SMMePlus

Measurands acquisition process

V1.0

Redatto da:	Federica Di Rienzo	23/12/2020
Verificato da:		23/12/2020
Approvato da:		-

Summary

The aim of this document is to describe the acquisition process of Daily Closure registries in SMMePlus

Distribution List

Document target list

Name	Company

Document modifications

The following modifications refer to the old document versions.

Changes Description	Reference
First version	1.0

References

List of the documents

[1]

Index

1. Introduction

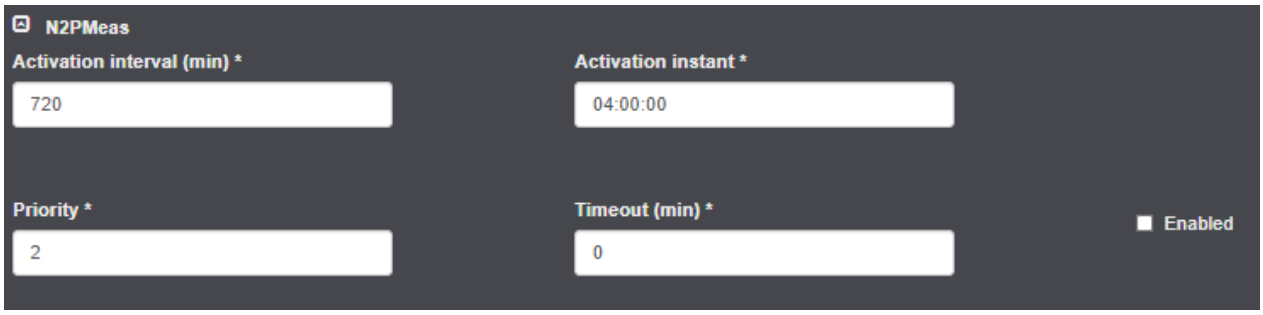
1.1. Purpose

The aim of this document is to describe the acquisition process of Measurands registries in SMMePlus

2. Concentrator procedure

The n2pmeas procedure of concentrators is in charge of collecting measurands from commissioned meters.

The configuration of procedures inside concentrators is performed through “Concentrator initialization” and “Concentrator modification” processes of SMMePlus.
The system writes inside the concentrator the parameters that have been defined in the concentrator profile.



Activation interval is the value of the period (in minutes) over which the concentrator procedure is executed. For example, a value 10 means that every ten minutes the system executes the procedure.

