

# Load management solutions for Grow Lighting Systems

## Greenhouse Horticulture



Produce healthy, tasty crops using our broad range of Load Management solutions to operate your grow lighting systems with maximized reliability and enhanced energy efficiency.

### What are Grow Lighting Systems?

Smart Greenhouses and Indoor farming need dedicated light control to ensure the best crop quality. By controlling the quality, quantity (with regard to the spectral composition of light) and duration of light, Grow Lighting Systems can now ensure perfect light conditions (probably impossible to obtain in any other way) to help you grow perfectly healthy crops.

### Why you need load management solutions for lamp starters

By switching the lamp loads and protecting the electrical distribution system from overloads, short-circuits and ground faults, the ABB lamp starting solution for assimilation lighting ensures that greenhouse plants thrive undisturbed under artificial light.



### Main benefits

#### Continuous Operation

Gain higher availability of the lamp starters using our technology - field-validated in harsh environments - while improving their safety and lifetime thanks to the small footprint, optimized thermal distribution and reliable lamp protection.



#### Energy-efficient system

Make your lamp starter panel energy-efficient thanks to AF technology, which ensures 80% reduction in conductor coil consumption, less heat dissipation and reduced temperature rise.



#### Compact control panels

Less space required in your lamp starter control panel using our compact lamp circuit breakers (MS132-L / MS132-LC) and lamp contactors (AFxx-L), typically combined and mounted on a busbar system (e.g. ABB Unifix AD).



#### Easy Installation

Improve the mounting process of your lamp starters thanks to our preconfigured product bundles. Simple to replace since the lamp starter combinations are fixed straight onto the busbar system using the Unifix AD adapter.

# Controlled Environment Agriculture

Controlled Environment Agriculture (CEA) is a combination of engineering, plant science and computer managed greenhouse control technologies able to optimize plant growing systems, plant quality and production efficiency.

The aim of CEA is to provide protection and maintain optimal growing conditions throughout crop development. Production takes place within an enclosed growing structure such as a greenhouse or building. Plants are often grown using hydroponic methods in order to supply the proper amounts of water and nutrients to the root zone. CEA optimizes the use of resources such as water, energy, space, capital and labor.

The most important variables that can be controlled using CEA techniques are:



**Nutrients and Irrigation**



**Temperature**



**CO<sub>2</sub> supply**



**Light**

(intensity, spectrum, duration and intervals)

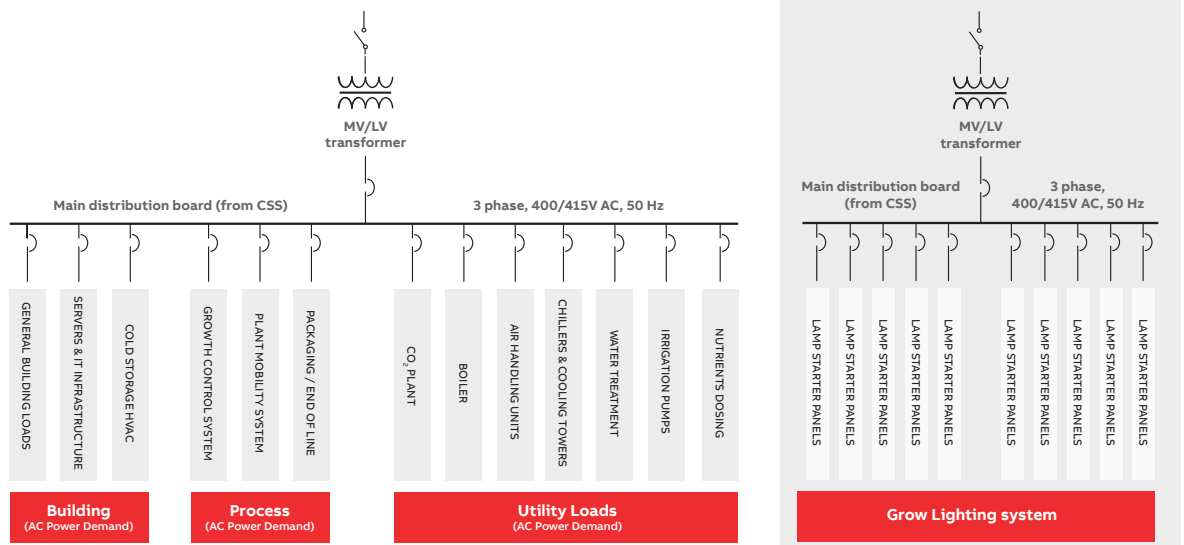


# Grow light panels in greenhouse horticulture

In Greenhouse horticulture, the intensity, spectrum, duration of grow lights and how long they must be left on are controlled and monitored by the Grow Lighting System, which comprises several lamp starter panels in parallel. Electric energy is distributed

in Greenhouses across the grid via cables routed from the transformer to the panels, which then supply the lamps. Because the lamps are structured in groups, there is a dedicated panel to supply each group.

## Typical greenhouse electrical distribution system



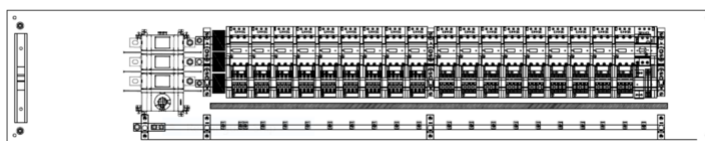
The Lamp starter panel typically consists of:

- Enclosure (IP rating to be considered according to local regulations)
- Busbar system (optional)
- Busbar adapters for lamp starter combinations. Unifix AD adapter (optional)
- Main incomer (depends on local regulations)
  - MCCB Tmax XT switch disconnecter with RCD
  - OT disconnecter switch / OT fuse disconnecter switch

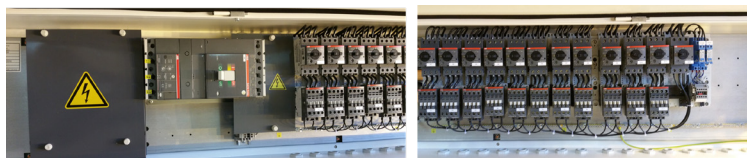
- Protected lamp starter combination
  - Lamp circuit breaker MS132-L/MS132-LC
  - Contactor AFxx-L series.
- Lockable handle
- Interface relays
- Timer
- Voltage monitoring relay

A typical layout for the components inside the panel is illustrated below.

