Franco Vecchiato, SAM LPBS Regional Manager

New SACE Emax 2
From Circuit-breaker to Power Manager

SACE Emax 2
From Circuit-Breaker to Power Manager

Our customers need more efficient solutions, to

- Increase productivity and reliability
- Reduce times and costs for installation and management
- Minimize environmental impact.

SACE Emax 2
From Circuit-Breaker to Power Manager

SACE Emax 2 improves the efficiency of all electrical plants, creating the new standard in:

- **Control**: power flow optimization
- **Connectivity**: integration in the systems
- **Performance**: all requirements in the right size
- **Ease of use**: to make efficiency available

SACE Emax 2 is the evolution of the Circuit-Breaker into the Power Manager.

Control
The power needed, when needed.

Control

Connectivity

Performance

Ease of use

Power Controller

Reduce power consumption through exclusive load management, to reduce energy bill.

- Available as accessory of Emax 2, no need for complex control systems
- Automatic control of downstream loads and generators

Control
The power needed, when needed.

Control

Connectivity

Performance

Ease of use

New Ekip Trip Units

- Precise Power, Energy Measurement to manage consumption
- Advanced event and alarm management to prevent faults and/or manage them quickly
- Embedded Power Quality Monitoring Function.

- **EKIP DIP:**
  Protection

- **EKIP TOUCH:**
  Protection,
  Measurements,
  Communication

- **EKIP HI-TOUCH:**
  Ekip Touch +
  advanced protections,
  Power Quality Monitoring

Connectivity
Integration is easy. Even from afar.

Control

Connectivity

Performance

Ease of use

Communication

- Modbus, Profibus, Devicenet, Modbus TCP, Profinet and Ethernet IP
- installed directly on the terminal box
- Integrated IEC61850 module connecting to Smart Grids.
- Accurate measurements available on the network
- All functions accessible via Internet (Ekip Link supervision)

Connectivity
Integration is easy. Even from afar.

Control

Connectivity

Performance

Ease of use

Power and auxiliary connections:
optimized to simplify connection.

- The power terminals, which can be oriented horizontally or vertically, designed for the most common busbars

- Push-in connections of the auxiliaries for immediate wiring.

Performance
A size for every requirement.

Control

Connectivity

Performance

Ease of use

Icu (440 Vac)	Versione	630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300
200	X											
150	V											
100	H											
85	S											
66	N											
50	C											
42	B											

E1.2

E2.2

E4.2

E6.2

- Improved pole performance
- New high-energy operating mechanism
- Same height and depth from E2.2 to E6.2

Performance
A size for every requirement.

Control

Connectivity

Performance

Ease of use

Icu (440 Vac)	Versione	630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300
200	X											
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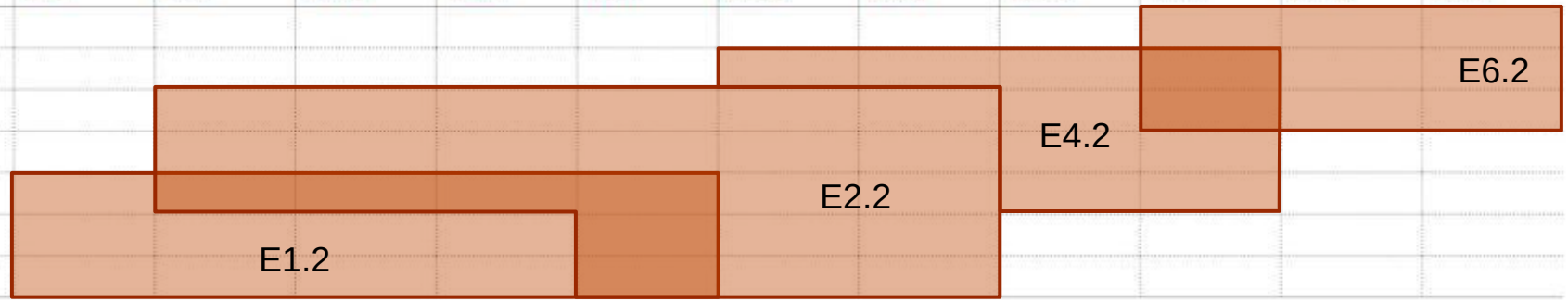


- **E 1.2** :1,600A, unique 50kA 1s, 65kA switchgear in 400x400mm (3p)
- **E2.2:** 2,500A in a width of 400mm, unique Icw 85kA for 1s.
- **E4.2:** the true 4,000A frame, Icw 100kA 1s in the size of E3
- **E6.2:** 6.300A with high switchgear performance, up to 120kA 1s.

Ease of use and safety
Everything under control and problem free.

Control

Connectivity

Performance

Ease of use

Circuit-breakers

- New ergonomic user interfaces on all range
- Trip unit programming directly from DOC, with Ekip Connect

Fixed Parts

- The most secure insertion mechanism
- New safety shutters

Accessories

- New range of accessories for secure and easy installation, operation & maintenance:
- New locks, interlocks
- New full remote control
- New Auxiliary contacts

ABB SACE Air Circuit Breaker

New SACE Emax 2
Load management with Ekip Power Controller

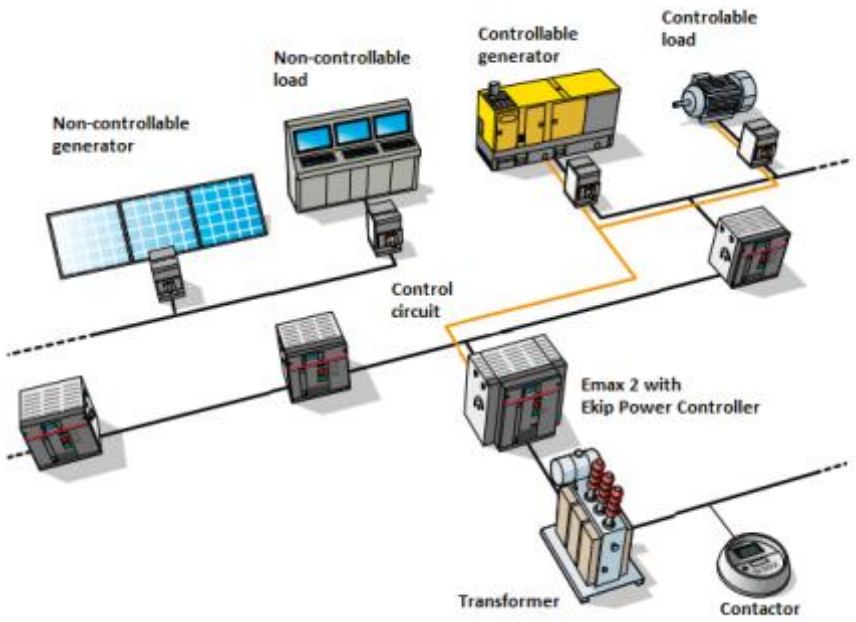
Power and productivity for a better world™