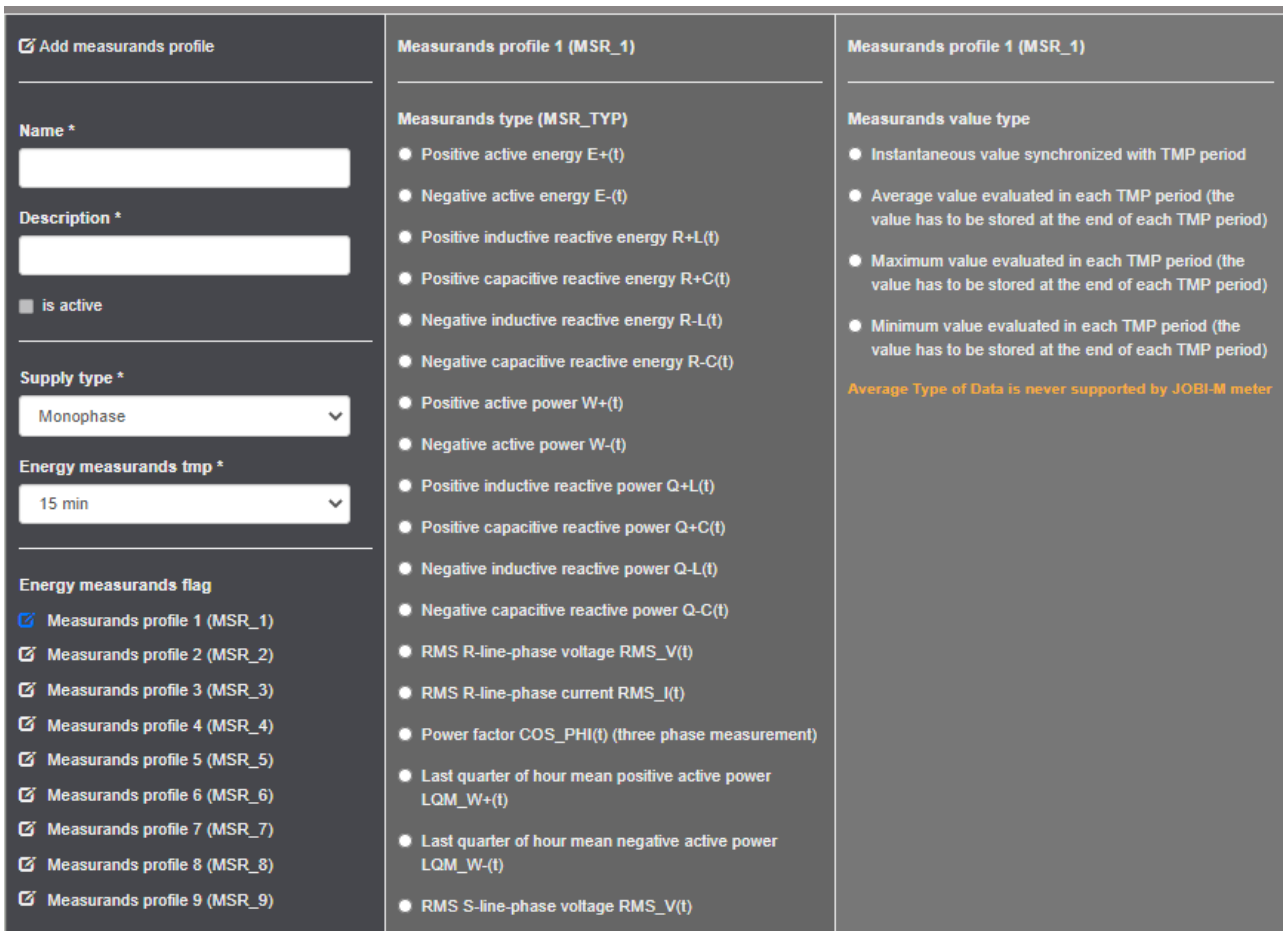
Activation instant is the first instant in the day in which the concentrator procedure is activated.

Priority is a value detailing the priority level of the procedure. In the case in which a high priority procedure is activated while a low priority procedure is still running, the low priority procedure execution is stopped and the high priority one is started.

Timeout is the timeout between the activation instant and the real activation of the procedure. It is normally set to 0.

3. Measurands profiles

Each meter can register up to 9 measurands and each measurand cane have 4 king of value: maximum, minimum, average and instantaneous.
SMMePlus has a specific section in which it's necessary to define the "measurand profile" that includes the registers that must be collected with their configuration.



For each of the 9 available measurands to collect, it's necessary to select:

- The supplytype of the meter: monophasic or polyphasic
- The interval between samples (TMP)
- The measurand register
- The kind of value

3.1. TMP

Available interval are:

- 1 min
- 5 min
- 10 min
- 15 min
- 1 h
- 2 h

- 4 h
- 12 h
- 24 h
-

1 minute and 5 minutes are not recommended because they will generate a massive amount of information.

