMS-700 Open CTs on MCBs

CMS Bus

MCB

Control Unit SCU100

CMS Bus

M4M Power Meter

Energy Meter

Existing MCB

Gas

Water

Electrical Room   **Gymnasium & Swimming Pool**   **Car Park Area**   **Sub Distribution**   **Lobby & Stair Area**

Energy Management

Features of ABB Ability BE Sustainable with Active Energy

Analysis and charting

Analysis and charting show you how, where, and when you are consuming energy. Energy consumption data can be analyzed in several different ways from spectral analysis displays, regression analysis, actual versus target graphing, and more. Allows you to compare meters, view data by time period, calculate energy costs and carbon emissions, and more. Data can be exported to CSV and Excel for additional analysis and sharing

Charting:
- View real-time energy information in a day, week, month, year, and a custom view
- Compare time periods, meters, and export data

Analysis:
- View energy patterns using the Spectral Analysis tool
- Set targets based on driving factors or fixed parameters
- Compare actual versus target
- Access regression analysis, overspend, and custom charts
- Analyze energy consumption compared to a smart target for real-time energy management

Reports

A fully customized reporting feature allows you to generate instant or scheduled reports on energy consumption, costs, carbon emissions, performance versus targets, as well as tenant costs reports. Export reports in pdf format to share with key stakeholders.
Reports are an important tool for ongoing energy control by helping managers and key decision-makers keep track of energy-saving initiatives, verify if and where savings have been made, and when targets have been achieved.

Monitoring and Alarms

Alarms can be viewed via the map-based interface, particularly useful for a quick overview of multiple buildings in multiple locations for bureau or monitoring centers.
- Set, edit, and monitor alarms on-line
- Receive alarms by email

Reports anomalies detected in energy consumed versus expected consumption. Alarm reports can be issued via email. Analysis of historical alarms can help identify potential ongoing issues.

Data Integrity

Continuously monitors data collection and alerts you if data has not been collected. This ensures full data integrity.

Data Collection

ABB Ability BE SustainableTM with Active Energy is an agnostic energy management platform that can collect data from most BMS, data logging, AMR, and Enterprise Level systems. ABB offers a range of metering and data collection hardware solutions to collect data from a building where no existing data collection solution is available. In addition, historical data can be manually uploaded to the system to enable trend analysis.

Energy Management
Energy Measuring Devices

Energy Meters

Energy consumption awareness is key to reduce energy costs and improve energy efficiency on your machines and electrical assets. Energy meters allow to identify areas for improvement and to generate benefits for owners, facility managers and users. They enable to run smarter buildings in a more energy and cost efficient manner. With Energy Meters you can also split the bill received from the utility within different household thanks to the MID certification.
Sub-metering provides a detailed picture of the energy consumption and the specific areas where energy is used.

ABB Energy Meters have the following instrumentation values as a minimum:
• Active power
• Voltage
• Current
• Power factor

Energy Management
Communication Gateways

EkipUP Hub series

Ekip UP is the low-voltage digital unit able to monitor, protect and control the next generation of plants. Thanks to the built-in software-based function, Ekip UP is the unit that digitalizes the plant performance. Sharing all the electronics solutions of "all-in-one" platform, Ekip UP completes the ecosystem to fit all the market opportunities. The result is a unit suitable for all the different applications including all the needed functionalities without the need of additional external devices.

Ekip UP in the best way, will be able to:
- UP-date old facility with the latest innovation in the fastest way.
- UP-grade plant and get more functionalities in order to cover all the opportunities.
- UP-load measures and enable true energy management function.
- Maximize UP-time thanks to easy commissioning without impact on switchboard design.

	Ekip UP Monitor	Ekip UP Protect	Ekip UP Protect +	Ekip UP Control	Ekip UP Control +
Control				●	○
Protection		●	○		○
Metering	○	●	○	○	○

● = standard functions
○ = advanced functions

Main Features
- The ABB plug&play solution improves the plant efficiency, increases awareness of resources and process behaviors, and delivers an easier, more intuitive user experience.
- As multifunctional unit, there are five different commercial versions that guarantee flexibility and modularity to meet the needs of all measurement, protection and control applications.
- All units can also be equipped with optional connectivity and signally modules, in addition to the standard accessories.
- The main software functions can also be uploaded into Ekip UP Protect, Protect+ and Control+. These versions are ready for external toroids that enable more earth fault protections

Metering
- Measurement capability of main energy parameters.
- Network analyzer to evaluate the power quality.
- Datalogger based on event triggers for fast fault diagnosis.
- Connectivity for system integration up to 8 field-bus protocols, plus a property bus for power automation applications that require advanced cyber-security.
- Embedded gateway that ensures power understanding by cloud-based energy management system.

Protection
- Distribution protection based on current and voltage measurement.
- Generator protection and interface protection systems
- Adaptive threshold according to grid topology.
- Digital selectivity for resource coordination.
- Load shedding algorithms to prevent blackouts.
- Programmable logics to manage transfer-switching operations and maximize service continuity.
- Synchrocheck function of different power sources inside.

Control
- Power management systems to optimize plant resources and enable Demand Response applications

Energy Management
EQ Matic Network Analyzer

ABB EQmatic Energy Analyzers are a compact solution for monitoring, logging, visualizing and analyzing energy and consumption data from electricity, gas, water or heat meters via KNX, M-Bus or Modbus RTU. The web-based user interface is individually configurable to the respective requirements and makes it possible to identify energy thieves and optimize energy costs sustainably.
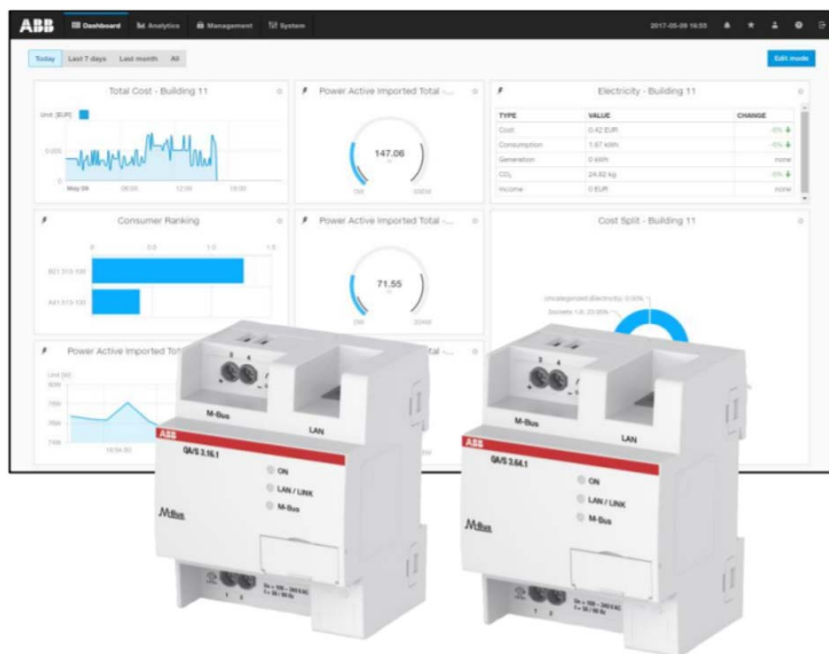
Commissioning and operation are carried out via the web-based graphical user interface. For a detailed monitoring the devices offer several analysis functions such as historical data analysis, benchmark functions, cost analysis according to consumer, instantaneous values, etc. The configurable dashboard page provides a quick overview of most relevant metering data and analytic charts according to customer needs. Various export functions (E-mail, FTP) for further processing of the data and connectivity options (Modbus/TCP, RestAPI) for integration into supervisory systems (e.g. SCADA, BMS, etc.) are available.

The recording of energy variables and values, as well as their processing, is continually gaining in significance This is not just due to the rising energy costs but also due to the frequently demanded evaluation and reading possibilities via a decentralized reading station The features of the EQmatic series help to meet these requirements and can provide operators and users with convenient, cost-effective solutions for modern energy management ABB offers a wide range of devices and solutions specially designed for these applications.

Important features:
- Automatic detection of ABB EQ meters (A- and B-Series) and M2M network analyzers (QA/S 3.xx.1, M-Bus, and QA/S 4.xx.1, Modbus)
- Load control function, alarm function and monitoring of environmental parameters (QA/S 1.16.1, KNX)
- Local data storage and data sharing options
- Integration into ABB Ability™ Energy and Asset Manager
- Graphical data analysis via dashboard/chart diagrams and data export options

Energy Management
Bill of Materials

Purpose	Type	Order Code	Description	Qty	Additional information / assumptions:
Active Energy manager					
Energy Meters	B24 352-300	2CMA100837R1000	Advanced compact DIN-rail meter with an easy to read back lighted display.	72	Modbus RS485 meter
Water Meters	By Others			10	Modbus RS485 meter
Gas Meters	By Others			25	Modbus RS485 meter

ABB Ability™
Energy and Asset Manager

ABB Ability™ Energy and Asset Manager is a state-of-the-art cloud solution that integrates energy and asset management in a single intuitive dashboard. Providing full remote visibility of asset and electrical-system behavior, ABB Ability™ Energy and Asset Manager provides insights that help to minimize cost and risk and maximize performance and safety across operations.

A powerful building-management tool that lets stakeholders:
- View, manage, and optimize building systems from anywhere, at any time
- Implement predictive (condition-based) maintenance, ensuring the reliability and availability of your power system and equipment
- Optimize energy-usage in real time to achieve maximum energy efficiency and lower costs

Achieve your sustainability targets. ABB Ability™ Energy and Asset Manager meets the requirements of ISO 50001.

