



High Performance Analyzer EM235/PM335/PM17X PRO

IEC 61850 Communications Protocol

Reference Guide

Every effort has been made to ensure that the material herein is complete and accurate. However, the manufacturer is not responsible for any mistakes in printing or faulty instructions contained in this book. Notification of any errors or misprints will be received with appreciation.

For further information regarding a particular installation, operation or maintenance of equipment, contact the manufacturer or your local representative or distributor.

REVISION HISTORY

A1	Sep 2019	Initial release.
A2	Jan 2021	The IEC 61850 conformance statement is moved to a separate document.
A3	Feb 2025	Updated IEC 61850 configuration instructions for Ed2.

Table of Contents

Chapter 1	General.....	4
Chapter 2	Impact of Device Settings.....	5
2.1	Logical Device Mode	5
2.2	Controls	5
2.3	Measurement Units	5
2.4	Process Measurement Limits	6
2.5	Deadbands	7
2.6	Textual Descriptions	7
2.7	Preconfigured Datasets	7
2.7.1	Predefined Datasets	7
2.7.2	Predefined Dataset Members.....	8
2.8	Preconfigured Reports.....	12
2.8.1	Predefined RCB.....	12
2.8.2	Predefined RCB Attributes	15
2.8.3	Report Service Information	16
Chapter 3	Configuring IEC 61850	17
3.1	Licensing IEC 61850	17
3.2	Initializing IED Site Database	18
3.3	Configuring IED Properties.....	19
3.4	Configuring Datasets	20
3.5	Configuring Reports.....	22
3.6	Configuring the GOOSE Publisher	23
3.7	Configuring the GOOSE Subscriber	24
3.8	Configuring Report Deadbands	28
3.9	Exporting IEC 61850 IED Configuration Files (CID/IID/ICD).....	31
3.10	Importing IEC 61850 SCD Configuration	32
3.11	Downloading the IEC 61850 Configuration to the Device	32
3.12	Resetting the IEC 61850 Configuration in the Device	32

Chapter 1 General

This document provides information on setting up and operating an IEC 61850 server in EM235/PM335/PM17X PRO devices with IEC 61850-8-1 and IEC 61850-9-2 interfaces compliant with the IEC 61850 set of standards.

See the EM235/PM335/PM17X PRO IEC 61850 Conformance Statement (PICS, PIXIT, MICS, TICS) for information on the device data object model, protocol implementation, and communication capabilities of the EM235/PM335/PM17X PRO IEC 61850 server.

The device capabilities and data model are described in the template ICD configuration file provided with your device (PM13xPRO_2007B_Rev8.icd).

Refer to the EM235/PM335/PM17X PRO Operation Manual for basic information on configuring and operating.

IMPORTANT

Control commands addressed to the CSWI switch controller nodes and to the boGGIO general binary output nodes will be rejected until the internal BOOLEAN variable REMOTE CONTROL is set to TRUE via a setpoint logic equation. See Controls in Section 2.2 for details.

This document applies to EM235/PM335/PM17X PRO devices with firmware version X.5.9.YY for IEC 61850 Ed2 releases, where X indicates the device type and YY indicates the firmware build number.

The IEC 61850 configuration instructions in this document apply to PAS V1.5.7.5 and higher.

Chapter 2 Impact of Device Settings

2.1 Logical Device Mode

Logical device mode given by LLN0.Mod is always ON.

2.2 Controls

The Loc attribute in logical nodes containing controls indicates the complementary status of the internal BOOLEAN variable REMOTE CONTROL defaulted to FALSE. Use PAS setpoint logic equations to operate REMOTE CONTROL status.

Control commands addressed to the CSWI switch controller nodes and to the boGGIO general binary output nodes will be rejected with AddCause=2 Blocked-by-switching-hierarchy until REMOTE CONTROL is set to TRUE.

The EM235/PM335/PM17X PRO can provide additional protection for control nodes based on client IP addresses by enabling control commands for specific clients and disabling or conditional blocking via logic equations for others. Commands received from a blocked client port are rejected with AddCause=2 Blocked-by-switching-hierarchy.

2.3 Measurement Units

Voltage, current and power units are selectable (see Section 3.2 for details).

Measurement type	Units (precision)	
	PT = 1	PT > 1
Current	A/kA (0.01 A)	A/kA (0.01 A)
Voltage AC	V/kV (0.1 V)	V/kV (1 V)
Power	kW, kVA, kvar or MW, Mvar, MVA (0.001 kW/kVA/kvar)	kW, kVA, kvar or MW, Mvar, MVA (1 kW/kVA/kvar)
Energy	0.001/0.01/0.1/1 kWh, kVAh, kvarh	0.001/0.01/0.1/1 kWh, kVAh, kvarh

2.4 Process Measurement Limits

Measurement type	Measurement limits		
	Condition	min	max
Current (standard inputs)		0	Current Scale $\times$ CT Ratio ^{1, 2} (Imax)
Auxiliary current I4 (standard input)		0	Current Scale $\times$ I4 CT Ratio ^{1, 2}
Current (extended inputs)		0	20 $\times$ CT Primary current
Auxiliary current I4x (extended input)		0	20 $\times$ I4 CT Primary current
Voltage AC		0	Voltage Scale $\times$ PT Ratio ³ (Vmax)
Auxiliary voltage V4		0	Voltage Scale $\times$ V4 PT Ratio ³
Power signed (kW, kvar)		$-V_{\max} \times I_{\max} \times 2/1000$	$V_{\max} \times I_{\max} \times 2/1000$ ⁴
Power unsigned (kVA, kW import/export, kvar import/export) and power demands		0	$V_{\max} \times I_{\max} \times 2/1000$ ⁴
Power factor signed		-1.000	1.000
Power factor unsigned (lag, lead)		0	1.000
Unbalance		0	300.0
THD		0	999.9
TDD		0	999.9
K-Factor		1.0	999.9
Harmonics		0	100.00
Analog inputs and outputs	+/-1mA	-AI full scale $\times$ 2	AI full scale $\times$ 2
	0-20mA	AI zero scale	AI full scale
	4-20mA	AI zero scale	AI full scale
	0-1mA	AI zero scale	AI full scale
	0-50mA	AI zero scale	AI full scale $\times$ 2
	+/-10V	-AI full scale	AI full scale

NOTES:

1. CT Ratio = CT primary current/CT secondary current.
2. The default Current Scale is 4 $\times$ CT secondary current for devices with a 400% overload (ANSI) or 2 $\times$ CT secondary current for devices with a 200% overload (IEC). It can be changed via the Device Options setup in PAS.
3. The default Voltage Scale is 828V. It can be changed via the Device Options setup in PAS.
4. If PT Ratio = 1.0 and Pmax is greater than 9,999 kW, then it is truncated to 9,999 kW.

2.5 Deadbands

The db (deadband) value represents the percentage of difference between max and min process measurement limits indicated in the table above. The default db attribute values in functional constraint CF are defined in the ICD file. They can be changed to provide reasonable conditions for generating reportable events.

2.6 Textual Descriptions

The default d (textual description of the data) attribute values in functional constraint DC are defined in the device. They can be changed for descriptions of measured/metered and status data.