Ekip Power Controller
Agenda

- Introduction
- Application examples
- The algorithm and description of operation
- Settings

Introduction

Introduction



SACE Emax 2 with *Ekip Power Controller* is the ideal solution for load management and provides the optimum balance between **reliability, simplicity** and **cost-effectiveness**

Its features and advantages include:

- integration in the trip unit for **simplicity of use** and **quick commissioning**
- patented calculation algorithm to **avoid penalties** and **reduce overall power consumption**
- one circuit-breaker controls up to **15 loads to eliminate the need for additional systems and software**

Introduction
Cost saving on electricity billing

The tariff structure generally includes:

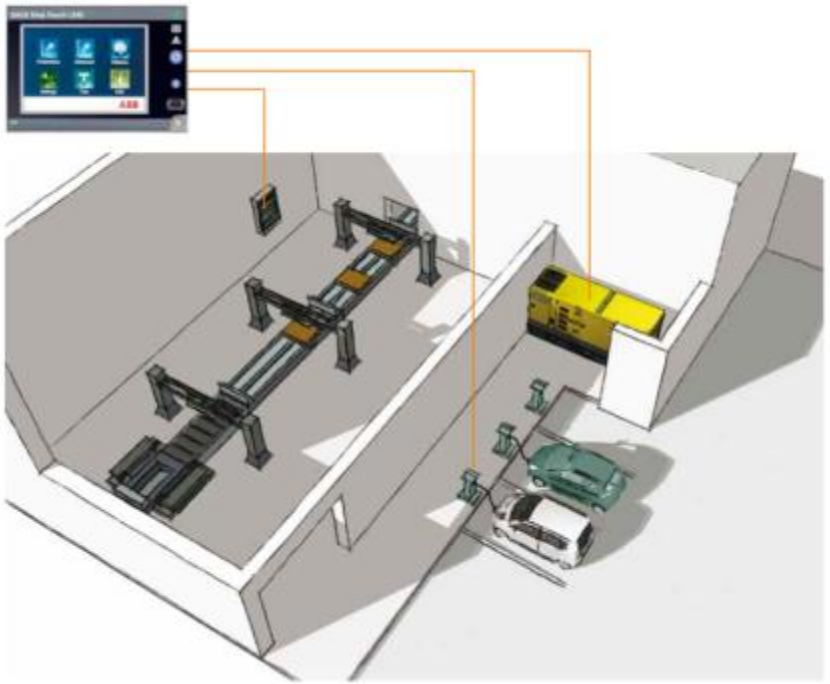
Maximum Demand Charges
• charges related to the maximum power demand registered during a billing period and its corresponding rate of utility
• this is NOT instantaneous based, but based on averages and will typically be set at the highest demand value recorded over the month

Energy Charges
• charges related to the energy consumed during the billing period and their corresponding rates

Ekip Power Controller allows savings on Maximum Demand Charges

Ekip Power Controller is a powerful means of efficiency improvement for both Users and Utilities

Introduction
Type of loads managed



Ekip Power Controller works by managing the loads to limit average power use.

The types of loads that can be managed include:

- thermal and refrigerating loads
- lighting apparatus
- delayed start loads
- charging systems for electric vehicles
- generators