ABB Ability™
Energy and Asset Manager
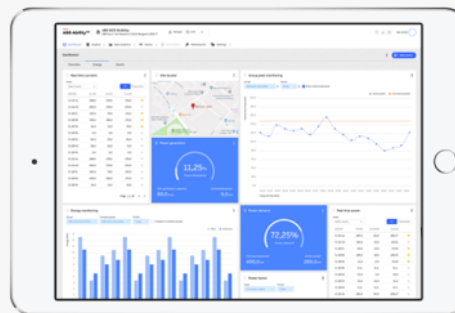

Energy Manager

Facility Manager

Asset and Maintenance Manager

Field Service

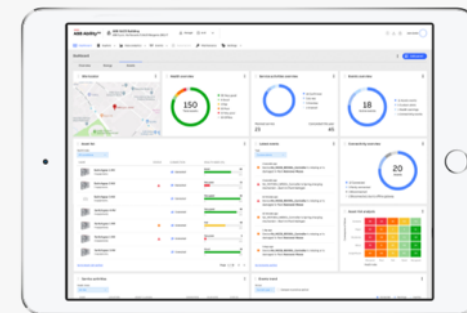## ABB Ability™ Energy and Asset Manager

Energy Manager

- Optimize energy bill
- Avoid energy waste
- Cost allocation

Asset Manager

- Reduce total cost of ownership
- Maximize uptime
- Improve safety

ABB Ability™
Energy and Asset Manager

—

Energy Manager

Energy efficiency has become essential to running cost-efficient operations. ABB Ability™ Energy Manager provides real-time understanding of your energy consumption and identifies areas of improvement.
And it's scalable, from a single site to a multi-facility system with hundreds of users.

- **Monitor**
  Discover Site performance, supervise the electrical system and allocate costs.

- **Analyze**
  Schedule automatic data exports, improve the use of assets and take the right business decision.

- **Act**
  Set up alerts and notify to key personnel and remotely implement an effective efficiency strategy to achieve energy savings in a simple way.
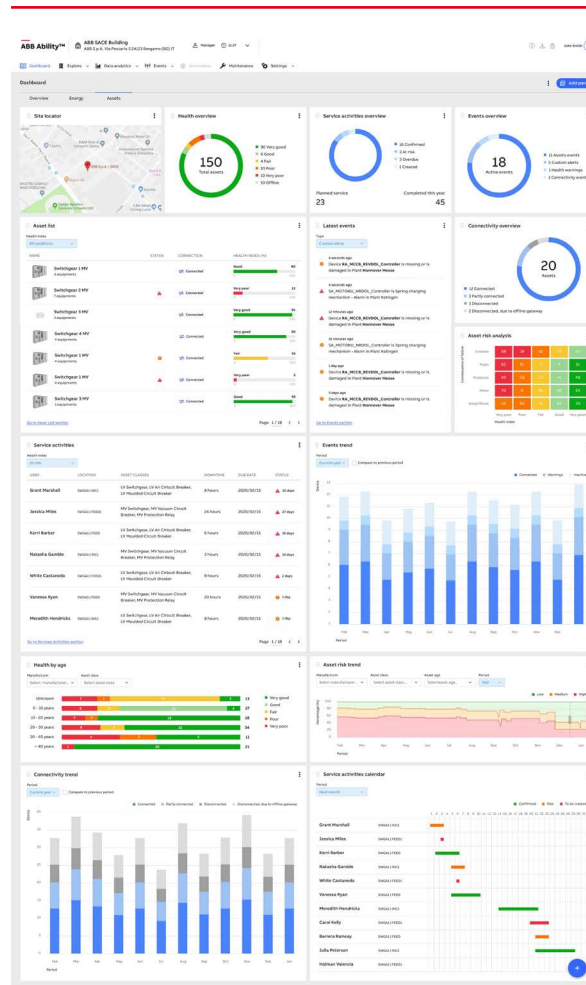
ABB Ability™
Energy and Asset Manager

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Asset Manager

ABB Ability™ Asset Manager sets a new benchmark for simplicity and flexibility in asset-performance management. It gives you the power of seeing and optimizing your site equipment behavior anytime, anywhere via an intuitive graphic interface, resulting in greater reliability and availability and minimized unplanned maintenance.

- **Condition Monitoring**
  Provide granular visibility of your asset behavior in real time for both LV and MV environments.

- **Predictive Analytics**
  Detect potential faults through condition assessment, performance trends and pre-alarm notifications.

- **Maintenance Planning**
  Root-cause analysis of asset condition enables predictive maintenance that significantly reduces unplanned downtime and operational costs.

Designing innovative solutions for residential

General Reference
Main technical normative references

▶ Standard IEC 60364 "Low-voltage electrical installations"

The main reference standard for electrical installations in offices is the IEC 60364 standard and its national implementation.
The standard specifies the requirements for the design and construction of a low voltage electrical system. low voltage electrical system.
The standard is composed by 8 main different parts.

▶ EN 12464-1 "Light and lighting - Lighting of work places - Part 1: Indoor work places"

The standard specifies lighting requirements for people, in indoor workplaces, that meet the visual comfort and visual performance needs of people with normal ophthalmic (visual) ability. All usual visual tasks are considered, including those involving the use of equipment with video display terminals.

▶ EN 1838 "Lighting applications - Emergency lighting"

The standard defines the lighting requirements for emergency lighting systems, installed in buildings or premises where such systems are required. It applies, primarily, to places intended for the public or workers.

▶ EN 15232 "Energy Performance of Buildings - Energy performance of buildings - Part 1: Impact of Building Automation, Controls and Building Management"

The EN 15232 standard specifies:
• a structured list of building control, automation and technical management functions that contribute to a building's energy performance; the functions have been classified and structured according to building regulations and so called Building Automation and Control (BAC);
• a method for defining minimum requirements or any other specifications for building control, automation and technical management functions that contribute to the energy efficiency of a building, which can be implemented in buildings of varying complexity;
• a simplified method for arriving at an initial estimate of the impact of these functions on representative buildings and use profiles;
• detailed methods for assessing the impact of these functions on a given building.

General Reference
Load classification

The first information that should be known when setting up the design of an electrical system for an office building is the quality of the power supply to be guaranteed to the various loads, i.e. when the economic consequences of an outage are particularly important or when the power supply cannot fail for safety reasons.

—

Loads that typically require the most attention are:

• IT (PCs, workstations, data centers)
• networking applications (WAN-LANs, structured cabling, VoIP, ISP centers)
• building management and control
• telecommunications (transmission devices)
• protection and control equipment in the distribution of electrical energy (transformer rooms)
• emergency and security (emergency lights, alarms).

—

The classification of the loads with respect to the continuity of the power supply can be carried out on the basis of the categories defined in Tabella 1.
On the basis of this classification, preferential and privileged loads can be identified and the right power supply associated with them.

In addition to the ordinary, he power supply can be:

• BACK-UP:
   electrical system intended to guarantee the supply of user appliances or parts of the system for reasons other than the safety of persons (Standard IEC 60364-2 - art. 21.6);

• SAFETY:
   electrical system intended to ensure the supply of power to user appliances or parts of the installation necessary for the safety of persons. The system includes the source, the circuits and the other electrical components (Standard IEC 60364-2 - art. 21.5).

—

General Reference
Load classification

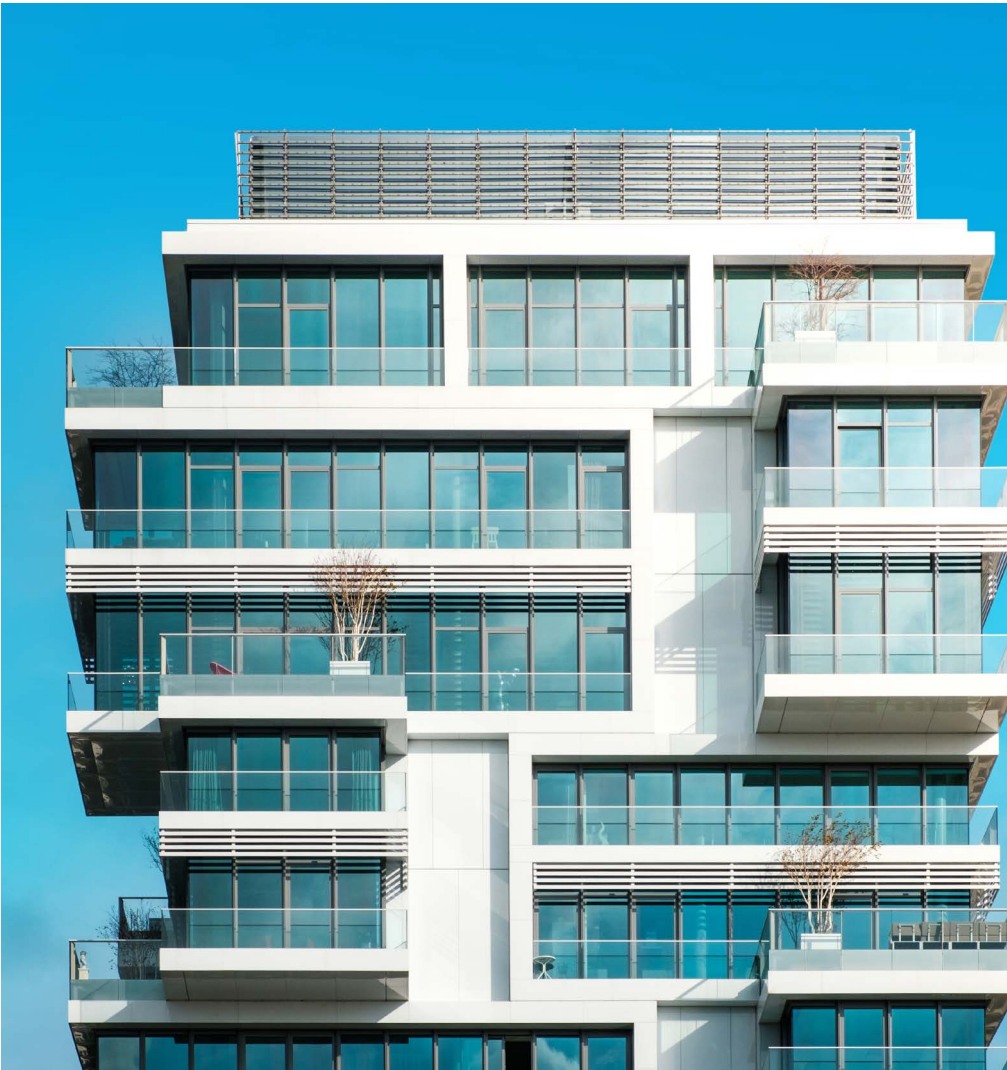—

Classification of loads with respect to power availability.

