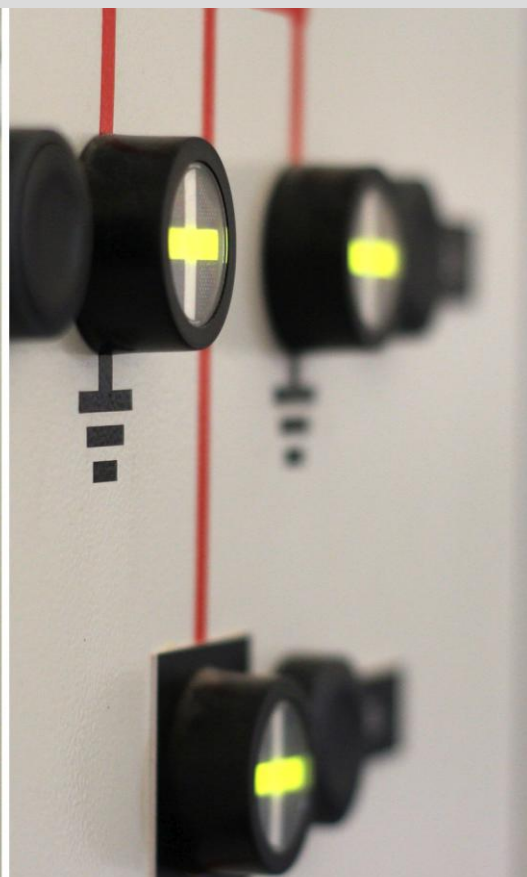
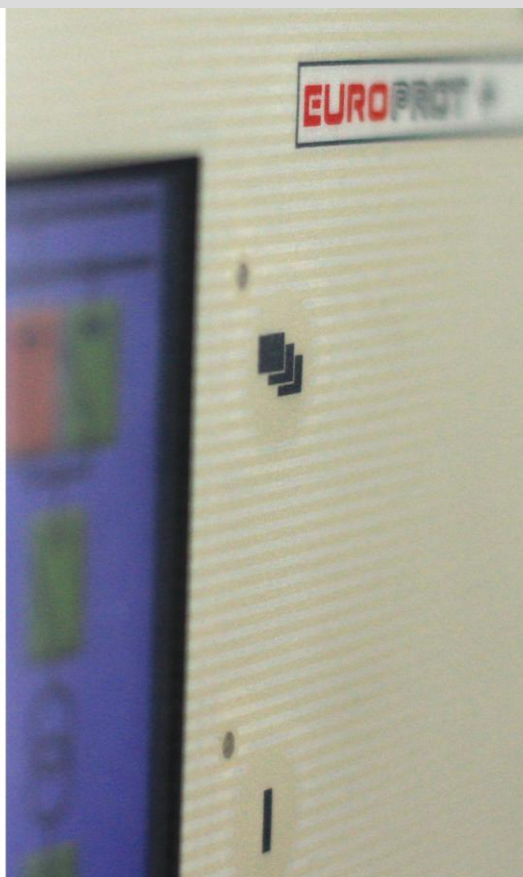




APPLICATION AND SETTING GUIDE

Measurement reporting in EP+ Devices



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PROTECTION, AUTOMATION AND
CONTROL FOR POWER INDUSTRY



VERSION INFORMATION

VERSION	DATE	MODIFICATION	COMPILED BY
1.0	2024-03-13	First edition, internal version	Saina, Csipke
1.1	2026-03-19	Final first edition	Saina, Günthner
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USED SYMBOLS



Additional information



Useful information for settings.



Important part for proper usage.

1 Introduction

Measurement reporting in EP+ devices can be done through any of the communication protocols available in the EP+ system (see Figure 1-1 **Error! Reference source not found.** below). This document focuses on reporting through IEC 61850.

