APPLICATION NOTE

Intelligent Distribution for remote monitoring in Battery Storage

IEC Utility Scale

Since much of our electrical energy production will be based on renewables, it will become increasingly crucial to ensure that systems are always available by preventing outages and minimizing downtime for maintenance. Discover our Intelligent Distribution solutions for remotely monitoring Battery Storage (BESS) and promptly detecting potential downtime risks.

What is remote monitoring?
Whenever something trips in the electrical system infrastructure of a Battery Storage, the only way to assess the problem is to go directly on-site. Unfortunately, the locations are often difficult to reach and it might be too late to remedy the fault. By installing a remote monitoring system, a clear vision of consumption, electrical parameters and equipment status is always available through web-based applications, thereby helping you ensure power quality, optimized maintenance and reduced CO_2 emissions.

Why you need an Intelligent Distribution solution
ABB Intelligent Distribution technology helps you to ensure power quality, optimized maintenance, reduced CO_2 emissions and enhanced ROI assessment in just one solution.
By combining advanced ABB devices, you can easily set up a modular Modbus network open to any platform and scalable throughout the lifetime of the system, thus compliant with the customers' changing and evolving needs.
In addition, ABB product connectivity enables you to set up configuration and communication architectures ready to be interfaced with ABB or 3rd party monitoring platforms or a SCADA.

Main benefits

Modular and scalable solutions
Extend and upgrade capability from essential to enhanced at any time.

Energy efficiency
Full control of power flow and reporting to maximize cost savings and emission reductions (ISO 50001 compliance).

Asset performance and optimization
Monitoring of asset reliability and efficiency for optimized operation and maintenance processes.

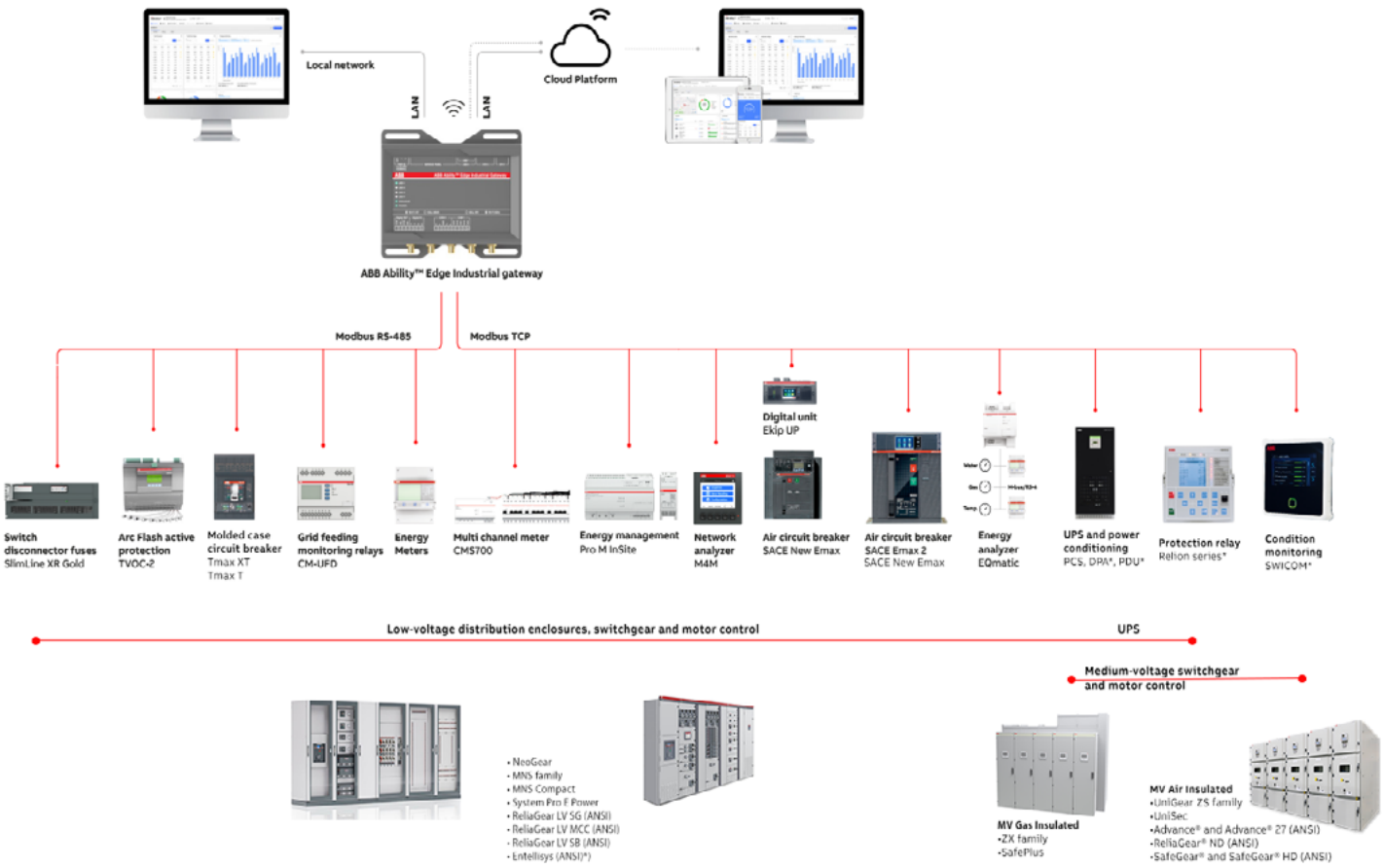
Avoid downtime and production losses
24/7 plant monitoring provides crucial information about faults and equipment failures.

