IEC 61850 Interface

SINEAX AMx000 / DM5000, LINAX PQx000, CENTRAX CUx000

Content

GMC INSTRUMENTS

Camille Bauer Metrawatt AG
Aargauerstrasse 7
CH-5610 Wohlen / Schweiz
Telefon: +41 56 618 21 11
Telefax: +41 56 618 35 35
E-Mail: info@cbmag.com
http://www.camillebauer.com

CAMILLE BAUER

1 Introduction

This manual documents the possibilities of the IEC61850 interface for the devices SINEAX AMx000, SINEAX DM5000, CENTRAX CUx000 and LINAX PQx000. It describes:

- All available nodes
- The validity of the data objects (measurement data), depending on the network type
- The possibility to assemble reports freely

This manual is primarily intended for persons who are familiar with the basic principles of IEC61850 and who configure devices to be used in an IEC61850 system, specify the data to be transmitted and / or establish the connection to the IEC61850 client.

The interface supports Edition 2 of IEC61850. Further information on the IEC61850 protocol can be found in the standard “IEC61850 - Communication networks and systems for power utility automation“.

Interfaces

The device provides always two Ethernet interfaces:

A) The **IEC61850 interface** for connection to the station bus, with two equivalent ports, which are connected via an internal switch. This interface can be used for communication with IEC61850 clients and time synchronization via NTP servers.
   - The factory setting of the IP address is 192.168.1.102

B) The **Standard interface** for the parameterization of the device functionality and a few of the IEC61850 features via webpage. The tool IEC61850-Configurator communicates with the device via this interface only. The interface supports also Modbus/TCP communication and time synchronization via NTP.
   - The factory setting of the IP address is 192.168.1.101

2 IEC configuration and assembly of reports

2.1 Reporting

Report Control Blocks (RCBs) provide a way to transmit measurement data in form of data objects from the server (measurement device) to the client (control system) when a trigger condition arrives. The user can freely assemble these data sets. The following trigger options come in question:

- Data change
- Quality change
- Data update
- Exceeding a time limit without sending data
- General interrogation

There are two different classes of RCBs:

- *Buffered Report Control Blocks (BRCB)*: When a trigger condition arrives data will be sent to the client. If there is currently no connection to the client or there are restrictions concerning data flow, data will be buffered for later transmission.
- *Unbuffered Report Control Blocks (URCB)*: When a trigger condition arrives data will be sent to the client. If there is currently no connection to the client or there are restrictions concerning data flow data may get lost.

The user can freely assemble the content of the data sets monitored by report control blocks. These data sets can be assigned to the available 20 URCBs and 10 BRCBs. Assembly is performed by means of the software „IEC 61850 Configurator".

Each RCB can be used by one client only. If multiple clients should receive the same data, multiple RCBs with the same information must be provided.

Note: Measurement data can be requested via polling or general interrogation as well.

2.2 IEC61850 configuration

The IEC61850 related configuration of a device may be divided into the following blocks:

Parameter	Changeable via …		Part of ICD/CID
	IEC61850 Configurator	Device website	
IED Name	■	■	■
Network settings IEC61850			
• IP address, subnet mask	■	■	■
• Gateway, DNS, NTP	■	■	-
• Host name	■	■	-
Firewall, Client Whitelist	■	■	-
TCP Keep-alive	■	-	-
Data sets	■	-	■
RCB settings	■	-	■
Deadband settings	■	■	-

The table shows that the data sets and the RCB settings can only be changed using the IEC61850-Configurator tool.

2.3 IEC61850 Configurator Tool

This tool can be downloaded via our homepage http://www.camillebauer.com.

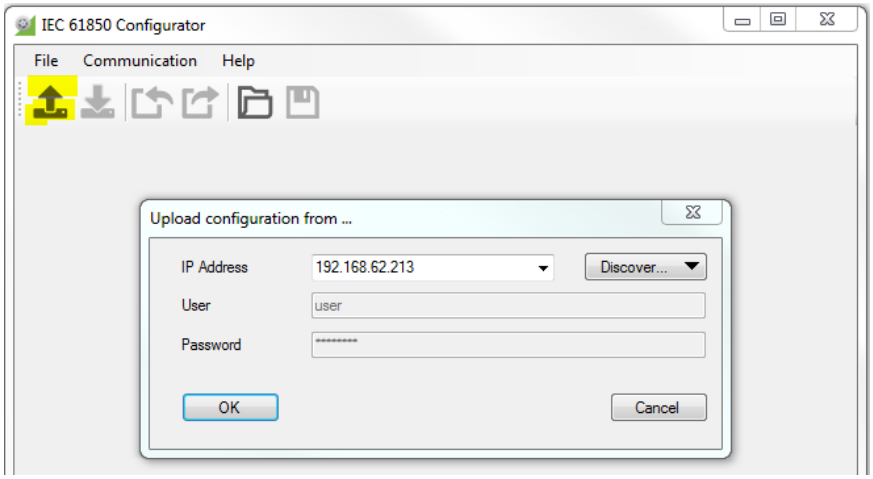
The tool can work with the following data types:

Data type	Contains	Importable	Storable
.tgz	Archive file with CID and the IEC61850 specific device configuration in XML format	■	■
.icd .cid	These files contain the device specific settings acc. 2.2, which is only a part of the whole IEC61850 configuration. When importing all other settings remain unchanged.	■	■
.scd	Such files contain the information about a complete substation, of the IEDs used in it and communication settings. When importing the .cid of a specific device will be extracted.	■	-

2.3.1 Loading and saving

The tool allows changing existing IEC61850 configurations. For that, either the configuration of the device is read at the beginning (as shown below) or an archive file is loaded.