## A typical layout for the components with disconnecter



## A typical layout for the components with MCCB Tmax with RCD



## Design data requirement for grow lighting panels

### Main functions

- Switching lamp loads
- Overload protection
- Short-circuit protection
- Ground fault protection
- European standard EN/IEC60364-7-705 requires the use of residual current devices (RCDs) with 300mA. This may be mandatory in certain countries and must be implemented in a suitable design.

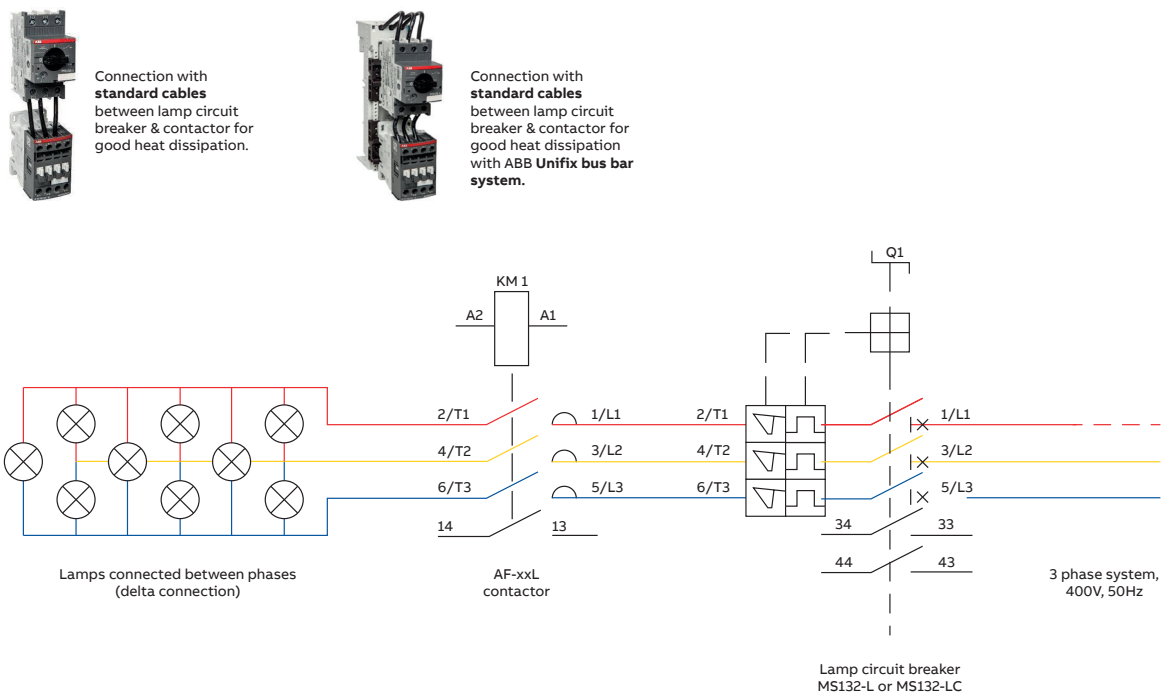
### Supporting functions

- Adjustable current setting for overload protection
- Temperature compensation: -25 to +60 °C
- Phase loss sensitivity
- Disconnect function
- Voltage level monitoring
- Digital connectivity (control, energy measurements etc..).

### Lamp characteristics to be considered

- Lamp type (HID, LED, etc..)
- Power (wattage)
- Nominal current (Ie), Nominal voltage (Ue), Frequency
- Power Factor
- Inrush current
- Number of lamps per phase
- Type of connection (phase-to-phase or phase-to-ground)
- Jumper cable
- Wire size
  - Between the lamps
  - Total length
- Load protection type
  - Thermal
  - Magnetic.

### Recommended lamp wiring: Connection options between lamp circuit breaker & contactor



### Example of calculation for maximum lamps to be connected

#### Data

Lamp 1000 W / 400 V – 2.61 A connected to phases  
Lamp starter load not above 16 A  
Lamps always equal to three (to balance the load)

#### Formula

$$2.61 \text{ A} / \sqrt{3} = 1.51 \text{ A} \times 9 \text{ lamps} = 13.6 \text{ A}$$