Integration of 3rd party devices
Minimized upgrading and replacement costs.
Coming soon!

Digitalization of renewable energy plants through ABB Ability™

ABB Intelligent Distribution solutions help you to ensure power quality, optimized maintenance, reduced CO_2 emissions and enhanced ROI assessment in just one solution. All ABB devices are typically provided by open communication protocols such as Modbus TCP/IP or Modbus RTU. It is very easy to create a remote monitoring system by connecting them through a gateway.

Not all devices have or need an embedded communication system. In the majority of cases, an auxiliary contact or clean contact is sufficient to collect the required information. To do this, our range includes a stand-alone TCP/IP, I/O module: Ekip Signalling Modbus TCP is a very compact and efficient solution.



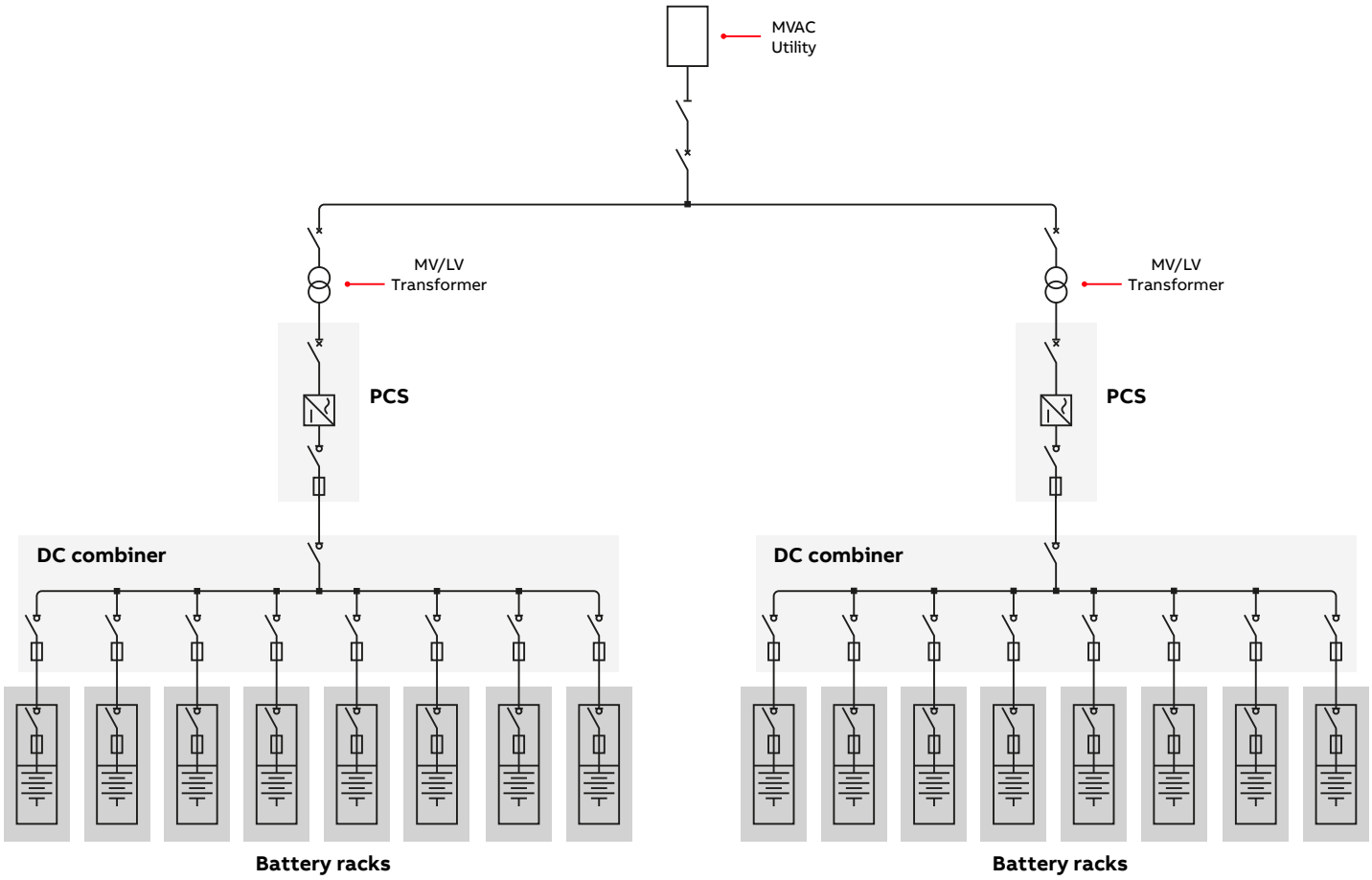
Typical features

- Full awareness and visibility of Energy and Assets including real time alarms.
- web based solution; thus remote accessibility ensuring enhanced effectiveness and operator safety
- Cost Efficient ; one stop shop (with integration of certain third party devices)
- Interoperability with SCADA, BMS and ERP via gateways and API
- Easily upgraded if necessary, also with add-ons and services
- Supports compliance with domestic and international environmental regulations (e.g. ISO 50001)

Utility Scale Battery Systems

4MWh typical architecture

Single-line diagram of 4MWh, 4MW Utility Scale application



Intelligent Distribution solutions for remote monitoring in Utility Scale Battery Storage

Our BESS architectures typically collect state and trip signals from the breakers and fuses that protect the battery racks, recombiner panels, SPDs, isolation monitors and other auxiliary devices. On the other hand, the main low voltage breakers and medium voltage protection relays are connected to the system via Modbus TCP/I, enabling the broadest range of data and alarms to be collected as well as very accurate energy and power data. Other key devices, such as the transformer temperature monitoring relays, are connected through Modbus RTU. 3rd party devices, including BMS and PCS, can also be integrated through a simple and easily configurable data unifier.

The selection of ABB products presented in the following pages highlights the embedded features to be used to monitor the most relevant data and signals in a Battery Storage system for the purpose of creating a remote energy monitoring system.