3.2. Measurand registries

MSR_TYPx	Description	Note
0x01	Positive active energy E+(t)	
0x02	Negative active energy E-(t)	
0x03	Positive inductive reactive energy R+L(t)	
0x04	Positive capacitive reactive energy R+C(t)	
0x05	Negative inductive reactive energy R-L(t)	
0x06	Negative capacitive reactive energy R-C(t)	
0x07	Positive active power W+(t)	
0x08	Negative active power W-(t)	
0x09	Positive inductive reactive power Q+L(t)	
0x0A	Positive capacitive reactive power Q+C(t)	
0x0B	Negative inductive reactive power Q-L(t)	
0x0C	Negative capacitive reactive power Q-C(t)	
0x0D	RMS R-line-phase voltage RMS_V(t)	
0x12	RMS S-line-phase voltage RMS_V(t)	
0x13	RMS T-line-phase voltage RMS_V(t)	
0x0E	RMS R-line-phase current RMS_I(t) (at secondary of CT in case of semi-direct meter)	

0x14	RMS S-line-phase current RMS_I(t) (at secondary of CT in case of semi-direct meter)	
0x15	RMS T-line-phase current RMS_I(t) (at secondary of CT in case of semi-direct meter)	
0x0F	Power factor COS_PHI(t) (three phase measurement)	
0x10	Last quarter of hour mean positive active power LQM_W+(t)	
0x11	Last quarter of hour mean negative active power LQM_W-(t)	
0x16	Power factor COS_PHI(t) for R-line-phase	Not available on monophasic
0x17	Power factor COS_PHI(t) for S-line-phase	Not available on monophasic
0x18	Power factor COS_PHI(t) for T-line-phase	Not available on monophasic
0x19	Phase angle for R-line-phase	Not available on monophasic
0x1A	Phase angle for S-line-phase	Not available on monophasic
0x1B	Phase angle for T-line-phase	Not available on monophasic
0x1C	Phase angle for three phase measurement	Available on monophasic on fw >= 13 and on JOBI-M
0x1D	Network fundamental frequency	
0x1E	Neutral current (only for direct meters) phase 2 of the project	
0x1F	Phase angle for R-line-phase and Neutral Current phase 2 of the project	
0x20	RMS R-line-phase current RMS_I(t) Primary Circuit	
0x21	RMS S-line-phase current RMS_I(t) Primary Circuit	
0x22	RMS T-line-phase current RMS_I(t) Primary Circuit	

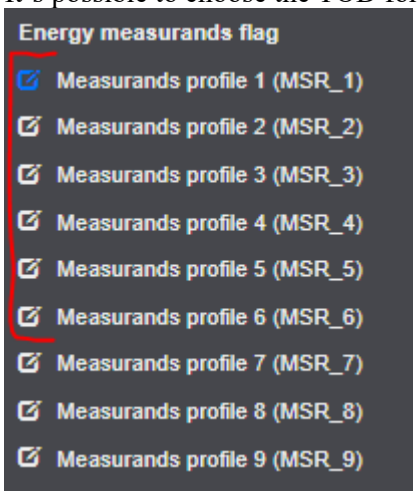
3.3. Type Of Data

These are the kind of values available

MSR_TODx	Description
0x00	Instantaneous value synchronized with T_{MP} period
0x01	Average value evaluated in each T_{MP} period (the value has to be stored at the end of each T_{MP} period)
0x02	Maximum value evaluated in each T_{MP} period (the value has to be stored at the end of each T_{MP} period)
0x03	Minimum value evaluated in each T_{MP} period (the value has to be stored at the end of each T_{MP} period)

Each measurand register can have a different Type Of Data.

An exception exists on JOBI-M fw 1.0:
It's possible to choose the TOD for the first 6 measurands chosen.



For measurands 7, 8, and 9, it's not possible to configure this fiels.
Default value is:

MSR_TODx	Description
0x00	Instantaneous value synchronized with T_{MP} period

4. Measurand profile configuration

4.1. Meter

When a meter is commissioned, SMMePlus system executes the “Meter Tech Configuration” process. Through this process, the meter is synchronized, configured and the firmware version is read.

This process writes in the meter the measurands that have been defined in the measurand profile.

4.2. Concentrator

After the “Meter Tech Configuration” process, the “Meter Tech Configuration on Concentrator” process is executed for each commissioned meter.

This process selects in CE Table of the concentrator the measurands registers that the concentrator must collect from the meter.