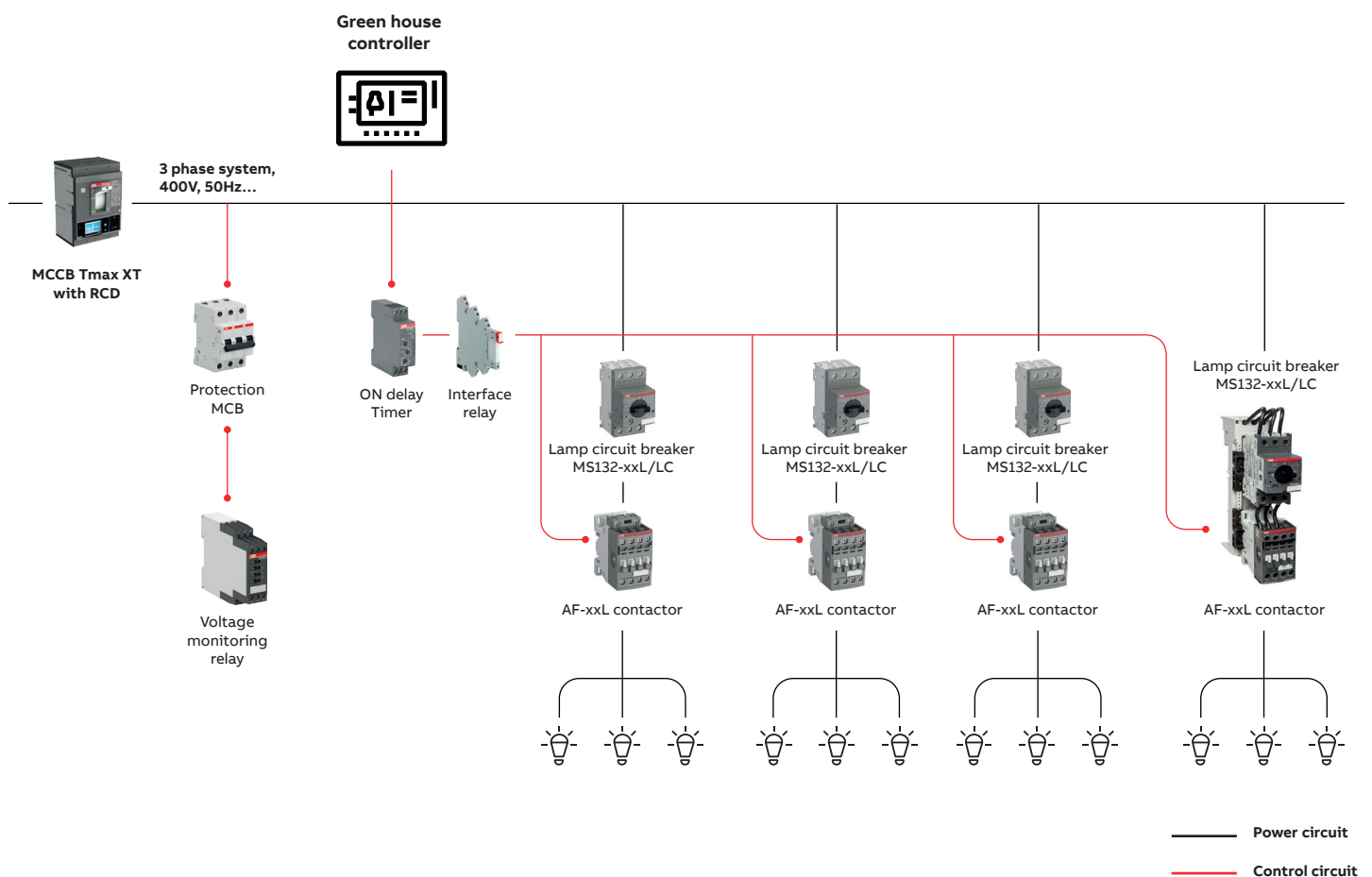
#### Note:

For detailed calculation please contact local sales unit.

# Load management solutions for grow lighting systems in greenhouse horticulture

Discover our load management solutions for lamp starting panels that control and protect grow lights in greenhouse applications, ensuring that the plants thrive under artificial light without disturbance.

## The ABB lamp starter panel solution



- Complete lamp starter portfolio (MS132-L + AF-xxL / MS132-xxLC + AF-xxL) compliant with the latest market trends.
- $7.5 \times I_n$  for MS132-LC,  $15 \times I_n$  for MS132-L.
- Fuseless protection against short-circuits, phase failure and overloads including disconnect function – all in one single compact product.
- MS132-LC and L features a magnetic trip indicator. This allows every trip event to be detected, making troubleshooting a lot easier and faster.
- Temperature compensation up to 60°C.

## Digital offering

Dependable lighting in your greenhouse is of the utmost importance

Our Smart and advanced products provide:



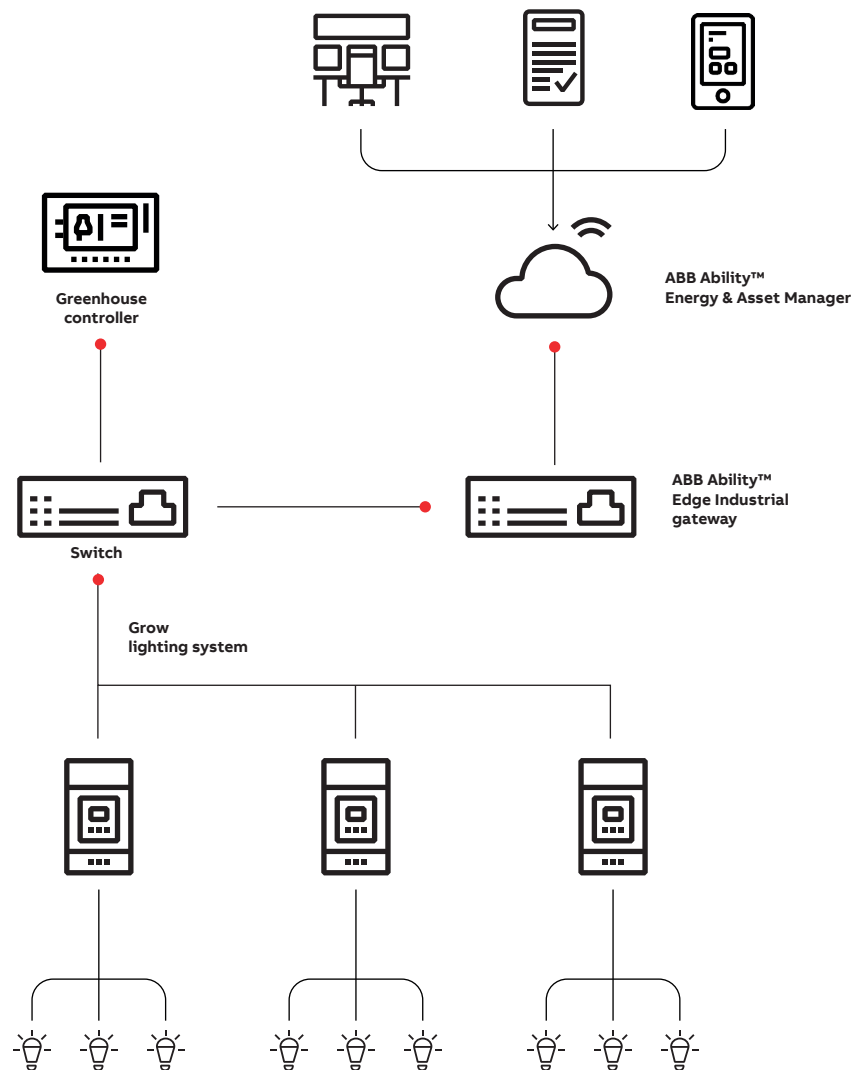
Remote control and monitoring of grow lighting systems