> Communication between the IEC61850 configurator and the device is possible via the standard Ethernet interface only.

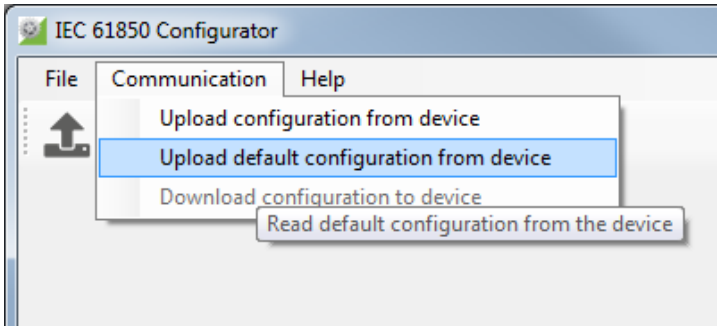


Uploading configuration from device

Changed configuration can be directly transferred to the device or may be saved as tgz, icd or cid file.

Factory settings

In order to restore the factory settings with respect to IEC61850, a default configuration can be uploaded from the device:



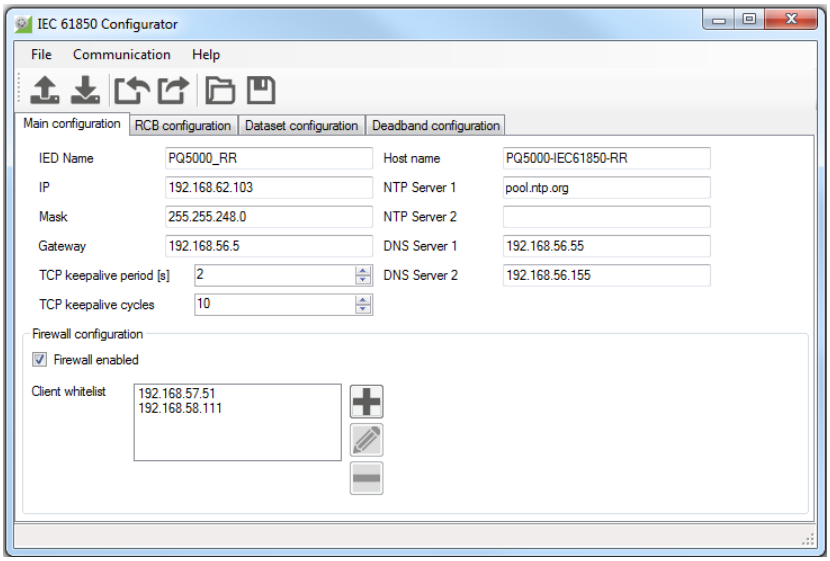
Hint

Only settings which are part of ICD/CID are reset, network settings as IP address and subnet mask remain unchanged.

2.3.2 Main configuration

In this part communication specific parameters can be adjusted:

- Network settings of the IEC61850 interface (IP address, subnet mask, gateway)
- NTP server addresses and (if required) DNS server addresses
- Behavior if there is no communication (TCP keep-alive)
- Access restrictions for IEC61850 communication via whitelist



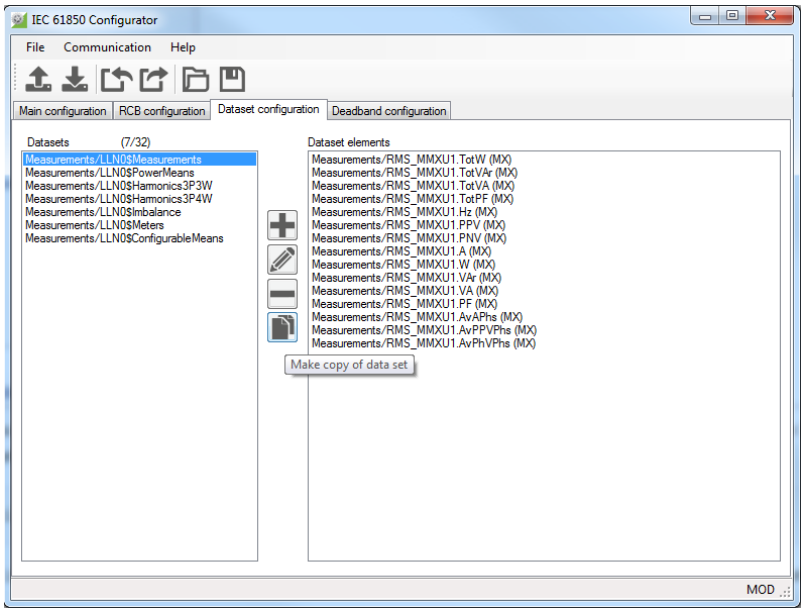
Configuration overview

Hints

- DNS server settings are required only if NTP servers are defined via URL (e.g. pool.ntp.org) rather than via IP address
- The IED name has to be unique within the network, i.e. different for each IED
- If the firewall is enabled each attempt to establish a connection to the device is refused, if the IP address of the appropriate client is not listed in the client whitelist. Even a request via „ping“ will not be answered.