When the “Meter Tech Configuration” and the “Meter Tech Configuration on Concentrator” processes are completed, in “Meter In Field” report it’s possible to see current configuration.

: sw update utc	pload	dailyclosure	measurands	energy dc profile	energy lp profile	tlp (LP)	cedata profile
21/2020 12:37:05 PM	True	False	True	PROFILO DC 1	All energies	15	CEDATA_Active_I
/21/2019 9:51:22 AM	True	False	True	DailyClosure Energy Profile 3	FastPload Energy Profile	60	CEDATA_Active_I
21/2020 12:37:57 PM	True	False	True	PROFILO DC 1	FastPload Energy Profile	15	CEDATA_Active_I

	measurands profile	meas profile configured in meter	prepayed configu
t_MaxPower_VoltageVariation	TestFD1	True	False
t_MaxPower_VoltageVariation	TestFD1	False	True
t_MaxPower_VoltageVariation	TestFD1	True	True

5. Collection and integration

5.1. Measurands collection

Measurands of meters are acquired in SMMePlus through N2PMeas scheduled activity.

Activities execution is based on “Concentrator Activities Settings”:

- **interval seconds** are seconds between the execution of activities.
- **priority** is used by the system for choosing which activity has to be executed first (in case of start at the same time)

Concentrator Activities Settings

concentrator activity	interval seconds	priority	max retry count	max execution hours
N2PMeas	21600	4	-	-

In “Completed Scheduled Works” report you can see all executions of scheduled activities.

Completed Scheduled Works

idwork	concentrator	activity type	startdate utc	enddate utc	startdate local	enddate local	result	error description
229797	GIALLOT01	N2PMeas	12/23/2020 4:32:58 AM	12/23/2020 4:33:32 AM	12/23/2020 5:32:58 AM	12/23/2020 5:33:32 AM	✓	
229793	GIALLOT01	N2PMeas	12/22/2020 10:30:34 PM	12/22/2020 10:32:58 PM	12/22/2020 11:30:34 PM	12/22/2020 11:32:58 PM	✓	

In “Measurands Info Per meter” report you can see statistic information of Measurands collection.

