



USER MANUAL

PQM-750
IEC 61850 PROTOCOL



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- Due to continuous product development, the manufacturer reserves the right to make changes to functionality, features and technical parameters of the analyzers. The manufacturer provides long-term support for the product, adding new functionalities and fixing noticed errors.
- This manual describes the firmware version 1.00.

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1 Introduction

This manual describes the basics of implementing the IEC 61850 protocol in the PQM-750 power quality analyzer. It also describes the implemented *Logical Nodes* (LN) and *Data Objects* (DO) of the IEC 61850 interface (*Model Implementation Conformance Statement*).

This handbook is intended for engineers, installation personnel and operators in electrical grid systems and power plants.

2 IEC 61850 protocol

2.1 General information

The IEC 61850 standard defines the way of exchanging information between power automation devices within power substations. The IEC 61850 standard defines a standard data model and naming convention for *Intelligent Electrical Devices* (abbreviated as IEDs) and a common language for their configuration, ensuring interoperability between devices and engineering tools.

Communication with the IEC 61850 protocol is performed using an Ethernet interface. The IEC 61850 specification with a detailed explanation of the protocol is given in the documentation of the International Standard IEC 61850. The device supports IEC 61850 Edition 2 Amd. 1.

The document describes the data models of the IEC 61850 protocol for each mains type configuration. The PQM-750 supports the following network type configurations (see the PQM-750 user manual):

- single-phase network,
- split-phase network,
- three-phase 3-wire network (including the Aron variant),
- three-phase 4-wire network.

Each configuration contains specific logical nodes and data objects, which are described in the tables below. The power quality logical nodes follow the naming conventions of IEC TR 61850-90-17.

2.2 Configuration

The IEC 61850 server configuration is possible via the analyzer's network interface (webserver) in the tab **SETTINGS**→**COMMUNICATION**→**IEC 61850**.



- The IEC 61850 standard requires a static IP address for the analyzer. When DHCP (automatic IP address acquisition) is enabled in the network configuration, enabling the IEC 61850 protocol is impossible. To unlock this option, the analyzer must be set to static IP address mode. This is only possible using the meter's GUI.
- Enabling DHCP in the meter when the IEC 61850 protocol is active will automatically disable the IEC 61850 protocol.

The purpose of the configuration performed using the webserver is to generate and download an .ICD (*IED Capability Description*) file that describes the capabilities of the device and its data model. The ICD file also contains the analyzer's IP address. The ICD file is then loaded into the master system to initially configure the analyzer in the management system.

We start the IEC 61850 server configuration by entering the IED name, which will be assigned to the PQM-750 in the IEC 61850 network. The name must meet the following requirements:

- It can contain only alphanumeric characters (a-z, A-Z, 0-9) and possibly underscores.
- It must start with a letter.
- It can be a maximum of 40 characters.

The next step is to set the deadbands for the parameters, which will determine the changes in these parameters at which the analyzer will send configured reports to the master system. This is described in more detail in sec. 2.3.

The port and IP address from the "Profile IP Port" and "Current IP Address" fields will be automatically used to generate the correct ICD profile. Each time the static IP address of the Ethernet network is changed, the IEC 61850 server configuration must be saved and a new profile must be downloaded. Each time the meter's mains type is changed, a new temporary profile (template) defined for the given mains type is loaded.

Harmonic and interharmonic logical nodes support vectors from order 0 to order 50.

2.3 Deadbands configuration (deadband and deadbandRef)

Terms used:

- deadband (*db*) – percentage range of parameter value changes that does not generate an event,
- deadband reference (*dbRef*) – reference value expressed in units of a given parameter, used when calculating the deadband in units of a given parameter.

The target deadband value saved in the IEC 61850 server in the analyzer is the result of multiplying the deadband in percentage and the reference value. For example: setting the reference phase voltage to 230 V and 5% for deadband will cause a report to be sent to the master system each time the subsequent measured rms voltage values differ from each other by more than 11.5 V.

Due to the ongoing development of the IEC 61850 profile editor, it is currently not possible to edit the *db* and *dbRef* values for all measurement nodes in the profile, which will become possible in the future. Currently, it is possible to set these values for the given measurement groups according to Tab. 1.

Tab. 1. Groups of parameters for which deadbands can be set.

Parameter	Reference value unit	Default value of deadband reference (<i>dbRef</i>)	Default value of deadband (<i>db</i>) [%]
Phase voltages	V	0,0	0
Phase-to-phase voltages	V	0,0	0
U _{NE} voltage	V	0,0	0
Phase currents	A	0,0	0
Neutral current (I _N / I _N)	A	0,0	0
Ground current (I _G / I _E)	A	0,0	0
Total active power P	W	0,0	0
Total reactive power Q	Var	0,0	0
Total apparent power S	VA	0,0	0
Phase active powers P	W	0,0	0
Phase reactive powers Q	Var	0,0	0
Phase apparent powers S	VA	0,0	0
Frequency	Hz	0,0	0
Voltage harmonics	V	0,0	0
Current harmonics	A	0,0	0
Voltage interharmonics	V	0,0	0
Current interharmonics	A	0,0	0
Voltage THD	%	0,0	0
Current THD	%	0,0	0
Voltage TID	%	0,0	0
Current TID	%	0,0	0
Symmetrical component U1	V	0,0	0
Symmetrical component U2	V	0,0	0
Symmetrical component U0	V	0,0	0
Symmetrical component I1	A	0,0	0
Symmetrical component I2	A	0,0	0
Symmetrical component I0	A	0,0	0
Voltage unbalance	%	0,0	0
Current unbalance	%	0,0	0
Short-term flicker P _{ST}	-	0,0	0
Long-term flicker P _{LT}	-	0,0	0
Emissions in the 2-9 kHz band	V	0,0	0
U _{max} in the 2-9 kHz band	V	0,0	0
Emissions in the 9-150 kHz band	V	0,0	0
U _{max} in the 9-150 kHz band	V	0,0	0
Battery voltage	V	0,0	0

The default setting for all values is 0. The *db* and *dbRef* values are stored in the meter database and loaded when the IEC 61850 server is started.



It is advised to avoid setting the deadbands to zero. Such a situation leads to sending reports in a continuous manner, with every change in the parameter value.