Type	Definition	Power Supply
Ordinary	They affect the smooth operation of all services, but their absence does not lead to situations of danger or serious discomfort	Ordinary
Preferential	They affect the smooth operation of all services, but their absence does not lead to situations of danger	Reserve
Privileged	They affect people safety or essential services	Safety

—

Example of preferred loads and their power source.

Preferred Loads	Power	Source Supply
Loads that guarantee the operation of the structure	Reserve	MV network, absolute uninterruptible power supply or stand-alone unit, generator set

—

Example of privileged loads and their power source.

Preferred Loads	Power	Source Supply
MV/LV cabin safety and alarm circuits		
External lighting		
Security lighting		Redundant and independent MT network, absolute UPS or stand-alone group
Smoke and fire detection system	Security	
Fire alarm		
CED utilities		
Office privileged users		

General Reference
Power quality

The public network of electric power supply is affected in a more or less relevant way by disturbances coming from the distribution networks and from the loads supplied by them that can easily lead to malfunctions and failures.
In other words, the characteristics of the power supply do not always correspond to the expected ideal characteristics.

The increasing diffusion of sensitive components has progressively made previously accepted levels of power quality critical.
Beyond the well-known contractual obligations that exist in the purchase, from the point of view of a user the electrical energy product is requested to have two fundamental characteristics: it should have a high availability and not cause malfunction, degradation or damage to the supplied loads.
The quality of the electric energy that a generic user considers necessary for his activity is not an absolute concept, but it depends on the susceptibility of the users to the phenomena considered (technical aspect) and on the consequences of the inefficiencies (economic aspect) resulting therefore variable from case to case.
In general, responsibility for satisfying this requirement depends only partially on the distribution company.

Electricity is in fact a particular product: it is never used as such by those who buy it, but it is always transformed and modified. In general terms, comparing electrical energy with other consumer products, it can be said that while the quality of most of these is completely determined by the producer and his distribution chain, in the case of electrical energy the quality of the final product is determined not only by the above mentioned figures, but also by the final consumer, or rather by the user at the very moment in which he uses it.

Moreover, achieving the best technical-economic compromise is not always easy and must be carefully evaluated.
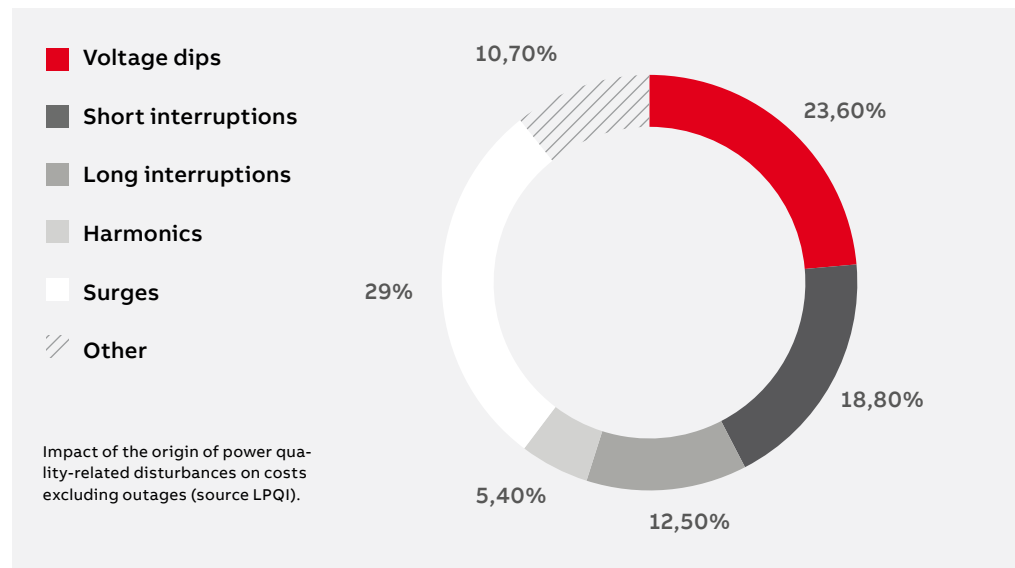
General Reference
Power quality

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The disturbances of greatest interest affecting the operation of an electrical component or user are:

- long or short duration power interruptions due to faults in the network;
- Voltage variations of short duration due to the insertion of heavy loads or faults in the network;
- dissymmetries in the power supply voltage system;
- flicker due to large intermittent loads;
- the distortion of currents and voltages due to the effect of non-linear loads present in the same system or in the systems of other users, etc.

—

Origin and effects of power quality disturbances.

Disturbance	Origin	Effects
Frequency Variations	Disconnection of large generators Switching of large loads Faults Generator set operation	Speed variation in motors
		Malfunctioning of electronic devices that use frequency
Rapid voltage variations	Insertion of loads Loads with variable absorption Natural overvoltage Interruption and disconnection	Untimely intervention of protections
		Flicker (if the variations are repetitive)
		Malfunctioning of electronic equipment
		Irreversible equipment failures
Voltage dips and short interruptions	Faults Transients	Irregularities in the operation of motors
		Malfunctioning of electronic equipment
		Improper intervention of relays
Harmonics	Non-linear loads Variable speed drives Fluorescent lamps Static converters Arc furnaces Welders	Malfunctioning of protections
		Increase in copper losses
		Increase in dielectric losses
		Increased iron losses in electrical machines
		Unstable operation of motors
		Interference on telecommunication circuits
		Irreversible damage to power factor correction filters
		Aging of components
Dissymmetry	Unbalanced loads	Overheating of rotating machines and rectifiers

Legend:

- ■ **Voltage dips**
- ■ **Short interruptions**
- ■ **Long interruptions**
- ■ **Harmonics**
- □ **Surges**
- ▨ **Other**

23,60%
18,80%
12,50%
5,40%
29%
10,70%

Impact of the origin of power quality-related disturbances on costs excluding outages (source LPQI).

General Reference
Power quality

—

Interruptions are characterized in terms of duration.

Long duration outages depend on permanent faults occurring in public distribution networks or within the user's facility.
The duration can vary from a few minutes to several hours in the most critical cases.
European standard EN 50160 defines short interruptions as those lasting less than three minutes.
Micro-interruptions are linked to faults occurring on the distributor's networks that are eliminated by automatic reclosure operations. The duration is normally less than one second. Micro-interruptions do not have a regulatory definition.
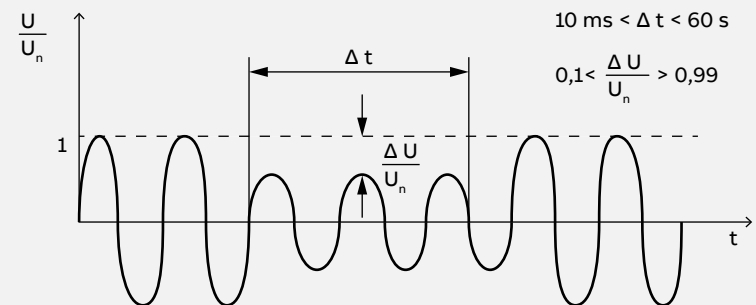
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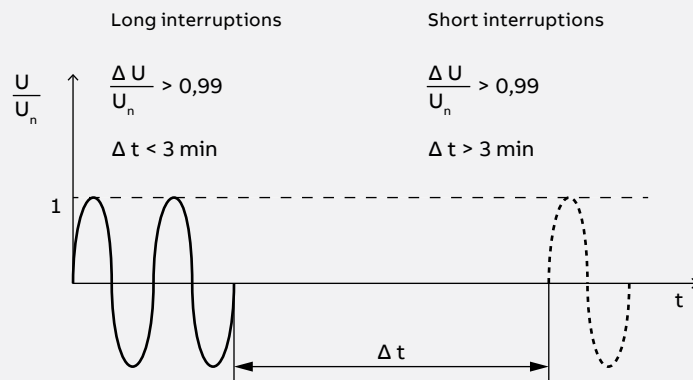
Accidental power outages

All elements of an electrical system are sensitive, in different ways, to long or short voltage interruptions.

Voltage dips are commonly characterized in terms of amplitude and duration.

In addition to the events already mentioned that directly result in a power failure, a load can also be disturbed by events that occur on other lines in the same system, causing voltage drops on the power system. The magnitude of the disturbance may vary within wide limits depending on the distance between the point where the event occurs and the cabin busbars or the switchboard.

Long interruptions

$\dfrac{\Delta U}{U_n} > 0,99$

$\Delta t < 3 \text{ min}$

Short interruptions

$\dfrac{\Delta U}{U_n} > 0,99$

$\Delta t > 3 \text{ min}$

$\dfrac{U}{U_n}$

Δt

$10 \text{ ms} < \Delta t < 60 \text{ s}$

$0,1 < \dfrac{\Delta U}{U_n} > 0,99$

$\dfrac{U}{U_n}$

Δt

$\dfrac{\Delta U}{U_n}$

Schematic representation of a voltage dip.