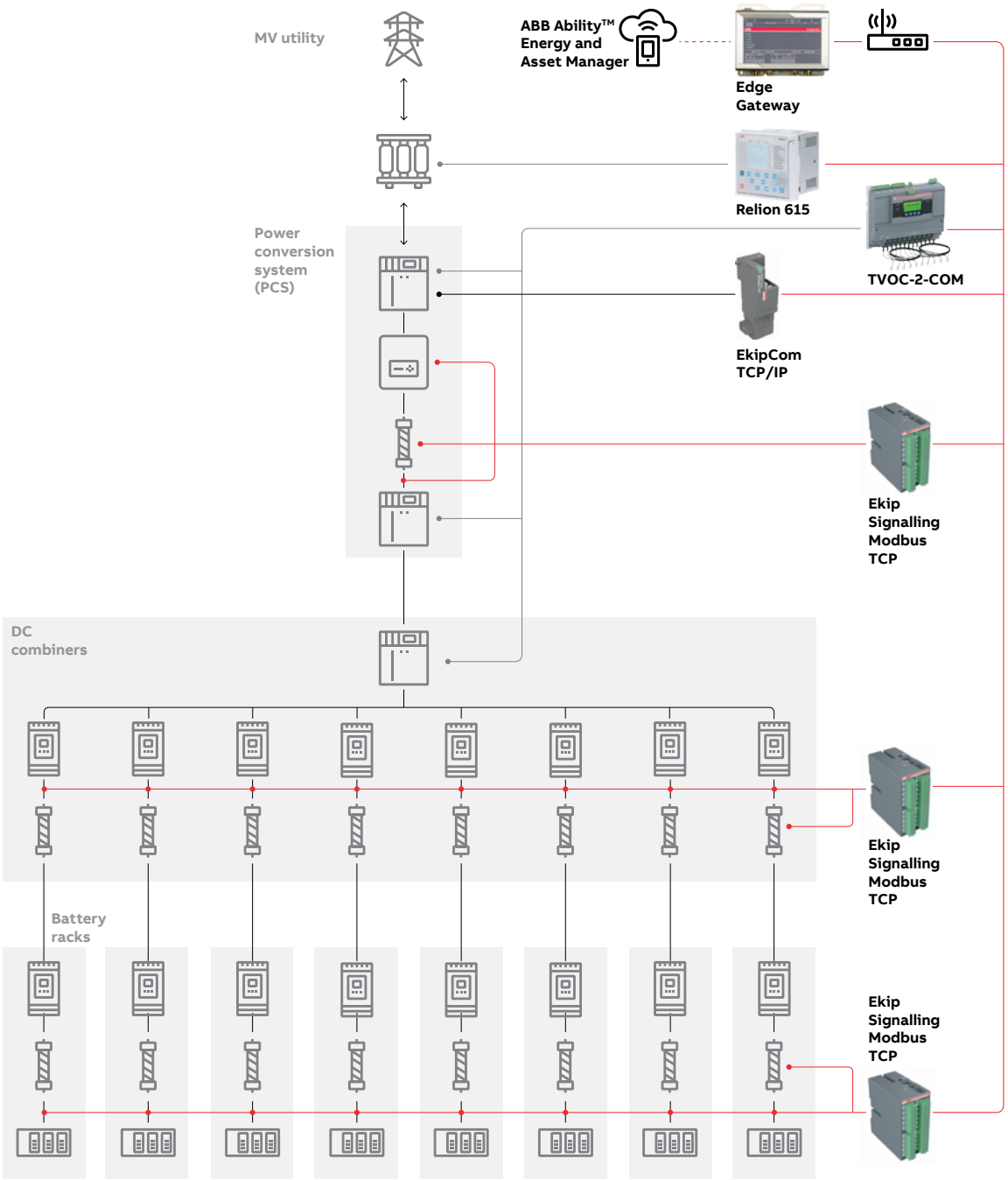


ABB offering (IEC)

Web page

Catalog

Collection of Input/Output state
The state of all breakers, switch-disconnectors and fuses installed in the plant to protect the solar string inverters or battery racks can be remotely monitored by connecting them to Ekip Signalling Modbus TCP/IP. Ekip Signalling Modbus TCP/IP is a remote I/O module which shares, via an Ethernet network with Modbus TCP communication protocol, information about the state and position of the devices by means of eleven digital inputs (I T01...I T11) and ten output contacts (O T01...O T10).

Main collected state
State and trip of string inverter protection
State of SPDs
Isolation motor pre-alarm and trip
Aux.Power supply fault
UPS fault and running
State and indications of other Devices

Web page

Catalog

AC-side metering and protection
Equipped with an Ekip Touch + measure package or Hi-Touch trip unit, the Emax2/E9 air circuit-breaker provides all the measurements required to control energy and the electrical parameters of the plant. The embedded Ekip Com Modbus TCP/IP communication protocol enables all information concerning the device to be exchanged with the control system. Both Ekip Touch/ Ekip Hi-Touch can be easily equipped with advanced voltage, frequency, power and ground fault protections.

Web page

Catalog

Temperature monitoring relays
The CM-TCN.xx temperature monitoring relay measures temperatures in up to three sensor circuits using different types of sensors. It also supports different thresholds and has three output relays.
It is simple to configure thanks to predefined settings for key applications and the Epic mobile App.
It can easily communicate with supervisors thanks to Modbus RTU.

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Web page

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Catalog

Medium voltage monitoring & protection relay
The Relion 615 series combines compactness and powerful features in one smart package.
The Relion 615 series provides standard configurations, so you can easily adapt and set up your applications while adjusting the configuration to suit your specific application needs.

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Web page

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Catalog

Arc Flash protection device
TVOC-2-COM is an HMI communication device to be added to the main TVOC-2 Arc Guard System if more than one HMI is needed or if communication is required. The COM module uses Modbus RTU.