3 Logical Nodes common to all mains types

3.1 Logical Node GGIO – digital inputs

diIntGGIO1: Digital inputs (internal)

prefix	diInt	
InClass	GGIO	
inst	1	
desc	Digital inputs (internal)	
LNRef (LDName/LNName)	IED_nameMeasurement/diIntGGIO1	
Data object name	Common data class	Description
Ind1~2	SPS	State of digital inputs 1~2

diExtGGIO2: Digital inputs (aux. I/O module)

prefix	diExt	
InClass	GGIO	
inst	2	
desc	Digital inputs (external module)	
LNRef (LDName/LNName)	IED_nameMeasurement/diExtGGIO2	
Data object name	Common data class	Description
Ind1~8	SPS	State of digital inputs 1~8

3.2 Logical Node ZBAT – battery status

ZBAT1: Battery status

prefix		
InClass	ZBAT	
inst	1	
desc	Battery status	
LNRef (LDName/LNName)	IED_nameMeasurement/ZBAT1	
Data object name	Common data class	Description
Vol	MV	Battery voltage
BatLo	SPS	Low battery indication

3.3 Events related to Power Quality

PQA_QVVR1: Voltage events

prefix	PQA_	
InClass	QVVR	
inst	1	
desc	Voltage events	
LNRef (LDName/LNName)	IED_nameEvent/PQA_QVVR1	
Data object name	Common data class	Description
VVa	MV	Highest/Lowest voltage magnitude of the last completed event
VVaTm	MV	Voltage variation duration of the last completed event
DipStrVal	ASG	Dip threshold
SwlStrVal	ASG	Swell threshold
IntrStrVal	ASG	Interrupt threshold
AffPhsExt1	ENS	Affected phase(s) of the last completed event
ClcMathExt1	ENG	Analogue values type: TRUE_RMS
HysVolVal1	ASG	Hysteresis voltage value setting (in Volts)
EvtCnt	HST	Event counter histogram
EvtCntRs1	SPC	(controllable) Operating with value <i>true</i> initiates resetting of the event counter EvtCnt, if present; operating with value <i>false</i> is ignored.

PQA_QRVC1: RVC events

prefix	PQA_	
InClass	QRVC	
inst	1	
desc	RVC event	
LNRef (LDName/LNName)	IED_nameEvent/PQA_QRVC1	
Data object name	Common data class	Description
VVa1	MV	Maximum voltage variation of the last completed RVC event
VVaTm1	MV	RVC duration of the last completed RVC event (in seconds)
RvcStrVal1	ASG	Rapid Voltage Change (RVC) function start voltage value setting
AffPhsExt1	ENS	Affected phase(s) of the last completed event
ClcMathExt1	ENG	Analogue values type: TRUE_RMS

3.4 Measurement Nodes

PQA4MMXU5: 10-second frequency

prefix	PQA4	
InClass	MMXU	
inst	5	
desc	10s frequency	
LNRref (LDName/LNName)	IED_nameMeasurement/PQA4MMXU5	
Data object name	Common data class	Description
Measured values		
Hz	MV	Frequency (Hz)

PQA0MHFE1: 10/12-cycle values of emissions in the 2-9 kHz band

prefix	PQA0	
InClass	MHFE	
inst	1	
desc	10/12-cycle values of emissions in the 2-9 kHz band	
LNRref (LDName/LNName)	IED_nameMeasurement/PQA0MHFE1	
Data object name	Common data class	Description
Measured values		
HbPhV1	HWYE	Sequence of bins of emission voltages
HbVAbsMax1	MV	Maximum rms voltage of all max bins
Settings		
ClcMth	MV	Analogue values type: RMS
GrHaPcb1	ENG	Frequency range enumeration: 1 (200 Hz)
NumHaPcb1	ENG	Number of bins in sequences, enumeration: 1 (35 bins)

PQA0MHFE2: 10/12-cycle values of emissions in the 8-150 kHz band

prefix	PQA0	
InClass	MHFE	
inst	2	
desc	10/12-cycle values of emissions in the 8-150 kHz band	
LNRref (LDName/LNName)	IED_nameMeasurement/PQA0MHFE2	
Data object name	Common data class	Description
Measured values		
HbPhV1	HWYE	Sequence of bins of emission voltages
HbVAbsMax1	MV	Maximum rms voltage of all max bins
Settings		
ClcMth	MV	Analogue values type: RMS
GrHaPcb1	ENG	Frequency range enumeration: 2 (2000 Hz)
NumHaPcb1	ENG	Number of bins in sequences, enumeration: 2 (71 bins)

PQA1MHFE3: 150/180-cycle average values of emissions in the 2-9 kHz band

prefix		PQA1
InClass		MHFE
inst		3
desc		150/180-cycle average values of emissions in the 2-9 kHz band
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHFE3
Data object name	Common data class	Description
Measured values		
HbPhV1	HWYE	Sequence of bins of emission voltages
HbVAbsMax1	MV	Maximum rms voltage of all max bins
Settings		
ClcMth	MV	Analogue values type: RMS
GrHaPcb1	ENG	Frequency range enumeration: 1 (200 Hz)
NumHaPcb1	ENG	Number of bins in sequences, enumeration: 1 (35 bins)

PQA1MHFE4: 150/180-cycle average values of emissions in the 8-150 kHz band

prefix		PQA1
InClass		MHFE
inst		4
desc		150/180-cycle average values of emissions in the 8-150 kHz band
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHFE4
Data object name	Common data class	Description
Measured values		
HbPhV1	HWYE	Sequence of bins of emission voltages
HbVAbsMax1	MV	Maximum rms voltage of all max bins
Settings		
ClcMth	MV	Analogue values type: RMS
GrHaPcb1	ENG	Frequency range enumeration: 2 (2000 Hz)
NumHaPcb1	ENG	Number of bins in sequences, enumeration: 2 (71 bins)

PQA2MHFE5: 10-minute average values of emissions in the 2-9 kHz band

prefix		PQA2
InClass		MHFE
inst		5
desc		10-minute average values of emissions in the 2-9 kHz band
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHFE5
Data object name	Common data class	Description
Measured values		
HbPhV1	HWYE	Sequence of bins of emission voltages
HbVAbsMax1	MV	Maximum rms voltage of all max bins
Settings		
ClcMth	MV	Analogue values type: RMS
GrHaPcb1	ENG	Frequency range enumeration: 1 (200 Hz)
NumHaPcb1	ENG	Number of bins in sequences, enumeration: 1 (35 bins)