2.7 Preconfigured Datasets

2.7.1 Predefined Datasets

Item	Value/Comments
Predefined datasets in ICD file	Measurand data: MET1/LLN0\$DSet01Mx MET1/LLN0\$DSet02Mx MET1/LLN0\$DSet03Mx MET1/LLN0\$DSet04St MET1/LLN0\$DSet05Mx Status data: MET1/LLN0\$DSet01StInd MET1/LLN0\$DSet02StInd MET1/LLN0\$DSet03StInd MET1/LLN0\$DSet04StInd MET1/LLN0\$DSet04StSPCSO MET1/LLN0\$DSet05StSPCSO MET1/LLN0\$DSet06StSPCSO MET1/LLN0\$DSet07StSPCSO MET1/LLN0\$DSet08StInd MET1/LLN0\$DSet09StInd MET1/LLN0\$DSet09StFltNum GOOSE publisher data set: CTRL/LLN0\$DSetGOOSE1

2.7.2 Predefined Dataset Members

Dataset name	Members
MET1/LLN0\$DSet01Mx	MET1/osvMMXU1\$MX\$AvPhV MET1/osvMMXU1\$MX\$AvPPV MET1/osvMMXU1\$MX\$AvA MET1/osvMMXU1\$MX\$TotW MET1/osvMMXU1\$MX\$TotVAr MET1/osvMMXU1\$MX\$TotVA MET1/osvMMXU1\$MX\$TotPF MET1/osvMMXU1\$MX\$Hz
MET1/LLN0\$DSet02Mx	MET1/osvMMXU1\$MX\$PhV\$phsA MET1/osvMMXU1\$MX\$PhV\$phsB MET1/osvMMXU1\$MX\$PhV\$phsC MET1/osvMMXU1\$MX\$PPV\$phsAB MET1/osvMMXU1\$MX\$PPV\$phsBC MET1/osvMMXU1\$MX\$PPV\$phsCA MET1/osvMMXU1\$MX\$A\$phsA MET1/osvMMXU1\$MX\$A\$phsB MET1/osvMMXU1\$MX\$A\$phsC MET1/osvMMXU1\$MX\$A\$neut
MET1/LLN0\$DSet03Mx	MET1/osvMMXU1\$MX\$W\$phsA MET1/osvMMXU1\$MX\$W\$phsB MET1/osvMMXU1\$MX\$W\$phsC MET1/osvMMXU1\$MX\$VAr\$phsA MET1/osvMMXU1\$MX\$VAr\$phsB MET1/osvMMXU1\$MX\$VAr\$phsC MET1/osvMMXU1\$MX\$VA\$phsA MET1/osvMMXU1\$MX\$VA\$phsB MET1/osvMMXU1\$MX\$VA\$phsC MET1/osvMMXU1\$MX\$PF\$phsA MET1/osvMMXU1\$MX\$PF\$phsB MET1/osvMMXU1\$MX\$PF\$phsC
MET1/LLN0\$DSet04St	MET1/engMMTR1\$ST\$SupWh MET1/engMMTR1\$ST\$DmdWh MET1/engMMTR1\$ST\$SupVArh MET1/engMMTR1\$ST\$DmdVArh
MET1/LLN0\$DSet05Mx	MET1/osvMMXU1\$MX\$AuxA MET1/osvMMXU1\$MX\$AuxV MET1/osvMMXU1\$MX\$ExtA\$phsA MET1/osvMMXU1\$MX\$ExtA\$phsB MET1/osvMMXU1\$MX\$ExtA\$phsC MET1/osvMMXU1\$MX\$ExtAuxA MET1/osvMMXU1\$MX\$AvExtA

Dataset name	Members
MET1/LLN0\$DSet01StInd	MET1/biGGIO1\$ST\$Ind1 MET1/biGGIO1\$ST\$Ind2 ... MET1/biGGIO1\$ST\$Ind16 MET1/biGGIO2\$ST\$Ind1 MET1/biGGIO2\$ST\$Ind2 ... MET1/biGGIO2\$ST\$Ind16
MET1/LLN0\$DSet02StInd	MET1/biGGIO3\$ST\$Ind1 MET1/biGGIO3\$ST\$Ind2 ... MET1/biGGIO3\$ST\$Ind16 MET1/biGGIO4\$ST\$Ind1 MET1/biGGIO4\$ST\$Ind2 ... MET1/biGGIO4\$ST\$Ind16
MET1/LLN0\$DSet03StInd	MET1/biGGIO5\$ST\$Ind1 MET1/biGGIO5\$ST\$Ind2 ... MET1/biGGIO5\$ST\$Ind16 MET1/biGGIO6\$ST\$Ind1 MET1/biGGIO6\$ST\$Ind2 ... MET1/biGGIO6\$ST\$Ind16
MET1/LLN0\$DSet04StInd	MET1/biGGIO7\$ST\$Ind1 MET1/biGGIO7\$ST\$Ind2 ... MET1/biGGIO7\$ST\$Ind16 MET1/biGGIO8\$ST\$Ind1 MET1/biGGIO8\$ST\$Ind2 ... MET1/biGGIO8\$ST\$Ind16
MET1/LLN0\$DSet04StSPCSO	MET1/boGGIO1\$ST\$SPCSO1 MET1/boGGIO1\$ST\$SPCSO2 ... MET1/boGGIO1\$ST\$SPCSO8 MET1/boGGIO2\$ST\$SPCSO1 MET1/boGGIO2\$ST\$SPCSO2 ... MET1/boGGIO2\$ST\$SPCSO8
MET1/LLN0\$DSet05StSPCSO	MET1/boGGIO3\$ST\$SPCSO1 MET1/boGGIO3\$ST\$SPCSO2 ...

Dataset name	Members
	MET1/boGGIO3\$ST\$SPCSO8 MET1/boGGIO4\$ST\$SPCSO1 MET1/boGGIO4\$ST\$SPCSO2 ... MET1/boGGIO4\$ST\$SPCSO8
MET1/LLN0\$DSet06StSPCSO	MET1/boGGIO5\$ST\$SPCSO1 MET1/boGGIO5\$ST\$SPCSO2 ... MET1/boGGIO5\$ST\$SPCSO8 MET1/boGGIO6\$ST\$SPCSO1 MET1/boGGIO6\$ST\$SPCSO2 ... MET1/boGGIO6\$ST\$SPCSO8
MET1/LLN0\$DSet07StSPCSO	MET1/boGGIO7\$ST\$SPCSO1 MET1/boGGIO7\$ST\$SPCSO2 ... MET1/boGGIO7\$ST\$SPCSO8 MET1/boGGIO8\$ST\$SPCSO1 MET1/boGGIO8\$ST\$SPCSO2 ... MET1/boGGIO8\$ST\$SPCSO8
MET1/LLN0\$DSet08StInd	MET1/spGGIO1\$ST\$Ind1 MET1/spGGIO1\$ST\$Ind2 ... MET1/spGGIO1\$ST\$Ind32
MET1/LLN0\$DSet09StInd	MET1/spGGIO2\$ST\$Ind1 MET1/spGGIO2\$ST\$Ind2 ... MET1/spGGIO2\$ST\$Ind32
MET1/LLN0\$DSet09StFltNum	MET1/drRDRE1\$ST\$FltNum MET1/drRDRE2\$ST\$FltNum ... MET1/drRDRE8\$ST\$FltNum
CTRL/LLN0\$DSetGOOSE1	CTRL/QA1XCBR1\$ST\$Pos\$stVal CTRL/QA1XCBR1\$ST\$Pos\$q CTRL/QA2XCBR2\$ST\$Pos\$stVal CTRL/QA2XCBR2\$ST\$Pos\$q CTRL/QB1XSWI1\$ST\$Pos\$stVal CTRL/QB1XSWI1\$ST\$Pos\$q CTRL/QB2XSWI2\$ST\$Pos\$stVal CTRL/QB2XSWI2\$ST\$Pos\$q CTRL/QB3XSWI3\$ST\$Pos\$stVal CTRL/QB3XSWI3\$ST\$Pos\$q