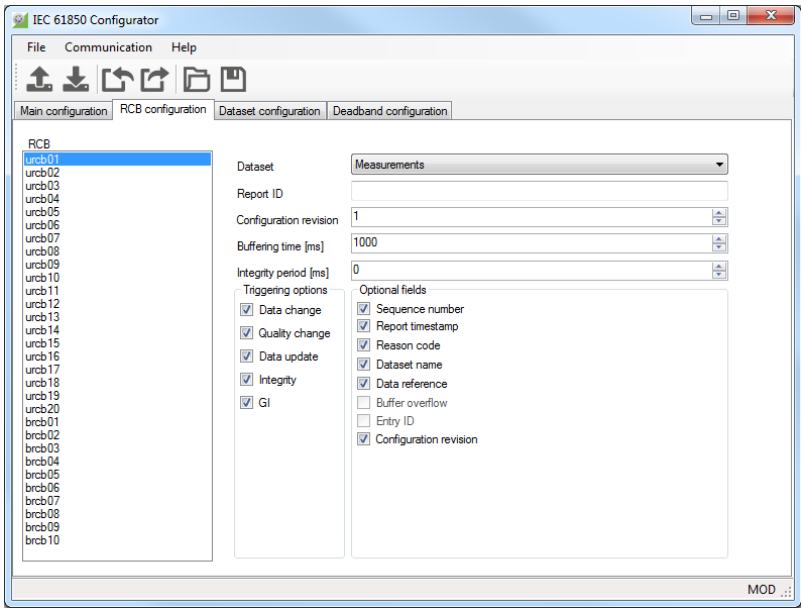
2.3.3 Assembly of datasets

A dataset is an assembly of measurement data, which are monitored by means of a Report Control Block. The basic configuration of the device contains already 7 pre-defined data sets. The user can rename, change, duplicate or delete them or create new data sets. A maximum of 32 data sets may be defined.



2.3.4 Defining Report Control Blocks

The user can freely select which data set is monitored via the appropriate RCB. Also the trigger options to be monitored may be pre-selected, but can be changed by the client reserving the RCB for itself.

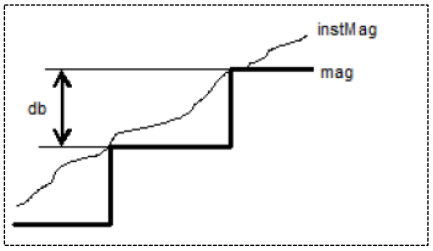


Hints

- „***Buffering time***“ is the time after recognizing a first trigger events, during which data of further event is collected until an RCB with all events is sent. A time of 0 disables the mechanism described.
- When the „***Integrity period***“ expires, which starts when the last RCB has been sent, a report including all elements of the associated data set will be sent. To do this, the triggering option „Integrity“ has to be selected. A value of 0 disables the described mechanism. However, this option avoids that no report is sent for a long time because none of the trigger conditions is met and therefore the connection is closed.