PQA2MHFE6: 10-minute average values of emissions in the 8-150 kHz band

prefix		PQA2
InClass		MHFE
inst		6
desc		10-minute average values of emissions in the 8-150 kHz band
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHFE6
Data object name	Common data class	Description
Measured values		
HbPhV1	HWYE	Sequence of bins of emission voltages
HbVAbsMax1	MV	Maximum rms voltage of all max bins
Settings		
ClcMth	MV	Analogue values type: RMS
GrHaPcb1	ENG	Frequency range enumeration: 2 (2000 Hz)
NumHaPcb1	ENG	Number of bins in sequences, enumeration: 2 (71 bins)

PQA0MSQI1: 10/12-cycle voltage and current unbalance

prefix		PQA0
InClass		MSQI
inst		1
desc		10/12-cycle Symmetrical Components U2, U0, I2, I0
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MSQI1
Data object name	Common data class	Description
Measured values		
SeqA	SEQ	Positive-negative-zero sequence current
SeqV	SEQ	Positive-negative-zero sequence voltage
ImbNgA	MV	Unbalance negative sequence current (I2/I1)
ImbNgV	MV	Unbalance negative sequence voltage (U2/U1)
ImbZroA	MV	Unbalance zero sequence current (I0/I1)
ImbZroV	MV	Unbalance zero sequence voltage (U0/U1)

PQA1MSQI2: 150/180-cycle average voltage and current unbalance

prefix		PQA1
InClass		MSQI
inst		2
desc		150/180-cycle Symmetrical Components U2, U0, I2, I0
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MSQI2
Data object name	Common data class	Description
Measured values		
SeqA	SEQ	Positive-negative-zero sequence current
SeqV	SEQ	Positive-negative-zero sequence voltage
ImbNgA	MV	Unbalance negative sequence current (I2/I1)
ImbNgV	MV	Unbalance negative sequence voltage (U2/U1)
ImbZroA	MV	Unbalance zero sequence current (I0/I1)
ImbZroV	MV	Unbalance zero sequence voltage (U0/U1)

PQA2MSQI3: 10-minute average voltage and current unbalance

prefix	PQA2	
InClass	MSQI	
inst	3	
desc	10-minute Symmetrical Components U2, U0, I2, I0	
LNRref (LDName/LNName)	IED_nameMeasurement/PQA2MSQI3	
Data object name	Common data class	Description
Measured values		
SeqA	SEQ	Positive-negative-zero sequence current
SeqV	SEQ	Positive-negative-zero sequence voltage
ImbNgA	MV	Unbalance negative sequence current (I2/I1)
ImbNgV	MV	Unbalance negative sequence voltage (U2/U1)
ImbZroA	MV	Unbalance zero sequence current (I0/I1)
ImbZroV	MV	Unbalance zero sequence voltage (U0/U1)

PQA3MSQI4: 2-hour average voltage and current unbalance

prefix	PQA3	
InClass	MSQI	
inst	4	
desc	2-hour Symmetrical Components U2, U0, I2, I0	
LNRref (LDName/LNName)	IED_nameMeasurement/PQA3MSQI4	
Data object name	Common data class	Description
Measured values		
SeqA	SEQ	Positive-negative-zero sequence current
SeqV	SEQ	Positive-negative-zero sequence voltage
ImbNgA	MV	Unbalance negative sequence current (I2/I1)
ImbNgV	MV	Unbalance negative sequence voltage (U2/U1)
ImbZroA	MV	Unbalance zero sequence current (I0/I1)
ImbZroV	MV	Unbalance zero sequence voltage (U0/U1)

4 Logical Nodes for different mains systems

4.1 Single-phase mains system

PQA0MMXU1: 10/12-cycle voltage and current

prefix		PQA0
InClass		MMXU
inst		1
desc		10/12-cycle voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MMXU1
Data object name	Common data class	Description
Measured values		
PhV	WYE	U_{1N}, U_{NE} voltages
A	WYE	I_1, I_N currents
Ape	CMV	I_E current

PQA1MMXU2: 150/180-cycle average voltage and current

prefix		PQA1
InClass		MMXU
inst		2
desc		150/180-cycle voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MMXU2
Data object name	Common data class	Description
Measured values		
PhV	WYE	U_{1N}, U_{NE} voltages
A	WYE	I_1, I_N currents
Ape	CMV	I_E current

PQA2MMXU3: 10-minute average voltage, current and power

prefix		PQA2
InClass		MMXU
inst		3
desc		10-minute voltage, current and power magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MMXU3
Data object name	Common data class	Description
Measured values		
PhV	WYE	U_{1N}, U_{NE} voltages
A	WYE	I_1, I_N currents
Ape	CMV	I_E current
TotW	MV	Total active power (W)
TotVAr	MV	Total reactive power (Var)
TotVA	MV	Total apparent power (VA)
W	WYE	Phase L1 active power (W)
VAr	WYE	Phase L1 reactive power (Var)
VA	WYE	Phase L1 apparent power (VA)

PQA3MMXU4: 2-hour average voltage and current

prefix		PQA3
InClass		MMXU
inst		4
desc		2-hour voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MMXU4
Data object name	Common data class	Description
Measured values		
PhV	WYE	U_{1N} , U_{NE} voltages
A	WYE	I_1 , I_N currents

PQA0MHA1: 10/12-cycle harmonics

prefix		PQA0
InClass		MHA1
inst		1
desc		10/12-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MHA1
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1 , I_N harmonics
HPhV	HWYE	U_{1N} , U_{NE} harmonics
ThdA	WYE	THD I_1 , I_N
ThdPhV	WYE	THD U_{1N}

PQA0MHA2: 10/12-cycle interharmonics

prefix		PQA0
InClass		MHA1
inst		2
desc		10/12-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MHA2
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1 , I_N interharmonics
HPhV	HWYE	U_{1N} , U_{NE} interharmonics
ThdA	WYE	TID I_1 , I_N
ThdPhV	WYE	TID U_{1N}

PQA1MHAI3: 150/180-cycle average harmonics

prefix		PQA1
InClass		MHAI
inst		3
desc		150/180-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHAI3
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1, I_N harmonics
HPhV	HWYE	U_{1N}, U_{NE} harmonics
ThdA	WYE	THD I_1, I_N
ThdPhV	WYE	THD U_{1N}

PQA1MHAI4: 150/180-cycle average interharmonics

prefix		PQA1
InClass		MHAI
inst		4
desc		150/180-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHAI4
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1, I_N interharmonics
HPhV	HWYE	U_{1N}, U_{NE} interharmonics
ThdA	WYE	TID I_1, I_N
ThdPhV	WYE	TID U_{1N}

