RMU Digital Upgrade
SafeRing / SafePlus 12-24kV
Automating secondary distribution network
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- Q&A and Webinar.
Introduction
Introduction

- Primary Service Center (PSC) for SafeRing / SafePlus, located in Skien, Norway.
- Part of EPDS Service (previously 3442 EPMV) Norway.
- Asgeir S. Elvestad, asgeir.elvestad@no.abb.com, Service Product Manager.
  - Project Manager.
  - Product Owner.
- Jonathan Groa, jonathan.groa@no.abb.com, Service Technician.
  - Relay / RTU and communication specialist.
  - Technical lead.
- Jørgen Johannessen, jorgen.johannessen@no.abb.com, Service Sale Manager.
  - Product Sale.
WebEx and Definitions
Before we start
WebEx - Normal view

Use the Q&A box for both questions and chat.
WebEx - Full screen

To go back to normal view, click <Esc>
**Definitions**

**RMU Digital Upgrade**

- **Ring Main Unit (RMU):** Sealed and gas-insulated compact switchgear, used at the load connection points of a ring-type secondary distribution network.

- **Smart Grid:** Leverages digital technology to improve reliability, security, transparency, connectivity, interoperability, and efficiency. It enables information collection and communication throughout the system, from generation to transmission and distribution to end users.

- **Digital:** ABB’s prefix to components and systems that fits in a Smart Grid.

- **Upgrade:** Raise to a higher grade or standard.

- **RMU Digital Upgrade:** Gives the customer the flexibility to remotely Monitoring, Controlling and Measurement of SafeRing / SafePlus.
SafeRing / SafePlus
Introduction
SafeRing / SafePlus
Gas-Insulated Ring Main Unit and Secondary Switchgear

- SafeRing is a Medium voltage (MV) gas-insulated Ring Main Unit (RMU) for secondary distribution network up to 40.5 kV, 630 A
  - SafeRing: 12-24 kV, 630 A (SF6-insulated gas)
  - SafeRing 36: 40.5 kV, 630 A (SF6-insulated gas)
  - SafeRing Air: 12 kV, 630 A (Air-insulated gas)
  - SafeRing AirPlus: 12-24 kV, 630 A (Mix of C5 and Air insulated gas)
- SafePlus is a gas-insulated compact switchgear system for secondary distribution network up to 40.5 kV, 630 A
  - SafePlus: 12-24 kV, 630 A (SF6-insulated gas)
  - SafePlus 36: 40.5 kV, 630 A (SF6-insulated gas)
  - SafePlus Air: 12 kV, 630 A (Air-insulated gas)
  - SafePlus AirPlus: 12-24 kV, 630 A (Mix of C5 and Air insulated gas)
- SafeRing combined with the SafePlus concept represent a complete solution for 12-24 kV secondary distribution networks.
- More than 200,000 units delivered worldwide
  - Manually operated.
  - Automated.
- RMU Digital Upgrade solutions are available for manually operated SafeRing / SafePlus.
SafeRing / SafePlus

Applications

- Distribution
- Wind power
- Hydro power
- Generator
- Solar
- Infrastructure
- Industry
- Marine
Changing face of the grid
Increasing complexity in Distribution Networks

New challenges for traditional paradigms for control and commerce

- Distributed energy resources at customer sites
- System in which EV sell demand response services to the grid
- Control in-home appliances to switch off high-load components (load disaggregation)
- Collect, store and report residential energy use information
- Underlying communication to support Smart technology
- Health Monitor network parameters & control devices remotely
- Managing voltage levels & reactive power (VAR) with assets owned by the utility and otherwise
- Distribution connected renewables generation and storage
- Aggregation of DERs for wide-area grid support and market trading
- Load management at customer sites through e.g. dynamic pricing
- Regulatory requirements for more granular pricing schemes and markets
- Prosumers locally sell excess energy from their distributed energy
- Decentralized market platform for charging EVs
- Frequency Regulation

EV: Electric Vehicle
DER: Distributed Energy Resource
Grid of the future
Rapid rate of change requires higher velocity of decision making

The world of energy is changing

Supply
- Dramatic renewables growth
- Increasing intermittency
- Greater volatility, less predictability
- More feed-in, take-off points (e.g. data centers and EV-charging)
- Increasing complexity, need for stability. On-and off-grid control
- Automation on “local” level Energy storage is key

Demand
- Continuing electrification of society
- Emerging market consumption growth

Customers will increasingly have to deal with very dynamic environments

The need for faster decisions and real-time action requires visibility of the entire business

Digitalization is the answer for the necessary agility and decision-making velocity