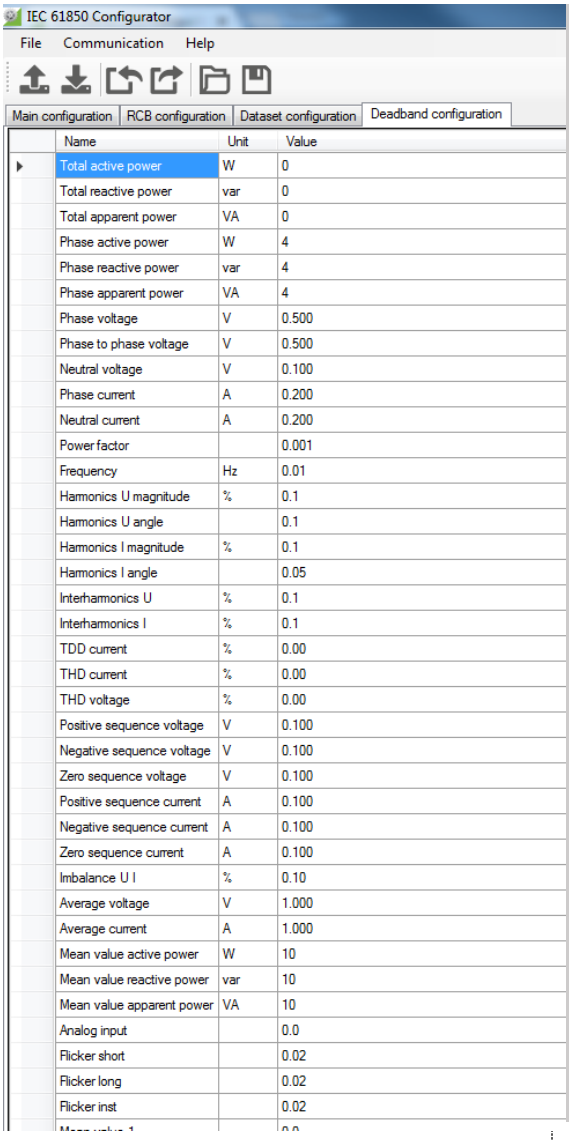
2.3.5 Deadband settings

Data are transferred e.g. due to data change. A data change is a change of a measured value within the dataset by a certain value, the deadband db, since the last reporting of the measured value. If the deadband is 0 or set to a very low value, measurements will be sent to the client after almost each update, which can lead to an unmanageable flood of data.



IEC 61850-7-3

Deadbands can be defined per measured value or measured value group. The default setting for all values is 0. The settings can be changed both via the IEC61850 configurator and via the web interface of the device.



Name	Unit	Value
Total active power	W	0
Total reactive power	var	0
Total apparent power	VA	0
Phase active power	W	4
Phase reactive power	var	4
Phase apparent power	VA	4
Phase voltage	V	0.500
Phase to phase voltage	V	0.500
Neutral voltage	V	0.100
Phase current	A	0.200
Neutral current	A	0.200
Power factor		0.001
Frequency	Hz	0.01
Harmonics U magnitude	%	0.1
Harmonics U angle		0.1
Harmonics I magnitude	%	0.1
Harmonics I angle		0.05
Interharmonics U	%	0.1
Interharmonics I	%	0.1
TDD current	%	0.00
THD current	%	0.00
THD voltage	%	0.00
Positive sequence voltage	V	0.100
Negative sequence voltage	V	0.100
Zero sequence voltage	V	0.100
Positive sequence current	A	0.100
Negative sequence current	A	0.100
Zero sequence current	A	0.100
Imbalance U I	%	0.10
Average voltage	V	1.000
Average current	A	1.000
Mean value active power	W	10
Mean value reactive power	var	10
Mean value apparent power	VA	10
Analog input		0.0
Flicker short		0.02
Flicker long		0.02
Flicker inst		0.02

IEC61850 configurator

WEB interface: Settings | IEC61850

3 Available nodes

Node settings may be read by the IEC61850 client, but not modified. The parameters are either constant or taken from the device configuration at runtime.

3.1 Validity of data objects

The below described nodes are independent of the applied network. They contain all possible data objects (measurement data), which may be valid in one of the supported network systems.

The following table shows the available data objects for each possible network system.

Network system

- **14** =Single phase system or 4-wire balanced
- **2L** =Split phase; system with 2 phases and center tap
- **3G** =3-wire system with balanced load
- **3P** =3-wire system with balanced load, phase shift (not available for PQx000)
- **3U** =3-wire system with unbalanced load
- **3A** =3-wire system with unbalanced load, Aron connection
- **4U** =4-wire system with unbalanced load
- **4O** =4-wire system with unbalanced load, Open-Y (not available for PQx000)

DataObject	AttrName	14	2L	3G	3P	3U	3A	4U	4O
TotW	mag.f	●	●	●	●	●	●	●	●
TotVAr	mag.f	●	●	●	●	●	●	●	●
TotVA	mag.f	●	●	●	●	●	●	●	●
TotPF	mag.f	●	●	●	●	●	●	●	●
Hz	mag.f	●	●	●	●	●	●	●	●
PPV	phsAB.cVal.mag.f	-	-	●	-	●	●	●	●
	phsBC.cVal.mag.f	-	-	●	-	●	●	●	●
	phsCA.cVal.mag.f	-	-	●	-	●	●	●	●
PNV	phsA.cVal.mag.f	●	●	-	●	-	-	●	●
	phsB.cVal.mag.f	-	●	-	-	-	-	●	●
	phsC.cVal.mag.f	-	-	-	-	-	-	●	●
	neut.cVal.mag.f	●	●	-	-	-	-	●	●
A	phsA.cVal.mag.f	●	●	●	●	●	●	●	●
	phsB.cVal.mag.f	-	●	-	-	●	●	●	●
	phsC.cVal.mag.f	-	-	-	-	●	●	●	●
	neut.cVal.mag.f	-	●	-	-	-	-	●	●
W	phsA.cVal.mag.f	-	●	-	-	-	-	●	●
	phsB.cVal.mag.f	-	●	-	-	-	-	●	●
	phsC.cVal.mag.f	-	-	-	-	-	-	●	●
VAr	phsA.cVal.mag.f	-	●	-	-	-	-	●	●
	phsB.cVal.mag.f	-	●	-	-	-	-	●	●
	phsC.cVal.mag.f	-	-	-	-	-	-	●	●
VA	phsA.cVal.mag.f	-	●	-	-	-	-	●	●
	phsB.cVal.mag.f	-	●	-	-	-	-	●	●
	phsC.cVal.mag.f	-	-	-	-	-	-	●	●
PF	phsA.cVal.mag.f	-	●	-	-	-	-	●	●
	phsB.cVal.mag.f	-	●	-	-	-	-	●	●
	phsC.cVal.mag.f	-	-	-	-	-	-	●	●
AvAPhs	mag.f	-	●	-	-	●	-	●	●
AvPPVPhs	mag.f	-	-	●	-	●	●	-	-
AvPhVPhs	mag.f	-	●	-	-	-	-	●	-