Agenda

Application examples

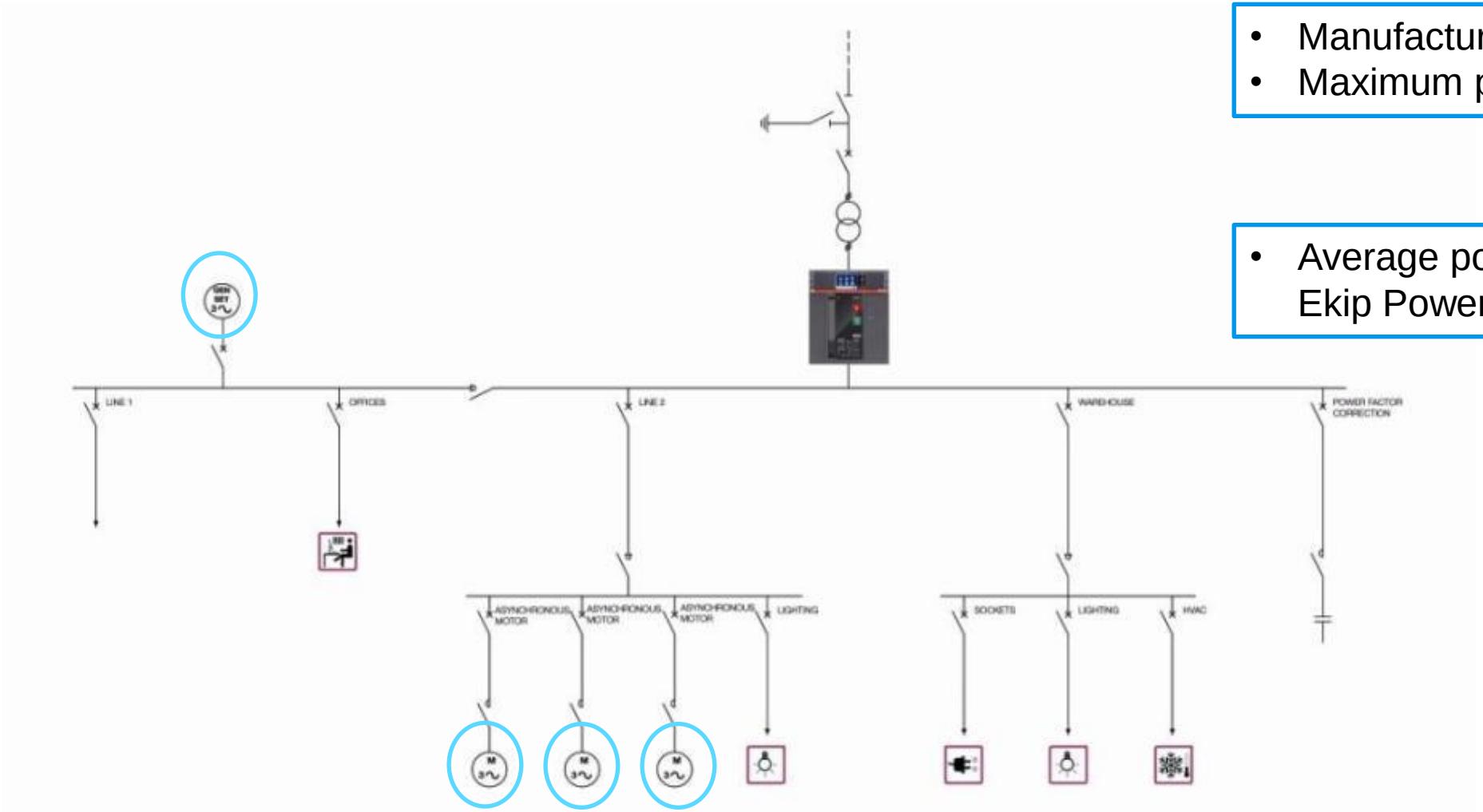
Application examples

Industry

Hotel

Building

Industry



- Manufacturing industry
- Maximum power absorption 1200kW

- Average power absorption with Ekip Power Controller 1000kW

-17% Power absorption

Industry
Controlled loads

Priority	Load	Power	Nominal current	Controlled device
1	Air compressor	30kW	55A	A63
2	Crusher	160kW	280A	A300
3	Conveyor belt	160kW	280A	A300
4	Gen Set	700kVA	1010A	E1.2 1250 Ekip G LSIG

Industry
Wired connections, 4 controlled loads

In the same switchboard, it’s convenient to use Ekip Signalling 2K-4K modules

1 digital input for clock tick synchronization with the smart meter of the DSO (optional)

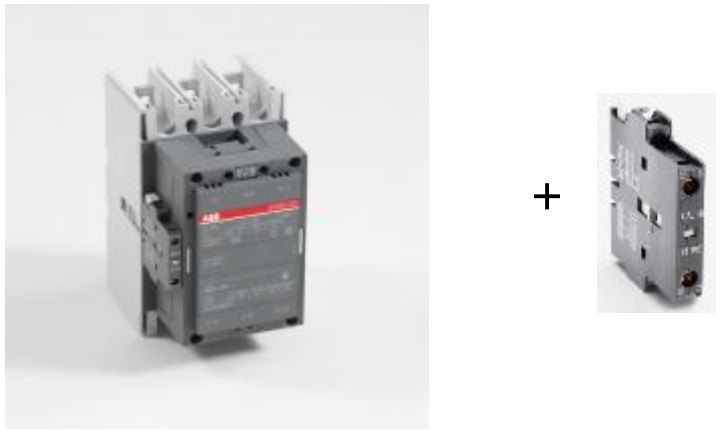
Industry
Shopping list

The main SACE Emax E2.2 equipped with:

- Ekip Touch LSIG + Measuring Pro
- *Ekip Power Controller* function
- Ekip Supply module
- 2 x Ekip Signalling 2K modules
- Ekip Signalling 4K module

Industry
Shopping list

The controlled SACE Emax 1.2 (Gen Set) equipped with :
- Ekip G Touch LSIG
- shunt opening release (YO)
- shunt closing release (YC)
- geared motor device (M)
- contact for signaling of CB open due to overcurrent (S51)
- open/closed auxiliary contact (Q/1)



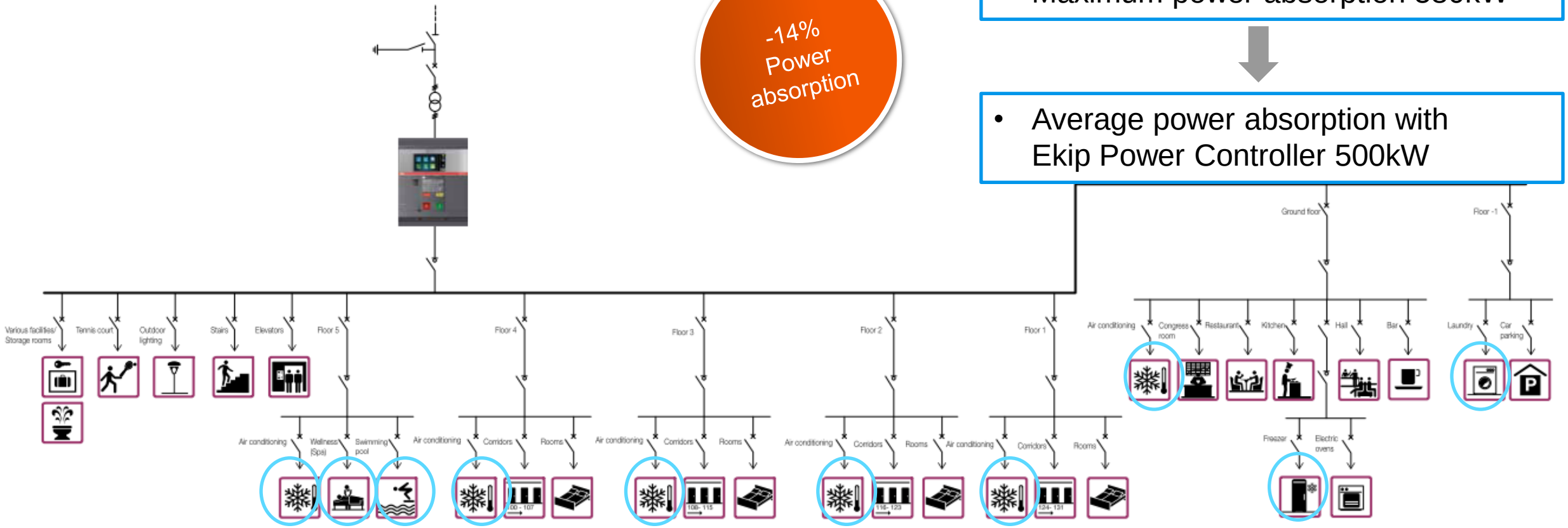
Each controlled contactor equipped with an auxiliary contact