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Web page

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Cloud Provisioning Guide

ABB Ability™ Edge Industrial Gateway
The ABB Ability™ Edge Industrial Gateway runs ABB Ability™ Energy and Asset Manager solutions on-premises or on cloud, with local data collection and viewing capabilities via a local Web server.
ABB Edge Gateway provides WiFi 3G and 4G communication options and, for long distances between containers, enables the network to be integrated without long LAN cables having to be routed.
Commissioning is easy thanks to the free ABB Provisioning Tool via internet connectivity.
An ABB data unifier can be used to connect ABB Ability™ Energy and asset manager to 3rd party devices such as, in our case, the solar PV inverter and a UPS able to communicate with standard protocols like Modbus TCP/IP and Modbus RTU. A simple system integration actuator will be required to configure the device properly.

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Web page

ABB Ability™ Energy Manager and ABB Ability™ Asset Manager platforms are among the several platforms and SCADA systems available in the ABB portfolio. They are a perfect addition to a Solar PV or battery energy storage management system since they enable plant monitoring to be completed when a full SCADA solution is not required.
ABB Ability™ Energy Manager and ABB Ability™ Asset Manager platforms allow the electrical parameters to be monitored, display the state of devices and provide functionalities like alerts, predictive maintenance and much more.

ABB Ability™ Energy Manager

Main functions
- Energy Management

Main benefits
- Reduces investments in supervision systems by 15%
- Provides proactive alerts and guarantees operations in 1 minute
- Maintains the expected POI through energy data comparison
- Ensures interoperability with SCADA, BMS and ERP through gateways and API.

ABB Ability™ Asset Manager

Main functions
- Energy Management
- Asset Monitoring

Main benefits
- Reduces investments in supervision systems by 15%
- Provides proactive alerts and guarantees operations in 1 minute
- Saves up to 30% on maintenance costs
- Maintains the expected POI through energy data comparison
- Ensures interoperability with SCADA, BMS and ERP through gateways and API.

List of components - Main input/output status collection

Main Input/output status collection	Intelligent Distribution Device part number	Device description	Useful documentation for Devices	Quantities required in our reference architecture (for each eHouse)	Total Quantities
Status and trip of battery racks protection	1SDA076898R1	T5D/PV-E 500 4p F F 1500V DC	Link	16	32
	1SDA054915R1	AUX-C 3Q 1SY 24V DC		16	32
Fuse blowing indications	3rd party device			18	32
PCS100 ESS	to be configured	PCS100 ESS	Link	4	8
Main DC switch	1SDA115419R1	E4.2V MS/DC-E 3200A 1500V 4p F	Link	2	4
SPDs status	Various	AC/DC SPDs	Link	4	8
Isolation motor pre-allarm and trip	1SVR470670R1100	CM-IWM.11	Link	2	4
Aux.Power supply fault	1SVR320761R1000	CP-S.1 24/20.0 Power supply	Link	2	4
Other Devices status and indications			Link	10	20

List of components - Part number & Quantity

Main function	Intelligent Distribution Device part number	Description of Device	ModBus Communication Protocol	Quantities required in our reference architecture (for each eHouse)	Total Quantities
MV protection relay	To be configured	REF615	TCP/IP	3	6
Protect and measure the LV side main	1SDA071146R1	E4.2N 3200 Ekip Touch LSIG 3p FHR		2	4
	1SDA107525R1	SW Measuring package per Emax 2	TCP/IP	2	4
	1SDA074217R1	External Outlets INST E1.2..E6.2-XT7/MEx		2	4
	1SDA074173R1	Ekip Supply 24-48V DC		2	4
	1SDA074151R1	Ekip Com Modbus TCP		2	4
Temperature monitoring of transformer windings	1SVR750740R0120	CM-TCN.012S	RTU	2	4
Arc flash active protection	1SFA664001R1004	TVOC-2-48C	RTU	2	4
Clean contact collection (refer to previous table)	1SDA082485R1	Ekip Signalling Modbus TCP E1.2...E6.2	TCP/IP	6	12
Gateway for ABB Ability™	1SDA116752R1	ABB Ability Edge Industrial gw 3G EU	TCP/IP	1	2
Connect devices' communication ports	3rd party device	Ethernet switch 8 ports	TCP/IP	1	2
Collect PV inverter and other 3rd party devices	Coming soon	Data unifier	TCP/IP	1	2
ABB Ability™ Energy and Asset Manager Licenses*	1SDA116735R1	ABB Ability™ Energy Manager - one year		1	2
	1VCF681602R0001	ABB Ability™ Asset Manager - one year		1	2
	1SDA116048R1	25 Extra Devices for ABB Ability		1	2
	1SDA120031R1	1000 extra SMS		1	2

Note: Only main components have been listed, other accessories may be needed to adapt and finalize the proposal for a real installation.
*) To subscribe please visit ABB Ability Marketplace™

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