DataObject	AttrName	14	2L	3G	3P	3U	3A	4U	4O
SeqA	c1.cVal.mag.f	-	-	-	-	●	-	●	●
	c2.cVal.mag.f	-	-	-	-	●	-	●	●
	c3.cVal.mag.f	-	-	-	-	-	-	●	●
SeqV	c1.cVal.mag.f	-	-	●	-	●	●	●	-
	c2.cVal.mag.f	-	-	●	-	●	●	●	-
	c3.cVal.mag.f	-	-	-	-	-	-	●	-
ImbNgA	mag.f	-	-	-	-	●	-	●	●
ImbNgV	mag.f	-	-	●	-	●	●	●	-
ImbZroA	mag.f	-	-	-	-	-	-	●	●
ImbZroV	mag.f	-	-	-	-	-	-	●	-
HA	phsAHar[0…50].cVal.mag.f	●	●	●	●	●	●	●	●
	phsBHar[0…50].cVal.mag.f	-	●	-	-	●	●	●	●
	phsCHar[0…50].cVal.mag.f	-	-	-	-	●	●	●	●
HPhV	phsAHar[0…50].cVal.mag.f	●	●	-	-	-	-	●	●
	phsBHar[0…50].cVal.mag.f	-	●	-	-	-	-	●	●
	phsCHar[0…50].cVal.mag.f	-	-	-	-	-	-	●	●
HPPV	phsABHar[0…50].cVal.mag.f	-	-	●	●	●	●	-	-
	phsBCHar[0…50].cVal.mag.f	-	-	●	●	●	●	-	-
	phsCAHar[0…50].cVal.mag.f	-	-	●	●	●	●	-	-
ThdA	phsA.cVal.mag.f	●	●	●	●	●	●	●	●
	phsB.cVal.mag.f	-	●	-	-	●	●	●	●
	phsC.cVal.mag.f	-	-	-	-	●	●	●	●
TddA	phsA.cVal.mag.f	●	●	●	●	●	●	●	●
	phsB.cVal.mag.f	-	●	-	-	●	●	●	●
	phsC.cVal.mag.f	-	-	-	-	●	●	●	●
ThdPhV	phsA.cVal.mag.f	●	●	-	-	-	-	●	●
	phsB.cVal.mag.f	-	●	-	-	-	-	●	●
	phsC.cVal.mag.f	-	-	-	-	-	-	●	●
ThdPPV	phsAB.cVal.mag.f	-	-	●	●	●	●	-	-
	phsBC.cVal.mag.f	-	-	●	●	●	●	-	-
	phsCA.cVal.mag.f	-	-	●	●	●	●	-	-
PPPst	phsAB.cVal.mag.f	-	-	●	-	●	●	-	-
	phsBC.cVal.mag.f	-	-	●	-	●	●	-	-
	phsCA.cVal.mag.f	-	-	●	-	●	●	-	-
PhPst	phsA.cVal.mag.f	●	●	-	-	-	-	●	-
	phsB.cVal.mag.f	-	●	-	-	-	-	●	-
	phsC.cVal.mag.f	-	-	-	-	-	-	●	-
PPPlt	phsAB.cVal.mag.f	-	-	●	-	●	●	-	-
	phsBC.cVal.mag.f	-	-	●	-	●	●	-	-
	phsCA.cVal.mag.f	-	-	●	-	●	●	-	-
PhPlt	phsA.cVal.mag.f	●	●	-	-	-	-	●	-
	phsB.cVal.mag.f	-	●	-	-	-	-	●	-
	phsC.cVal.mag.f	-	-	-	-	-	-	●	-
PPPiMax	phsAB.cVal.mag.f	-	-	●	-	●	●	-	-
	phsBC.cVal.mag.f	-	-	●	-	●	●	-	-
	phsCA.cVal.mag.f	-	-	●	-	●	●	-	-
PhPiMax	phsA.cVal.mag.f	●	●	-	-	-	-	●	-
	phsB.cVal.mag.f	-	●	-	-	-	-	●	-
	phsC.cVal.mag.f	-	-	-	-	-	-	●	-