Measurands info per meter

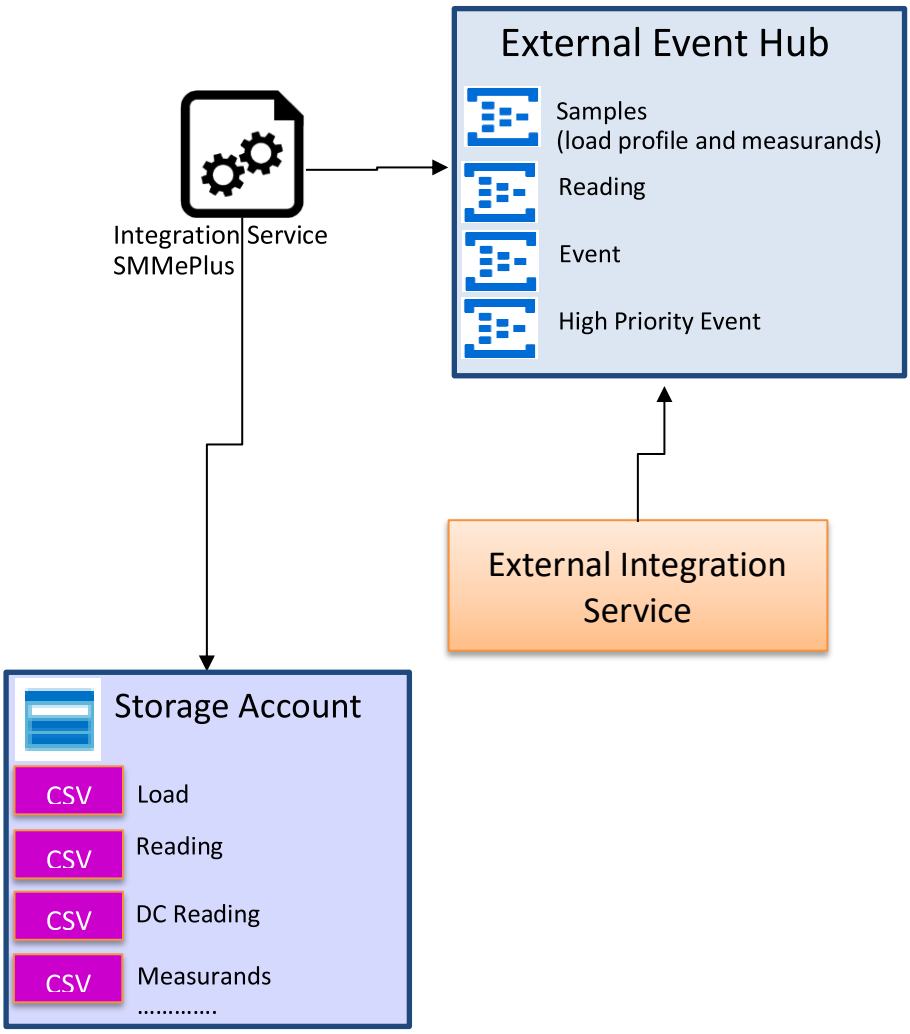
concentrator	mac address	serialnumber	table type	energy type	tmp	value type
GIALLOT01	86041601B17B	UAAEEDN11200110971	0D	RMS R-line-phase voltage RMS_V(t)	15 min	Average value evaluated in each TM be stored at the end of each TMP pe
GIALLOT01	86041601B17B	UAAEEDN11200110971	0F	Power factor COS_PHI(t) (three phase measurement)	15 min	Instantaneous value synchronized w
GIALLOT01	86041601B17B	UAAEEDN11200110971	03	Positive inductive reactive energy R+L(t)	15 min	Instantaneous value synchronized w
GIALLOT01	86041601B17B	UAAEEDN11200110971	0B	Negative inductive reactive power Q-L(t)	15 min	Instantaneous value synchronized w
GIALLOT01	86041601B17B	UAAEEDN11200110971	10	Last quarter of hour mean positive active power LQM_W+(t)	15 min	Instantaneous value synchronized w
GIALLOT01	86041601FA98	UAAEEDN11200129688	01	Positive active energy E+(t)	15 min	Maximum value evaluated in each TI

value type	measurand date local	errordesc	is error	last update utc
Average value evaluated in each TMP period (the value has to be stored at the end of each TMP period)	12/22/2020 1:15:00 AM		True	12/23/2020 8:34:08 AM
Instantaneous value synchronized with TMP period	12/22/2020 1:15:00 AM		False	12/23/2020 8:34:08 AM
Instantaneous value synchronized with TMP period	12/22/2020 1:15:00 AM		False	12/23/2020 8:34:08 AM
Instantaneous value synchronized with TMP period	12/22/2020 1:15:00 AM		False	12/23/2020 8:34:08 AM
Instantaneous value synchronized with TMP period	12/22/2020 1:15:00 AM		False	12/23/2020 8:34:08 AM
Maximum value evaluated in each TMP period (the value has	12/22/2020 1:15:00 AM		True	12/23/2020

In this report it’s possible to see when last measurand has been collected per each meter.

5.2. SMMePlus Integration Service

SMMePlus Integration Service is the component in charge of making collected registries available for business processes.



SMMePlus Integration Service pushes collected data (readings, load profile samples, measurands samples, alarms, events) on an Azure Event Hub stream that can be accessed used a private key.

The Integration service of the client “listens” to this stream in order to download new information as soon as they’re available.

In addition to this real time process, every day a csv file containing measurands registries is produced and saved on an Azure File Storage.

The file contains all registries collected the day before. If the N2PMeas process recovers data of previous days you will find them in the csv file of the day the process runs.