Voltage fluctuations cause undesired effects in all those users that require a stable power supply for proper operation. It is worth mentioning among others the whole IT world.

Features and applications for Power Distribution
Protection against indirect contacts

Protection against indirect contact is one of the fundamental safety requirements
of electrical systems.

Protection against indirect contacts can be achieved in various ways (by automatic protection of the interruption, Class II electrical components or equivalent insulation, etc.), but in office buildings, the automatic interruption of the power supply is definitely the most commonly adopted solution.

The differential circuit breaker plays a key role in the protection against indirect contacts by automatic power interruption with particular reference to the protection in TT and TN systems.

In TT systems, in fact, differential current protection devices must be used for the automatic interruption of the power supply; the use of overcurrent protection devices for protection against indirect contacts in TT systems is in fact not permitted by standard IEC 60364.

In particular, the following condition must be met:

$$R_E \times I_{dn} \leq U_L$$

where:
- R_E is the resistance of the earth electrode in ohms;
- I_{dn} is the rated differential current in amperes.

The use of differential current protection devices for protection against indirect contacts is not compulsory in TN systems, but certainly represents an effective solution in the context under consideration.

The use of residual current devices with a rated tripping differential current not exceeding 30 mA, is recognized by the CEI 64-8 standard as additional protection against direct contacts in the event of failure of other protective measures or negligence on the part of the users.

In particular, additional protection against direct contacts is required:

- in rooms used for residential purposes for circuits supplying plug sockets with a rated current not exceeding 20 A, and
- for circuits supplying plug sockets with a nominal current not exceeding 32 A intended for supplying mobile consumer appliances used outdoors.

Earth leakage circuit breakers can also be used as a means of protection against the ignition of fire, being able to detect the degradation of the insulation of circuits and equipment, prodrome of a short circuit.

Features and applications for Power Distribution
RCD

It is important to choose the type of earth leakage circuit breaker according to the type of application and ground fault current that may occur.

Earth leakage circuit breakers are classified into different categories, as follows, according to their ability to provide protection against different types of earth fault currents:

▶ **AC differential circuit breaker**

The opening of the circuit breaker is ensured for differential sinusoidal alternating currents applied instantaneously or slowly increasing

▶ **Type A differential switch**

the opening of the switch is ensured as for the type AC; for unidirectional pulsating currents and for unidirectional pulsating currents, applied instantaneously or slowly increasing

▶ **Type B residual current circuit breaker**

the opening of the circuit breaker is ensured as for type A and in addition for differential sinusoidal alternating currents up to 1000 Hz, for continuous differential currents without ripples, applied instantaneously or slowly increasing.

Features and applications for Power Distribution
Permanent leakage current at mains frequency

Generally, the permanent leakage currents in a circuit are related to the deterioration of the insulation or to the presence of filters or capacitors between phase and earth.

If the total leakage currents are higher than $0,3\,I_{dn}$, in order to avoid untimely interventions it is advisable to divide the protected circuit in sub-circuits, each protected by single differential devices. The total leakage current coming from different devices generally does not coincide with the arithmetic sum of the single currents due to phase differences so it is advisable to consider a multiplication factor equal to 0,7/0,8.

For an estimate of the permanent leakage current in the design phase, it may be useful to refer to the IEC 61140 standard which recommends the values shown in the table.

—

Table 2 – Stationary electrical equipment connected to a single-phase or polyphase system permanently or by means of plug-in receptacles having a current rating greater than 32 A.

Rated current (In)	Maximum leakage current
In ≤ 7 A	3,5 mA
7 A < In ≤ 20 A	0,5 mA/A
In > 20 A	10 mA

—

Table 1 – Electrical equipment connected to a single-phase or polyphase system via plug-in receptacles rated 32 A or less.

Rated current (In)	Maximum leakage current
In ≤ 4 A	2 mA
4 A < In ≤ 10 A	0,5 mA/A
In > 10 A	5 mA

—

Table 3 – Typical leakage current levels of common appliances.

Devices	Maximum leakage current
Appliances	da 1 a 2 mA
Computers	da 0,5 a 1 mA
Printers	da 0,5 a 0,75 mA
Small portable devices	da 0,5 a 1 mA
Copiers	da 0,5 a 1,5 mA
Photocopiers	circa 1 mA

Features and applications for Power Distribution
Harmonics and high frequency leakage current

The immunity of residual current devices to high-frequency leakage currents is ensured by compliance with standard IEC 61543 whose requirements are based on standards IEC 61000-4-3; IEC 61000-4-6 and IEC 61000-4-16.

Selectivity

The installation of a residual current circuit breaker upstream of another residual current circuit breaker without special precautions can create selectivity problems: a fault that causes a residual current in a downstream circuit leads to the tripping not only of the residual current circuit breaker that protects the downstream circuit but also of the upstream one, unless the fault lasts longer than a certain period of time.

The general rule for ensuring selectivity is based on two basic conditions:

- the minimum non-intervention time of the upstream residual current device must be greater than the interruption time of the downstream residual current devices;
- the rated tripping differential current of the upstream device must be at least 3 times the rated tripping differential current of the downstream installed earth leakage circuit breakers.

Features and applications for Power Distribution
Overvoltage protection

Surges are the primary cause of electronic device failure and business interruption. The most dangerous surges are caused by lightning strikes, electrical maneuvering on the distribution grid, and parasitic interference.

Surge incidents and damage are of paramount importance in a world where applications that rely on electrical distribution networks and computer systems for their operation have increased dramatically.
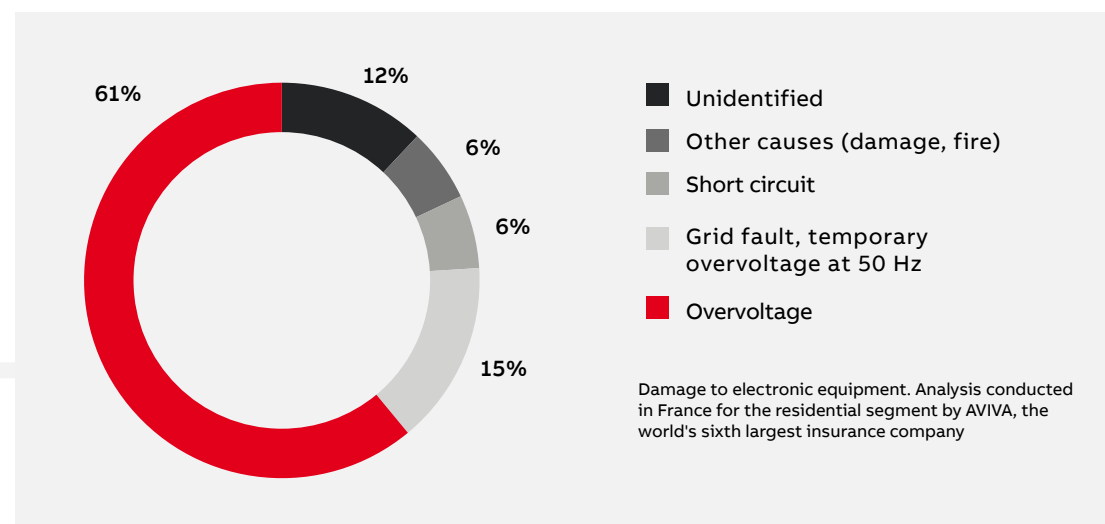
Electronic equipment is increasingly sensitive.

With the process of miniaturization of circuits and components, modern equipment is more prone than ever before to being damaged by surges.
Distribution and telecommunications networks are increasingly interconnected and complex. In densely populated cities, the effects induced by lightning discharges are devastating, as they can propagate for several kilometers.

Surge protection begins at the origin of the electrical system and ends near the most sensitive equipment. The energy of the discharges is reduced in several stages, first with the most robust arresters (Type 1), then with the finest protections (Type 2 or 3). This logic of coordination in protection is represented with the LPZ protection zones, which divide the environment according to the effect of lightning.

For the purpose of protecting equipment and systems against the electromagnetic effects of the lightning current LEMP (Lightning Electromagnetic Impulse), a structure can be divided into protection zones (LPZ: Lightning Protection Zones), understood as homogeneous electromagnetic environments, not necessarily confined (by walls, floor and ceiling), but ideal, in which therefore the protection measures adopted, represented by LPS, shielding and SPDs, are homogeneous. The type of electrical and electronic installations and their vulnerability to LEMP also contribute to the identification of the various zones.

Surge protection is therefore of paramount importance.