The EP+ device processing is split into two sub-systems i.e. RDSP and CDSP. The RDSP is responsible for processing protection automation and measurement functions while the CDSP is responsible for processing communication functions and for handling the HMI. The RDSP takes in inputs (i.e. voltages and currents) and processes them using the so-called measurement function block to produce reportable outputs. The RDSP determines how to update these measurements in the CDSP based on the user's selection and setting of the reporting mode parameters. There are two reporting modes which can be set by parameter: "Deadband" and "Periodic" reporting modes. If "Deadband" mode is set, then measurements are updated when they cross a set threshold, if "Periodic" is set, measurements are updated according to the time set by the user.

NOTE: These updates only serve the purpose of updating the CDSP, not the SCADA client. The SCADA client receives reports from the CDSP according to measurement RCB settings. For this reason, the parameters on the web interface are named with the key word "Update" rather than "Report". See Figure 2-1 below.

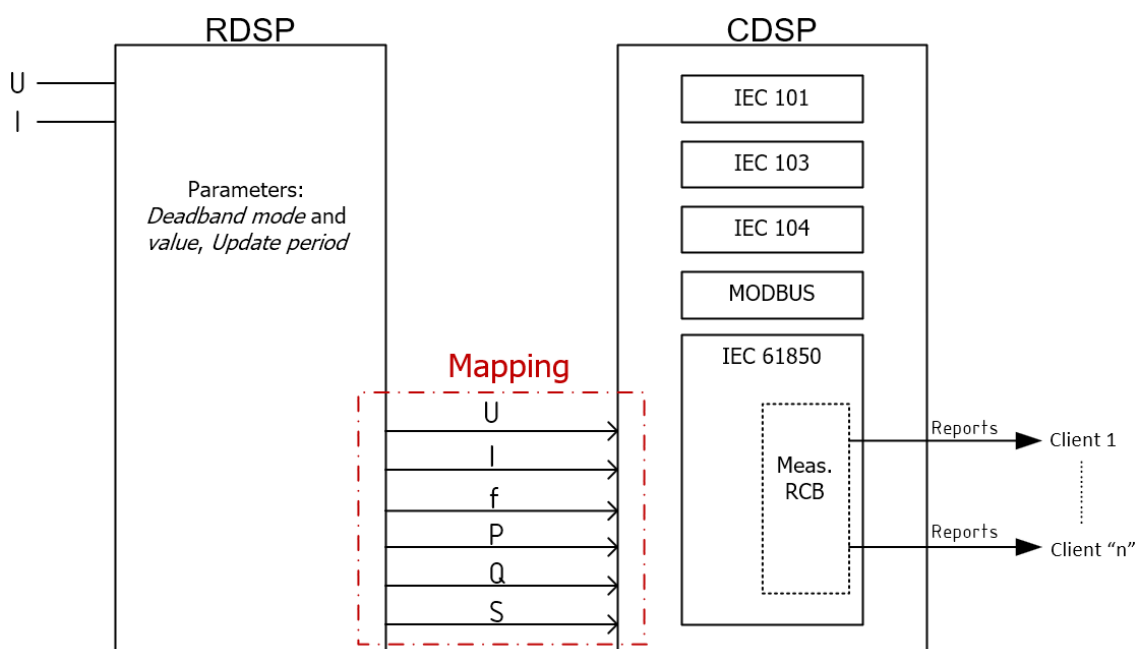


Figure 1-1 System diagram for measurement reporting

At the same time, the updated quantities are mapped onto the CDSP, from where the SCADA clients can access the reports. The standard IEC 61850 model tree resides in the CDSP. These measured quantities are mapped to this model tree so that they can also be reported through IEC 61850 according to the specified standard. The IEC 61850 users are referred here to as clients. Each IEC 61850 client can set reporting parameters through a report control block (RCB).

2 Implementation

2.1 Relevant settings in the MXU function block (RDSP)

These settings i.e. reporting mode parameters, which can also be accessed via the web browser through HTTP(s) are available for each quantity. Figure 2-1 below shows the RDSP parameters of the function.