Dataset name	Members
	CTRL/QB4XSWI4\$ST\$Pos\$stVal CTRL/QB4XSWI4\$ST\$Pos\$q CTRL/QB5XSWI5\$ST\$Pos\$stVal CTRL/QB5XSWI5\$ST\$Pos\$q CTRL/QB6XSWI6\$ST\$Pos\$stVal CTRL/QB6XSWI6\$ST\$Pos\$q CTRL/QE1XSWI7\$ST\$Pos\$stVal CTRL/QE1XSWI7\$ST\$Pos\$q CTRL/QE2XSWI8\$ST\$Pos\$stVal CTRL/QE2XSWI8\$ST\$Pos\$q CTRL/QE3XSWI9\$ST\$Pos\$stVal CTRL/QE3XSWI9\$ST\$Pos\$q CTRL/QE4XSWI10\$ST\$Pos\$stVal CTRL/QE4XSWI10\$ST\$Pos\$q CTRL/QE5XSWI11\$ST\$Pos\$stVal CTRL/QE5XSWI11\$ST\$Pos\$q CTRL/QE6XSWI12\$ST\$Pos\$stVal CTRL/QE6XSWI12\$ST\$Pos\$q CTRL/QE71XSWI13\$ST\$Pos\$stVal CTRL/QE7XSWI13\$ST\$Pos\$q CTRL/QE8XSWI14\$ST\$Pos\$stVal CTRL/QE8XSWI14\$ST\$Pos\$q MET1/osvMMXU1\$MX\$PhV\$phsA\$cVal MET1/osvMMXU1\$MX\$PhV\$phsA\$q MET1/osvMMXU1\$MX\$PhV\$phsB\$cVal MET1/osvMMXU1\$MX\$PhV\$phsB\$q MET1/osvMMXU1\$MX\$PhV\$phsC\$cVal MET1/osvMMXU1\$MX\$PhV\$phsC\$q

2.8 Preconfigured Reports

2.8.1 Predefined RCB

See Section 3.2 on configuring the number of RCB instances in the device.

Number of Instances	Report ID
Number of RCB instances = 1 (non-indexed RCBs)	16 URCBs: CTRL/LLN0\$RP\$URep01 CTRL/LLN0\$RP\$URep02 CTRL/LLN0\$RP\$URep03 CTRL/LLN0\$RP\$URep04 CTRL/LLN0\$RP\$URep05 CTRL/LLN0\$RP\$URep06 CTRL/LLN0\$RP\$URep07 CTRL/LLN0\$RP\$URep08 MET1/LLN0\$RP\$URep01 MET1/LLN0\$RP\$URep02 MET1/LLN0\$RP\$URep03 MET1/LLN0\$RP\$URep04 MET1/LLN0\$RP\$URep05 MET1/LLN0\$RP\$URep06 MET1/LLN0\$RP\$URep07 MET1/LLN0\$RP\$URep08 16 BRCBs: CTRL/LLN0\$BR\$BRep01 CTRL/LLN0\$BR\$BRep02 CTRL/LLN0\$BR\$BRep03 CTRL/LLN0\$BR\$BRep04 CTRL/LLN0\$BR\$BRep05 CTRL/LLN0\$BR\$BRep06 CTRL/LLN0\$BR\$BRep07 CTRL/LLN0\$BR\$BRep08 MET1/LLN0\$BR\$BRep01 MET1/LLN0\$BR\$BRep02 MET1/LLN0\$BR\$BRep03 MET1/LLN0\$BR\$BRep04 MET1/LLN0\$BR\$BRep05 MET1/LLN0\$BR\$BRep06 MET1/LLN0\$BR\$BRep07 MET1/LLN0\$BR\$BRep08

Number of Instances	Report ID
Number of RCB instances = 1 (indexed RCBs, RptEnabled max=1)	16 URCBs: CTRL/LLN0\$RP\$URepA01 CTRL/LLN0\$RP\$URepB01 CTRL/LLN0\$RP\$URepC01 CTRL/LLN0\$RP\$URepD01 CTRL/LLN0\$RP\$URepE01 CTRL/LLN0\$RP\$URepF01 CTRL/LLN0\$RP\$URepG01 CTRL/LLN0\$RP\$URepH01 MET1/LLN0\$RP\$URepA01 MET1/LLN0\$RP\$URepB01 MET1/LLN0\$RP\$URepC01 MET1/LLN0\$RP\$URepD01 MET1/LLN0\$RP\$URepE01 MET1/LLN0\$RP\$URepF01 MET1/LLN0\$RP\$URepG01 MET1/LLN0\$RP\$URepH01 16 BRCBs: CTRL/LLN0\$BR\$BRepA01 CTRL/LLN0\$BR\$BRepB01 CTRL/LLN0\$BR\$BRepC01 CTRL/LLN0\$BR\$BRepD01 CTRL/LLN0\$BR\$BRepE01 CTRL/LLN0\$BR\$BRepF01 CTRL/LLN0\$BR\$BRepG01 CTRL/LLN0\$BR\$BRepH01 MET1/LLN0\$BR\$BRepA01 MET1/LLN0\$BR\$BRepB01 MET1/LLN0\$BR\$BRepC01 MET1/LLN0\$BR\$BRepD01 MET1/LLN0\$BR\$BRepE01 MET1/LLN0\$BR\$BRepF01 MET1/LLN0\$BR\$BRepG01 MET1/LLN0\$BR\$BRepH01
Number of RCB instances = 2 (indexed RCBs, RptEnabled max=2)	8 URCBs x 2 clients: CTRL/LLN0\$RP\$URepA01 CTRL/LLN0\$RP\$URepA02 CTRL/LLN0\$RP\$URepB01 CTRL/LLN0\$RP\$URepB02 CTRL/LLN0\$RP\$URepC01 CTRL/LLN0\$RP\$URepC02 CTRL/LLN0\$RP\$URepD01 CTRL/LLN0\$RP\$URepD02 MET1/LLN0\$RP\$URepA01 MET1/LLN0\$RP\$URepA02