Hotel

-14% Power absorption

- 4 star hotel with 80 rooms
- Maximum power absorption 580kW

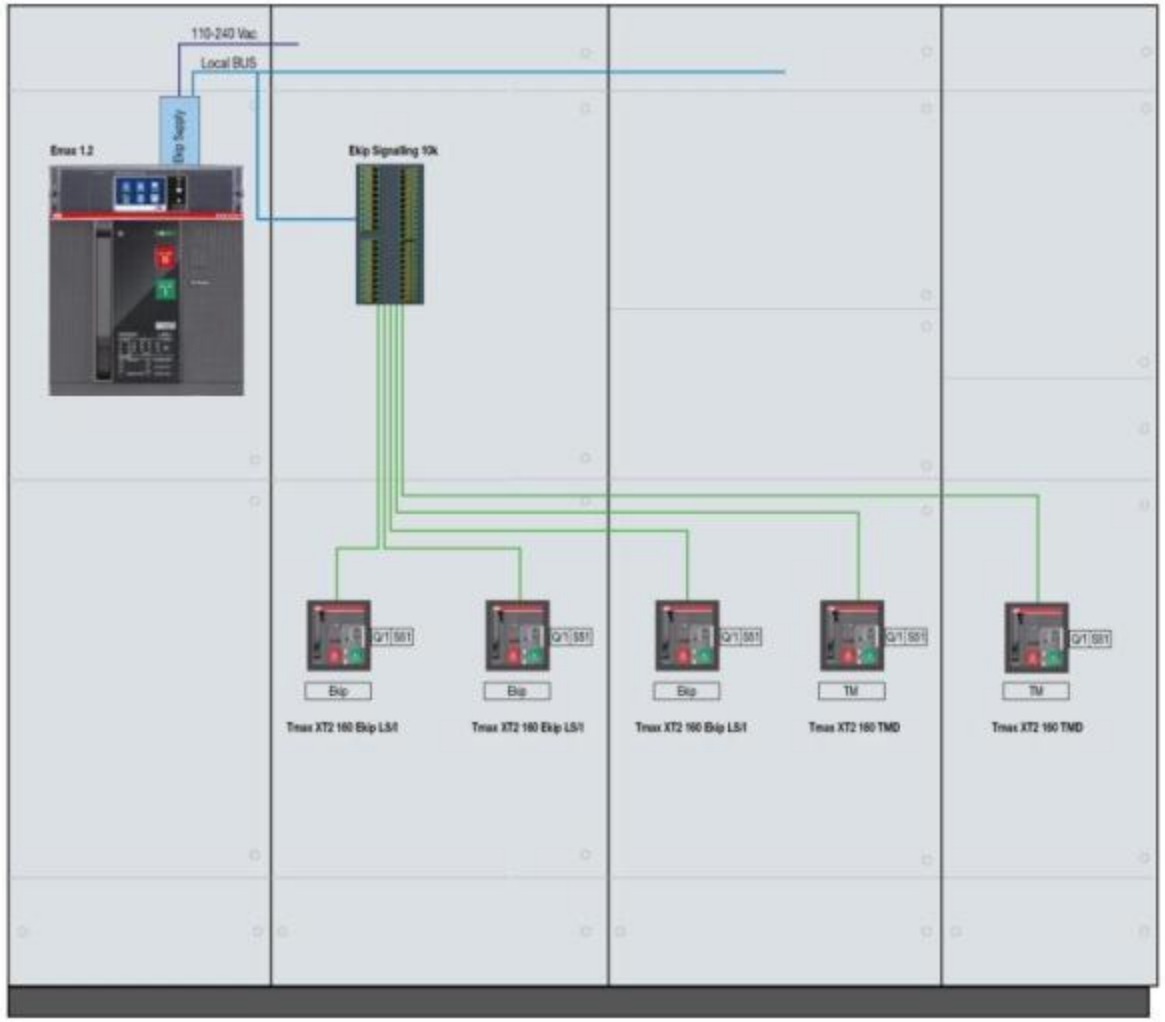
- Average power absorption with Ekip Power Controller 500kW



Hotel
Controlled loads

Priority	Load	Power	Nominal current	Controlled device
1	SPA	32kW	51A	XT2 160 Ekip LS/I 63A
2	Swimming pool	32kW	51A	XT2 160 Ekip LS/I 63A
3	Air-conditioning per floor	35kW	56A	XT2 160 Ekip LS/I 63A
4	Kitchen (refrigerators)	8kW	13A	XT2 160 TMD 16A
5	Laundry	8.4kW	13.5A	XT2 160 TMD 16A

Hotel
Wired connections, 10 controlled loads



To manage more than 5 loads, it is possible to use up to 3 Ekip Signalling 10K units

Ekip Signalling 10K is mounted on DIN rail and interfaced with the main Emax 2 through the internal bus connection

Same configuration for the other 5 loads

Hotel
Shopping list

The main SACE Emax E1.2 equipped with:

- Ekip Hi-Touch LSIG
- *Ekip Power Controller* function
- Ekip Supply module

Hotel
Shopping list

Each controlled SACE XT2 equipped with:
- stored energy motor operator (MOE)
- contact for signaling of CB open due to overcurrent (S51)
- open/closed auxiliary contact Q/1