PQA2MHAI5: 10-minute average harmonics

prefix		PQA2
InClass		MHAI
inst		5
desc		10-minute harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHAI5
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1, I_N harmonics
HPhV	HWYE	U_{1N}, U_{NE} harmonics
ThdA	WYE	THD I_1, I_N
ThdPhV	WYE	THD U_{1N}

PQA2MHAI6: 10-minute average interharmonics

prefix		PQA2
InClass		MHAI
inst		6
desc		10-minute interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHAI6
Data object name	Common data class	Description
Measured values		
HA	HWYE	I _{1, IN} interharmonics
HPhV	HWYE	U _{1N, U_{NE}} interharmonics
ThdA	WYE	TID I _{1, IN}
ThdPhV	WYE	TID U _{1N}

PQA3MHAI7: 2-hour average harmonics

prefix		PQA3
InClass		MHAI
inst		7
desc		2-hour harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MHAI7
Data object name	Common data class	Description
Measured values		
HA	HWYE	I _{1, IN} harmonics
HPhV	HWYE	U _{1N, U_{NE}} harmonics
ThdA	WYE	THD I _{1, IN}
ThdPhV	WYE	THD U _{1N}

PQA3MHAI8: 2-hour average interharmonics

prefix		PQA3
InClass		MHAI
inst		8
desc		2h interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MHAI8
Data object name	Common data class	Description
Measured values		
HA	HWYE	I _{1, IN} interharmonics
HPhV	HWYE	U _{1N, U_{NE}} interharmonics
ThdA	WYE	TID I _{1, IN}
ThdPhV	WYE	TID U _{1N}

PQA2MFLK1: flicker P_{ST}

prefix		PQA2
InClass		MFLK
inst		1
desc		Short-term flicker
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MFLK1
Data object name	Common data class	Description
Measured values		
PhPst	WYE	U _{1N} P _{ST} flicker

PQA3MFLK2: flicker P_{LT}

prefix		PQA3
InClass		MFLK
inst		2
desc		Long-term flicker
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MFLK1
Data object name	Common data class	Description
Measured values		
PhPlt	WYE	U _{1N} P _{LT} flicker

4.2 Split-phase mains system

PQA0MMXU1: 10/12-cycle voltage and current

prefix		PQA0
InClass		MMXU
inst		1
desc		10/12-cycle voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MMXU1
Data object name	Common data class	Description
Measured values		
PPV	DEL	U ₁₂ voltage
PhV	WYE	U _{1N} , U _{2N} , U _{NE} voltages
A	WYE	I ₁ , I ₂ , I _N currents
Ape	CMV	I _E current

PQA1MMXU2: 150/180-cycle average voltage and current

prefix		PQA1
InClass		MMXU
inst		2
desc		150/180-cycle voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MMXU2
Data object name	Common data class	Description
Measured values		
PPV	DEL	U ₁₂ voltage
PhV	WYE	U _{1N} , U _{2N} , U _{NE} voltages
A	WYE	I ₁ , I ₂ , I _N currents
Ape	CMV	I _E current

PQA2MMXU3: 10-minute average voltage, current and power

prefix		PQA2
InClass		MMXU
inst		3
desc		10-minute voltage, current and power magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MMXU3
Data object name	Common data class	Description
Measured values		
PPV	DEL	U ₁₂ voltage
PhV	WYE	U _{1N} , U _{2N} , U _{NE} voltages
A	WYE	I ₁ , I ₂ , I _N currents
Ape	CMV	I _E current
TotW	MV	Total active power (W)
TotVAr	MV	Total reactive power (Var)
TotVA	MV	Total apparent power (VA)
W	WYE	Phase L1, L2 active powers (W)
VAr	WYE	Phase L1, L2 reactive powers (Var)
VA	WYE	Phase L1, L2 apparent powers (VA)

PQA3MMXU4: 2-hour average voltage and current

prefix		PQA3
InClass		MMXU
inst		4
desc		2-hour voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MMXU4
Data object name	Common data class	Description
Measured values		
PPV	DEL	U ₁₂ voltage
PhV	WYE	U _{1N} , U _{2N} , U _{NE} voltages
A	WYE	I ₁ , I ₂ , I _N currents

PQA0MHAI1: 10/12-cycle harmonics

prefix		PQA0
InClass		MHAI
inst		1
desc		10/12-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MHAI1
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N}

PQA0MHAI2: 10/12-cycle interharmonics

prefix		PQA0
InClass		MHAI
inst		2
desc		10/12-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MHAI2
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N}

PQA1MHAI3: 150/180-cycle average harmonics

prefix		PQA1
InClass		MHAI
inst		3
desc		150/180-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHAI3
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N}

PQA1MHA14: 150/180-cycle average interharmonics

prefix		PQA1
InClass		MHA1
inst		4
desc		150/180-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHA14
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N}

PQA2MHA15: 10-minute average harmonics

prefix		PQA2
InClass		MHA1
inst		5
desc		10-minute harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHA15
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N}

PQA2MHA16: 10-minute average interharmonics

prefix		PQA2
InClass		MHA1
inst		6
desc		10-minute interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHA16
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N}

PQA3MHA17: 2-hour average harmonics

prefix		PQA3
InClass		MHA1
inst		7
desc		2-hour harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MHA17
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N}

PQA3MHA18: 2-hour average interharmonics

prefix		PQA3
InClass		MHA1
inst		8
desc		2h interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MHA18
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N}

PQA2MFLK1: Short-term flicker

prefix		PQA2
InClass		MFLK
inst		1
desc		Short-term flicker
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MFLK1
Data object name	Common data class	Description
Measured values		
PhPst	WYE	U _{1N} , U _{2N} P _{ST} flicker

PQA3MFLK2: Long-term flicker

prefix		PQA3
InClass		MFLK
inst		2
desc		Long-term flicker
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MFLK1
Data object name	Common data class	Description
Measured values		
PhPit	WYE	U _{1N} , U _{2N} P _{LT} flicker

4.3 Three-phase 3-wire mains system

PQA0MMXU1: 10/12-cycle voltage and current

prefix	PQA0	
InClass	MMXU	
inst	1	
desc	10/12-cycle voltage and current magnitude	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA0MMXU1	
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	U_{1E}, U_{2E}, U_{3E} voltages
A	WYE	I_1, I_2, I_3 currents
Ape	CMV	I_E current