Number of Instances	Report ID
	MET1/LLN0\$RP\$URepB01 MET1/LLN0\$RP\$URepB02 MET1/LLN0\$RP\$URepC01 MET1/LLN0\$RP\$URepC02 MET1/LLN0\$RP\$URepD01 MET1/LLN0\$RP\$URepD02 8 BRCBs x 2 clients: CTRL/LLN0\$BR\$BRepA01 CTRL/LLN0\$BR\$BRepA02 CTRL/LLN0\$BR\$BRepB01 CTRL/LLN0\$BR\$BRepB02 CTRL/LLN0\$BR\$BRepC01 CTRL/LLN0\$BR\$BRepC02 CTRL/LLN0\$BR\$BRepD01 CTRL/LLN0\$BR\$BRepD02 MET1/LLN0\$BR\$BRepA01 MET1/LLN0\$BR\$BRepA02 MET1/LLN0\$BR\$BRepB01 MET1/LLN0\$BR\$BRepB02 MET1/LLN0\$BR\$BRepC01 MET1/LLN0\$BR\$BRepC02 MET1/LLN0\$BR\$BRepD01 MET1/LLN0\$BR\$BRepD02
Number of RCB instances = 4 (indexed RCBs, RptEnabled max=4)	4 URCBs x 4 clients: CTRL/LLN0\$RP\$URepA01 CTRL/LLN0\$RP\$URepA02 CTRL/LLN0\$RP\$URepA03 CTRL/LLN0\$RP\$URepA04 CTRL/LLN0\$RP\$URepB01 CTRL/LLN0\$RP\$URepB02 CTRL/LLN0\$RP\$URepB03 CTRL/LLN0\$RP\$URepB04 MET1/LLN0\$RP\$URepA01 MET1/LLN0\$RP\$URepA02 MET1/LLN0\$RP\$URepA03 MET1/LLN0\$RP\$URepA04 MET1/LLN0\$RP\$URepB01 MET1/LLN0\$RP\$URepB02 MET1/LLN0\$RP\$URepB03 MET1/LLN0\$RP\$URepB04 4 BRCBs x 4 clients: CTRL/LLN0\$BR\$BRepA01 CTRL/LLN0\$BR\$BRepA02 CTRL/LLN0\$BR\$BRepA03 CTRL/LLN0\$BR\$BRepA04

Number of Instances	Report ID
	CTRL/LLN0\$BR\$BRepB01
	CTRL/LLN0\$BR\$BRepB02
	CTRL/LLN0\$BR\$BRepB03
	CTRL/LLN0\$BR\$BRepB04
	MET1/LLN0\$BR\$BRepA01
	MET1/LLN0\$BR\$BRepA02
	MET1/LLN0\$BR\$BRepA03
	MET1/LLN0\$BR\$BRepA04
	MET1/LLN0\$BR\$BRepB01
	MET1/LLN0\$BR\$BRepB02
	MET1/LLN0\$BR\$BRepB03
	MET1/LLN0\$BR\$BRepB04

2.8.2 Predefined RCB Attributes

Report ID	Dataset
CTRL/LLN0\$RP\$URep01	Not defined
CTRL/LLN0\$RP\$URep02	Not defined
CTRL/LLN0\$RP\$URep03	Not defined
CTRL/LLN0\$RP\$URep04	Not defined
CTRL/LLN0\$RP\$URep05	Not defined
CTRL/LLN0\$RP\$URep06	Not defined
CTRL/LLN0\$RP\$URep07	Not defined
CTRL/LLN0\$RP\$URep08	Not defined
CTRL/LLN0\$BR\$BRep01	Not defined
CTRL/LLN0\$BR\$BRep02	Not defined
CTRL/LLN0\$BR\$BRep03	Not defined
CTRL/LLN0\$BR\$BRep04	Not defined
CTRL/LLN0\$BR\$BRep05	Not defined
CTRL/LLN0\$BR\$BRep06	Not defined
CTRL/LLN0\$BR\$BRep07	Not defined
CTRL/LLN0\$BR\$BRep08	Not defined
MET1/LLN0\$RP\$URep01	MET1/LLN0\$DSet01Mx
MET1/LLN0\$RP\$URep02	MET1/LLN0\$DSet02Mx
MET1/LLN0\$RP\$URep03	MET1/LLN0\$DSet03Mx
MET1/LLN0\$RP\$URep04	MET1/LLN0\$DSet05Mx
MET1/LLN0\$RP\$URep05	Not defined
MET1/LLN0\$RP\$URep06	Not defined

Report ID	Dataset
MET1/LLN0\$RP\$URep07	Not defined
MET1/LLN0\$RP\$URep08	Not defined
MET1/LLN0\$BR\$BRep01	Not defined
MET1/LLN0\$BR\$BRep02	Not defined
MET1/LLN0\$BR\$BRep03	Not defined
MET1/LLN0\$BR\$BRep04	Not defined
MET1/LLN0\$BR\$BRep05	Not defined
MET1/LLN0\$BR\$BRep06	Not defined
MET1/LLN0\$BR\$BRep07	Not defined
MET1/LLN0\$BR\$BRep08	Not defined

2.8.3 Report Service Information

Any predefined RCB attribute value may be written when RptEna is FALSE. Only existing data sets (see Dataset model table) may be used for DataSet attribute changing. Internal events, caused by data-change and quality-change trigger options only, result in immediate sending of reports or buffering events for transmission (limited by a buffer size of 64 Kbytes per report).

Chapter 3 Configuring IEC 61850

The PAS software supplied with the EM235/PM335/PM17X PRO provides an IED configuration tool for customizing your device settings and exporting IED configuration description files (CID/IID/ICD) for use with IEC 61850 client applications. See the EM235/PM335/PM17X PRO Operation Manual for general information on installing and operating PAS.

NOTE

When you select an IEC 61850 configuration tab while the On-line checkbox on the PAS toolbar is checked, the currently displayed configuration settings show the online settings from the connected device. In case the On-line checkbox on the PAS toolbar is not checked, the currently displayed configuration settings show the offline settings from the IED database, or default IED settings if the setup is not present in the IED database.

Click the Open button on the configuration tab to display IED database settings.

Click the Receive button on the configuration tab to display online device settings.

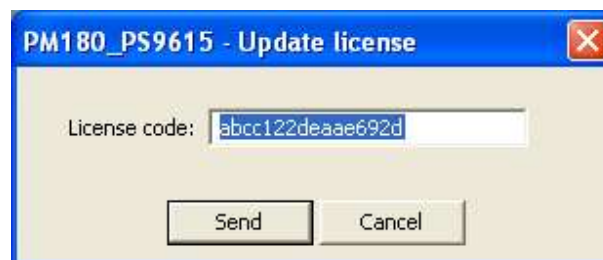
3.1 Licensing IEC 61850

A valid license key must be provided in the EM235/PM335/PM17X PRO for IEC 61850 communications. The device is usually shipped with a temporary license, which is valid for a 30-day operation and then can be extended for an additional month.

A permanent license can be obtained from your local distributor for an additional fee. A device serial number must be provided in the license request. The device may also be shipped with the permanent license in the event of a pre-paid fee.

To program a license key in your device:

1. Select Administration->Update License from the Monitor menu.



2. Type in the license code and click Send.

3.2 Initializing IED Site Database

IEC 61850 configuration settings for an IED are stored in the IED site database, from where they can be downloaded to your device online or exported to an IED configuration file. See the EM235/PM335/PM17X PRO Operation Manual for information on how to create a site database for your device.

The IED database can be initialized with default settings applicable to your device, or settings imported from another IED's database, or settings uploaded directly from the IED online.

To initialize the IED site database for your device:

1. Select IEC 61850 Setup from the Meter Setup menu and click on the IED Configurator tab. The settings shown on the tab indicate the communication parameters of the IED stored in the IED database.