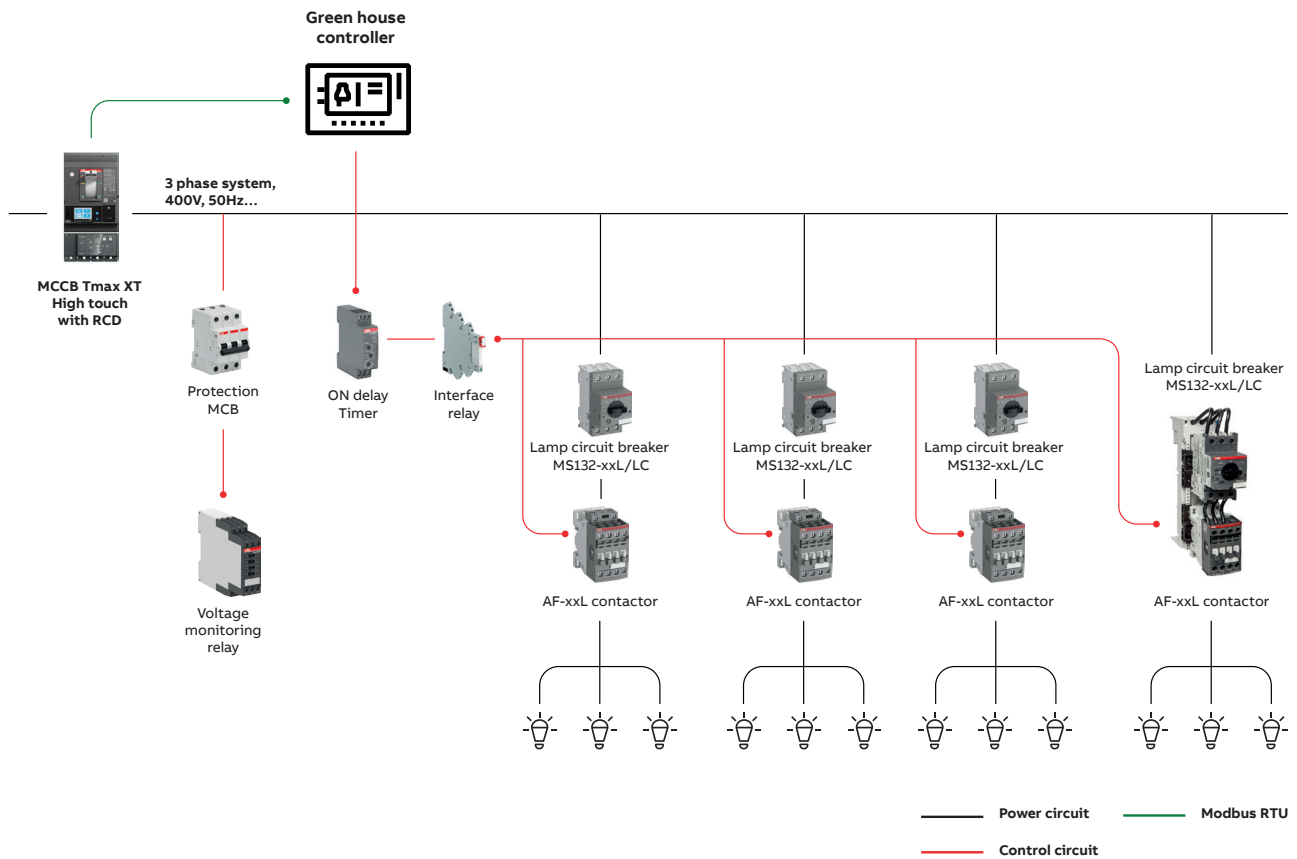
100% availability of measurement data for facilitated predictive maintenance



Rapid availability of data via web applications plus connection of greenhouse climate control if required



## 1<sup>st</sup> scenario: Digital offering for grow lighting panel control and monitoring



### Capabilities:

- Lamp control by switching contactor - from green-house controller through hardwired logic.
- Monitoring and measuring - from MCCB digital connectivity to greenhouse controller.