PQA1MMXU2: 150/180-cycle average voltage and current

prefix	PQA1	
InClass	MMXU	
inst	2	
desc	150/180-cycle voltage and current magnitude	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA1MMXU2	
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	U_{1E}, U_{2E}, U_{3E} voltages
A	WYE	I_1, I_2, I_3 currents
Ape	CMV	I_E current

PQA2MMXU3: 10-minute average voltage, current and power

prefix	PQA2	
InClass	MMXU	
inst	3	
desc	10-minute voltage, current and power magnitude	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA2MMXU3	
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	U_{1E}, U_{2E}, U_{3E} voltages
A	WYE	I_1, I_2, I_3 currents
Ape	CMV	I_E current
TotW	MV	Total active power (W)
TotVAr	MV	Total reactive power (Var)
TotVA	MV	Total apparent power (VA)
W	WYE	Phase L1, L2, L3 active powers (W)
VAr	WYE	Phase L1, L2, L3 reactive powers (Var)
VA	WYE	Phase L1, L2, L3 apparent powers (VA)

PQA3MMXU4: 2-hour average voltage and current

prefix	PQA3	
InClass	MMXU	
inst	4	
desc	2-hour voltage and current magnitude	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA3MMXU4	
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	U_{1E}, U_{2E}, U_{3E} voltages
A	WYE	I_1, I_2, I_3 currents

PQA0MHAI1: 10/12-cycle harmonics

prefix	PQA0	
InClass	MHAI	
inst	1	
desc	10/12-cycle harmonics	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA0MHAI1	
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1, I_2, I_3 harmonics
HPhV	HWYE	U_{12}, U_{23}, U_{31} harmonics
ThdA	WYE	THD I_1, I_2, I_3
ThdPhV	WYE	THD U_{12}, U_{23}, U_{31}

PQA0MHAI2: 10/12-cycle interharmonics

prefix	PQA0	
InClass	MHAI	
inst	2	
desc	10/12-cycle interharmonics	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA0MHAI2	
Data object name	Common data class	Description
Measured values		
HA	HWYE	I_1, I_2, I_3 interharmonics
HPhV	HWYE	U_{12}, U_{23}, U_{31} interharmonics
ThdA	WYE	TID I_1, I_2, I_3
ThdPhV	WYE	TID U_{12}, U_{23}, U_{31}

PQA1MHAI3: 150/180-cycle average harmonics

prefix		PQA1
InClass		MHAI
inst		3
desc		150/180-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHAI3
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ harmonics
HPhV	HWYE	U ₁₂ , U ₂₃ , U ₃₁ harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃
ThdPhV	WYE	THD U ₁₂ , U ₂₃ , U ₃₁

PQA1MHAI4: 150/180-cycle average interharmonics

prefix		PQA1
InClass		MHAI
inst		4
desc		150/180-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHAI4
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ interharmonics
HPhV	HWYE	U ₁₂ , U ₂₃ , U ₃₁ interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃
ThdPhV	WYE	TID U ₁₂ , U ₂₃ , U ₃₁

PQA2MHAI5: 10-minute average harmonics

prefix		PQA2
InClass		MHAI
inst		5
desc		10-minute harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHAI5
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ harmonics
HPhV	HWYE	U ₁₂ , U ₂₃ , U ₃₁ harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃
ThdPhV	WYE	THD U ₁₂ , U ₂₃ , U ₃₁

PQA2MHAI6: 10-minute average interharmonics

prefix		PQA2
InClass		MHAI
inst		6
desc		10-minute interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHAI6
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ interharmonics
HPhV	HWYE	U ₁₂ , U ₂₃ , U ₃₁ interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃
ThdPhV	WYE	TID U ₁₂ , U ₂₃ , U ₃₁

PQA3MHAI7: 2-hour average harmonics

prefix		PQA3
InClass		MHAI
inst		7
desc		2-hour harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MHAI7
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ harmonics
HPhV	HWYE	U ₁₂ , U ₂₃ , U ₃₁ harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃
ThdPhV	WYE	THD U ₁₂ , U ₂₃ , U ₃₁

PQA3MHAI8: 2-hour average interharmonics

prefix		PQA3
InClass		MHAI
inst		8
desc		2-hour interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MHAI8
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ interharmonics
HPhV	HWYE	U ₁₂ , U ₂₃ , U ₃₁ interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃
ThdPhV	WYE	TID U ₁₂ , U ₂₃ , U ₃₁

PQA2MFLK1: Short-term flicker

prefix		PQA2
InClass		MFLK
inst		1
desc		Short-term flicker
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MFLK1
Data object name	Common data class	Description
Measured values		
PPPst	DEL	U_{12}, U_{23}, U_{31} P _{ST} flicker

PQA3MFLK2: Long-term flicker

prefix		PQA3
InClass		MFLK
inst		2
desc		Long-term flicker
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MFLK1
Data object name	Common data class	Description
Measured values		
PPPIt	DEL	U_{12}, U_{23}, U_{31} P _{LT} flicker

4.4 Three-phase 4-wire mains system

PQA0MMXU1: 10/12-cycle voltage and current

prefix		PQA0
InClass		MMXU
inst		1
desc		10/12-cycle voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MMXU1
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	$U_{1N}, U_{2N}, U_{3N}, U_{NE}$ voltages
A	WYE	I_1, I_2, I_3, I_N currents
Ape	CMV	I_E current

PQA1MMXU2: 150/180-cycle average voltage and current

prefix		PQA1
InClass		MMXU
inst		2
desc		150/180-cycle voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MMXU2
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	$U_{1N}, U_{2N}, U_{3N}, U_{NE}$ voltages
A	WYE	I_1, I_2, I_3, I_N currents
Ape	CMV	I_E current

PQA2MMXU3: 10-minute average voltage, current and power

prefix		PQA2
InClass		MMXU
inst		3
desc		10-minute voltage, current and power magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MMXU3
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	$U_{1N}, U_{2N}, U_{3N}, U_{NE}$ voltages
A	WYE	I_1, I_2, I_3, I_N currents
Ape	CMV	I_E current
TotW	MV	Total active power (W)
TotVAr	MV	Total reactive power (Var)
TotVA	MV	Total apparent power (VA)
W	WYE	Phase L1, L2, L3 active powers (W)
VAr	WYE	Phase L1, L2, L3 reactive powers (Var)
VA	WYE	Phase L1, L2, L3 apparent powers (VA)