61% **12%** **6%** **6%** **15%**

- Unidentified
- Other causes (damage, fire)
- Short circuit
- Grid fault, temporary overvoltage at 50 Hz
- Overvoltage

Damage to electronic equipment. Analysis conducted in France for the residential segment by AVIVA, the world's sixth largest insurance company

Features and applications for Power Distribution
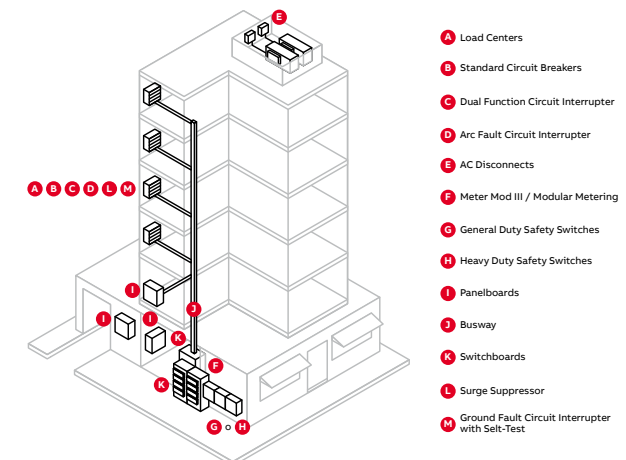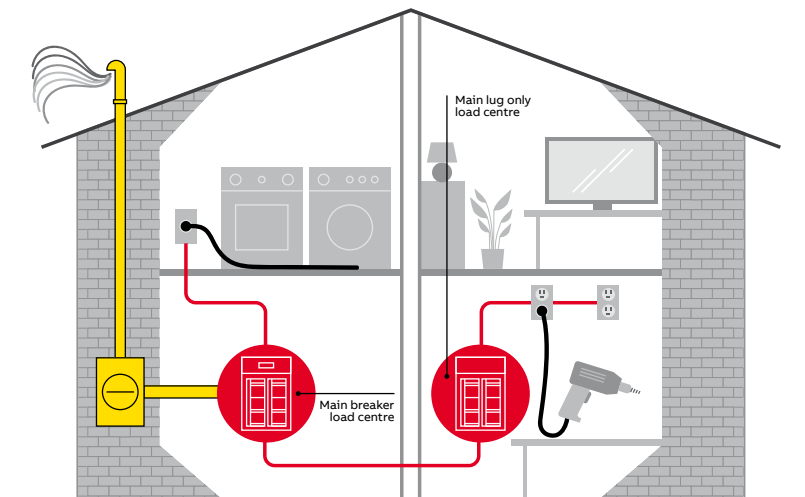## NEMA Load centers and type of breakers

In a main breaker load center, the main circuit breaker, for example the main disconnect, is built into the load center. The main disconnect allows a person to manually disconnect the power from the load center. In a house, the most common use of a main breaker load center is as the main (or only) load center. This load center contains a main breaker and two rows of circuit breakers. It is typically used to supply power to outlets, lighting and subpanels, if any, in and around the home.

Load Centers provide safe, easy to install electrical distribution solutions for residential and single-family applications in NEMA markets

After passing through a meter on the outside of the house, the electrical service enters the house and connects to a load center, also known as a service box or service panel. The load center is an electrical box that is commonly located on an interior basement for a house wall as close as possible to the meter, or in the entrance of a multiplex condo. It distributes electric current to the various circuits within the home. The load center allows you to supply power to outlets, lighting and large appliances. The load center has two rows of circuit breakers. Each circuit breaker has a lever that can be used to set it "on" or "off". As a safety feature, each circuit breaker is designed to automatically "trip"—that is, interrupt the circuit—when a circuit carries more current than it is designed to carry. This prevents wires from carrying excessive current, which could cause them to overheat and possibly cause a fire.

Main lug only load centre

Main breaker load centre

A Load Centers
B Standard Circuit Breakers
C Dual Function Circuit Interrupter
D Arc Fault Circuit Interrupter
E AC Disconnects
F Meter Mod III / Modular Metering
G General Duty Safety Switches
H Heavy Duty Safety Switches
I Panelboards
J Busway
K Switchboards
L Surge Suppressor
M Ground Fault Circuit Interrupter with Selt-Test

Features and applications for Power Distribution
NEMA Modular metering

Modular meter centers are used for multi-family dwellings such as duplexes or apartment buildings, coming off the utility transformer, a Residential project will be for either a single-family home or a multi-family home. Usually a single-family project will have a meter socket load center on the outside of the home, or a meter base on the outside with a standard load center on the inside of the home. From there the load center breakers would supply all the power for the home including to the AC disconnects and/or SPA panels. For multi-family projects, all the metering is consolidated in the modular metering lineups. Each meter in the modular metering has a breaker that feeds to the downstream load centers.

Meter Modules are available with two to six-meter compartments that are self-contained. Individual branch circuit breakers for each tenant are located in a separate compartment adjacent to each meter socket.

Meter Stack Modules - Single- and Three- Phase
Consists of 2-6 commonly bussed meter sockets with branch circuit protection.

Meter Stack Modules - Single- and Three- Phase
Meter stacks consist of 2-6 commonly bussed meter sockets with branch circuit protection. A meter socket secures and provides the electrical connection for the meter. Meter stacks are mechanically and electrically built to connect with main modules and other meter stacks to secure an optimized electrical distribution.

High-rise Residential Condos & Towers
For high-rise apartment or condo towers, since the apartments are very similar to another, builders usually purchase a model that suit exactly their requirements. This is called a pre-
Confidential | For internal Use Only P a g e | 52
assemble kit. In this case, the load center comes in with all the breakers, factory installed. During the roughing-in, the electrician leaves all circuit wires for final termination at the panel. The only remaining tasks on site are to make the main connection, the neutral termination and grounding and connect the circuit wires to the breakers.

Features and applications for Smart Home
Solution with free@home

Home Lighting and Shading Control

With ABB-free@home you can switch and dim lights in the conventional sense but also call up predefined dimming values and light scenes. Furthermore, you can control lights individually or as a group and depending on movement detection. Through the integration of Philips Hue LED you can also control RGB LEDs through the same system and bring light control to a whole new level.

L1
L2
L3
N
PE

max. 16

DALI   DALI   DALI

A   O
ON
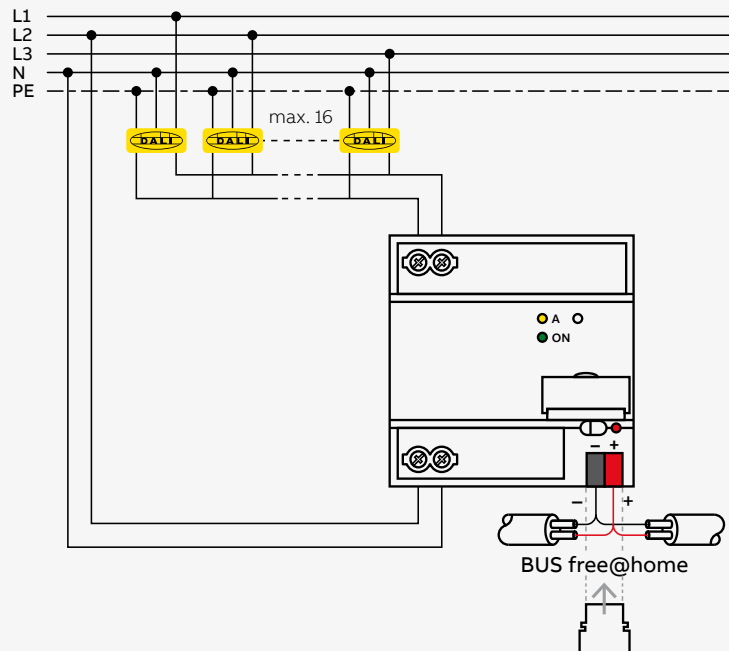
BUS free@home
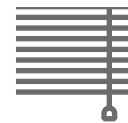
BLIND CONTROL

With ABB-free@home you can control shutters, blinds and curtains individually or in groups. It also features window monitoring and allows shading control depending on weather conditions. With ABB-free@home, blind control can easily be automated depending on external factors, e.g. the weather or with a fixed time schedule.

SCENE CONTROL

To create or change scenes is child's play with ABB-free@home. An intelligent assistance function in the app helps to put together the desired functions. A single press of the button on the switch, on the ABB-free@homeTouch, smartphone or tablet suffices to call up a complete scene.

Integration with Philips Hue:

LAN/WLAN

LAN/WLAN

Zigbee
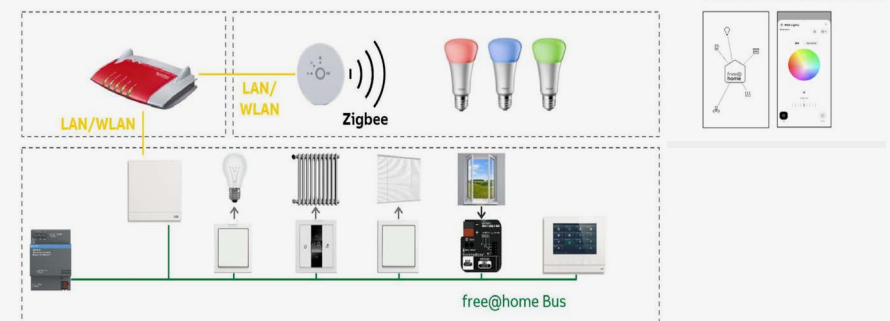
free@home Bus

Features and applications for Smart Home
Home HVAC Control

Comfortable and energy-saving.

The optimum room temperature can be adjusted with ABB-free@home   according to the actual requirement. In ECO mode, the temperature is automatically lowered at night or when no one is home. The heating can be automatically shut off when the windows are open. This reduces the energy consumption – whether for conventional heaters or under-floor heating. The ideal temperature is never the same. Depending on the time of the day, the room temperature controller provides your personal feel-good temperature. The heating valves are controlled wirelessly – with radio-controlled thermal actuating drives. The room temperature controllers can be integrated into the switch combination. And the window contacts are net-worked wirelessly as well. That is both smart and efficient.