PM335 - IEC 61850 Setup

GOOSE Subscriber Setup | Report Deadbands | IED Configurator | GOOSE Publisher Setup

IED Properties | IEC 61850 Datasets | IEC 61850 Reports

IED Properties	
IED Name	PM335
IEC 61850 Edition	Ed2
Subnet Name	W01
Access Point Name	S1
IP Address *	192 . 168 . 0 . 203
Subnet Mask *	255 . 255 . 255 . 0
Default Gateway *	192 . 168 . 0 . 1
Location	
Client Connection Idle Timeout, min	2
TCP Keepalive Time, s	0
Number of RCB Instances	1 (non-indexed)
Voltage Units	V
Current Units	A
Power Units	kW

* Configured in the device via Network Setup

Open Save as... Default Print Send Receive

OK Cancel Apply Help

2. Select one of the following options to initialize the IED database:
 - To initialize the database with default settings, click the "Initialize" button.
 - To import IEC 61850 settings from another IED's database, click the "Import from..." button, and then select the source IED database file.
 - To import the settings from the connected device, make sure the On-line checkbox on the PAS toolbar is checked, and then click the "Save from IED" button.

In case the IED database is initialized with default settings, the IED site name is used as a temporary name for the IED. The figure above shows what the IED database settings might look like after initialization with default values.

See the following sections in this manual for information on how to configure IEC 61850 parameters for your specific application.

3.3 Configuring IED Properties

To configure the IED identification parameters and general IEC 61850 protocol options for your IED:

1. Select IEC 61850 Setup from the Meter Setup menu and click on the IED Properties tab.
2. Select the IEC 61850 edition implemented in your device and configure other IED parameters to suit your application.

NOTES

- The configured IED name will be concatenated with logical device instances' names in IEC 61850 object references.
- The device location will also identify the substation location in COMTRADE configuration files as the station_name attribute.
- Attributes marked with the asterisk in PAS cannot be changed in the device via this setup but you can define and store them to the device database when working offline for later updating a device CID/IID/ICD configuration file.
- The number of RCB instances defines how pre-defined RCBs are arranged in the device for use in multi-client applications. The RCBs are automatically pre-configured in the device in the way indicated in Section "Reporting model". The RCB names and report IDs are set to defaults as the number of RCB instances changes. If you intend to change the default setting, setup the number of RCB instances first before configuring report control blocks.
- The TCP_KEEPALIVE interval can be configured in the device from 1 to 60 seconds (the default is 20 s) or can be set to 0 to inactivate keepalive probes.
- Client connection idle timeout can be used with keepalive probes or separately to terminate a TCP connection if the connection is idle for too long. The idle timeout can be set between 1 and 10 minutes or set to 0 to inactivate the idle timer. The timer is disabled in the device by default.

IED Properties	
IED Name	PM335_681612
IEC 61850 Edition	Ed2
Subnet Name	W01
Access Point Name	S1
IP Address *	10 . 0 . 0 . 188
Subnet Mask *	255 . 255 . 255 . 0
Default Gateway *	10 . 0 . 0 . 254
Location	
Client Connection Idle Timeout, min	0
TCP Keepalive Time, s	20
Number of RCB Instances	1 (non-indexed)
Voltage Units	V
Current Units	A
Power Units	kW

* Configured in the device via Network Setup

3. Click on “Save as ...” to save your setup to the IED database.
4. To update the device's online settings right now, send your new setting to the device.

NOTE

The network IP address and subnet settings received online from the device always indicate the actual device's network settings and may not match your settings in the IDE database, unless they are imported from the device or you have changed them via the device network setup (see note in Section 3.12).

3.4 Configuring Datasets

This setup dialog allows you to create, reconfigure, or delete any deletable dataset. Pre-defined datasets are non-deletable and are not listed in this dialog.

NOTES

1. A dataset cannot be deleted or its attributes changed if it is referenced by any currently enabled report, GOOSE, or sampled values control block.
2. Create your new datasets before configuring your reports; otherwise, you may see an incomplete dataset list in your reports setup dialog.

To review or configure deletable IEC 61850 datasets:

1. Select IEC 61850 Setup from the Meter Setup menu, and then click on the IEC 61850 Datasets tab.

The screenshot shows the 'PM335 - IEC 61850 Setup' dialog box with the 'IEC 61850 Datasets' tab selected. The dialog has several tabs: 'GOOSE Subscriber Setup', 'Report Deadbands', 'IED Configurator', 'IED Properties', 'IEC 61850 Datasets', 'IEC 61850 Reports', and 'GOOSE Publisher Setup'. The 'IEC 61850 Datasets' tab is active, showing a list of 'Deletable/Changeable Datasets'. The 'Dataset Reference' is set to 'CTRL/LLN0\$DSetGOOSE1'. Below this is a table of 'Dataset Members' with columns 'No.', 'Member Reference', and 'Included'. The table lists 14 members, with the first 6 being included (checked) and the remaining 8 being excluded (unchecked). At the bottom of the dialog are buttons for 'Open', 'Save as...', 'Default', 'Print', 'Send', 'Receive', 'Edit from File', 'OK', 'Cancel', 'Apply', and 'Help'.

Deletable/Changeable Datasets		
Dataset Reference: CTRL/LLN0\$DSetGOOSE1		
Dataset Members		
No.	Member Reference	Included
1	MET1/osvMMXU1\$MX\$PhV\$phsA\$CVal	☒
2	MET1/osvMMXU1\$MX\$PhV\$phsA\$Cq	☒
3	MET1/osvMMXU1\$MX\$PhV\$phsB\$CVal	☒
4	MET1/osvMMXU1\$MX\$PhV\$phsB\$Cq	☒
5	MET1/osvMMXU1\$MX\$PhV\$phsC\$CVal	☒
6	MET1/osvMMXU1\$MX\$PhV\$phsC\$Cq	☒
7	---	☐
8	---	☐
9	---	☐
10	---	☐
11	---	☐
12	---	☐
13	---	☐
14	---	☐

2. Select a dataset you wish to view or configure in the “Dataset Reference” box. Select “New Dataset” to create a new dataset.

- To delete dataset members, uncheck the appropriate "Included" boxes. Uncheck all dataset members to delete the entire dataset.
- To add or change dataset members, you need to use a preconfigured CID or IID configuration description file for your IED. See Section 3.10 "Exporting IEC 61850 IED Configuration Files" for instructions on creating a CID/IID file for your device. Click "Edit from file", select the type of the IED configuration file, locate the file, and then click Open.

A full list of the available data objects and data attributed is displayed, where included dataset members are checked.

To create a new dataset, select a logical device where the dataset to be located and type a dataset name in the "Dataset Name" box.

Check the "Included" boxes for items you wish to be members of the dataset and click OK.

To make easy selection of items across the list, use filters for functional constraints or/and a selected logical device/logical node. Click "Filter checked" to see and revise a list of the selected items.