PQA3MMXU4: 2-hour average voltage and current

prefix		PQA3
InClass		MMXU
inst		4
desc		2-hour voltage and current magnitude
LNRef (LDName/LNName)		IED_nameMeasurement/PQA3MMXU4
Data object name	Common data class	Description
Measured values		
PPV	DEL	U_{12}, U_{23}, U_{31} voltages
PhV	WYE	$U_{1N}, U_{2N}, U_{3N}, U_{NE}$ voltages
A	WYE	I_1, I_2, I_3, I_N currents

PQA0MHA1: 10/12-cycle harmonics

prefix		PQA0
InClass		MHA1
inst		1
desc		10/12-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MHA1
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N} , U _{3N}

PQA0MHA2: 10/12-cycle interharmonics

prefix		PQA0
InClass		MHA1
inst		2
desc		10/12-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA0MHA2
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N} , U _{3N}

PQA1MHA3: 150/180-cycle average harmonics

prefix		PQA1
InClass		MHA1
inst		3
desc		150/180-cycle harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHA3
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N} , U _{3N}

PQA1MHA14: 150/180-cycle average interharmonics

prefix		PQA1
InClass		MHAI
inst		4
desc		150/180-cycle interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA1MHA14
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N} , U _{3N}

PQA2MHA15: 10-minute average harmonics

prefix		PQA2
InClass		MHAI
inst		5
desc		10-minute harmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHA15
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N} , U _{3N}

PQA2MHA16: 10-minute average interharmonics

prefix		PQA2
InClass		MHAI
inst		6
desc		10-minute interharmonics
LNRef (LDName/LNName)		IED_nameMeasurement/PQA2MHA16
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} interharmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N} , U _{3N}

PQA3MHA17: 2-hour average harmonics

prefix	PQA3	
InClass	MHAI	
inst	7	
desc	2-hour harmonics	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA3MHA17	
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N harmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE} harmonics
ThdA	WYE	THD I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	THD U _{1N} , U _{2N} , U _{3N}

PQA3MHA18: 2-hour average interharmonics

prefix	PQA3	
InClass	MHAI	
inst	8	
desc	2h interharmonics	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA3MHA18	
Data object name	Common data class	Description
Measured values		
HA	HWYE	I ₁ , I ₂ , I ₃ , I _N interharmonics
HPhV	HWYE	U _{1N} , U _{2N} , U _{3N} , U _{NE inter} harmonics
ThdA	WYE	TID I ₁ , I ₂ , I ₃ , I _N
ThdPhV	WYE	TID U _{1N} , U _{2N} , U _{3N}

PQA2MFLK1: Short-term flicker

prefix	PQA2	
InClass	MFLK	
inst	1	
desc	Short-term flicker	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA2MFLK1	
Data object name	Common data class	Description
Measured values		
PhPst	WYE	U _{1N} , U _{2N} , U _{3N} P _{ST} flicker

PQA3MFLK2: Long-term flicker

prefix	PQA3	
InClass	MFLK	
inst	2	
desc	Long-term flicker	
LNRef (LDName/LNName)	IED_nameMeasurement/PQA2MFLK1	
Data object name	Common data class	Description
Measured values		
PhPlt	WYE	U _{1N} , U _{2N} , U _{3N} P _{LT} flicker

5 Predefined data sets and report blocks (BRCB and URCB)

The analyzer is supplied with predefined data sets that can be used by the reporting functions. These sets can be modified by the operator.

An example data set called **DSet01Mx** contains three total 10-minute average power values: active, reactive and apparent (logical node **PQA2MMXU3**). This set is connected to the **URep01** unbuffered reporting block by default. The operator can activate sending of the **URep01** report after exceeding the deadband of a parameter that is in the data set, e.g. 10-minute total active power, or can associate it with power quality events - nodes **PQA_QVVR1** and **PQA_QRVC1**.

Reporting blocks are divided into two types:

- Buffered (*Buffered Report Control Blocks*, BRCB) – events are recorded regardless of whether there are active subscribers and preserving sequence of events. This type of report is essential in SCADA systems and communication with remote terminals (RTU – *Remote Terminal Unit*) due to the certainty of report delivery.
- Unbuffered (*Unbuffered Report Control Blocks*, URCB) – data is sent without guarantee of delivery, e.g. in case of connection problems, when data cannot be sent, it is dropped. This type of reporting is often used in communication with HMI user interfaces.

The following sections list the data sets and reporting blocks for each type of network.

5.1 Single-phase mains system

LLNO: General use LD (*Logical Device*)

InClass	LLNO
desc	Logical node contain predefined data sets and report buffered/unbuffered control blocks
LNRef (LDName/LNName)	IED_nameMeasurement/LLNO
Data object name	Description/Contain
Data sets	
DSet01Mx	Measurement/PQA2MMXU3.TotW Measurement/PQA2MMXU3.TotVar Measurement/PQA2MMXU3.TotVA
DSet02Mx	Measurement/PQA0MMXU1.PhV.phsA Measurement/PQA0MMXU1.PhV.neut Measurement/PQA0MMXU1.A.phsA Measurement/PQA0MMXU1.A.neut Measurement/PQA0MMXU1.Ape
DSet03Mx	Measurement/PQA1MMXU2.PhV.phsA Measurement/PQA1MMXU2.PhV.neut Measurement/PQA1MMXU2.A.phsA Measurement/PQA1MMXU2.A.neut Measurement/PQA1MMXU2.Ape
DSet04Mx	Measurement/PQA2MMXU3.PhV.phsA Measurement/PQA2MMXU3.PhV.neut Measurement/PQA2MMXU3.A.phsA Measurement/PQA2MMXU3.A.neut Measurement/PQA2MMXU3.Ape
DSet05Mx	Measurement/PQA3MMXU4.PhV.phsA Measurement/PQA3MMXU4.PhV.neut Measurement/PQA3MMXU4.A.phsA Measurement/PQA3MMXU4.A.neut