Split unit are widely used in apartment towers in both new construction & retrofit construction because of ease of installation & cheaper cost, ABB free@home split unit gateway interface provides interface between ABB free@home system and many manufacturers' air conditioners, so-called split units (DAKIN, LG, etc..) The device converts the free@home telegrams into infrared commands and transmits them to the split unit. The transmitter of the supplied cable is bonded directly onto the split unit's receiver. The split unit then no longer receives the commands from a remote control. Instead, it can be operated via any free@home sensors like PIR, thermostat, switch, door contacts, weather station etc..
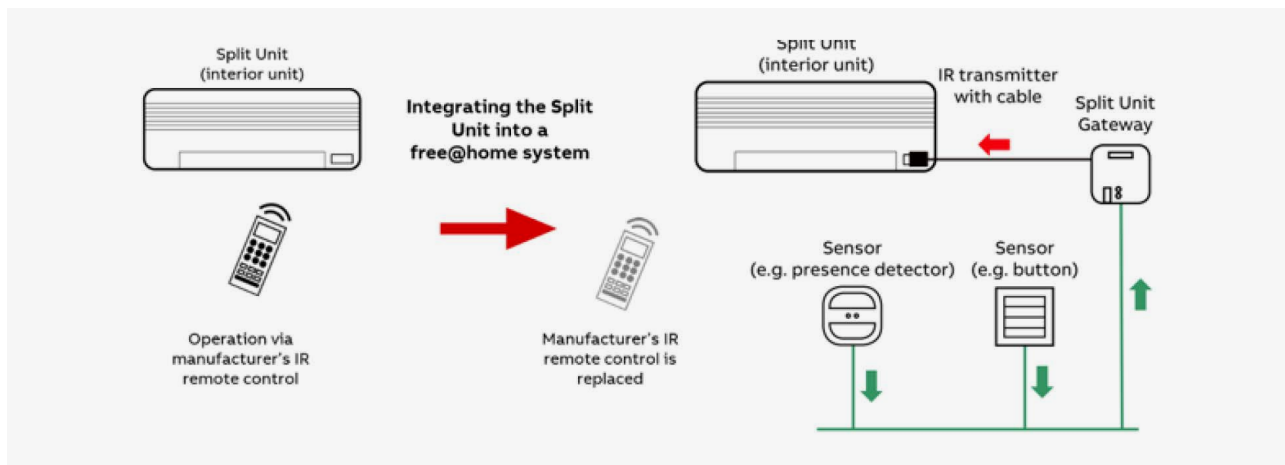
Features and applications for Smart Home
## Home Entertainment

The integration of the Sonos wireless home sound system into ABB-free@home brings multi-room audio to a new level of convenience.

The Sonos speakers can be controlled by integrated ABB-free@home in-wall sensors and panels to play/pause the music, skip through the Sonos favorites or to set the volume. Also, the integration into scenes is possible. And, of course, everything can be controlled at the touch of a button remotely or from the comfort of your armchair.

The integration of the Sonos system into free@home is carried out with the aid of the Sonos API. This means that the commands of the free@home system are "compiled" within the free@home system access point, transmitted from there via the IP protocol to the Sonos speaker to control the music in your house

Free@home Integration with Sonos wireless speakers:
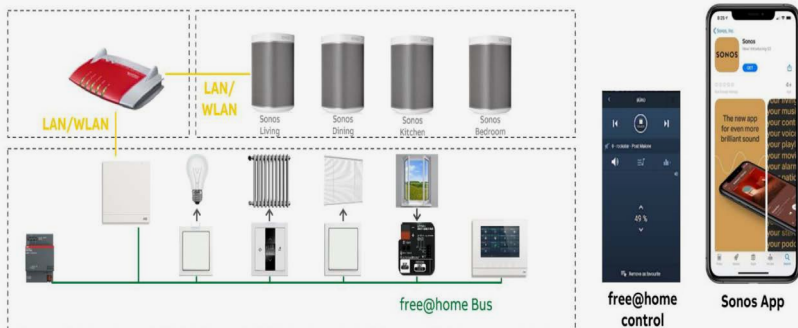
Features and applications for Smart Home
Home Security & Safety

Securing your home is more than just about protecting valuable possessions. It's about delivering peace of mind for you and your family. You need to be able to enjoy your home when there and to look forward to returning to it when not. ABB-secure@home is a complete wireless system with one intention to keep you and your family safe and secure. It's easy to install, flexible and integrates perfectly into your existing home design.

Secure
Proprietary protocol and encryption plus a unique rolling code for all arming/disarming controls provide maximum security during transmission CSMA (Carrier Sense Multiple Access) technology allows to optimize communications avoiding the disturbances, since the alarm transmitter and the receiver verify the absence of band occupancy

Flexible
Wireless technology 868.3 MHz with bidirectional communication allows flexibility: - to install the security system without brickwork - to place security sensors in the most convenient spot to maximize protection

Simple & Integrated
Initial setup is just to create a PIN code on the central unit and then power up the sensors to be paired wirelessly Using the system is particularly fast and much easier connecting also a free@home system, with an intuitive and easy to use app to control the security system from your smartphone or tablet

Volumetric detection
Any movement, any presence inside the house is detected by volumetric sensors. They are in strategic points and are equipped with different coverage lenses according to specific needs, and they will automatically adjust to changes of the environmental conditions and provide adjustable sensitivity. The alarm signal can be selected between the instant or delayed mode.

Opening detection
Windows, doors, main or secondary entrances, shutters or blinds, any opening of the house is controlled by perimeter detection sensors. The contact safety can also be associated with inertial devices which detect a possible shock occurred on a door or a window. Many small eyes stand guard on your tranquility, to ensure total protection and maximum serenity.
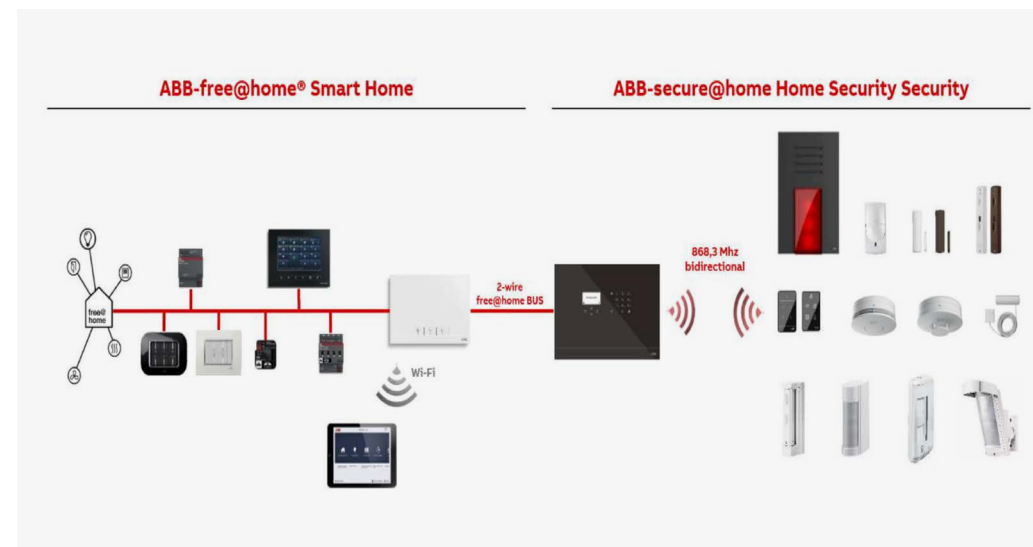
Features and applications for Smart Home
Home Personal Assist

Free@home Alexa Amazon Integration

Alexa is an intelligent personal assistant developed by Amazon. free@home integration enables voice control of up to 65 functions within the free@home system

The user starts the speech assistant with the keyword "Alexa,…"
2. The spoken sentence "Turn on the lights" will be transferred to Alexa Services and interpreted
3. The extracted command "Lights on" will now be transferred to the ABB MyBuildings service…
4. …and forwarded to the local installation
5. The command is realized by an installed switching actuator
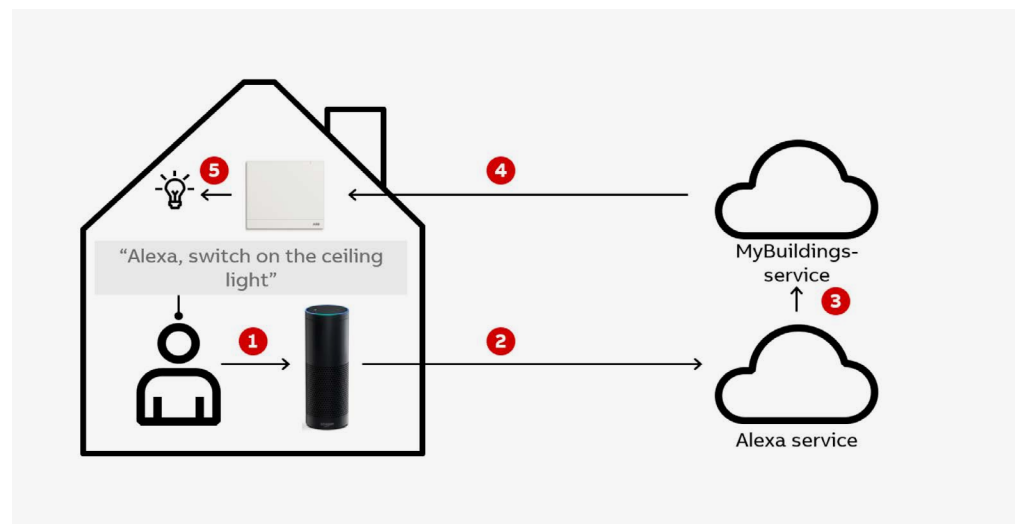
Free@home Google Home Integration

The free@home action for the Google Assistant allows easy control of free@home smart home devices using the Google voice assistant