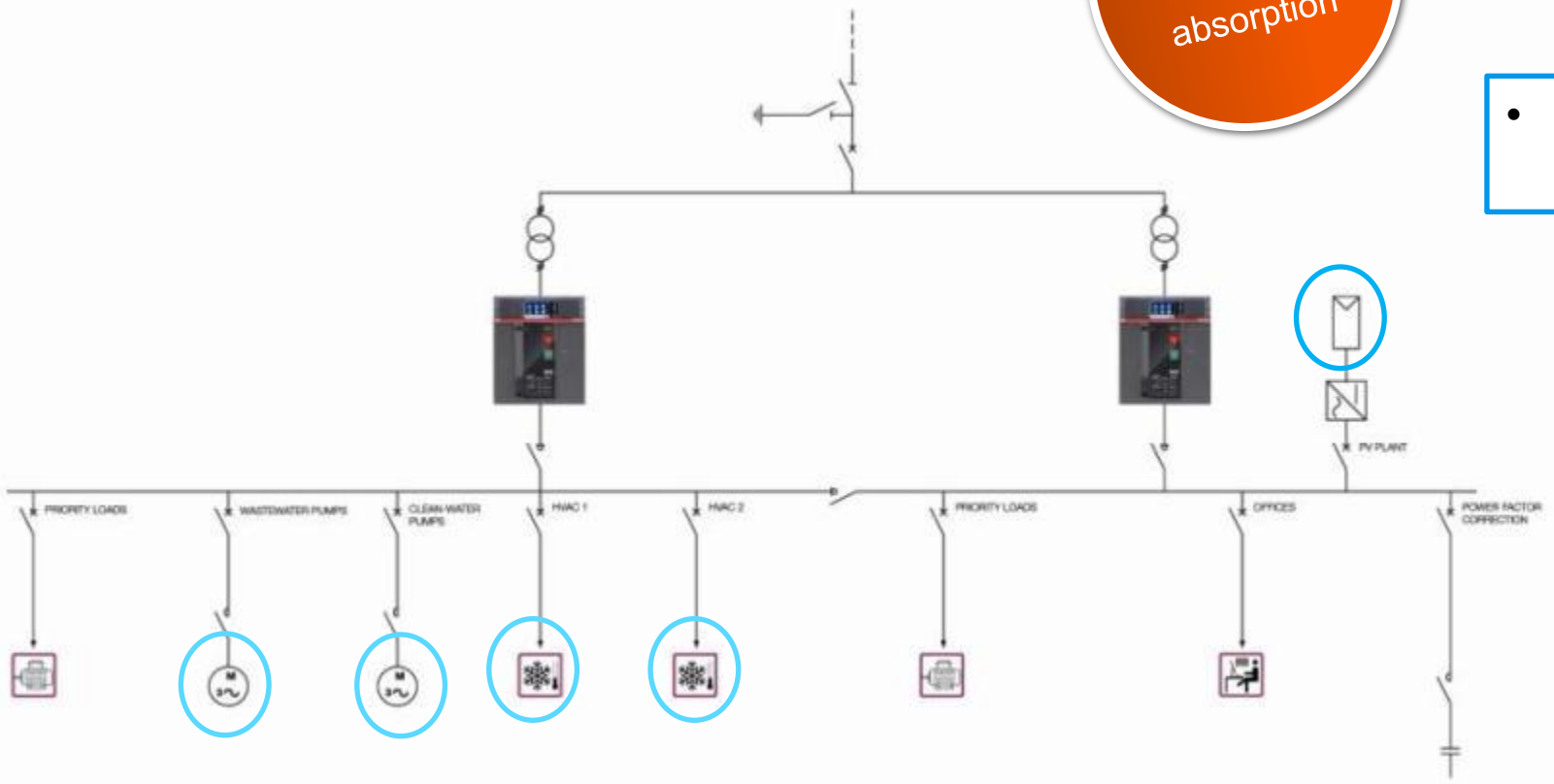
+

2x

2x Ekip Signalling 10K (on DIN rail)