DSet06Mx	Measurement/PQA2MMXU3.W.phsA Measurement/PQA2MMXU3.VAr.phsA Measurement/PQA2MMXU3.VA.phsA
DSet07StInd	Measurement/diIntGGIO1.Ind1 Measurement/diIntGGIO1.Ind2
DSet08StInd	Measurement/diExtGGIO2.Ind1 Measurement/diExtGGIO2.Ind2 Measurement/diExtGGIO2.Ind3 Measurement/diExtGGIO2.Ind4 Measurement/diExtGGIO2.Ind5 Measurement/diExtGGIO2.Ind6 Measurement/diExtGGIO2.Ind7 Measurement/diExtGGIO2.Ind8
Unbuffered Report CB	
URep01	connected DSet01Mx
URep02	connected DSet02Mx
URep03	connected DSet03Mx
URep04	connected DSet04Mx
URep05	connected DSet05Mx
URep06	connected DSet06Mx
URep07-URep16	free to use
Buffered Report CB	
BRep01	connected DSet07StInd
BRep02	connected DSet08StInd
BRep03-BRep16	free to use

5.2 Split-phase mains system

LLNO: General use LD (*Logical Device*)

InClass	LLNO
desc	Logical node contain predefined data sets and report buffered/unbuffered control blocks
LNRef (LDName/LNName)	IED_nameMeasurement/LLNO
Data object name	Description/Contain
Data sets	
DSet01Mx	Measurement/PQA2MMXU3.TotW Measurement/PQA2MMXU3.TotVar Measurement/PQA2MMXU3.TotVA
DSet02Mx	Measurement/PQA0MMXU1.PhV.phsA Measurement/PQA0MMXU1.PhV.phsB Measurement/PQA0MMXU1.PhV.neut Measurement/PQA0MMXU1.PPV.phsAB Measurement/PQA0MMXU1.A.phsA Measurement/PQA0MMXU1.A.phsB Measurement/PQA0MMXU1.A.neut Measurement/PQA0MMXU1.Ape

DSet03Mx	Measurement/PQA1MMXU2.PhV.phsA Measurement/PQA1MMXU2.PhV.phsB Measurement/PQA1MMXU2.PhV.neut Measurement/PQA1MMXU2.PPV.phsAB Measurement/PQA1MMXU2.A.phsA Measurement/PQA1MMXU2.A.phsB Measurement/PQA1MMXU2.A.neut Measurement/PQA1MMXU2.Ape
DSet04Mx	Measurement/PQA2MMXU3.PhV.phsA Measurement/PQA2MMXU3.PhV.phsB Measurement/PQA2MMXU3.PhV.neut Measurement/PQA2MMXU3.PPV.phsAB Measurement/PQA2MMXU3.A.phsA Measurement/PQA2MMXU3.A.phsB Measurement/PQA2MMXU3.A.neut Measurement/PQA2MMXU3.Ape
DSet05Mx	Measurement/PQA3MMXU4.PhV.phsA Measurement/PQA3MMXU4.PhV.phsB Measurement/PQA3MMXU4.PhV.neut Measurement/PQA3MMXU4.PPV.phsAB Measurement/PQA3MMXU4.A.phsA Measurement/PQA3MMXU4.A.phsB Measurement/PQA3MMXU4.A.neut
DSet06Mx	Measurement/PQA2MMXU3.W.phsA Measurement/PQA2MMXU3.W.phsB Measurement/PQA2MMXU3.VAr.phsA Measurement/PQA2MMXU3.VAr.phsB Measurement/PQA2MMXU3.VA.phsA Measurement/PQA2MMXU3.VA.phsB
DSet07StInd	Measurement/diIntGGIO1.Ind1 Measurement/diIntGGIO1.Ind2
DSet08StInd	Measurement/diExtGGIO2.Ind1 Measurement/diExtGGIO2.Ind2 Measurement/diExtGGIO2.Ind3 Measurement/diExtGGIO2.Ind4 Measurement/diExtGGIO2.Ind5 Measurement/diExtGGIO2.Ind6 Measurement/diExtGGIO2.Ind7 Measurement/diExtGGIO2.Ind8
Unbuffered Report CB	
URep01	connected DSet01Mx
URep02	connected DSet02Mx
URep03	connected DSet03Mx
URep04	connected DSet04Mx
URep05	connected DSet05Mx
URep06	connected DSet06Mx
URep07-URep16	free to use
Buffered Report CB	
BRep01	connected DSet07StInd
BRep02	connected DSet08StInd
BRep03-BRep16	free to use

5.3 Three-phase 3-wire mains system

LLNO: General use LD (Logical Device)

InClass	LLNO
desc	Logical node contain predefined data sets and report buffered/unbuffered control blocks
LNRef (LDName/LNName)	IED_nameMeasurement/LLNO
Data object name	Description/Contain
Data sets	
DSet01Mx	Measurement/PQA2MMXU3.TotW Measurement/PQA2MMXU3.TotVar Measurement/PQA2MMXU3.TotVA
DSet02Mx	Measurement/PQA0MMXU1.PhV.phsA Measurement/PQA0MMXU1.PhV.phsB Measurement/PQA0MMXU1.PhV.phsC Measurement/PQA0MMXU1.PPV.phsAB Measurement/PQA0MMXU1.PPV.phsBC Measurement/PQA0MMXU1.PPV.phsCA Measurement/PQA0MMXU1.A.phsA Measurement/PQA0MMXU1.A.phsB Measurement/PQA0MMXU1.A.phsC Measurement/PQA0MMXU1.Ape
DSet03Mx	Measurement/PQA1MMXU2.PhV.phsA Measurement/PQA1MMXU2.PhV.phsB Measurement/PQA1MMXU2.PhV.phsC Measurement/PQA1MMXU2.PPV.phsAB Measurement/PQA1MMXU2.PPV.phsBC Measurement/PQA1MMXU2.PPV.phsCA Measurement/PQA1MMXU2.A.phsA Measurement/PQA1MMXU2.A.phsB Measurement/PQA1MMXU2.A.phsC Measurement/PQA1MMXU2.Ape
DSet04Mx	Measurement/PQA2MMXU3.PhV.phsA Measurement/PQA2MMXU3.PhV.phsB Measurement/PQA2MMXU3.PhV.phsC Measurement/PQA2MMXU3.PPV.phsAB Measurement/PQA2MMXU3.PPV.phsBC Measurement/PQA2MMXU3.PPV.phsCA Measurement/PQA2MMXU3.A.phsA Measurement/PQA2MMXU3.A.phsB Measurement/PQA2MMXU3.A.phsC Measurement/PQA2MMXU3.Ape
DSet05Mx	Measurement/PQA3MMXU4.PhV.phsA Measurement/PQA3MMXU4.PhV.phsB Measurement/PQA3MMXU4.PhV.phsC Measurement/PQA3MMXU4.PPV.phsAB Measurement/PQA3MMXU4.PPV.phsBC Measurement/PQA3MMXU4.PPV.phsCA Measurement/PQA3MMXU4.A.phsA Measurement/PQA3MMXU4.A.phsB Measurement/PQA3MMXU4.A.phsC