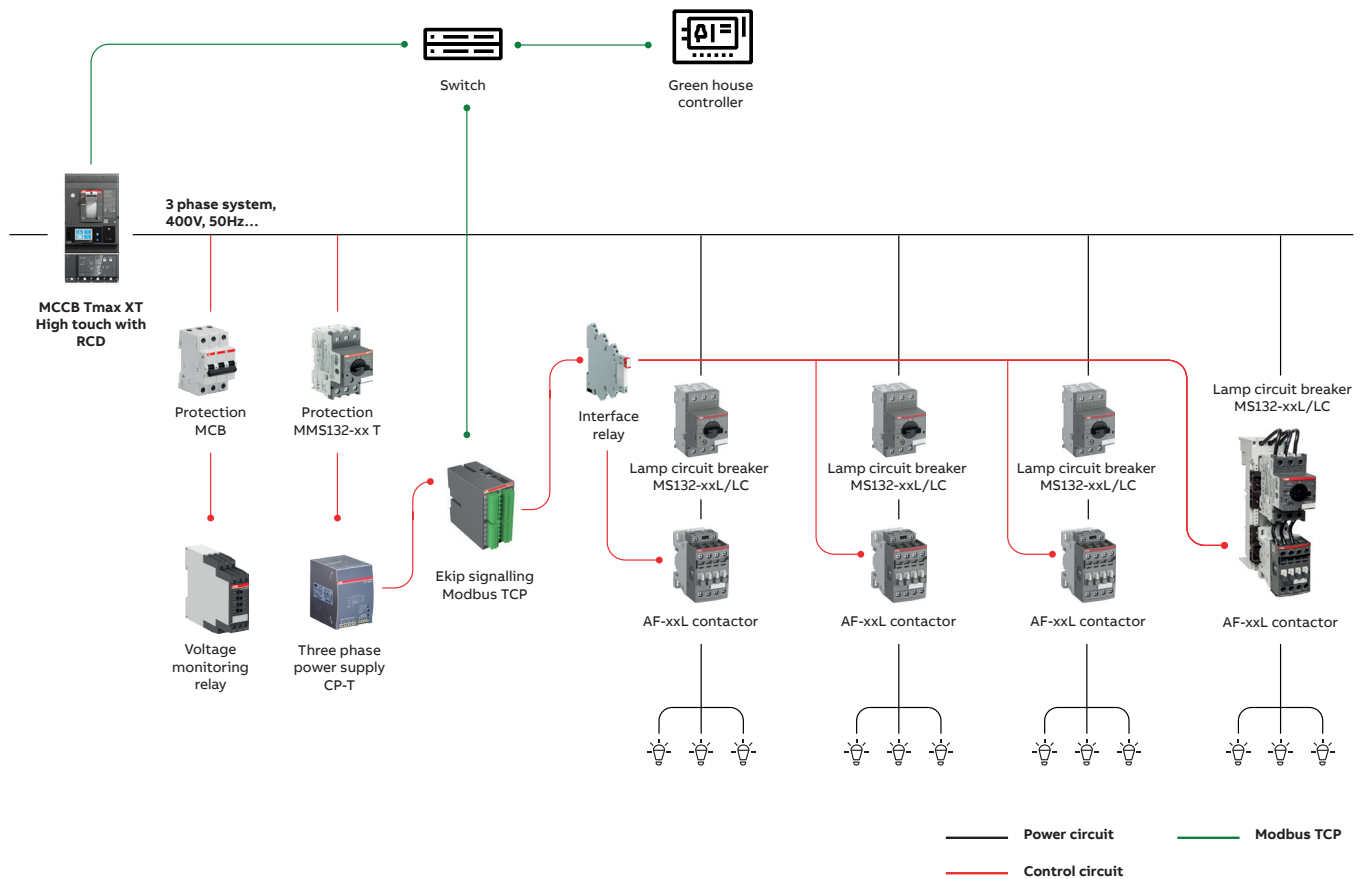
### The Internal Communication protocol supports

- Modbus RTU
- Device net
- Profibus DP
- Modbus TCP
- IEC61850
- Ethernet / IP
- BACnet / IP
- Cloud connectivity (using Modbus RTU/TCP with Edge industrial gateway)
- ABB Ability – Energy & Asset Management.

### Notes:

1. RCD parameters will not be available through communication.
2. Voltage monitoring and protection function is available in MCCB if trip unit selected is Ekip Hi-Touch.

## 2<sup>nd</sup> scenario: Digital offerings for grow lighting panel control and monitoring



### Capabilities:

- **Lamp control by switching contactor** - from Ekip Signalling module via Modbus communication from greenhouse controller.
- **Monitoring and measuring** - from MCCB digital connectivity to greenhouse controller.

### Ekip signalling Modbus TCP

External signalling accessory module for installation on a DIN rail. It is provided with:

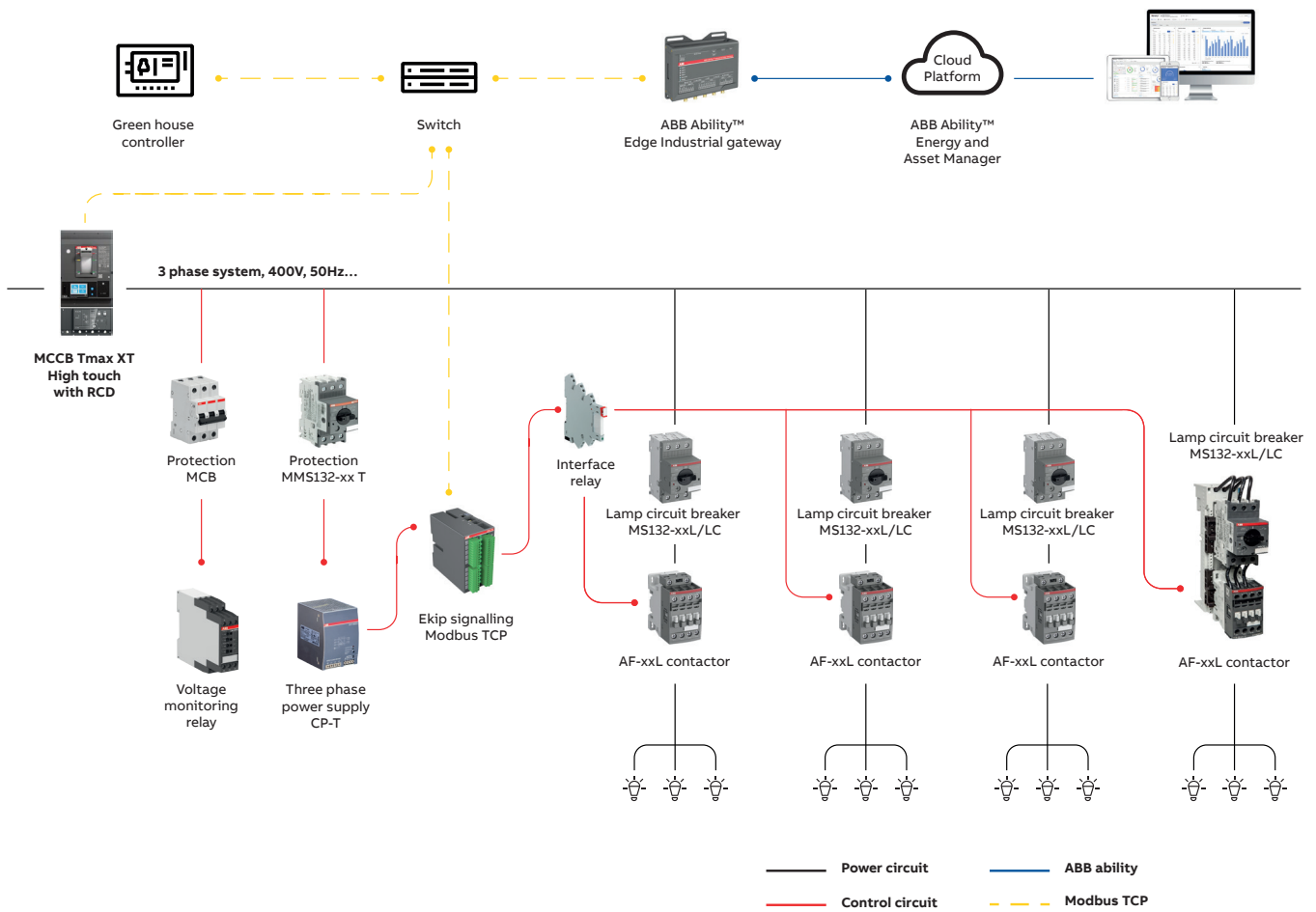
- 11 digital inputs.
- 10 contacts for output signals.