Back

Building



-20% Power absorption

- Office building
- Maximum power absorption 1000kW

- Average power absorption with Ekip Power Controller 800kW

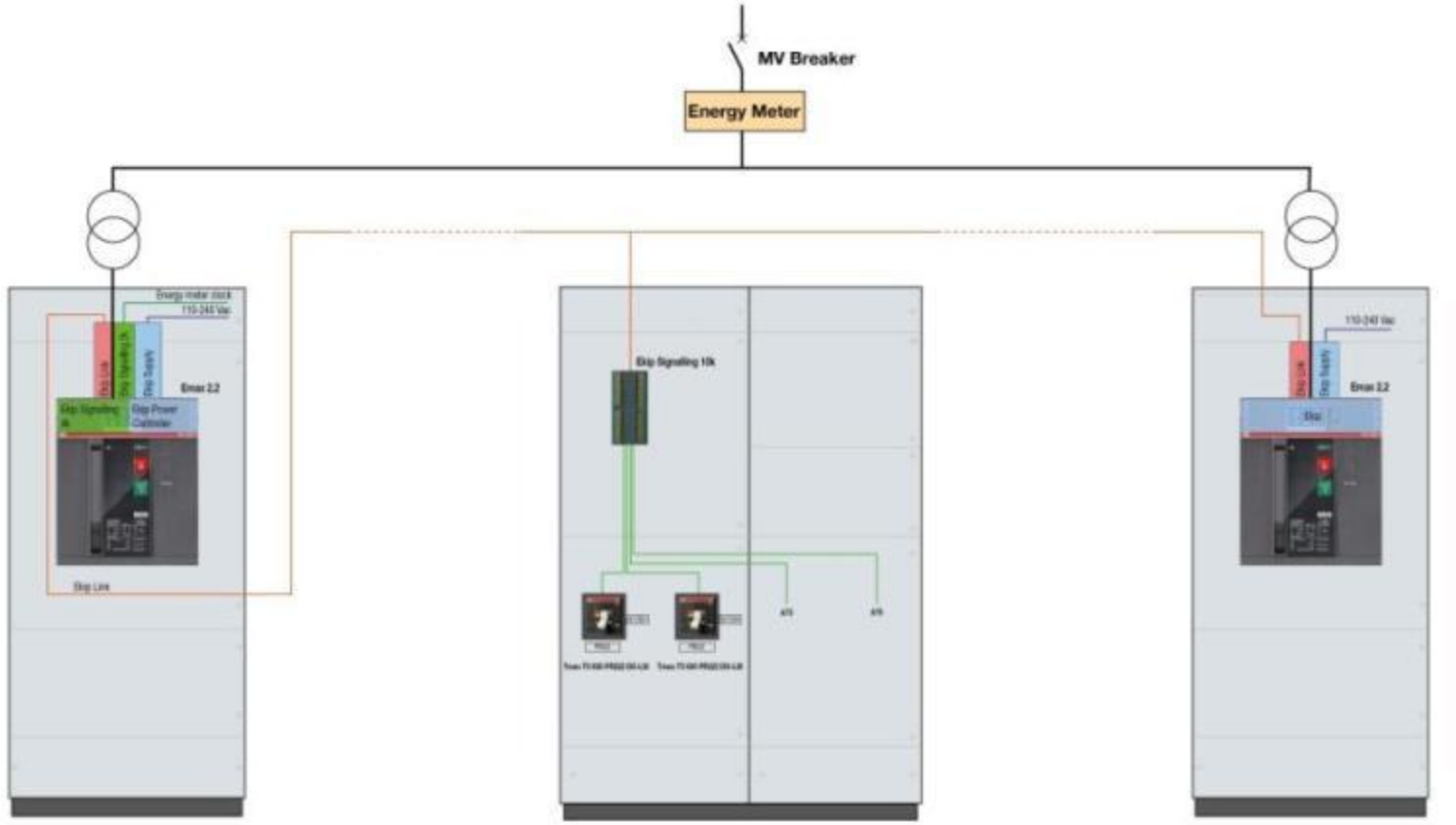
The PV plant is a “priority load” as renewable energy source

NO DISCONNECTION

Building
Controlled loads

Priority	Load	Power	Nominal current	Controlled device
1	Clean-water pumps	37kW	66A	A75
2	Wastewater pumps	37kW	66A	A75
3	HVAC1	360kW	578A	T5 630 PR222 DS-LSI 630A
4	HVAC2	360kW	578A	T5 630 PR222 DS-LSI 630A

Building
Connection through Ekip Link

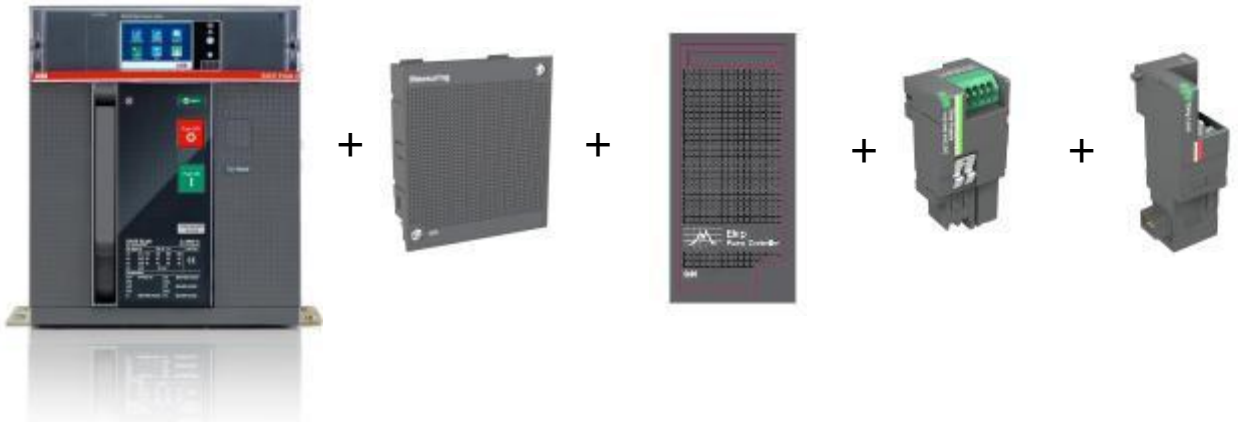


It is possible to install only 1 Emax 2 equipped with *Ekip Power Controller*, without having to duplicate wiring

The first circuit-breaker will carry out the analysis (and the consequent load management) of the total energy consumed in the plant

The total energy is the sum of the 2 energy profiles detected by the two measure modules

Building
Shopping list



1 of the 2 main SACE Emax 2.2 equipped with:
- Ekip Touch LSIG + Ekip Measuring
- *Ekip Power Controller* function
- Ekip Supply module
- Ekip Link module

The other main SACE Emax 2.2 equipped with:
- Ekip Touch LSIG + Ekip Measuring
- Ekip Supply module
- Ekip Link module

Building
Shopping list

+

+

+

Each controlled Tmax T5 equipped with:
- stored energy motor (MOE)
- contact for signaling of CB open due to overcurrent (S51)
- open/closed auxiliary contact Q/1

+

Each controlled contactor equipped with an auxiliary contact

+

Ekip Signalling 10K (on DIN rail)