PM335_681612.cid - [C:\PAS\Samples]

Reference IED: PM335_681612

Dataset Name: CTRL / LLNO \$ DSetGOOSE1

Selected Items: 6

Filters: ☒ ST ☒ MX ☐ CO ☐ SV ☐ CF ☐ DC

Logical Device/Node: MET1/osvMMXU1

Filter Checked: ☐

No.	Data Reference	Included
1	MET1/osvMMXU1\$MX\$PhV	☐
2	MET1/osvMMXU1\$MX\$PhV\$phsA	☐
3	MET1/osvMMXU1\$MX\$PhV\$phsA\$scVal\$mag\$f	☐
4	MET1/osvMMXU1\$MX\$PhV\$phsA\$scVal	☒
5	MET1/osvMMXU1\$MX\$PhV\$phsA\$scVal	☒
6	MET1/osvMMXU1\$MX\$PhV\$phsA\$scVal	☒
7	MET1/osvMMXU1\$MX\$PhV\$phsB	☐
8	MET1/osvMMXU1\$MX\$PhV\$phsB\$scVal\$mag\$f	☐
9	MET1/osvMMXU1\$MX\$PhV\$phsB\$scVal	☒
10	MET1/osvMMXU1\$MX\$PhV\$phsB\$scVal	☒
11	MET1/osvMMXU1\$MX\$PhV\$phsB\$scVal	☒
12	MET1/osvMMXU1\$MX\$PhV\$phsC	☐
13	MET1/osvMMXU1\$MX\$PhV\$phsC\$scVal\$mag\$f	☐

OK Cancel

- Click on "Save as ..." to save your setup to the IED database.
- To update the device's online settings right now, send the new setting to the device.

3.5 Configuring Reports

NOTES:

1. No change of attribute values of the report control block is allowed while the report is enabled by a client.
2. If you have created new datasets previously, make sure they have been saved in the IED database if you are working offline, or updated in the device if you are connected to the device online; otherwise, the list of dataset references may be incomplete.

To configure Report Control Blocks (RCB) for your IED:

1. Select IEC 61850 Setup from the Meter Setup menu, and then click on the IEC 61850 Reports tab.
2. Select an RCB you wish to view or configure in the “RCB Reference” box.

RCB #1 - Unbuffered Report Control Block	
RCB Reference	MET1/LLN0\$RPSURep01
Report ID	MET1/LLN0\$RPSURep01
Enabled	NO
Reserved	NO
Dataset Reference	MET1/LLN0\$DSet01Mx
Configuration Revision	1
Optional Fields	0111110000
Buffer Time	0
Sequence Number	0
Trigger Options	011001
Integrity Period, ms	0

3. Configure the RCB attributes as required for your application. The following items can be configured:
 - Report ID
 - Dataset reference (can be selected from the available datasets list)
 - Configuration revision
 - Optional fields
 - Trigger options
 - Buffer time
 - Integrity period for periodic reports with the integrity trigger option selected

To change the Optional fields or Trigger options, click the arrow button to the right of the item, check the appropriate options and click OK.

NOTES:

- The dataset list shows only datasets located in the same logical node as the selected report control block.
 - In case you change the dataset reference while the configuration revision is still unchanged, the device will automatically increment the configuration revision when you download your new settings to the device. Keep this in mind when validating your device settings.
4. Click on “Save as ...” to save your setup to the IED database.
 5. To update the device's online settings right now, send your new setting to the device.

3.6 Configuring the GOOSE Publisher

NOTE

No change of attribute values of the GOOSE publisher control block is allowed while the GOOSE publisher is enabled.

To configure the GOOSE publisher:

1. Select IEC 61850 Setup from the Meter Setup menu, and then click on the GOOSE Publisher Setup tab.

GOOSE Publisher	
GOOSE CB Reference	CTRL/LLN0\$GOSGoCBPub1
Publisher Enabled	NO
GOOSE ID	CTRL/LLN0\$GOSGoCBPub1
Dataset Reference	CTRL/LLN0\$DSetGOOSE1
Configuration Revision	1
Needs Commissioning	NO
Destination MAC Address	01:0C:CD:01:01:FF
VLAN Priority	4
VLAN ID [hex]	000
APPID [hex]	3001
Max. Retransmission Interval, ms	5000

2. You can configure the destination MAC address, GOOSE ID, application ID and the maximum message retransmission interval for your application. You can also preset the configuration revision if needed. Other attributes are indicated for information only.

The default GOOSE dataset reference is preconfigured in your device for GOOSE communications. The dataset variables list can be modified via the IEC 61850 Datasets setup (see Section 3.4).

In Ed2 versions, a GOOSE dataset can also be selected from the supplied list. Note that only datasets located in the same logical device as the GOOSE publisher are displayed. **In case you change the GOOSE dataset reference while the configuration revision is still unchanged, the device will automatically increment the configuration revision when you download your new settings to the device.**

3. Select Yes in the Publisher Enabled box to enable publisher operation.
4. Click on "Save as ..." to save your setup to the IED database.
5. To update the device's online settings right now, send the new setting to the device.

3.7 Configuring the GOOSE Subscriber

The EM235/PM335/PM17X PRO can subscribe to messages sent by any GOOSE network device including both EM235/PM335/PM17X PRO and non-SATEC devices.

The GOOSE subscriber supports up to 64 subscriptions with up to 16 data elements in each subscription. The location of the subscribed elements in GOOSE data sets and mapping to the EM235/PM335/PM17X PRO internal variables are configurable. The subscribed elements can be selected from a publishing device's CID/IID IED configuration description file or a SCD substation configuration description. See Section 3.10 "Exporting IEC 61850 IED Configuration File" for instructions on creating a CID/IID file for your device.

The EM235/PM335/PM17X PRO provides a set of internal variables for mapping external GOOSE data:

- a 128-bit binary string composed of 128 binary variables ExtInd1...ExtInd128 of type BOOLEAN called external indication and intended for mapping single-point BOOLEAN and integer elements and double-point Dbpos data;
- 64 variables ExtiVal1...ExtiVal64 of type INT32 for mapping signed and unsigned integer numbers of any size;
- 64 variables ExtfVal1...ExtfVal64 of type FLOAT32 for mapping single-precision floating point numbers.

When the subscriber receives GOOSE message updates, the subscribed data is copied to the internal variables that can be monitored and recorded in the device like any other measured value. When the subscriber does not receive updates, or the declared message live time has expired, or the data set differs from the subscriber setup, the internal variables are zeroed and the non-active status is indicated in the subscription status.

The subscription status can be monitored from an IEC 61850 client via the GOOSE subscriber logical nodes CTRL/sbsLGOS1-CTRL/sbsLGOS64, or from a Modbus client application via the GOOSE subscriber status register (see the EM235/PM335/PM17X PRO Modbus Reference Guide for the register location).

NOTE

No change of attribute values of the GOOSE subscriber control block is allowed while the GOOSE subscriber is enabled.

To configure the GOOSE subscriber:

1. Select IEC 61850 Setup from the Meter Setup menu, and then click on the GOOSE Subscriber Setup tab.
2. In the Subscription Number box, select the subscription you wish to configure.
3. Click the "Open SCL File" button and open a CID, IID or SCD file of the publishing device you wish to subscribe to. PAS shows you a list of all datasets linked to GOOSE publisher control blocks that are found in the IED or SCD configuration file.