3.2 Measurements

RMS_MMXU1: Instantaneous values over 10/12 cycles (50/60Hz)		
Data object	**Common data class**	**Descriptions**
Measured values		
TotW	MV	Total active power
TotVAr	MV	Total reactive power
TotVA	MV	Total apparent power
TotPF	MV	Average power factor
Hz	MV	System frequency
PPV	DEL	Voltages phase-phase
PNV	WYE	Voltages phase-neutral, neutral-earth
A	WYE	Phase currents
W	WYE	Active power per phase
VAr	WYE	Reactive power per phase
VA	WYE	Apparent power per phase
PF	WYE	Power factor per phase
AvAPhs	MV	Average of phase currents
AvPPVPhs	MV	Average of phase-phase voltages
AvPhVPhs	MV	Average of phase-neutral voltages
Settings		
ClcMth	ENG	TRUE_RMS
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	CYCLE (kind of calculation interval: cycles)
ClcIntvPer	ING	10/12 (50/60Hz)

RMS_MMXU2: Maximum of instantaneous values over 10/12 cycles (since last reset)		
Data object	**Common data class**	**Descriptions**
Measured values		
TotW	MV	Total active power
TotVAr	MV	Total reactive power
TotVA	MV	Total apparent power
Hz	MV	System frequency
PPV	DEL	Voltages phase-phase
PNV	WYE	Voltages phase-neutral, neutral-earth
A	WYE	Phase currents
W	WYE	Active power per phase
Var	WYE	Reactive power per phase
VA	WYE	Apparent power per phase
Settings		
ClcMth	ENG	MAX (maximum values)
ClcMod	ORG	TOTAL (not periodically)
ClcIntvTyp	ENG	EXTERNAL
ClcIntvPer	ING	0

RMS_FND_MMXU1: Instantaneous values of fundamental components over 10/12 cycles		
Data object	**Common data class**	**Descriptions**
Measured values		
TotW	MV	Fundamental total active power
TotVAr	MV	Fundamental total reactive power
TotVA	MV	Fundamental total apparent power
TotPF	MV	Fundamental average power factor (cosφ)
W	WYE	Fundamental active power per phase
VAr	WYE	Fundamental reactive power per phase
VA	WYE	Fundamental apparent power per phase
PF	WYE	Fundamental power factor (cosφ) per phase
Settings		
ClcMth	ENG	RMS_FUNDAMENTAL
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	CYCLE (kind of calculation interval: cycles)
ClcIntvPer	ING	10/12 (50/60Hz)

RMS_FND_MMXU2: Maximum of fundamental components over 10/12 cycles (since last reset)		
Data object	**Common data class**	**Descriptions**
Measured values		
TotW	MV	Fundamental total active power
TotVAr	MV	Fundamental total reactive power
TotVA	MV	Fundamental total apparent power
W	WYE	Fundamental active power per phase
VAr	WYE	Fundamental reactive power per phase
VA	WYE	Fundamental apparent power per phase
Settings		
ClcMth	ENG	RMS_FUNDAMENTAL
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	EXTERNAL
ClcIntvPer	ING	0

RMS_FND_MSQI1: Sequence and imbalance 10/12 cycles **RMS_FND_MSQI2**: Sequence and imbalance 150/180 cycles **RMS_FND_MSQI3**: Sequence and imbalance 10 minutes				
Data object	**Common data class**	**Descriptions**		
Measured values				
SeqA	SEQ	Sequence components voltage		
SeqV	SEQ	Sequence components current		
ImbNgA	MV	Imbalance negative sequence current		
ImbNgV	MV	Imbalance negative sequence voltage		
ImbZroA	MV	Imbalance zero sequence current		
ImbZroV	MV	Imbalance zero sequence voltage		
Settings		**MSQI1**	**MSQI2**	**MSQI3**
ClcMth	ENG	RMS_FUNDAMENTAL	AVG	AVG
ClcMod	ORG	PERIOD (periodically)		
ClcIntvTyp	ENG	CYCLE	CYCLE	MS
ClcIntvPer	ING	10/12 (50/60Hz)	150/180	600‘000

Restriction: RMS_FND_MSQI2/3 available for LINAX PQx000 only

RMS_FND_MSQI4: Maximum imbalance, 10/12 cycles (since last reset)		
Data object	**Common data class**	**Descriptions**
Measured values		
ImbNgA	MV	Imbalance negative sequence current
ImbNgV	MV	Imbalance negative sequence voltage
ImbZroA	MV	Imbalance zero sequence current
ImbZroV	MV	Imbalance zero sequence voltage
Settings		
ClcMth	ENG	MAX (Maximum values)
ClcMod	ORG	TOTAL (not periodically)
ClcIntvTyp	ENG	EXTERNAL
ClcIntvPer	ING	0

HARM_MHAI1: Instantaneous harmonics, 10/12 cycles

HARM_MHAI2: Harmonics, mean-values over 10 minutes

HARM_MHAI3: Maximum harmonics, 10/12 cycles (since last reset)

