

**Description of IEC 61850 data maps 1 and 2 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 1 and 2 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 1

2.2.1 AR1ftGGIO16 – AR1 final trip

Element	Description
LN: AR1ftGGIO16 (AR1 final trip)	The status of final trip of Auto-Reclose 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 AR1ftGGIO17 – AR2 final trip

Element	Description
LN: AR1ftGGIO17 (AR2 final trip)	The status of final trip of Auto-Reclose 2
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).

2.2.3 AR1ftGGIO18 – AR3 final trip

Element	Description
LN: AR1ftGGIO18 (AR3 final trip)	The status of final trip of Auto-Reclose 3
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).

2.2.4 AR1ftGGIO19 – AR4 final trip

Element	Description
LN: AR1ftGGIO19 (AR4 final trip)	The status of final trip of Auto-Reclose 4
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).

2.2.5 AR5RREC1 – Auto-reclose (AR)

Element	Description
LN: AR5RREC1	Auto-reclose (AR).
DO: BlkRec	Block reclosing.
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: 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. (2)
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: AutoRecSt	Auto Reclosing 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).

2.2.6 ARcftGGIO15 – AR critical final trip

Element	Description
LN: ARcftGGIO15 (AR critical final trip)	The status of the Auto-reclose critical final 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).

2.2.7 ARcreGGIO13 – AR critical request

Element	Description
LN: ARcreGGIO13 (AR critical request)	The status of the Auto-reclose critical request.
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).

2.2.8 ARftGGIO14 – AR final trip

Element	Description
LN: ARftGGIO14 (AR final trip)	The status of the Auto-reclose final 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).

2.2.9 ARlocGGIO2 – AR locked

Element	Description
LN: ARlocGGIO2 (AR locked)	Status of Auto-reclose locked.
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).

2.2.10 ARre1GGIO3 – AR request 1

Element	Description
LN: ARre1GGIO3 (AR request 1)	Status of Auto-reclose request 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).

2.2.11 ARre2GGIO4 – AR request 2

Element	Description
LN: ARre2GGIO4 (AR request 2)	Status of Auto-reclose request 2.
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).

2.2.12 ARre3GGIO5 – AR request 3

Element	Description
LN: ARre3GGIO5 (AR request 3)	Status of Auto-reclose request 3.
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).

2.2.13 ARre4GGIO6 – AR request 4

Element	Description
LN: ARre4GGIO6 (AR request 4)	Status of Auto-reclose request 4.
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).

2.2.14 ARre5GGIO7 – AR request 5

Element	Description
LN: ARre5GGIO7 (AR request 5)	Status of Auto-reclose request 5.
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).

2.2.15 ARrunGGIO1 – AR running

Element	Description
LN: ARrunGGIO1 (AR running)	Status of Auto-reclose running.
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).

2.2.16 ARsh1GGIO8 – AR shot 1

Element	Description
LN: ARsh1GGIO8 (AR shot 1)	Status of Auto-reclose shot 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).

2.2.17 ARsh2GGIO9 – AR shot 2

Element	Description
LN: ARsh2GGIO9 (AR shot 2)	Status of Auto-reclose shot 2.
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).

2.2.18 ARsh3GGIO10 – AR shot 3

Element	Description
LN: ARsh3GGIO10 (AR shot 3)	Status of Auto-reclose shot 3.
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).

2.2.19 ARsh4GGIO11 – AR shot 4

Element	Description
LN: ARsh4GGIO11 (AR shot 4)	Status of Auto-reclose shot 4.
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).

2.2.20 ARsh5GGIO12 – AR shot 5

Element	Description
LN: ARsh5GGIO12 (AR shot 5)	Status of Auto-reclose shot 5.
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).

2.2.21 CBFPPIOC4 – CB failure protection

Element	Description
LN: CBFPPIOC4	Circuit-breaker failure protection
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).

2.2.22 CBWA1GGIO20 – CB wear alarm 1

Element	Description
LN: CBWA1GGIO20 (CB wear alarm 1)	Status of Circuit-breaker wear alarm 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).

2.2.23 CBWA2GGIO21 – CB wear alarm 2

Element	Description
LN: CBWA2GGIO21 (CB wear alarm 2)	Status of Circuit-breaker wear alarm 2.
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).

2.2.24 CN01GGIO103 – Counter 1

Element	Description
LN: CN01GGIO103 (Counter 1)	Counter 1.
DO: IntIn	Integer status input.
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).

2.2.25 CN02GGIO104 – Counter 2

Element	Description
LN: CN02GGIO104 (Counter 2)	Counter 2.
DO: IntIn	Integer status input.
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).

2.2.26 Counters 3 – 32

The rest of the counters have the same structure as Counter 1 and Counter 2.
The LN:s of the counters not already covered in this document are listed below:

1. CN04GGIO106 – Counter 4
2. CN05GGIO107 – Counter 5
3. CN06GGIO108 – Counter 6
4. CN07GGIO109 – Counter 7
5. CN08GGIO110 – Counter 8
6. CN09GGIO111 – Counter 9
7. CN10GGIO112 – Counter 10
8. CN11GGIO113 – Counter 11
9. CN12GGIO114 – Counter 12
10. CN13GGIO115 – Counter 13
11. CN14GGIO116 – Counter 14
12. CN15GGIO117 – Counter 15
13. CN16GGIO118 – Counter 16
14. CN17GGIO119 – Counter 17
15. CN18GGIO120 – Counter 18
16. CN21GGIO123 – Counter 21
17. CN22GGIO124 – Counter 22
18. CN23GGIO125 – Counter 23
19. CN24GGIO126 – Counter 24
20. CN25GGIO127 – Counter 25
21. CN26GGIO128 – Counter 26
22. CN27GGIO129 – Counter 27
23. CN28GGIO130 – Counter 28
24. CN29GGIO131 – Counter 29

- 25. CN30GGIO132 – Counter 30
- 26. CN31GGIO133 – Counter 31
- 27. CN32GGIO134 – Counter 32

2.3 Data map 2

2.3.1 Counters 8 – 32

See subsection 2.2.26 of this document.

2.3.2 CTAlmGGIO22 – CT alarm

Element	Description
LN: CTAlmGGIO22 (CT alarm)	Status of the CT alarm.
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).

2.3.3 DEF1PTOC9 – IoDir>

Element	Description
LN: DEF1PTOC9 (IoDir>)	Directional earth fault protection stage 1.
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 DEF2PTOC10 – IoDir>>

Element	Description
LN: DEF2PTOC10 (IoDir>>)	Directional earth fault protection stage 2.
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 dfdtPFRC1 – df/dt>

Element	Description
LN: dfdtPFRC1(df/dt>)	Rate of change of frequency (ROFOC) protection.
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	
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 DI01GGIO45 – Digital input 1

Element	Description
LN: DI01GGIO45(Digital input 1)	The value of digital input 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).

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