The format of the file is the following

serialnumber;pod;value;state;cimcode;sampledate
UAAEEDN10100080395;POD001;532;0;0.0.2.6.16.1.37.0.0.0.0.0.0.0.0.0.63.0;2020-12-21 01:15:00.000
UAAEEDN10100080395;POD001;314;0;0.0.2.6.16.1.37.0.0.0.0.0.0.0.0.0.63.0;2020-12-21 01:15:00.000
UAAEEDN10100080395;POD001;2820;0;0.0.2.6.16.1.37.0.0.0.0.0.0.0.0.0.63.0;2020-12-21 01:15:00.000
UAAEEDN10100080395;POD001;7;0;0.0.2.6.16.1.37.0.0.0.0.0.0.0.0.0.63.0;2020-12-21 01:15:00.000
UAAEEDN10100080395;POD001;640;0;0.0.2.6.16.1.37.0.0.0.0.0.0.0.0.0.63.0;2020-12-21 01:15:00.000
UAAEEDN10100080395;POD001;16512;4;0.0.2.6.16.1.37.0.0.0.0.0.0.0.0.0.63.0;2020-12-21 01:15:00.000

5.3. CIM Code

As listed in "SMM ePlus - Requirements - Integration" document, here are the CIM Code related to measurand registers.

Energy Load Profile	
Code	**Comments**
0.{msr_tod}.{tmp}.1.1.1.12.0.0.0.0.0.0.0.0.72.0	Positive active energy E+(t) (Wh)
0.{msr_tod}.{tmp}.1.19.1.12.0.0.0.0.0.0.0.0.72.0	Negative active energy E-(t) (Wh)
0.{msr_tod}.{tmp}.1.15.1.12.0.0.0.0.0.0.0.0.73.0	Positive inductive reactive energy R+L(t) (varh)
0.{msr_tod}.{tmp}.1.16.1.12.0.0.0.0.0.0.0.0.73.0	Positive capacitive reactive energy R+C(t) (varh)
0.{msr_tod}.{tmp}.1.17.1.12.0.0.0.0.0.0.0.0.73.0	Negative inductive reactive energy R-L(t) (varh)
0.{msr_tod}.{tmp}.1.18.1.12.0.0.0.0.0.0.0.0.73.0	Negative capacitive reactive energy R-C(t) (varh)
0.{msr_tod}.{tmp}.6.1.1.37.0.0.0.0.0.0.0.0.38.0	Positive active power W+(t) (W or kW)
0.{msr_tod}.{tmp}.6.19.1.37.0.0.0.0.0.0.0.0.38.0	Negative active power W-(t) (W or kW)
0.{msr_tod}.{tmp}.6.15.1.37.0.0.0.0.0.0.0.0.63.0	Positive inductive reactive power Q+L(t) (var or kvar)
0.{msr_tod}.{tmp}.6.16.1.37.0.0.0.0.0.0.0.0.63.0	Positive capacitive reactive power Q+C(t) (var or kvar)
0.{msr_tod}.{tmp}.6.17.1.37.0.0.0.0.0.0.0.0.63.0	Negative inductive reactive power Q-L(t) (var or kvar)
0.{msr_tod}.{tmp}.6.18.1.37.0.0.0.0.0.0.0.0.63.0	Negative capacitive reactive power Q-C(t) (var or kvar)
0.{msr_tod}.{tmp}.6.0.1.54.0.0.0.0.0.0.0.128.-1.29.0	RMS R-line-phase voltage RMS_V(t) (1/10 V)
0.{msr_tod}.{tmp}.6.0.1.54.0.0.0.0.0.0.0.64.-1.29.0	RMS S-line-phase voltage RMS_V(t) (1/10 V)
0.{msr_tod}.{tmp}.6.0.1.54.0.0.0.0.0.0.0.32.-1.29.0	RMS T-line-phase voltage RMS_V(t) (1/10 V)
0.{msr_tod}.{tmp}.6.0.1.4.0.0.0.0.0.0.0.128.-1.5.0	RMS R-line-phase current RMS_I(t) (at secondary of CT in case of semi-direct meter) (dA)
0.{msr_tod}.{tmp}.6.0.1.4.0.0.0.0.0.0.0.64.-1.5.0	RMS S-line-phase current RMS_I(t) (at secondary of CT in case of semi-direct meter) (dA)
0.{msr_tod}.{tmp}.6.0.1.4.0.0.0.0.0.0.0.32.-1.5.0	RMS T-line-phase current RMS_I(t) (at secondary of CT in case of semi-direct meter) (dA)
0.{msr_tod}.{tmp}.6.0.1.38.0.0.0.0.0.0.0.224.0.0.0	Power factor COS_PHI(t) (three phase measurement)
0.{msr_tod}.{tmp}.6.1.1.37.0.0.0.0.0.0.0.0.38.0	Last quarter of hour mean positive active power LQM_W+(t) (W ok kW)
0.{msr_tod}.{tmp}.6.19.1.37.0.0.0.0.0.0.0.0.38.0	Last quarter of hour mean negative active power LQM_W-(t) (W ok kW)
0.{msr_tod}.{tmp}.6.0.1.38.0.0.0.0.0.0.0.128.0.0.0	Power factor COS_PHI(t) for R-line-phase

