

**Description of IEC 61850 data maps 5 and 6 in
VAMP 257 protection relays**

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1 Introduction

The goal of this document is to give a description of the IEC 61850 Logical Nodes (LN) in data maps 5 and 6 available in VAMP 257 protection relays.

Abbreviations used in this document are explained in Table 1.1 below.

Table 1.1: List of abbreviations.

| Abbreviation | Meaning |
|--------------|---|
| LN | Logical Node |
| DO | DATA in IEC 61850-7-2, data object type or instance, depending on the context |
| DA | Data Attribute |
| SDO | Substructure Data Object |
| BDA | Basic Data Attribute that is not structured |
| GOOSE | Generic Object Oriented Subscriber Events |

2 Description of Logical Nodes and their Data Objects and Data Attributes

2.1 Information common to all Logical Nodes

The following table contains the information which is common to all Logical Nodes, and will thus not be repeated again in this document.

| Element | Description |
|---------------|---|
| LN: X | Description of Logical node "X" |
| DO: Mod | Mode (1 p. 80) |
| DA: stVal | Status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: ctrlModel | Specifies the control model of IEC 61850-7-2 that corresponds to the behaviour of the data (1 p. 51). |
| DO: Beh | Behaviour (2 p. 71). |
| DA: stVal | Status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Health | This information reflects the state of the logical node related HW and SW (2 p. 75). |
| DA: stVal | Status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: NamePlt | Name plate. |
| DA: vendor | Vendor name. |
| DA: swRev | Software revision. |
| DA: d | Textual description of the data. |

2.2 Data map 5

2.2.1 LO01GGIO77 – Logical output 1

| Element | Description |
|----------------|---|
| LN: LO01GGIO77 | The value of Logic output 1. |
| DO: Ind | Indication of the status. |
| DA: stVal | The status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |

2.2.2 Logic output 2 – logic output 20

The rest of the logic outputs have the same structure as Logic(al) output 1.

The LN:s of the logic outputs not already covered in this document are listed below:

1. LO02GGIO78 (Logical output 2)
2. LO03GGIO79 (Logical output 3)
3. LO04GGIO80 (Logical output 4)
4. LO05GGIO81 (Logical output 5)
5. LO06GGIO82 (Logical output 6)
6. LO07GGIO83 (Logical output 7)
7. LO08GGIO84 (Logical output 8)
8. LO09GGIO85 (Logical output 9)
9. LO10GGIO86 (Logical output 10)
10. LO11GGIO87 (Logical output 11)
11. LO12GGIO88 (Logical output 12)
12. LO13GGIO89 (Logical output 13)
13. LO14GGIO90 (Logical output 14)
14. LO15GGIO91 (Logical output 15)
15. LO16GGIO92 (Logical output 16)
16. LO17GGIO93 (Logical output 17)
17. LO18GGIO94 (Logical output 18)
18. LO19GGIO95 (Logical output 19)
19. LO20GGIO96 (Logical output 20)

2.2.3 Obj1CSWI1 – Object 1

| Element | Description |
|---------------|--|
| Obj1CSWI1 | Object 1. |
| DO: Pos | Indication of the position of a switch. Accessed when performing a switch command or to verify the switch status or position. |
| DA: Oper | ASCI control service: Operate. |
| BDA: ctrlVal | Determines the control activity. |
| BDA: origin | Originator information. |
| BDA: orCat | The category of the originator that caused a change of a value. (2 p. 20) |
| BDA: orIdent | The address of the originator who caused the change of the value. The value of NULL shall be reserved to indicate that the originator of a particular action is not known or is not reported. (2 p. 20) |
| BDA: ctrlNum | Shows the control sequence number of the control service. |
| BDA: T | The time when the client sends the control request. (3 s. 148) |
| BDA: Test | An additional identifier that may be used to classify a value being a test value and not to be used for operational purposes. (2 p. 14) |
| BDA: Check | Specifies the kind of checks a control object shall perform before issuing the control operation if common data class is DPC (double-point control – see IEC 61850-7-3). |
| DA: stVal | The status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: ctrlModel | Specifies the control model of IEC 61850-7-2 that corresponds to the behaviour of the data (1 p. 51). |
| DO: BlkOpn | This Data is used to block 'open operation' (for example to XCBR, XSWI, YPSH) from another logical node such as a protection node or from a local/remote switch. An example may be the blocking of the buscoupler also for trips during busbar transfer. Block opening is not reflected in operating capability. If status value = TRUE, then the block 'open circuit breaker' operation is blocked. |
| DA: stVal | Status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: ctrlModel | Specifies the control model of IEC 61850-7-2 that |