PM335 - IEC 61850 Setup

IED Properties | IEC 61850 Datasets | IEC 61850 Reports | GOOSE Publisher Setup
GOOSE Subscriber Setup | Report Deadbands | IED Configurator

GOOSE Subscriber Settings

Subscription Number	1
Subscription Enabled	NO
GOOSE ID	
GOOSE CB Reference	
Dataset Reference	
Configuration Revision	1
Destination MAC Address	01:0C:CD:01:01:01
APPID [hex]	3001

Mapped GOOSE Message

No.	Element No.	Member Reference	Type	Input Variable
1	---		---	---
2	---		---	---
3	---		---	---
4	---		---	---
5	---		---	---
6	---		---	---
7	---		---	---
8	---		---	---
9	---		---	---
10	---		---	---

Open Save as... Default Print Send Receive Open SCL File

OK Cancel Apply Help

4. Check the Subscribe box for the dataset you wish to subscribe to.

PM335_681612.cid - [C:\PAS\Samples]

Published Datasets

No.	IED Name	Dataset Reference	Subscribe
1	PM335_681612	CTRL/LLN0.DSetGOOSE1	☐
2	---	---	☒
3	---	---	☒
4	---	---	☒
5	---	---	☒
6	---	---	☒
7	---	---	☒
8	---	---	☒
9	---	---	☒
10	---	---	☒

OK Cancel

- The publisher attributes and a list of dataset members for the selected dataset are displayed as shown in the picture below. PAS also indicates a basic IEC 61850 data element type and a physical MMS type for dataset members. Check the Subscribe boxes for elements you want to subscribe to, and then click OK.

Member Number	Member Reference	Basic Type	Member Type	Subscribe
1	MET1/osvMMXU1\$MX\$PhV\$phsA\$CVal\$mag\$f	FLOAT32	FLOAT32	☒
2	MET1/osvMMXU1\$MX\$PhV\$phsA\$q	Quality	Bstring16	☐
3	MET1/osvMMXU1\$MX\$PhV\$phsB\$CVal\$mag\$f	FLOAT32	FLOAT32	☒
4	MET1/osvMMXU1\$MX\$PhV\$phsB\$q	Quality	Bstring16	☐
5	MET1/osvMMXU1\$MX\$PhV\$phsC\$CVal\$mag\$f	FLOAT32	FLOAT32	☒
6	MET1/osvMMXU1\$MX\$PhV\$phsC\$q	Quality	Bstring16	☐
7	---	---	---	☐
8	---	---	---	☐
9	---	---	---	☐
10	---	---	---	☐
11	---	---	---	☐
12	---	---	---	☐

You are allowed to select no more than 16 elements. Elements with incompatible data types cannot be selected.

The publisher attributes of the selected dataset and the selected data elements are copied to the current subscription.

For your convenience, PAS automatically maps the selected elements to the compatible input variables. If desired, you can change the mapping of the selected elements using the compatible types listed in the table below.

Basic Data Type	MMS Data Type	Compatible Input Variables
BitString32	Bstring32	ExtInd, ExtiVal
Dbpos	Bstring8	ExtInd, ExtiVal
Enum	INT8	ExtInd, ExtiVal
INT32	INT32	ExtInd, ExtiVal
INT32U	INT32U	ExtInd, ExtiVal
INT16	INT16	ExtInd, ExtiVal
INT16U	INT16U	ExtInd, ExtiVal
INT8	INT8	ExtInd, ExtiVal
INT8U	INT8U	ExtInd, ExtiVal
BOOLEAN	BOOLEAN	ExtInd, ExtiVal
FLOAT32	FLOAT32	ExtfVal

PM335 - IEC 61850 Setup

IED Properties | IEC 61850 Datasets | IEC 61850 Reports | GOOSE Publisher Setup

GOOSE Subscriber Setup | Report Deadbands | IED Configurator

GOOSE Subscriber Settings

Subscription Number	1
Subscription Enabled	NO
GOOSE ID	PM335_681612CTRL/LLN0\$GO\$GoCBPub1
GOOSE CB Reference	PM335_681612CTRL/LLN0\$GoCBPub1
Dataset Reference	PM335_681612CTRL/LLN0\$DSetGOOSE1
Configuration Revision	1
Destination MAC Address	01:0C:CD:01:01:FF
APPID [hex]	3001

Mapped GOOSE Message

No.	Element No.	Member Reference	Type	Input Variable
1	1	MET1/osvMMXU1\$MX\$PhV\$phsA\$CVal\$mag\$f	FLOAT32	ExtfVal1
2	3	MET1/osvMMXU1\$MX\$PhV\$phsB\$CVal\$mag\$f	FLOAT32	ExtfVal2
3	5	MET1/osvMMXU1\$MX\$PhV\$phsC\$CVal\$mag\$f	FLOAT32	ExtfVal3
4	---		---	---
5	---		---	---
6	---		---	---
7	---		---	---
8	---		---	---
9	---		---	---
10	---		---	---

Open Save as... Default Print Send Receive Open SCL File

OK Cancel Apply Help

NOTES:

- Mapping integer data to a BOOLEAN ExtIInd variable results in copying a least-significant bit of the dataset member only.
 - Mapping double-point data of type Dbpos to a BOOLEAN ExtIInd variable causes a high-order bit of the dataset member to be copied to the following BOOLEAN ExtIInd variable.
6. Check the application ID, configuration revision and destination MAC address imported from the IED configuration file to meet the requirements of your application.
 7. Select Yes in the Subscription Enabled box to activate the subscription.
 8. Repeat the setup for other subscriptions you wish to configure.
 9. Click on "Save as ..." to save your setup to the IED database.

The dataset member references are only stored in the IED database and are not sent to the device, so they may not be displayed when reading the device settings online if you have not saved the settings in the IED database.

10. To update the device's online settings right now, send your new setting to the device.

3.8 Configuring Report Deadbands

Generic deadbands for reporting measured analog values can be configured via PAS without the need to setup individual deadbands for every data element via IEC 61850 services. If required, you can then change deadbands for individual variables via your IEC 61850 application.

Downloading new report deadbands to the device changes deadbands for all analog data of the same type in all logical nodes, so it is recommended to do that before you make your individual deadband adjustments.

NOTE

The process measurement scales for most analog values depend on your external PT and CT settings and on the voltage and current scales defined in the device. Configure them in your device and save to the device site database before changing report deadbands. See Basic Setup and Device Options Setup in the EM235/PM335/PM17X PRO Operation Manual on how to configure these parameters in the device. See Programming Analog Inputs in the EM235/PM335/PM17X PRO Operation Manual on how to setup the measurement scales for analog inputs.

To configure the deadbands for measured analog values:

1. Select IEC 61850 Setup from the Meter Setup menu, and then click on the Report Deadbands tab.

For your convenience, PAS shows the deadbands both in percent and in engineering units, and indicates the minimum and maximum process measurements from which the percent deadband is taken.