0.{msr_tod}.{tmp}.6.0.1.38.0.0.0.0.0.0.64.0.0.0	Power factor COS_PHI(t) for S-line-phase
0.{msr_tod}.{tmp}.6.0.1.38.0.0.0.0.0.0.32.0.0.0	Power factor COS_PHI(t) for T-line-phase
0.{msr_tod}.{tmp}.6.0.1.5.0.0.0.0.0.0.128.0.0.0	Phase angle for R-line-phase
0.{msr_tod}.{tmp}.6.0.1.5.0.0.0.0.0.0.64.0.0.0	Phase angle for S-line-phase
0.{msr_tod}.{tmp}.6.0.1.5.0.0.0.0.0.0.32.0.0.0	Phase angle for T-line-phase
0.{msr_tod}.{tmp}.6.0.1.5.0.0.0.0.0.0.224.0.0.0	Phase angle for three phase measurement
0.{msr_tod}.{tmp}.6.0.1.15.0.0.0.0.0.0.0.-1.33.0	Network fundamental frequency (dHz)
0.{msr_tod}.{tmp}.6.1.1.4.0.0.0.0.0.0.0.-1.5.0	Neutral current (only for direct meters) phase 2 of the project (dA)
0.{msr_tod}.{tmp}.6.0.1.38.0.0.0.0.0.0.129.0.0.0	Phase angle for R-line-phase and Neutral Current phase 2 of the project
0.{msr_tod}.{tmp}.6.1.1.4.0.0.0.0.0.0.128.-1.5.0	RMS R-line-phase current RMS_I(t) Primary Circuit (dA)
0.{msr_tod}.{tmp}.6.1.1.4.0.0.0.0.0.0.64.-1.5.0	RMS S-line-phase current RMS_I(t) Primary Circuit (dA)
0.{msr_tod}.{tmp}.6.1.1.4.0.0.0.0.0.0.32.-1.5.0	RMS T-line-phase current RMS_I(t) Primary Circuit (dA)

The {msr_tod} placeholder is replaced by one of the following values.
“msr_tod” stands form MEASURANDS TYPE OF DATA

MEASURANDS TYPE OF DATA	
Code	**Comments**
0	Instantaneous value synchronized with TMP period
2	Average value evaluated in each TMP period (the value has to be stored at the end of each TMP period)
8	Maximum value evaluated in each TMP period (the value has to be stored at the end of each TMP period)
9	Minimum value evaluated in each TMP period (the value has to be stored at the end of each TMP period)

The {tmp} placeholder is replaced by one of the following values.
“tmp” is the interval period for measurands

MEASURANDS INTERVAL PERIOD	
Code	**Comments**
3	1 minute
6	5 minutes
1	10 minutes
2	15 minutes
7	1 hour
79	2 hours
80	4 hours
82	12 hours
4	24 hours