The module can communicate with the controller via Modbus TCP and can be freely configured in free I/O mode.

### Notes:

1. an additional internal communication module needs to be considered for MCCB.
2. RCD parameters will not be available through communication.
3. Voltage monitoring and protection function is available in MCCB if trip unit selected as Ekip High touch.

### 3<sup>rd</sup> scenario: Digital offerings for grow lighting panel control and monitoring with cloud connectivity



#### Capabilities:

- **Lamp control by switching contactor** - from Ekip Signalling module via greenhouse controller Modbus communication.
- **Monitoring and measuring** - from MCCB digital connectivity to greenhouse controller.
- **Cloud Connectivity** - ABB Ability™ Energy & Asset Manager via Edge Industrial gateway.

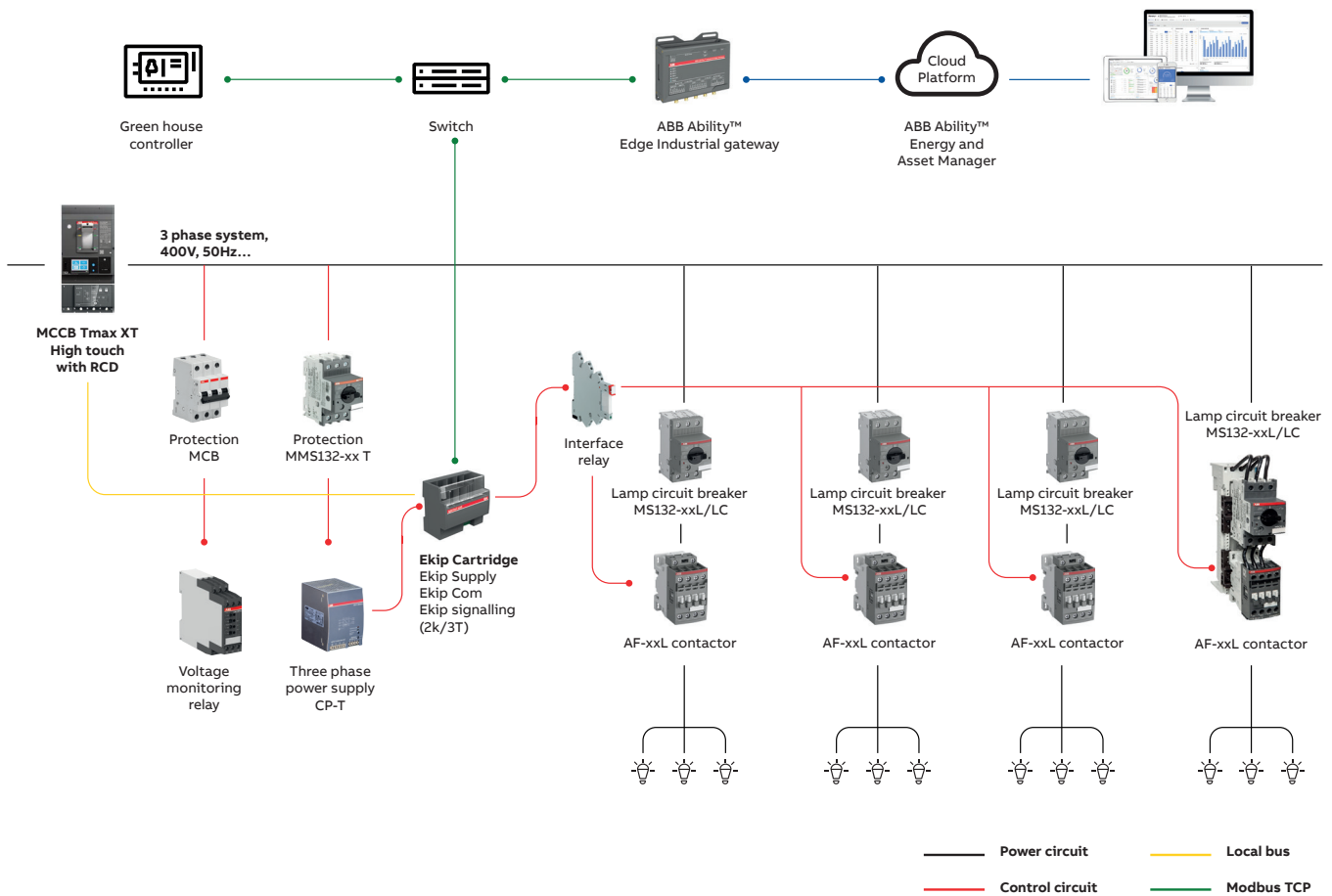
#### ABB Ability™ Energy and Asset Manager

- Plug-and-play solution for monitoring the most important parameters
- Remote supervision of facility
- Interactive images via tags & markers
- Alert management: reduces downtime & improves efficiency
- Scheduled reports
- Power quality (THD)
- Data storage
- Asset management
- Predictive maintenance (only on cloud)
- Customized reporting generated automatically.