Control & information flow is key
Next generation Smart Secondary Switchgear

Key features

- Quick and accurate location of outages.
- Directional fault indication.
- Communication SCADA / DMS.
- Flexibility.
- Remote control of switches.
- "Self-healing" network.
- Surveillance of the network.
- Sensor Technology (MV / LV).
- Components monitoring.
- Battery backup.
- Safe communication.
Automation levels and Concept
RMU Digital Upgrade
Key Functionalities for the RMU Digital Upgrade

RMU Digital Upgrade covers up to Level 3 of the ABB switchgear automation portfolio

**Automation Levels**

**Level 1 - Monitoring**
- MV switch position indication.
- LV measurement.
- MV network faults.

**Level 2 - Control (plus Level 1)**
- MV switch operation.
- MV network non-directional faults.

**Level 3 - Measurement (plus Level 2)**
- MV network directional faults.
- MV network analog values measurements.
- Earth switches position indication.

**Level 4 - Protection (plus Level 3)**
- Selectivity using the circuit breakers.
- “Self-healing”.
- Prediction.
RMU Digital Upgrade
Application concept

- RMU Digital Upgrades are ready-made packages easily pluggable to existing RMUs.
- RMU Digital Upgrade is applicable only for internal mounting arrangement.
- RMU Digital Upgrade application is only available for SafeRing / SafePlus 12-24kV switchgears having the first two C-modules next to each other. (There must e.g. neither be test points in these two C-modules.)
- Standard RMU Digital Upgrade supports up to 4-way SafeRing / SafePlus unit. The additional one or two modules can be any configuration of C/ F/ V-module(s).
**RMU Digital Upgrade**

Feeder Automation (FA) device – Integrated solution

Digital Upgrades are ready-made packages easily plugable to existing RMUs

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**Monitoring and control of SWG**

- GPRS, 4G, LTE, fiber...
- VPN
- Sensors
- Motor
- FA devices
- FPI’s
- Battery back-up
RMU Digital Upgrade

Communication overview
Packages and options
RMU Digital Upgrade
## Packages and options

**RMU Digital Upgrades**

### Packages

Three different packages:
- RMU Digital Upgrade ARC600 FA Box (Level 1, 2 & 3)
- RMU Digital Upgrade RTU 540CID01 FA Box (Level 3)
- RMU Digital Upgrade REC615 FA Box (Level 3)

All standard packages always include:
- Power supply backup source for automation devices (24V DC batteries and charger)

**Communication:**
- Ethernet port/ connection on all FA devices
- Wireless GSM/ GPRS communication is included in the ARC600
- Wireless communication comes with IEC 60870-5-104 host (slave) communication protocol among others

### Options

- Wireless GSM/ GPRS communication as option with ARG600 for the RTU540 and the REC615
- FPI remote reset
  - After remote resetting of fault indication, the FPI is again ready to catch, indicate and report another fault.
- Distribution transformer feeders “Emergency open” remote command
  - Fast trip in case of emergency situations like local flooding, fire etc.
- Supervision of the LV side of the Distribution transformer
  - Energy quality, I, U, P, cos phi.
- Configuration SW
  - Basic, Basic plus and Advanced.
RMU Digital Upgrade ARC600

Functionality solution: Level 1, 2 & 3

**Base Unit**

- ARC600: Main controller, internal charger and wireless modem.
- Enclosure and heater.
- 2 x batteries.

**External**

- Local remote switch: Motor operation.
- LV multi-meter:
  - Fault Passage Indicator (FPI):
    - OC and EF non directional.
    - OC and EF directional.
RMU Digital Upgrade RTU 540CID01

Functionality solution: Level 3

**Base Unit**

- RTU 540: Main controller and license.
- (Optional) Wireless gateway (ARG600).
- Enclosure and heater.
- 2 x batteries and charger.

**External**

- Local remote switch: Motor operation.
- LV multi-meter:
  - Fault Passage Indicator (FPI):
    - OC and EF non directional.
    - OC and EF directional.
RMU Digital Upgrade REC615

Functionality solution: Level 3

**Base Unit**

- REC615: Main controller and internal FPI.
- (Optional) Wireless gateway (ARG 600).
- Enclosure and heater.
- 2 x batteries and charger

**External**

- Local remote switch: Motor operation.
- LV multi-meter:
- Fault Passage Indicator (FPI):
  - 1 x inbuilt, plus RIO600.
  - OC and EF directional (functions in REC615).
- Sensors
  - Indoor current sensor: KECA.
  - Indoor voltage sensor: KEVA.
Customer Benefits
RMU Digital Upgrade
Customer Benefits

The fastest way to align with the Smart Grid and the demand for cost efficiency.