Data object	Common data class	Descriptions		
Measured values				
Hz	MV	Fundamental frequency		
HA	HWYE	Current harmonics		
HPhV	HWYE	Voltage harmonics phase-neutral		
HPPV	HDEL	Voltage harmonics phase-phase		
ThdA *)	WYE	THD current		
TddA	WYE	TDD current		
ThdPhV	WYE	THD voltage phase-neutral		
ThdPPV	DEL	THD voltage phase-phase		
Settings		**MHAI1**	**MHAI2**	**MHAI3**
ClcMth	ENG	RMS_FUNDAMENTAL	AVG	MAX
ClcMod	ORG	PERIOD (periodically)	PERIOD	TOTAL
ClcIntvTyp	ENG	CYCLE	MS	EXTERNAL
ClcIntvPer	ING	10/12 (50/60Hz)	600‘000	0

*) for HARM_MHAI1 only

3.3 Energy meters

MMTR1: Energy meters demand / supply, high tariff **MMTR2**: Energy meters demand / supply, low tariff		
Data object	**Common data class**	**Descriptions**
Measured or metered values		
SupWh	BCR	Real energy supply (system)
SupVArh	BCR	Reactive energy supply (system)
DmdWh	BCR	Real energy demand (system)
DmdVArh	BCR	Reactive energy demand (system)
Settings		
ClcMth	ENG	TRUE_RMS
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	CYCLE (kind of calculation interval: cycles)
ClcIntvPer	ING	10/12 (50/60Hz)

METER_GGIO1: Meters (user-defined base quantities), high tariff **METER_GGIO2**: Meters (user-defined base quantities), low tariff		
Data object	**Common data class**	**Descriptions**
Measured or metered values		
CntVal1	BCR	Meter 1
CntVal2	BCR	Meter 2
CntVal3	BCR	Meter 3
CntVal4	BCR	Meter 4
CntVal5	BCR	Meter 5
CntVal6	BCR	Meter 6
CntVal7	BCR	Meter 7
CntVal8	BCR	Meter 8
CntVal9	BCR	Meter 9
CntVal01	BCR	Meter 10
CntVal11	BCR	Meter 11
CntVal12	BCR	Meter 12
Settings		
ClcMth	ENG	TRUE_RMS
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	CYCLE (kind of calculation interval: cycles)
ClcIntvPer	ING	10/12 (50/60Hz)

3.4 Power mean-values (load profile values)

POW_INC_MMXU1: Power mean-values (load profile values) demand, last interval **POW_INC_MMXU2**: Power mean-values (load profile values) demand, trend present interval			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
TotW	MV	Total active power	
TotVAr	MV	Total reactive power	
TotVA	MV	Total apparent power	
Settings		**MMXU1**	**MMXU2**
ClcMth	ENG	AVG	PREDICTION
ClcMod	ORG	PERIOD (periodically)	
ClcIntvTyp	ENG	MS	CYCLE
ClcIntvPer	ING	e.g. 900‘000 (15 min.)	10/12 (50/60Hz)

POW_INC_MMXU3: Minimum power mean-values demand (since last reset) **POW_INC_MMXU4**: Maximum power mean-values demand (since last reset)			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
TotW	MV	Total active power	
TotVAr	MV	Total reactive power	
TotVA	MV	Total apparent power	
Settings		**MMXU1**	**MMXU2**
ClcMth	ENG	MIN	MAX
ClcMod	ORG	PERIOD (periodically)	
ClcIntvTyp	ENG	EXTERNAL	
ClcIntvPer	ING	0	

POW_OUT_MMXU1: Power mean-values (load profile values) supply, last interval **POW_OUT_MMXU2**: Power mean-values (load profile values) supply, trend present interval			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
TotW	MV	Total active power	
TotVAr	MV	Total reactive power	
Settings		**MMXU1**	**MMXU2**
ClcMth	ENG	AVG	PREDICTION
ClcMod	ORG	PERIOD (periodically)	
ClcIntvTyp	ENG	MS	CYCLE
ClcIntvPer	ING	e.g. 900‘000 (15 min.)	10/12 (50/60Hz)

POW_OUT_MMXU3: Minimum power mean-values supply (since last reset) **POW_OUT_MMXU4**: Maximum power mean-values supply (since last reset)			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
TotW	MV	Total active power	
TotVAr	MV	Total reactive power	
Settings		**MMXU3**	**MMXU4**
ClcMth	ENG	MIN	MAX
ClcMod	ORG	PERIOD (periodically)	
ClcIntvTyp	ENG	EXTERNAL	
ClcIntvPer	ING	0	

USRMEAN_GGIO1: Mean-values (user-defined base quantities), last interval **USRMEAN_GGIO2**: Mean-values (user-defined base quantities), trend present interval			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
AnIn1	MV	Mean-value 1	
AnIn2	MV	Mean-value 2	
AnIn3	MV	Mean-value 3	
AnIn4	MV	Mean-value 4	
AnIn5	MV	Mean-value 5	
AnIn6	MV	Mean-value 6	
AnIn7	MV	Mean-value 7	
AnIn8	MV	Mean-value 8	
AnIn9	MV	Mean-value 9	
AnIn10	MV	Mean-value 10	
AnIn11	MV	Mean-value 11	
AnIn12	MV	Mean-value 12	
Settings		**GGIO1**	**GGIO2**
ClcMth	ENG	AVG	PREDICTION
ClcMod	ORG	PERIOD (periodically)	
ClcIntvTyp	ENG	MS	CYCLE
ClcIntvPer	ING	e.g. 900‘000 (15 min.)	10/12 (50/60Hz)