#### Note:

An additional internal communication module needs to be considered for MCCB.

#### 4<sup>th</sup> scenario: Digital offerings for grow lighting panel control and monitoring with cloud connectivity



#### Capabilities:

- **Lamp control** by switching contactor - from green-house controller via soft logic by Modbus.
- **Monitoring and measuring** - from Ekip Com digital connectivity to greenhouse controller.
- **Cloud Connectivity** - ABB Ability™ for Energy & Asset Manager via Edge Industrial gateway.

#### External accessory module for installation on a DIN rail

- Ekip cartridge : available in 2 versions
  - with 2 slots (1 Ekip Supply + 1 module)
  - with 4 slots (1 Ekip Supply + 3 modules)
- Ekip Supply in two different voltage versions
  - Ekip Supply 110-240V AC/DC
  - Ekip Supply 24-48V DC
- Ekip 2K Signalling module with two inputs and outputs
- Ekip 3T Signalling module with three analog inputs for PT100/PT1000 & one analog input 4-20mA for external sensor.



Ekip Supply



Ekip Com



Ekip 2K Signalling

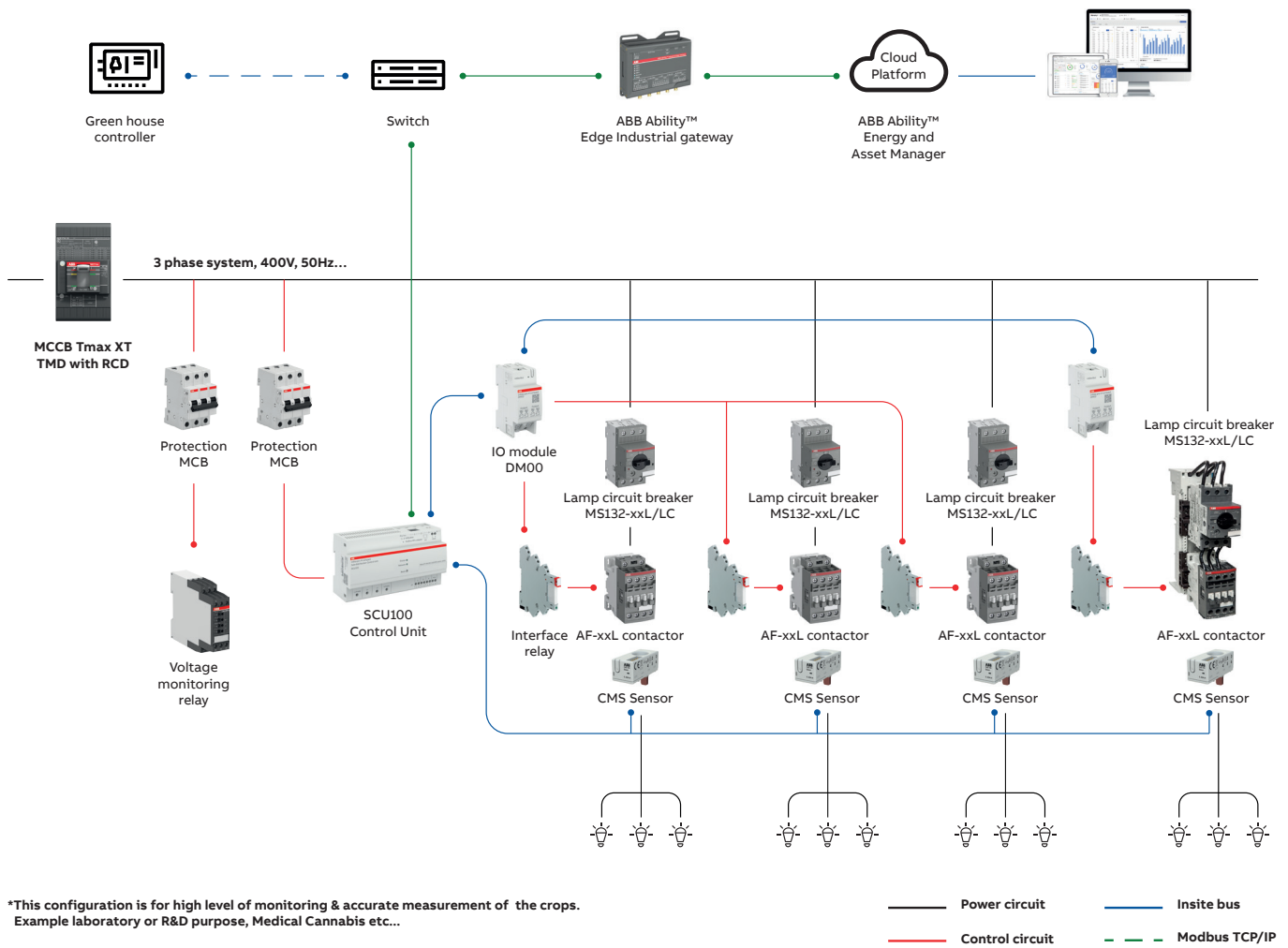


Ekip 3T Signalling

#### Notes:

1. RCD parameters will not be available through communication.
2. By changing some of the accessories, the same digital configuration can be obtained with Modbus RTU.
3. Voltage monitoring and protection function is available in MCCB if trip unit selected as Ekip High touch.