Feeder Automation box inside the RMU/ Switchgear
- Fully integrated solution in the RMU, less space consuming.
- Fewer maintenance objects.
- Less affected by the environment.
- Fast and plugable installation.
- No impact on compact secondary substation IP rating.

Benefits of Compact Secondary Substation (CSS) automatization
- Improved quality of the power supply:
  - Less and shorter outages.
  - Improvement of the operational efficiency.

Optimal utilization of the distribution network
- Utilize the network more efficiently, minimize the network losses.
- Optimal asset management.
- Measurements of power flows/ quality.
- Improves overview of power network.
- Extends life cycle of the earlier investments.

Improves efficiency and safety of operating personnel
- Less need to travel to places that are difficult to reach.
- Less need to work in dangerous environments.
Benefits

Scalable solutions – from basic monitoring to more advanced measurement functionality

RMU Digital highlights

- Gain more efficient utilization of the secondary distribution network through automation and thus minimize the effect of power outages.
- Wireless modem GPRS/3G/ LTE communicating with your DMS or SCADA system.

RMU Digital Upgrade functionalities enable network operators to

- Obtain real time data for analyzing and decision making, in order to optimize operations and improve power quality.
- Monitor the grid to enable remote fault localization.
- Reconfigure the network so that the faulty part of the network is isolated and ensure faster power restoration reducing the cost of energy loss.
Product page and Distribution Solutions, Finland
RMU Digital Upgrade
RMU Digital Product page

How to find more information

Internal release page
- Released the 23.03.2018
- Link to the internal release note:
  - Internal RMU Digital Upgrade release web page

RMU Digital Product page
- RMU Digital Upgrade product page
Grid automation control cabinet

- External solution.
- Covering all 4 automation levels.
  - GA01, GA02, GA03 or GA04.
  - GA01, GAI2, GA13 or GAI4.
- Definition.
  - GA = grid automation solutions.
  - O = outdoor (for pole mounted equipment).
  - I = Indoor solution (CSS, RMU, secondary switchgear etc.).
- Product page.
- Contact information.
  - Johan Nilsson, johan.nilsson@fi.abb.com, Sales Manager.
  - Soren Mattback, soren.mattback@fi.abb.com.
Spare parts policy and Business Online (BOL)
RMU Digital Upgrade
EPDS spare parts policy

Overview

In short it says

• All General questions, Request for Quotation (RFQ) or Orders should ONLY come from your local EPDS Service (EPMV 3442) center or some pre-approved Small Countries through Business Online (BOL).

• This means if you are NOT a part of EPDS Service center or a Small Countries, you should contact them for Service, spare parts, or e.g. RMU Digital Upgrade.

• All EPDS Service center or Small Countries must have an pre-setup organization in BOL.
EPDS spare parts policy

Overview

Spare parts category
- Spare parts are divided into four categories with excepted delivery times.
- The RMU Digital Upgrade is categorized as 4 (Other Spares only made to order): 6-8 weeks delivery time.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Normal Delivery</th>
<th>Emergency Delivery **</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strategic spares for Active/Classic products</td>
<td>3 days*</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Other Spares for Active products</td>
<td>2 week</td>
<td>1 week</td>
</tr>
<tr>
<td>3</td>
<td>Other Spares for Classic products</td>
<td>3 week</td>
<td>2 week</td>
</tr>
<tr>
<td>4</td>
<td>Spares for Limited products</td>
<td>3-4 week</td>
<td>2 week</td>
</tr>
<tr>
<td></td>
<td>Other Spares only made to order</td>
<td>By quotation</td>
<td>---</td>
</tr>
</tbody>
</table>

*Note: Times are approximate and subject to change.

**Premium on list price and delivery time may vary depending on order quantity and location.
How to find RMU Digital Upgrade in BOL

- Log into BOL.
- Hint: In the Search filed always start with "PUNOAAS001" (our supplier organization).
- Search our three different packages in BOL:
  - "PUNOAAS0012RAA037059A0001RMU DIGITAL UPGRADE ARC600 FA BOX".
  - "PUNOAAS0012RAA037058A0001RMU DIGITAL UPGRADE RTU 540CID01FA BOX".
  - "PUNOAAS0012RAA037057A0001RMU DIGITAL UPGRADE REC615 FA BOX".
- Add the your preferred FA Box to "Add to cart". Click on “RFQ".
Price is "On Request" in BOL

- This is due to that there are so many possible configuration that can't offer them all.
- E.g. some customers would like to use the FPI Compass B and the VPIS WEGA from Hörstmann, while other would like to use the FPI IKI-50 and the VPIS Capdis-S1+ from Kries.