The free@home action for the Google Assistant allows easy control of free@home smart home devices using the Google voice assistant
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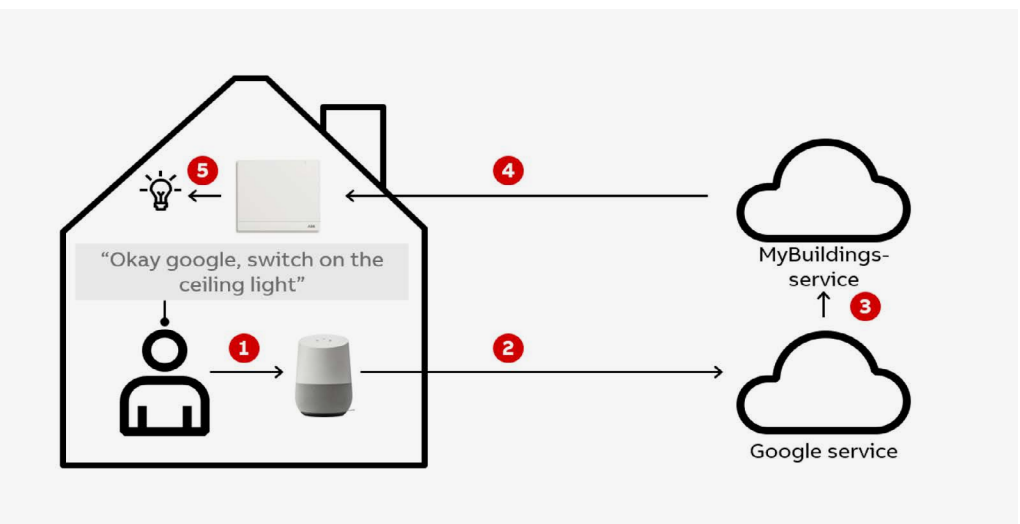
Features and applications for Smart Home
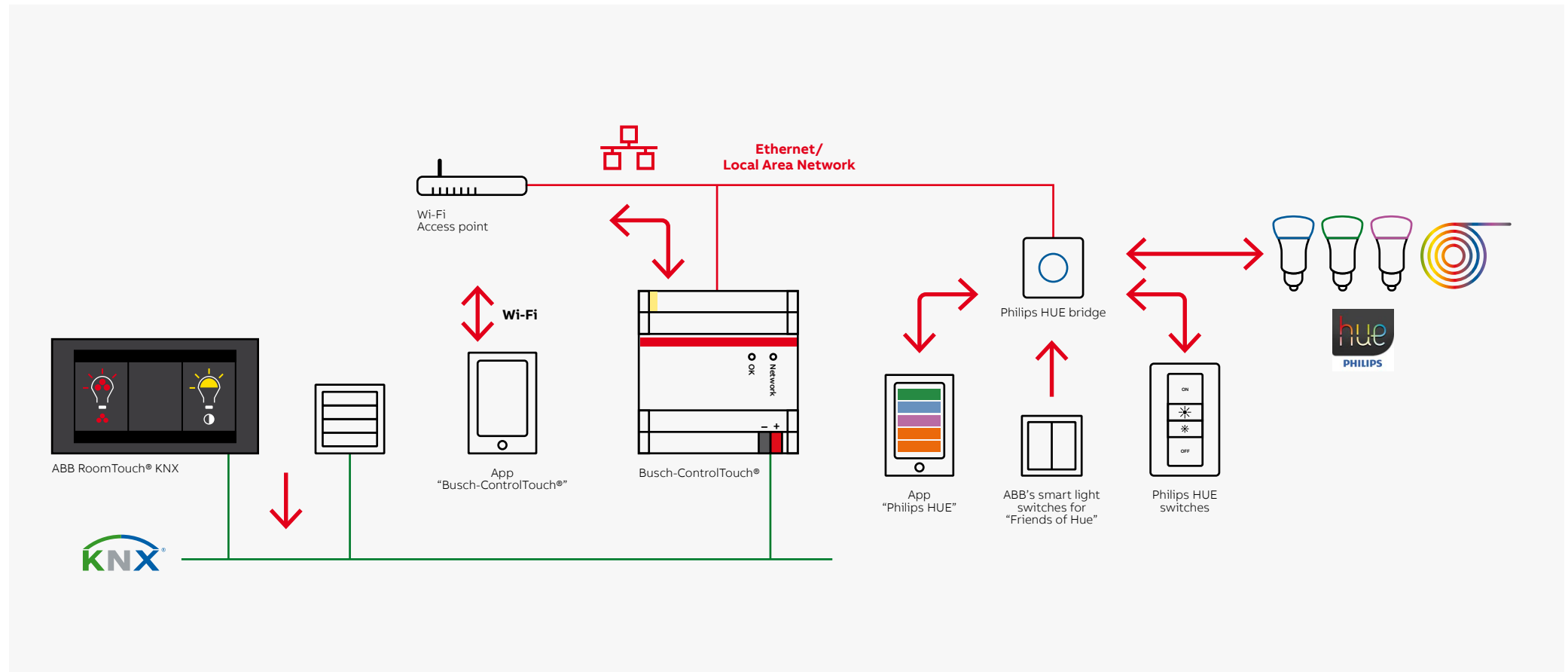## Geofencing

The innovative Geofencing function of ABB-free@home makes it possible for homeowners to surround the house or other locations with an imaginary fence.

 If someone enters or leaves this defined zone, free@home automatically responds with previously specified actions. For example, the system switches off the lights and adjusts the heating, to save energy when all residents have left the house.
Or it regulates the room temperature as soon as one leaves the place of work in the evening so that the home is warm and cozy when arriving at home.

Features and applications for Smart Home
Solution with KNX

Philips HUE interface

Wi-Fi
Access point

Ethernet/
Local Area Network

Wi-Fi

Philips HUE bridge

ABB RoomTouch® KNX

App
"Busch-ControlTouch®"

Busch-ControlTouch®

App
"Philips HUE"

ABB's smart light
switches for
"Friends of Hue"

Philips HUE
switches

Features and applications for Smart Home
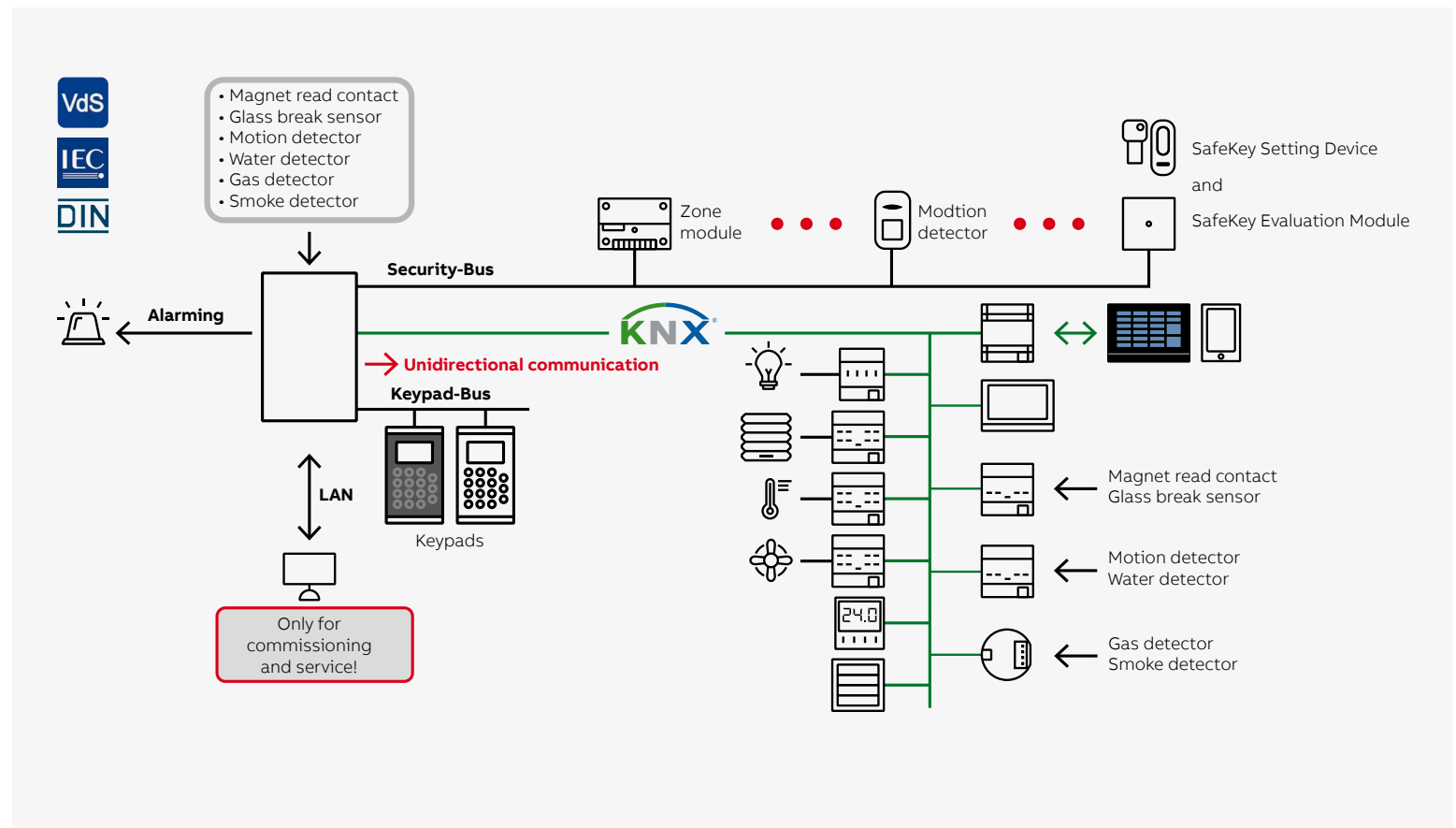## Solution with KNX

Home Security & Safety

The connection of ABB i-bus® KNX to security technology offers the user many significant advantages. Various tasks are implemented together with ABB i-bus® KNX and security products.

New possibilities provide economic benefits. Detectors can be used for several tasks. The high technical and functional quality of the used ABB i-bus KNX devices and security products has been approved by the German VdS Schadenverhuetung GmbH, an independent institution certifying solutions in the field of security and fire protection (VdS certificate 3438)

Arming/disarming, operation and display are carried out on the on the "Busch-Smart Touch" and mobile phone. The overview is assured by the clear operation and display features of the KNX.