## 5<sup>th</sup> scenario: Digital offerings for grow lighting panel control and monitoring with cloud connectivity



### Capabilities:

- **Lamp control** by switching contactor - from SCU100 with IO module DM00 via Modbus communication with greenhouse controller.
- **Monitoring and measuring** - from SCU100 controller via Modbus communication to greenhouse controller.
- **Cloud Connectivity** - ABB Ability™ for Energy & Asset Manager through Edge Industrial gateway.

### CMS bus interface

- SCU100 supports up to 96 sensors/ IO modules (3 x 32) RS485 (Modbus RTU), LAN (TCP/IP and Modbus TCP), SNMP v1/v2 encrypted v3

### Mains Measurement

- Current [A]
- Voltage [V]
- Power factor
- THD V, I [%]
- Energy: Active [kWh], reactive [varh], apparent [VAh]
- Power: Active [W], reactive [var], apparent [VA]

### Notes:

1. RCD parameters will not be available through communication.
2. For SCU100 – additional CT's to be used for total circuit measurement at mains

# Key benefits of offered products



## Reliable in all networks

The electronic system within the AF contactor continuously monitors the current and voltage applied to the coil. The contactor is safely operated in an always-optimized condition and hum free.



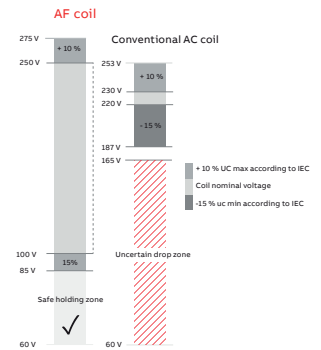
## Troubleshooting made easy

Separate thermal and magnetic trip indication makes troubleshooting a lot easier and faster and reduces downtime. This allows you to easily take action based on thermal or magnetic tripping



## Wide control voltage

The AF contactor ensures steady operation in unstable networks and signifies a major advancement in motor control and power switching, with no threat of voltage sags, dips, or surges. So, it prevents stoppages caused by voltage fluctuations.



## AC & DC control voltage

Thanks to the AF technology the same contactor can be used for AC and DC control. This means easier choice of contactor type, reduced number of parts to keep in stock.



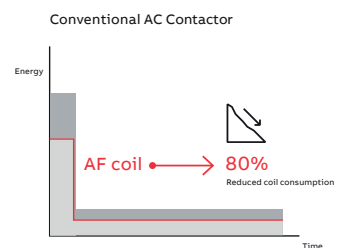
## Built-in Surge suppressor

Conventional contactor technology normally requires an external surge suppressor. With the AF contactor technology, surges are handled by a built-in contactor and never reach the control circuit. One less product and one less complication to worry about causing electronics near contactors to fail.



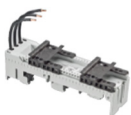
## Reduced coil consumption

Thanks to the AF contactor's 80% coil consumption reduction, there is less heat dissipation and a reduction in temperature rise. So, installation density in the panel can be increased. Also, reduction of the control transformer rating, reduction in the size of control panel and a reduction in cost.



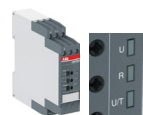
## Safe & easy to install busbar system

In comparison with a standard solution, Unifix AD allows to save up to 60% in mounting time thanks to the clipping system. The system guarantees the maximum safety thanks to the IP20 busbar covers.



## Reliable in harsh condition

The plastic housing material used for monitoring relays meets the requirements for the highest flammability class: UL94 V-0 rated. All relays work reliably in environments with low temperatures down to -25°C. The relay is not only reliable, no matter the environment temperature, but it is also durable to shock and vibration.



## Ease of use and installation

Maximum flexibility for every application – SACE Tmax XT sets standards for electrical installations. Easy selection, one-fits-all accessories and intuitive design pave the way for fast upgrades and create values through the entire customer journey.



# Product offering

## Contactors - AF...L series:



  
WEB PAGE

## Lamp Circuit breaker:



  
DATA  
SHEET

## Unifix AD:



  
WEB PAGE  
  
CATALOG

## Tmax XT:



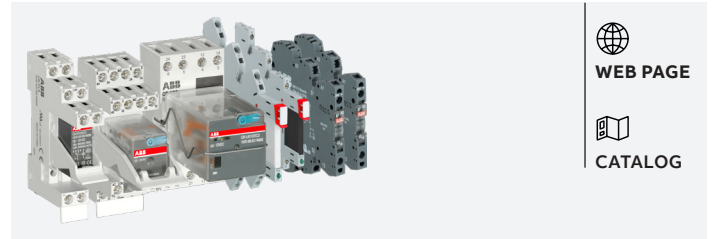
  
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## OT:



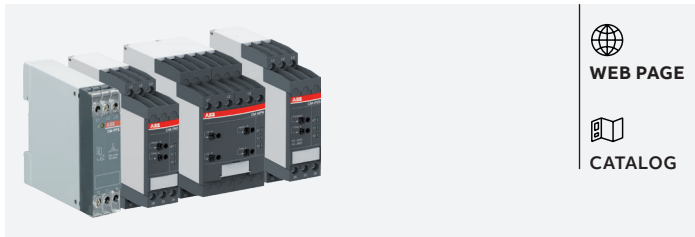
  
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## Pluggable Interface Relays:



  
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CATALOG

## Three phase monitoring relays:



  
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CATALOG

## Time relays:



  
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## Temperature monitoring relay:



  
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CATALOG

## Primary switched mode power supplies:



  
WEB PAGE  
  
CATALOG

## System pro M compact - MCB:



  
WEB PAGE  
  
CATALOG



**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.

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# To discover more

## APPLICATION FINDER



Find the reference architecture tailored to your needs and speed up your project thanks to our new Application Finder Tool!



## CONTACT US



Do you have a similar project and are you searching for the right Application configuration? Contact us and talk to our experts!



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