| | |
|--------------|---|
| | corresponds to the behaviour of the data (1 p. 51). |
| DO: BlkCls | This Data is used to block 'close operation' (for example, for XCBR, XSWI, YPSH) from another logical node such as a protection node or from a local/remote switch. Block closing is not reflected in operating capability. If Status value = TRUE, then operation 'close circuit breaker' is blocked. |
| DA: stVal | Status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: ctlModel | Specifies the control model of IEC 61850-7-2 that corresponds to the behaviour of the data (1 p. 51). |

2.2.4 Objects 2 – 6

A number of the other objects have the same structure as Object 1.

The LN:s of the objects with the same structure not already covered in this document are listed below:

1. Obj2CSWI2 (Object 2)
2. Obj3CSWI3 (Object 3)
3. Obj4CSWI4 (Object 4)
4. Obj5CSWI5 (Object 5)
5. Obj6CSWI6 (Object 6) (Found in datamap 6).

2.3 Data map 6

2.3.1 Obj7CSWI7 – Object 7

| Element | Description |
|---------------|---|
| LN: Obj7CSWI7 | Object 7. |
| DO: Pos | Indication of the position of a switch. Accessed when performing a switch command or to verify the switch status or position. |
| DA: stVal | Indication of the status. |
| DA: q | The status value of the data. |
| DA: t | Quality (1 p. 55). |
| DA: ctlModel | Specifies the control model of IEC 61850-7-2 that corresponds to the behaviour of the data (1 p. 51). |

2.3.2 Obj8CSWI8 – Object 8

The structure of the Logical node of Object 8 is the same as that of Object 7 (above).

2.3.3 OC1PTOC1 – I>

| Element | Description |
|------------------|--|
| LN: OC1PTOC1(I>) | First overcurrent protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.4 OC2PTOC2 – I>>

| Element | Description |
|--------------------|--|
| LN: OC2PTOC2 (I>>) | Second overcurrent protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.5 OC3PTOC3 – />>>

| Element | Description |
|---------------------|--|
| LN: OC3PTOC3 (/>>>) | Third overcurrent protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.6 OFUF1PTOF1 – f><

| Element | Description |
|----------------------|--|
| LN: OFUF1PTOF1 (f><) | First over-/under-frequency protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.7 OFUF2PTOF2 – f>><<

| Element | Description |
|------------------------|--|
| LN: OFUF2PTOF2 (f>><<) | Second over-/under-frequency protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.8 OVIPTOV3 – U>

| Element | Description |
|-------------------|--|
| LN: OVIPTOV3 (U>) | First overvoltage protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.9 OV2PTOV4 – U>>

| Element | Description |
|-------------------|--|
| LN: OV2PTOV4(U>>) | Second overvoltage protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.10 OV3PTOV5 – U>>>

| Element | Description |
|---------------------|--|
| LN: OV3PTOV5 (U>>>) | Third overvoltage protection stage. |
| DO: Str | Indicates the detection of a fault or an unacceptable condition. |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: dirGeneral | General direction of the fault. If the faults of individual phases have different directions, this attribute is set to both. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: Op | Operate. Indicates the trip decision of a protection function (LN). |
| DA: general | Logical "or" of the phase values, for example trip or start. The attribute shall also be set if not all phases have a fault condition. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DO: StrVal | Start value. Level of the supervised value, which starts a dedicated action of the related function. |
| DA: setMag | Indication of the start value. |
| BDA: f | The actual start value. |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| DO: OpDITmms | Time delay in ms before operating once operate conditions have been met. |
| DA: setVal | The value of the operate delay time setting. |

