

SIPROTEC

Multifunction protection with control

7SJ61 / 7SJ62 / 7SJ64

Communication module

Redundant IEC 60870-5-103

Bus mapping

Preface

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Liability statement

We have checked the contents of this manual against the described hardware and software. Nevertheless, deviations may occur so that we cannot guarantee the entire harmony with the product.

The contents of this manual will be checked in periodical intervals, corrections will be made in the following editions. We look forward to your suggestions for improvement.

We reserve the right to make technical improvements without notice.

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Preface

Aim of This Manual The manual is divided into the following topics:

- Notes to SIPROTEC objects
- Redundant IEC 60870-5-103 Device Profile
- Bus mapping

General information about design, configuration, and operation of SIPROTEC devices are laid down in the SIPROTEC 4 system manual, order no. E50417-H1176-C151.

Target Audience Protection engineers, commissioning engineers, persons who are involved in setting, testing and service of protection, automation, and control devices, as well as operation personnel in electrical plants and power stations.

Additional literature This manual describes the redundant IEC 60870-5-103 Device Profile of the SIPROTEC devices.

The following additional manuals inform you about the redundant IEC 60870-5-103 and the function, operation, assembly and commissioning of the SIPROTEC devices:

Manual	Contents	Order number
Multi-Functional Protective Relay with BayController SIPROTEC 7SJ61	Function, operation, assembly and commissioning of the SIPROTEC device 7SJ61	C53000-G1140-C210
Multi-Functional Protective Relay with Local Control SIPROTEC 7SJ62/64	Function, operation, assembly and commissioning of the SIPROTEC device 7SJ62	C53000-G1140-C207
IEC 60870-5-103 Communication Database	redundant IEC 60870-5-103 communication database of the SIPROTEC devices	C53000-L2540-A301

IEC 60870-5-103 Specification

The IEC 60870-5-103 specification and the structure of the IEC 60870-5-103 messages are defined in:

- > International Standard IEC 60870-5-103
Transmission protocols-
Companion standard for the informative interface of protection equipment
Edition 1997-12
Reference number CEI/IEC 60870-5-103: 1997

Applicability of this Manual

This manual is valid for

- SIPROTEC 4 devices 7SJ61 / 7SJ62 / 7SJ64 version V4.80 or higher
- Redundant IEC 60870-5-103 communication module version 01.00.01 or higher.



Note:

The redundant IEC 60870-5-103 module is not for all SIPROTEC devices available. Check the manual of the device or contact your Siemens representative.

For device parameterization **DIGSI 4 version 4.8 or higher** and IEC 60870-5-103 standard mappings 3-1 to 3-n (n = device type dependent number of standard mappings) have to be used.

Additional Support

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, the matter should be referred to the local Siemens representative.

Instructions and Warnings

The warnings and notes contained in this manual serve for your own safety and for an appropriate lifetime of the device. Please observe them!

The following terms are used:

DANGER

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken. This particularly applies to damage on or in the device itself and consequential damage thereof.

Note

indicates information about the device or respective part of the instruction manual which is essential to highlight.



Warning!

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety rules can result in severe personal injury or property damage.

Only qualified personnel shall work on and around this equipment after becoming thoroughly familiar with all warnings and safety notices of this manual as well as with the applicable safety regulations.

The successful and safe operation of this device is dependent on proper handling, installation, operation, and maintenance by qualified personnel under observance of all warnings and hints contained in this manual.

In particular the general erection and safety regulations (e.g. IEC, DIN, VDE, EN or other national and international standards) regarding the correct use of hoisting gear must be observed. Non-observance can result in death, personal injury or substantial property damage.

QUALIFIED PERSONNEL

For the purpose of this instruction manual and product labels, a qualified person is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, he has the following qualifications:

- Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment in accordance with established safety practices.
- Is trained in rendering first aid.

Typographic and Symbol Conventions

The following text formats are used when literal information from the device or to the device appear in the text flow:

Parameter names, i.e. designators of configuration or function parameters which may appear word-for-word in the display of the device or on the screen of a personal computer (with operation software DIGSI 4), are marked in bold letters of a monospace type style.

Parameter options, i.e. possible settings of text parameters, which may appear word-for-word in the display of the device or on the screen of a personal computer (with operation software DIGSI 4), are written in italic style, additionally.

“Annunciations”, i.e. designators for information, which may be output by the relay or required from other devices or from the switch gear, are marked in a monospace type style in quotation marks.

Deviations may be permitted in drawings when the type of designator can be obviously derived from the illustration.



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Notes to SIPROTEC objects

1

This chapter contains notes for the use and evaluation of certain SIPROTEC objects which are available via IEC 60870-5-103 communication.

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Note

The description of the standard mappings contains the pre-allocation of the mapping files at delivery or first assignment of a mapping in DIGSI 4 to the SIPROTEC device.

Changes of the allocation and the scaling of the measured values are possible in adaptation to the concrete installation environment (ref. to page 3).