DSet06Mx	Measurement/PQA2MMXU3.W.phsA Measurement/PQA2MMXU3.W.phsB Measurement/PQA2MMXU3.W.phsC Measurement/PQA2MMXU3.VAr.phsA Measurement/PQA2MMXU3.VAr.phsB Measurement/PQA2MMXU3.VAr.phsC Measurement/PQA2MMXU3.VA.phsA Measurement/PQA2MMXU3.VA.phsB Measurement/PQA2MMXU3.VA.phsC
DSet07StInd	Measurement/diIntGGIO1.Ind1 Measurement/diIntGGIO1.Ind2
DSet08StInd	Measurement/diExtGGIO2.Ind1 Measurement/diExtGGIO2.Ind2 Measurement/diExtGGIO2.Ind3 Measurement/diExtGGIO2.Ind4 Measurement/diExtGGIO2.Ind5 Measurement/diExtGGIO2.Ind6 Measurement/diExtGGIO2.Ind7 Measurement/diExtGGIO2.Ind8
Unbuffered Report CB	
URep01	connected DSet01Mx
URep02	connected DSet02Mx
URep03	connected DSet03Mx
URep04	connected DSet04Mx
URep05	connected DSet05Mx
URep06	connected DSet06Mx
URep07-URep16	free to use
Buffered Report CB	
BRep01	connected DSet07StInd
BRep02	connected DSet08StInd
BRep03-BRep16	free to use

5.4 Three-phase 4-wire mains system

LLNO: General use LD (Logical Device)

InClass	LLNO
desc	Logical node contain predefined data sets and report buffered/unbuffered control blocks
LNRef (LDName/LNName)	IED_nameMeasurement/LLNO
Data object name	Description/Contain
Data sets	
DSet01Mx	Measurement/PQA2MMXU3.TotW Measurement/PQA2MMXU3.TotVar Measurement/PQA2MMXU3.TotVA
DSet02Mx	Measurement/PQA0MMXU1.PhV.phsA Measurement/PQA0MMXU1.PhV.phsB Measurement/PQA0MMXU1.PhV.phsC Measurement/PQA0MMXU1.PhV.neut Measurement/PQA0MMXU1.PPV.phsAB Measurement/PQA0MMXU1.PPV.phsBC Measurement/PQA0MMXU1.PPV.phsCA Measurement/PQA0MMXU1.A.phsA Measurement/PQA0MMXU1.A.phsB Measurement/PQA0MMXU1.A.phsC Measurement/PQA0MMXU1.A.neut Measurement/PQA0MMXU1.Ape
DSet03Mx	Measurement/PQA1MMXU2.PhV.phsA Measurement/PQA1MMXU2.PhV.phsB Measurement/PQA1MMXU2.PhV.phsC Measurement/PQA1MMXU2.PhV.neut Measurement/PQA1MMXU2.PPV.phsAB Measurement/PQA1MMXU2.PPV.phsBC Measurement/PQA1MMXU2.PPV.phsCA Measurement/PQA1MMXU2.A.phsA Measurement/PQA1MMXU2.A.phsB Measurement/PQA1MMXU2.A.phsC Measurement/PQA1MMXU2.A.neut Measurement/PQA1MMXU2.Ape
DSet04Mx	Measurement/PQA2MMXU3.PhV.phsA Measurement/PQA2MMXU3.PhV.phsB Measurement/PQA2MMXU3.PhV.phsC Measurement/PQA2MMXU3.PhV.neut Measurement/PQA2MMXU3.PPV.phsAB Measurement/PQA2MMXU3.PPV.phsBC Measurement/PQA2MMXU3.PPV.phsCA Measurement/PQA2MMXU3.A.phsA Measurement/PQA2MMXU3.A.phsB Measurement/PQA2MMXU3.A.phsC Measurement/PQA2MMXU3.A.neut Measurement/PQA2MMXU3.Ape
DSet05Mx	Measurement/PQA3MMXU4.PhV.phsA Measurement/PQA3MMXU4.PhV.phsB Measurement/PQA3MMXU4.PhV.phsC Measurement/PQA3MMXU4.PhV.neut Measurement/PQA3MMXU4.PPV.phsAB Measurement/PQA3MMXU4.PPV.phsBC Measurement/PQA3MMXU4.PPV.phsCA Measurement/PQA3MMXU4.A.phsA Measurement/PQA3MMXU4.A.phsB Measurement/PQA3MMXU4.A.phsC Measurement/PQA3MMXU4.A.neut

DSet06Mx	Measurement/PQA2MMXU3.W.phsA Measurement/PQA2MMXU3.W.phsB Measurement/PQA2MMXU3.W.phsC Measurement/PQA2MMXU3.VAr.phsA Measurement/PQA2MMXU3.VAr.phsB Measurement/PQA2MMXU3.VAr.phsC Measurement/PQA2MMXU3.VA.phsA Measurement/PQA2MMXU3.VA.phsB Measurement/PQA2MMXU3.VA.phsC
DSet07StInd	Measurement/diIntGGIO1.Ind1 Measurement/diIntGGIO1.Ind2
DSet08StInd	Measurement/diExtGGIO2.Ind1 Measurement/diExtGGIO2.Ind2 Measurement/diExtGGIO2.Ind3 Measurement/diExtGGIO2.Ind4 Measurement/diExtGGIO2.Ind5 Measurement/diExtGGIO2.Ind6 Measurement/diExtGGIO2.Ind7 Measurement/diExtGGIO2.Ind8
Unbuffered Report CB	
URep01	connected DSet01Mx
URep02	connected DSet02Mx
URep03	connected DSet03Mx
URep04	connected DSet04Mx
URep05	connected DSet05Mx
URep06	connected DSet06Mx
URep07-URep16	free to use
Buffered Report CB	
BRep01	connected DSet07StInd
BRep02	connected DSet08StInd
BRep03-BRep16	free to use

6 Manufacturer

The manufacturer of the device and provider of guarantee and post-guarantee services:

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Note

Service repairs must be performed only by the manufacturer.

NOTES

NOTES



SONEL S.A.

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