Line measurement			
Measurement mode (?)	ThreePhase		
Reference direction (?)	Default		
Update Period - U (?)	20	sec	(0 - 3600 / 1)
Deadband Mode - U (?)	Amplitude		
Deadband Value - Uph-N (?)	5.00	kV	(0.10 - 100.00 / 0.01)
Deadband Value Uph-ph (?)	5.00	kV	(0.10 - 100.00 / 0.01)
Deadband Value - U Res (?)	5.00	kV	(0.10 - 100.00 / 0.01)
Deadband Value - Uneg (?)	5.00	kV	(0.10 - 100.00 / 0.01)
Deadband Value - Upos (?)	5.00	kV	(0.10 - 100.00 / 0.01)
Range Value - Uph-N (?)	231.0	kV	(1.0 - 1000.0 / 0.1)
Range Value - Uph-ph (?)	400.0	kV	(1.0 - 1000.0 / 0.1)
Range Value - U Res (?)	20.0	kV	(1.0 - 100.0 / 0.1)
Range Value - Uneg (?)	231.0	kV	(1.0 - 1000.0 / 0.1)
Range Value - Upos (?)	231.0	kV	(1.0 - 1000.0 / 0.1)
Update Period - I (?)	20	sec	(0 - 3600 / 1)
Deadband Mode - I (?)	Amplitude		
Deadband Value - I (?)	10	A	(1 - 2000 / 1)
Deadband Value - I Res (?)	10	A	(1 - 500 / 1)
Deadband Value - Ineg (?)	10	A	(1 - 2000 / 1)
Deadband Value - Ipos (?)	10	A	(1 - 2000 / 1)
Range Value - I (?)	500	A	(1 - 5000 / 1)
Range Value - I Res (?)	100	A	(10 - 1000 / 1)
Range Value - Ineg (?)	500	A	(1 - 5000 / 1)
Range Value - Ipos (?)	500	A	(1 - 5000 / 1)
Update Period - P (?)	20	sec	(0 - 3600 / 1)
Deadband Mode - P (?)	Amplitude		
Deadband Value - P (?)	10.00	MW	(0.10 - 10000.00 / 0.01)
Range Value - P (?)	500.00	MW	(1.00 - 100000.00 / 0.01)
Update Period - Q (?)	20	sec	(0 - 3600 / 1)
Deadband Mode - Q (?)	Amplitude		
Deadband Value - Q (?)	10.00	Mvar	(0.10 - 10000.00 / 0.01)
Range Value - Q (?)	500.00	Mvar	(1.00 - 100000.00 / 0.01)
Update Period - S (?)	20	sec	(0 - 3600 / 1)
Deadband Mode - S (?)	Amplitude		
Deadband Value - S (?)	10.00	MVA	(0.10 - 10000.00 / 0.01)
Range Value - S (?)	500.00	MVA	(1.00 - 100000.00 / 0.01)

Figure 2-1 RDSP parameters of the measurement function block

In some previous versions of MXU function, the parameter "Update period" is hidden with the default value of 20s and the user cannot see it via the web interface or configuration tool. If it is required to unhide, please contact the Protecta Support Team via the web-based support tool.

2.2 Reporting settings in the report control block

The report control block reports these measurement data i.e. U, I, f, etc. as a dataset according to the IEC 61850 standard. The default values of the relevant settings to be changed are highlighted in Figure 2-2 below:

Information of the left side selected item	
Property	Value
Name	rcb_Meas
Description	
Report ID	rcb_Meas
Dataset	Meas:
Trigger dchg	True
Trigger qchg	True
Trigger dupd	False
Trigger period	False
Buffered	False
Buffer time (ms)	500
Rpt enabled max.	4
Integrity period (ms)	0