The building always informs the user in plain text about the current state of the building and security functions. Depending on the arming state and type of alarm, an alarm is issued via the outdoor siren, strobe light, indoor siren, remote alarm on mobile phone and scene recall. In the event of mains failure, the safety functions are guaranteed due to the uninterruptible KNX and auxiliary power supply units

Features and applications for Smart Home
Solution with KNX

Home Energy Management

The recording of energy consumption, as well as their processing, is continually gaining in significance. The rising energy costs also make metering necessary in residential buildings.

To save energy and reduce operating costs, the energy consumption must first be measured. With ABB i-bus   KNX, the consumption values of: electricity, gas, water, are measured, analyzed, and processed. Thus, energy flows and costs can be monitored and made transparent Incentives and additional reasons and for Smart Metering

Sustainable building
• The building gets an energy label/certificate
• Using the available resources in a responsible manner
• Funding from the state

Consumption becomes transparent
• Display of current consumption values on the Busch-Smart Touch and mobile phone
• Review and comparison of previous consumption values (day, week, month) with the Energy Analyzer QA/S

Load management
• In the foreseeable future, load management will also be required in residential homes, e.g.
• The charging power of the electric car is regulated depending on the yield from the photovoltaic system
• The washing machine starts at the cheapest energy tariff
• The Energy Analyzer QA/S already has integrated load management with prioritized shutdown levels

Monitoring of the installation and detection of "energy thieves"
• The consumption values are monitored in their range
• A message are issued when a value falls below or exceeds a threshold
• No power consumption of the freezer → there is a defect
• The lifter bell on the guest toilet was defective due to aging This resulted in a water loss of 400 liters per day! The high-water loss could be recognized and remedied immediately
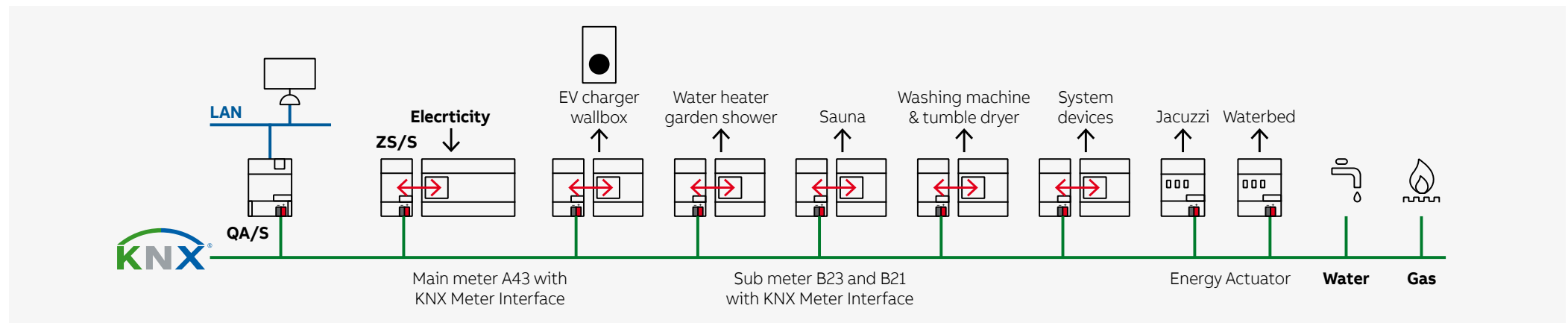
Features and applications for Smart Home
Solution with KNX

Home HVAC System

A gas heating boiler is used to generate heat for the
• Heating system (underfloor heating and wall radiators) and
• Hot water

The gas heating boiler is integrated into the KNX via a gateway. The temperature in the rooms is controlled via Room Temperature Controller (RTC) and valve drives. The heating does not only operate according to the outside temperature, but also according to the needs of the residents, present/absent, day/night. The energy savings are based on demand-driven heating.

A holistic heating solution based on the ABB i-bus® KNX integrates individual room temperature control and generation increase in energy efficiency and reduce operating costs.
Integration of a "Buderus" heat generator: A KNX Gateway conveniently connects the Buderus gas heating boiler with ABB i-bus® KNX Communication between
• Heating boiler
• Control unit
• Room temperature controller (setpoint) and valve drive (valve position)

The amount of heat generated is based on the needs of the residents (present/absent,
day/night, …). Control and change of system parameters for reading or changing the operation of the heating boiler and distribution. Forwarding of fault, status, etc. messages to KNX. Visualization of operating and switching states as well as temperature setpoints and actual temperature values.
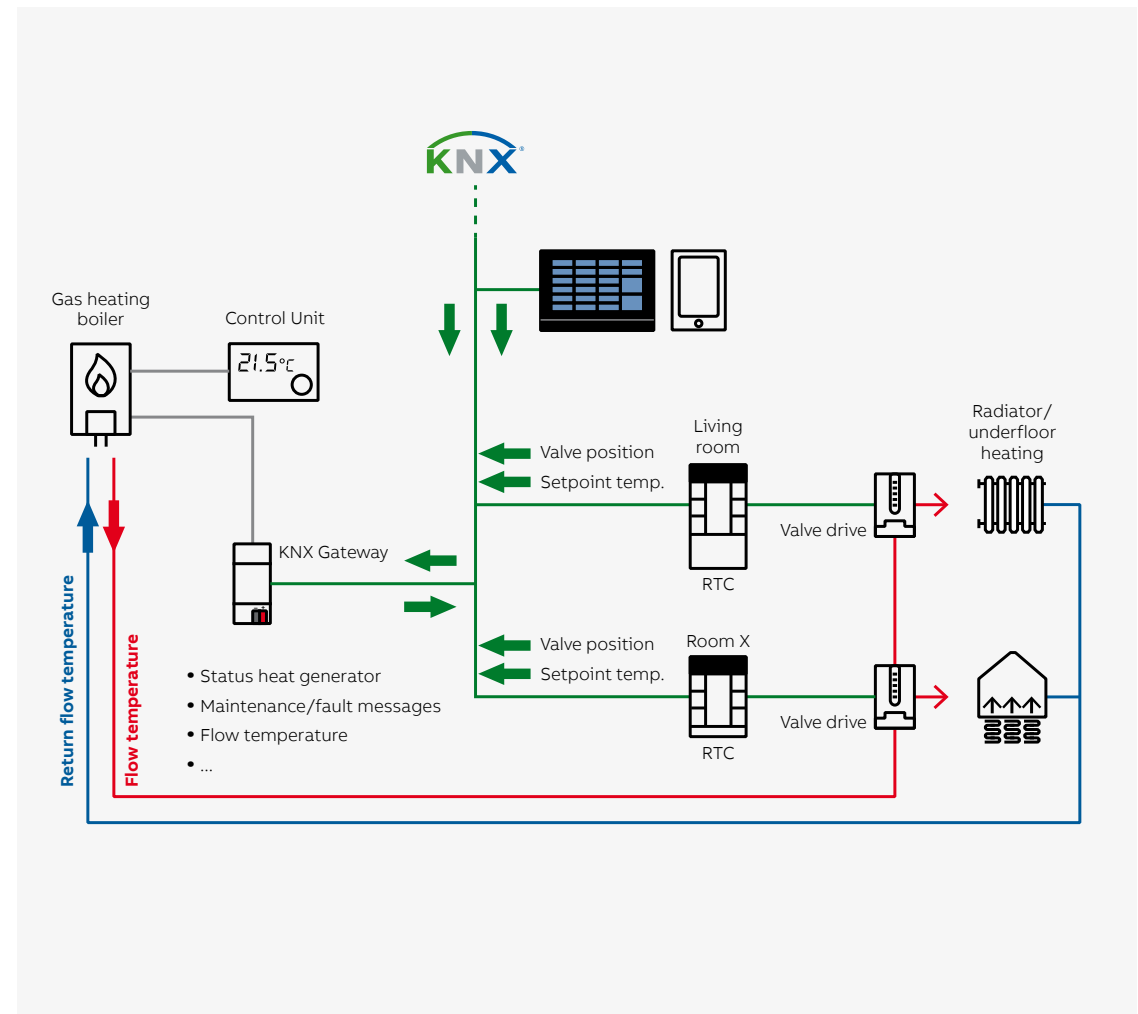
Features and applications for Smart Home
Electrical Wiring Accessories/Conventional Wiring Accessories & Electronics

There are many wiring accessories that can compliment the Residential offering from global and local standard ranges to suit local installation habits, with colours to match or combine in aesthetically pleasing ways to enhance the experience of the end user.
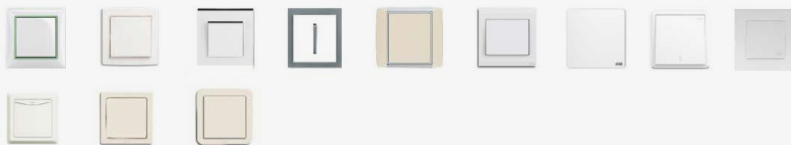
Residential product
Various Product ranges for Residential are available dependent upon level and budget constraints and to suit local regulations and market requirements.

Basic

Mid Range

Dimmers, Thermostats to ad lighting and heating control

Blind and shutter control

Premium
High quality plastic, metal finishes and Glass ranges are available

Colours align with Tacteo

Metal Clad range for workshops and garages

Outdoor installations

Sockets with USB outlets and USB Outlets high current applications for charging mobile phones

Multimedia outleys with USB, HDMI and Bluetooth connectivity

Presence Detectors and Whatchdogs to add Safety and security i and around the residence

Proximity sensor to switch loads by close sensing of hands

09.2021