Agenda
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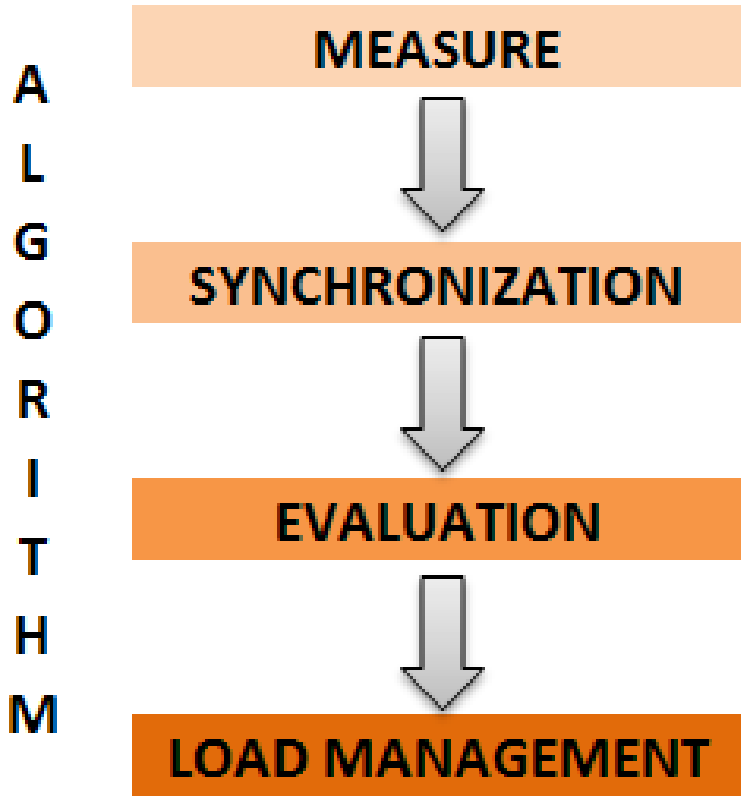
The algorithm and description of operation

The algorithm



The algorithm consists of 4 steps:

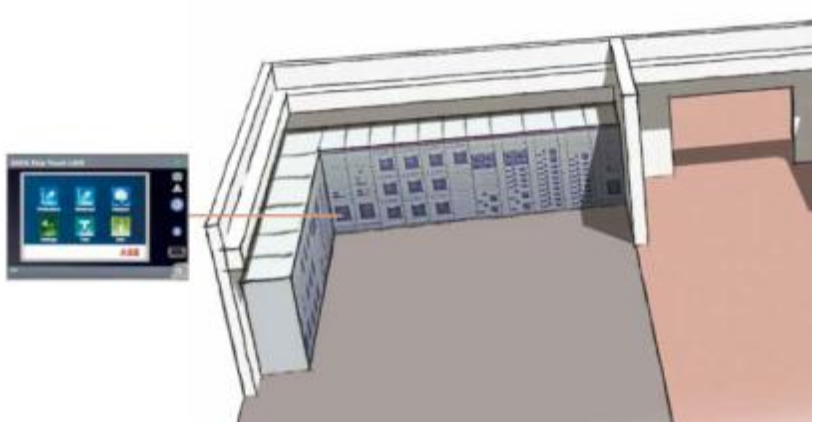
1. *Measure*: measures the total power flow through the SACE Emax 2 which implements the function

2. *Synchronization*: defines the time intervals in which the average power demand is measured

3. *Evaluation*: evaluates whether the demand is too high, whether it is within the normal limits or whether it is significantly lower

4. *Load management*: decides which are the loads to be disconnected/reconnected, in compliance with:
   - priority
   - respect times
   - reordering

Description of operation
Connection details



Ekip Power Controller is able to automatically manage the following situations, allowing integration with the selectivity of the protection devices in the plant:

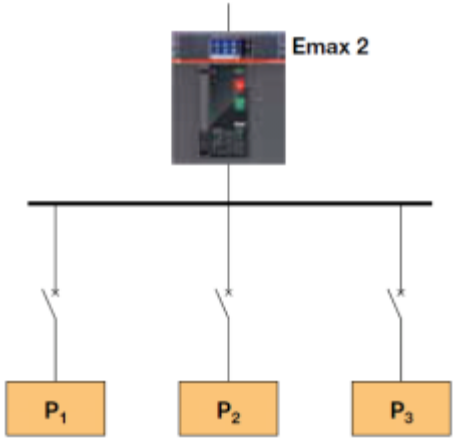
- tripping of protection trip units
- manual operation

Each load is controlled in one of the following ways:

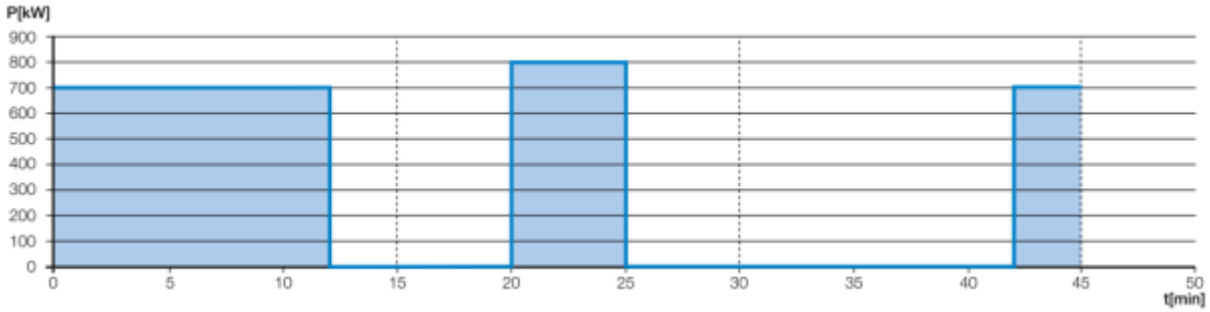
1 - *Wired control*
- 1 digital input (mandatory) to get information about the open/closed state of the downstream device
- 1 digital input (optional) to get information about the enabled/disabled state of the downstream device (or tripped state or redundant contact state)
- 2 digital outputs to give the opening/closing command to the downstream device when it is a circuit breaker or switch disconnector