Measured Value	Deadband, %	Deadband, units	Minimum Measurement	Maximum Measurement
Phase voltage, V	1.000	10.0	0.0	1000.0
Auxiliary voltage V4, V	----	----	----	----
DC voltage, V	----	----	----	----
Phase currents, A	1.000	2.00	0.00	200.00
Neutral current, A	1.000	2.00	0.00	200.00
Auxiliary current I4, A	1.000	2.00	0.00	200.00
Phase currents (extended inputs), A	----	----	----	----
Neutral current (extended inputs), A	----	----	----	----
Auxiliary current I4 (extended inputs), A	----	----	----	----
Voltage sequence, V	1.000	10.0	0.0	1000.0
Current sequence, A	1.000	2.00	0.00	200.00
Current sequence (extended inputs), A	----	----	----	----
Voltage unbalance, %	0.333	1.0	0.0	300.0
Current unbalance, %	0.333	1.0	0.0	300.0
Active power, kW	0.500	4.000	-400.000	400.000
Reactive power, kvar	0.500	4.000	-400.000	400.000
Active power import/export, kW	1.000	4.000	0.000	400.000
Reactive power import/export, kvar	1.000	4.000	0.000	400.000

2. Adjust the default percent deadbands to the desired values as required for your application. The allowable range is 0.001% to 50.000%. Press Enter or click elsewhere on the dialog window with the left mouse button to update the engineering deadbands.
3. Click on "Save as ..." to save your setup to the IED database.
4. To update the device's online settings right now, send your new setting to the device.

The following table shows the default factory-set deadbands for measured analog values.

Measured Value	Default Deadband, %
Phase voltage	1.000
Auxiliary voltage V4	1.000
Phase currents	1.000
Neutral current	1.000
Auxiliary current I4	1.000
Phase currents (extended inputs)	0.133
Neutral current (extended inputs)	0.133
Auxiliary current I4 (extended inputs)	0.133
Voltage sequence	1.000
Current sequence	1.000
Current sequence (extended inputs)	0.133
Voltage unbalance	0.333
Current unbalance	0.333
Active power	0.500
Reactive power	0.500
Active power import/export	1.000
Reactive power import/export	1.000
Apparent power	1.000
Active power demand	1.000
Reactive power demand	1.000
Apparent power demand	1.000
Power factor	5.000
Power factor lag/lead	10.000
Frequency	0.100
Voltage THD	0.100
Current THD	0.500
Voltage interharmonic THD	0.100
Current interharmonic THD	0.500
Current TDD	1.000
Current K-factor	0.100
Analog input #1	1.000
Analog input #2	1.000
Analog input #3	1.000
Analog input #4	1.000
Analog input #5	1.000
Analog input #6	1.000

Measured Value	Default Deadband, %
Analog input #7	1.000
Analog input #8	1.000
Analog input #9	1.000
Analog input #10	1.000
Analog input #11	1.000
Analog input #12	1.000
Analog input #13	1.000
Analog input #14	1.000
Analog input #15	1.000
Analog input #16	1.000

3.9 Exporting IEC 61850 IED Configuration Files (CID/IID/ICD)

Generating a new or updating a preconfigured CID/IID/ICD file for your device is done from the IED Configurator tab. A template ICD file or a preconfigured CID/IID is used as a source for creating a new SCL file.

Make sure the IED database is up to date and all configuration settings are consistent with the device before exporting the IED configuration.

To create or update a device CID/IID/ICD file:

1. Click on the IED Configurator tab.

The screenshot shows the 'PM335 - IEC 61850 Setup' dialog box with the 'IED Configurator' tab selected. The dialog has several tabs: 'IED Properties', 'IEC 61850 Datasets', 'IEC 61850 Reports', 'GOOSE Publisher Setup', 'GOOSE Subscriber Setup', 'Report Deadbands', and 'IED Configurator'. The 'IED Configurator' tab contains two tables: 'IED Communication' and 'GOOSE Publisher'.

IED Communication	
IED Name	PM335_681612
IEC 61850 Edition	Ed2
Subnet Name	W01
Access Point Name	S1
IP Address *	10 . 0 . 0 . 188
Subnet Mask *	255 . 255 . 255 . 0
Default Gateway *	10 . 0 . 0 . 254
Location	

GOOSE Publisher	
GOOSE ID	CTRL/LLN0\$GOS\$GoCBPub1
Dataset Reference	CTRL/LLN0\$DSetGOOSE1
Configuration Revision	1
Destination MAC Address	01:0C:CD:01:01:FF
APPID [hex]	3001

* Configured in the device via Network Setup

At the bottom of the dialog, there are buttons: 'Initialize', 'Import from...', 'Export to...', 'Save from IED', 'Download to IED', 'Export SCL File', 'Import SCD File', 'OK', 'Cancel', 'Apply', and 'Help'.

2. Click the "Export SCL file" button.
3. Select the type of the source template file in the "Files of type" box, locate the EM235/PM335/PM17X PRO IED template ICD file or a preconfigured CID/IID/ICD file for your device you wish to update and click Open.

Use the basic template ICD file provided with your device (EM235/PM335/PM17X PRO_2003_RevXX.icd for Ed1 or EM235/PM335/PM17X PRO_2007B_RevXX.icd for Ed2) as a primary template for creating new CID/IID/ICD files.

4. Select the type of the output file in the "Files of type" box, locate the folder and type the name of the target CID/IID/ICD file where to store your new IED configuration description, and then click Open. You can point to the same CID/IID/ICD file you used as the source if you intend to update the existing IED configuration. In case that the *.icd file extension is selected for the output file, the generic "TEMPLATE" name will be written in place of the actual IED name.

NOTES

- In the event an RCB reference is used as the Report ID (the default setting for non-indexed RCBs), update the IED configuration file after changing the IED name even if no changes to RCBs have been made to keep consistency with your device.
- Breaker/switch nodes prefixes are configured in a CID/IID file as they are defined in the device database while updating the IED properties. If you change the default breaker/switch prefixes in your device via the Bay Control setup, update the setup in the device database, and then update the IED properties in an IED configuration file even if no other properties have been changed.

3.10 Importing IEC 61850 SCD Configuration

Basic IED communication settings can be imported from the communication part of an SCD substation configuration file to the IED database. These include the IED name, IED network and subnet parameters, access point name, and communication and configuration settings of the GOOSE publishers.

To import the IED settings from an SCD file:

1. Click on the IED Configurator tab.
2. Click the “Import SCD file” button.
3. Locate an SCD substation configuration file and click Open.
4. The list of IEDs found in the SCD file is displayed. IEDs of incompatible types will have a shaded Select box.
5. Check the “Select” box for the IED whose configuration description you want to import.

3.11 Downloading the IEC 61850 Configuration to the Device

Make sure the IED database is up to date and all configuration settings are consistent with the device before downloading the IED configuration to the device.

To download the IED configuration settings to the device:

1. Make sure the On-line checkbox on the PAS toolbar is checked.
2. Click on the IED Configurator tab.
3. Click the “Download to IED” button.

NOTE

The IP network settings are not changed in the device online by downloading the IEC 61850 configuration, as this could immediately affect communication with other parts of the EM235/PM335/PM17X PRO device. To change the device’s IP address and subnet settings, select Communication Setup from the Meter Setup menu, make the required changes in the Network Setup dialog tab, and then send your new network settings to the device.

3.12 Resetting the IEC 61850 Configuration in the Device

If required, the IEC 61850 configuration settings in your device can be reset to the factory defaults.

To reset the IEC 61850 configuration settings in the device:

1. Select Administration->Master Reset from the Monitor menu.
2. Click the “Reset IEC 61850 Configuration” button, and then confirm the command.

After the command is executed, the device's network restarts, so communication with the device may be lost for a while if you are connected to the device through the network port.