USRMEAN_GGIO3: Mean-values (user-defined base quantities), minimum values since last reset **USRMEAN_GGIO4**: Mean-values (user-defined base quantities), maximum values since last reset			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
AnIn1	MV	Mean-value 1	
AnIn2	MV	Mean-value 2	
AnIn3	MV	Mean-value 3	
AnIn4	MV	Mean-value 4	
AnIn5	MV	Mean-value 5	
AnIn6	MV	Mean-value 6	
AnIn7	MV	Mean-value 7	
AnIn8	MV	Mean-value 8	
AnIn9	MV	Mean-value 9	
AnIn10	MV	Mean-value 10	
AnIn11	MV	Mean-value 11	
AnIn12	MV	Mean-value 12	
Settings		**GGIO3**	**GGIO4**
ClcMth	ENG	MIN	MAX
ClcMod	ORG	PERIOD (periodically)	
ClcIntvTyp	ENG	EXTERNAL	
ClcIntvPer	ING	0	

3.5 Digital inputs

STD_DIN_GGIO1: State of standard digital input 0.1		
Data object	**Common data class**	**Descriptions**
Measured or metered values		
Ind1	SPS	State digital input

OPT_DIN_GGIO1: Energy meters / states of optional digital input extension 1 **OPT_DIN_GGIO2**: Energy meters / states of optional digital input extension 2 **OPT_DIN_GGIO3**: Energy meters / states of optional digital input extension 3 **OPT_DIN_GGIO4**: Energy meters / states of optional digital input extension 4		
Data object	**Common data class**	**Descriptions**
Measured or metered values		
Ind1	SPS	State digital input 1
Ind2	SPS	State digital input 2
Ind3	SPS	State digital input 3
Ind4	SPS	State digital input 4
CntVal1	BCR	Meter digital input 1, high tariff
CntVal2	BCR	Meter digital input 2, high tariff
CntVal3	BCR	Meter digital input 3, high tariff
CntVal4	BCR	Meter digital input 4, high tariff
CntVal5	BCR	Meter digital input 1, low tariff
CntVal6	BCR	Meter digital input 2, low tariff
CntVal7	BCR	Meter digital input 3, low tariff
CntVal8	BCR	Meter digital input 4, low tariff

Restriction: Available for devices with corresponding optional extension modules only

3.6 **Power quality data** (for LINAX PQ3000/PQ5000 only)

IHARM_MHAI1: Instantaneous interharmonics, 10/12 cycles **IHARM_MHAI2**: Interharmonics, mean-values over 10 minutes			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
Hz	MV	Fundamental frequency	
HA	HWYE	Current interharmonics	
HPhV	HWYE	Voltage interharmonics phase-neutral	
HPPV	HDEL	Voltage interharmonics phase-phase	
Settings		**MHAI1**	**MHAI2**
ClcMth	ENG	RMS_FUNDAMENTAL	AVG
ClcMod	ORG	PERIOD (periodically)	PERIOD
ClcIntvTyp	ENG	CYCLE	MS
ClcIntvPer	ING	10/12 (50/60Hz)	600‘000

MFLK1: Instantaneous, short-term and long-term flicker		
Data object	**Common data class**	**Descriptions**
Measured or metered values		
PPPst	DEL	Short term flicker Pst phase-phase
PhPst	WYE	Short term flicker Pst phase-neutral
PPPlt	DEL	Long term flicker Plt phase-phase
PhPlt	WYE	Long term flicker Plt phase-neutral
PPPiMax	DEL	Instantaneous flicker phase-phase
PhPiMax	WYE	Instantaneous flicker phase-neutral
Settings		
ClcMth	ENG	TRUE_RMS
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	CYCLE
ClcIntvPer	ING	10/12 (50/60Hz)

PQ_F_MMXU1: Frequency, 10-second value		
Data object	**Common data class**	**Descriptions**
Measured or metered values		
Hz	MV	System frequency
Settings		
ClcMth	ENG	UNSPECIFIED
ClcMod	ORG	PERIOD (periodically)
ClcIntvTyp	ENG	MS
ClcIntvPer	ING	10‘000

PQ_UI_MMXU1: Voltage and current values, 150/180 cycles (50/60Hz) **PQ_UI_MMXU1**: Voltage and current values, 10 minutes			
Data object	**Common data class**	**Descriptions**	
Measured or metered values			
PPV	DEL	Voltages phase-phase	
PNV	WYE	Voltages phase-neutral, neutral-earth	
A	WYE	Phase currents	
Settings		**MMXU1**	**MMXU2**
ClcMth	ENG	TRUE_RMS	AVG
ClcMod	ORG	PERIOD (periodically)	PERIOD
ClcIntvTyp	ENG	CYCLE	MS
ClcIntvPer	ING	10/12 (50/60Hz)	600‘000