2 - *Ekip Link control*
- Using Ethernet cable with Ekip Link module

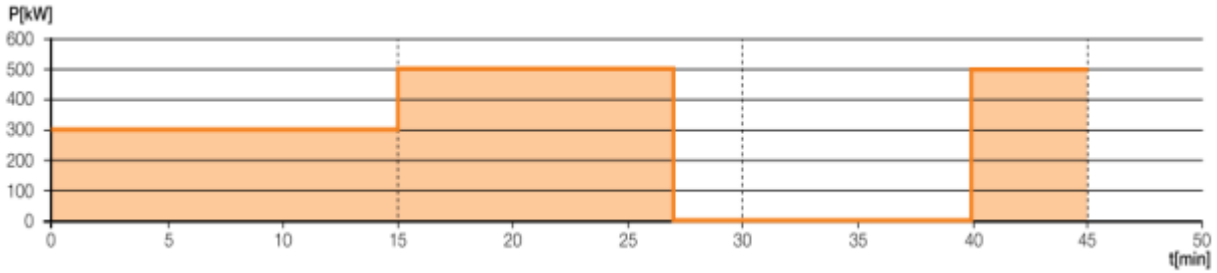
Description of operation
Example of operating logic



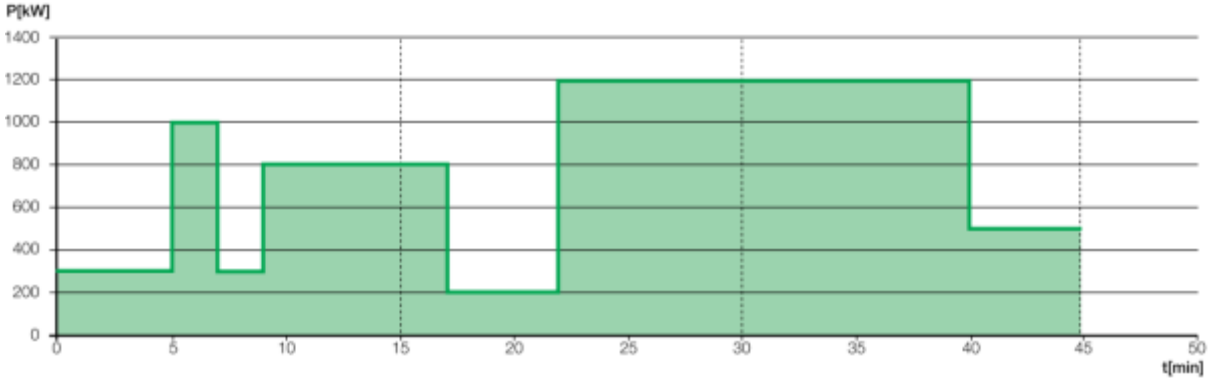
Load – P1



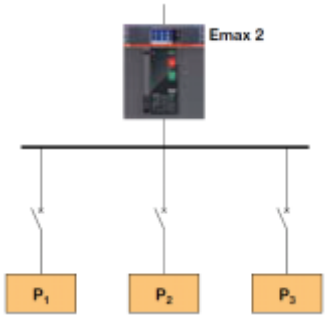
Load – P2

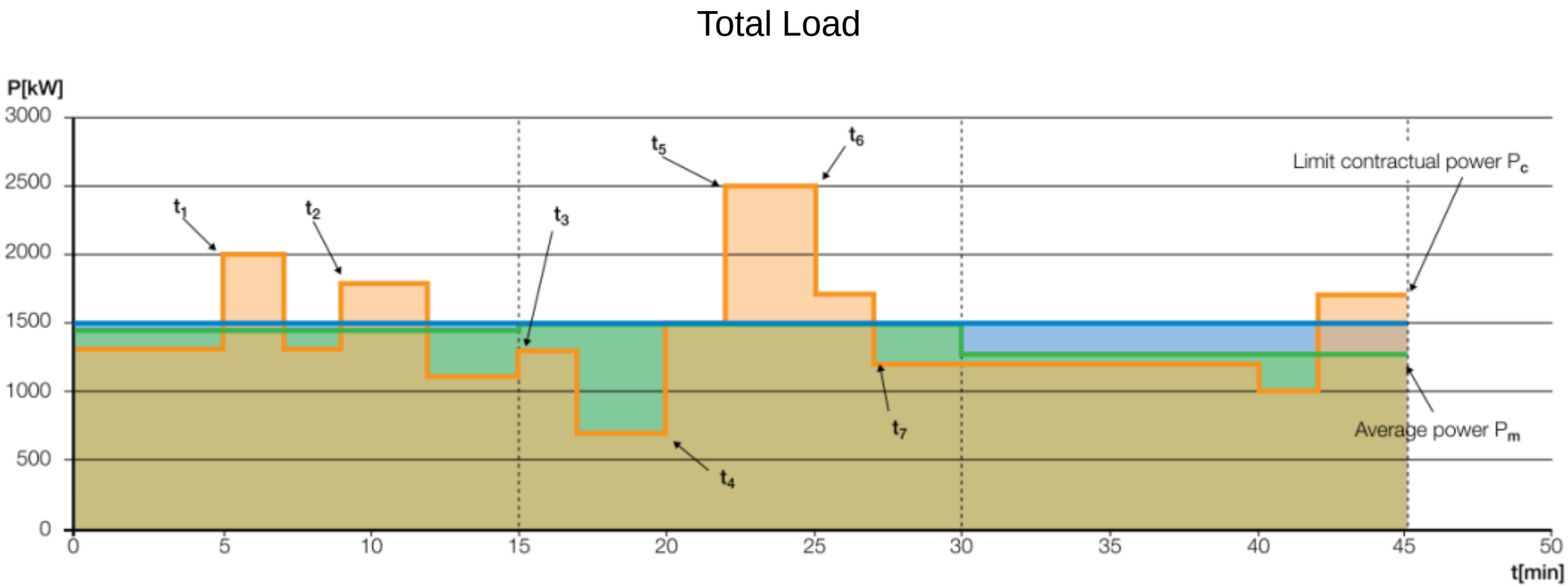


Load – P3



Description of operation
Example of operating logic





Agenda

Settings

Settings
Ekip Connect

To initiate the Power Controller, the user may set a list of parameters:

- enable/disable
- power limits
- week scheduling
- Saturday scheduling
- Sunday scheduling
- synch configuration
- start-up behavior

Settings
Ekip Connect

For each load, the following parameters may be set:

- connection type
- open/closed input
- optional input
- enable/disable
- shed priority
- ton_min
- toff_min
- toff_max
- user type
- nickname

Agenda

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