Selected dataset: LD0/Meas	
FCDA	Edited dataset: LD0/Meas (8/100)
☒	1 LD0/CMMXU1\$MX\$A
☒	2 LD0/VMMXU1\$MX\$PPV
☒	3 LD0/VMMXU1\$MX\$PhV
☒	4 LD0/PQSMXU1\$MX\$TotW
☒	5 LD0/PQSMXU1\$MX\$TotVAr
☒	6 LD0/PQSMXU1\$MX\$TotVA
☒	7 LD0/PQSMXU1\$MX\$TotPF
☒	8 LD0/HZMMXU1\$MX\$Hz

Figure 2-2 Measurement rcb showing the relevant settings and the dataset

The above values are only default values as each client can modify its reserved RCB instance's reporting parameters.

If a quantity needs to be reported to SCADA periodically, the client needs to set the *Trigger period* to "True" and the *Integrity period* with the desired cycle time. On the other hand, if the quantity should be reported to SCADA according to change of measured values, the client needs to set *Trigger dchg* to "True". In this case, measurements will be reported according to the threshold set by the RDSP *Deadband value* parameter.

KNOWN ISSUE: If the user desires to use *Datachange* reporting, the client will experience nuisance reports of changing values before the set deadband is crossed. As a mitigation, make sure that the *Update period* parameter is set to "0". If it is not possible to set this, e.g. due to parameter inaccessibility, please contact the Protecta Support Team via the web-based support tool.

CDSP “database”/ “buffer” update scenarios:

When **Deadband Mode** is active and **deadband value** is set to a given value, the **Update period** set to “0”, and the change is lower than the deadband, the CDSP “database” is not updated.

When **Deadband Mode** is active and **deadband value** is set to a given value, the **Update period** set to “0”, and the change is higher than the deadband, then the CDSP “database” is updated.

When **Deadband Mode** is active and **deadband value** is set to a given value, the **Update period** set to other than “0”, then the CDSP “database” is updated according to the given **Update period** value **and** also when the change is higher than the deadband. ***In this case, the nuisance reporting may be experienced on the SCADA side.***

On the other hand, if the **Deadband mode** is set to “Off”, the **Update period** set to a given value, and analogue values are injected, then the CDSP “database” is updated **only** according to the given **Update period** value.

Note on processing and priority:

Because measurement reporting is a low priority function as compared with e.g. protection functions, measurements are processed with a low priority. For this reason, clients may experience considerable delay in reporting if the configuration contains other functions. The weightier the configuration, the bigger the reporting delay.

3 Summary setting guide

FB parameters: define when the data is refreshed with new timestamp in the CDSP database (buffer)		
	<i>update period</i> the measured data is updated according to the set update period time. If the value is set to 0, data is not refreshed at all in the CDSP	<i>Deadband mode, deadband value</i> the data is updated after the measurements cross the value set for the <i>deadband value</i>
RCB parameters, Trigger modes: Define when the reports of the monitored quantity are sent	Trigger period=True, integrity period=x ms	Report sent: according to the value set for integrity period (x ms) Recommended setting for <i>deadband mode</i> parameter: “Off” Recommended setting for <i>Update period</i> parameter: integrity period > update period > 0
	Trigger datachange = True	Report sent: after measurement change crosses the value set for the <i>deadband value</i> parameter* Recommended setting for <i>deadband mode</i> parameter: “Amplitude” Recommended setting for <i>Update period</i> parameter: =0
	Trigger period = True, integrity period=x ms and Trigger datachange = True	Report sent: according to the value set for integrity period (x ms), as well as after measurement change crosses the value set for the <i>deadband value</i> parameter Recommended setting for <i>deadband mode</i> parameter: “Amplitude” Recommended setting for <i>Update period</i> parameter: =0**

*if the update period parameter is set to > 0, the report will not only be according to the deadband value crossing

**because of setting the update period parameter to 0, there will be no periodic refreshing of the timestamps in the reports, timestamps will only be refreshed after measurements cross the deadband