2.3.11 PQSpdMMXU19 – P, Q, S, PF demand

| Element | Description |
|--------------------------------------|---|
| LN: PQSpdMMXU19 (P,Q,S,PF demand) | Active, Reactive, Apparent power and power factor demand. |
| DO: TotW | Total active power in a three phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total active power demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVAR | Total reactive power in a three-phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total reactive power demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVA | Total apparent power in a three-phase circuit. |
| BDA: f | The measurement value of the total apparent power demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotPF | Average power factor for a three-phase circuit. |
| BDA: f | The value of the power factor demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the |

| | |
|-----------------|-------------|
| | data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |

2.3.12 PQSpfMMXU18 – P, Q, S, PF

| Element | Description |
|----------------------------|---|
| LN: PQSpfMMXU18 (P,Q,S,PF) | Active, Reactive, Apparent power and power factor. |
| DO: TotW | Total active power in a three phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total active power. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVAR | Total reactive power in a three-phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total reactive power. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVA | Total apparent power in a three-phase circuit. |
| BDA: f | The measurement value of the total apparent power. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotPF | Average power factor for a three-phase circuit. |
| BDA: f | The value of the power factor. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |

| | |
|-----------------|-------------|
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |

2.3.13 PQSrdMMXU7 – P, Q, S RMS demand

| Element | Description |
|----------------------------------|---|
| PQSrdMMXU7 (P,Q,S RMS demand) | Active, Reactive, Apparent power demand. |
| DO: TotW | Total active power in a three phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total active power RMS demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVAr | Total reactive power in a three-phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total reactive power RMS demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVA | Total apparent power in a three-phase circuit. |
| BDA: f | The measurement value of the total apparent power RMS demand. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |

2.3.14 PQSrMMXU6 – P, Q, S RMS

| Element | Description |
|-----------------------|---|
| PQSrMMXU6 (P,Q,S RMS) | Active, Reactive, Apparent power RMS. |
| DO: TotW | Total active power in a three phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total active power RMS. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVAr | Total reactive power in a three-phase circuit. |
| DA: mag | Deadbanded value (2 p. 53) |
| BDA: f | The measurement value of the total reactive power RMS. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |
| DO: TotVA | Total apparent power in a three-phase circuit. |
| BDA: f | The measurement value of the total apparent power RMS. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |
| DA: units | Units of the attribute(s) representing the value of the data. |
| BDA: SIUnit | SI unit. |
| BDA: multiplier | Multiplier. |

2.3.15 PS1SGGIO29 – Programmable stage 1 start

| Element | Description |
|------------|---|
| PS1TGGIO37 | Programmable stage 1 start. |
| DO: Ind | Indication of the status. |
| DA: stVal | The status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |

2.3.16 PS1TGGIO37 – Programmable stage 1 trip

| Element | Description |
|------------|---|
| PS1TGGIO37 | Programmable stage 1 trip. |
| DO: Ind | Indication of the status. |
| DA: stVal | The status value of the data. |
| DA: q | Quality (1 p. 55). |
| DA: t | Timestamp of the last change in one of the attribute(s) representing the value of the data or in the q attribute (1 p. 58). |

2.3.17 Programmable stages 2 – 8 start

The Logical nodes of the starts of the programmable stages 2 – 8 have the same structure as Programmable stage 1 start above.

The logical nodes are:

1. PS2SGGIO30 (Programmable stage 2 start)
2. PS3SGGIO31 (Programmable stage 3 start)
3. PS4SGGIO32 (Programmable stage 4 start)
4. PS5SGGIO33 (Programmable stage 5 start)
5. PS6SGGIO34 (Programmable stage 6 start)
6. PS7SGGIO35 (Programmable stage 7 start)

2.3.18 Programmable stages 2 – 8 trip

The Logical nodes of the trips of the programmable stages 2 – 8 have the same structure as Programmable stage 1 trip above.

The logical nodes are:

1. PS2TGGIO38 (Programmable stage 2 trip)
2. PS3TGGIO39 (Programmable stage 3 trip)
3. PS4TGGIO40 (Programmable stage 4 trip)
4. PS5TGGIO41 (Programmable stage 5 trip)
5. PS6TGGIO42 (Programmable stage 6 trip)
6. PS7TGGIO43 (Programmable stage 7 trip)

3 Bibliography

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