1.1 Annunciations



Note

Depending on the device composition and the existing protection packages not all of the indicated binary inputs or protection annunciations (and corresponding IEC 60870-5-103 Information numbers) may be available in the SIPROTEC device

1.1.1 Error with a summary alarm

The "Error with a summary alarm" (Obj.- Adr. 140) is ON if at least one of the following internal alarms assumes the value ON:

- "Error 5V", "Error 0V", "Error -5V", "Failure Battery empty", "Error Power Supply"
- "Error I/O Board", "Error Board 1", "Error Board 2", "Error Board 3", "Error Board 4", "Error Board 5", "Error Board 6", "Error Board 7"
- "Error Offset", "Calibration data fault"

Reference ref to chap. 3.2.8

1.1.2 Alarm Summary Event

The "Alarm summary event" (Obj.- Adr. 160) is indicated, if at least one of the following internal alarms assumes the ON status:

- "Failure Current Balance", "Failure Current Summation", "Voltage Balance"
- "Failure Phase Sequence Current", "Failure Phase Sequence Voltage",
- "Failure RTD-Box 1", "Failure RTD-Box 2".

Reference ret. to chap. 3.2.8

1.1.3 Stop Data Transmission

The functionality "Stop data transmission" is not supported via IEC 60870-5-103 communication. If "Stop data transmission" is active nevertheless data via IEC 60870-5-103 will be transmitted furthermore.

The annunciation "DataStop" (Obj.-Adr. 16) signals the activation of "Stop data transmission" however and can be evaluated correspondingly in the IEC 60870-5-103 master.

Reference ref. to chap. 3.2.8

1.2 Commands



Note

The allocation of the output relays to the switching devices and to the binary outputs is defined during parametrization of the SIPROTEC devices.

Depending on the device composition there may be less than the indicated output relays (and corresponding IEC 60870-5-103 Information numbers) available in the SIPROTEC device.

1.2.1 Single Commands

The command output mode (*pulse output*, *continuous output*) is changeable for the single commands using parametrization software DIGSI 4.

The switching direction OFF for single commands with *pulse output* is not permitted and is rejected in the SIPROTEC device.

Reference ref. to chap. 3.1.2

1.2.2 Changing the setting group

Switching on one setting group automatically switches off the current active setting group. Transmission of the value OFF is insignificant for the change of the setting group and is refused by the device.

A change of the setting group is only possible via IEC 60870-5-103 if the parameter **CHANGE TO ANOTHER SETTING GROUP** (parameter address = 302) has the value "Protocol".

Reference Refer to chapter 3.1.2 to the command for changing the setting group. The indication for a change of a setting group is shown in chapter 3.2.8

1.3 Measured values



Note

Depending on the device composition not all of the indicated analog inputs (and corresponding IEC 60870-5-103 mapping entries) may be available in the SIPROTEC device.

For the transmission of measured values, the compatible range and the private range can be used. Are there several measurement telegrams parameterised then these are transferred cyclically after each other.



Note

If all parameterised measurement telegrams aren't transferred, the parameter `Scanning period (in ms) for measurements` must be put on a greater value.

The range of the values which can be transmitted is mostly +/-240% or +/-2.4 of the rated value. The value in data unit 9 has 13 bit (1 sign, 12 bit data). That means that +/- 4096 indicates +/- 240% of the measured value. Some following measured values use a different definition:

- cos Phi: -4096 relates to cos PHI = -1; +4096 relates to cos PHI = +1
- IEE real, IEE reactive: -4096 relates to IEE = -800 mA; +4096 relates to IEE = +800 mA

Changes of the scaling of the measured values are possible in adaptation to the concrete installation environment (ref. to manual "IEC 60870-5-103 Communication database").

Reference

Refer to chapter 3.3

1.4 Metered measurands

Scaling

Metering values (e.g. kWh) are not defined in the IEC 60870-5-103 standard and there are no compatible data units available which are suitable for the transmission of metered values. Some SIPROTEC 4 relays offer the possibility to transmit metered values via the IEC 60870-5-103 interface. For this reason, the private data unit 205 has been defined for the transmission of metered values. This data unit 205 is sent spontaneously. Only one metering value per data unit is transmitted.

The scaling of the metered measurands, which are derived from measured values is defined as:

60000 impulses per hour for $V = V_{\text{prim}}$ and $I = I_{\text{prim}}$

$V_{\text{prim}} = \text{Full Scale Voltage}$
(parameter address = 1101)

$I_{\text{prim}} = \text{FULL SCALE CURRENT}$
parameter address = 1102)

Example

In the parameter set is configured:

$I_{\text{prim}} = 1000 \text{ A}$ and $V_{\text{prim}} = 400.0 \text{ kV}$,

60000 impulses correspond so that:

$1 \text{ h} * 1000 \text{ A} * 400 \text{ kV} * \sqrt{3} = 692.82 \text{ MWh}$



Note

- The type of the update (cyclic, with or without deletion) and the update interval must be programmed for the metered measurands with the parametrization software DIGSI 4. If the parameter was set to update with deletion, then the value will be deleted in the device after transmission.
- The scaling of the metered measurands at binary inputs ("Wp(puls)" and "Wq(puls)") is independent from the definition above and depends on the externally connected pulse generator.

Reference

Refer to chapter 3.3.5

IEC 60870-5-103 Interoperability

2

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Redundant IEC 60870-5-103

DEVICE PROFILE DOCUMENT

Vendor Name: **SIEMENS AG**

Device Name: **7SJ61 / 7SJ62 / 7SJ64**

2.1 Physical layer

2.1.1 Electrical interface

- EIA RS-485
- Number of loads _____ for one protection equipment

2.1.2 Optical interface

- Glass fibre
- Plastic fibre
- F-SMA type connector
- BFOC/2,5 type connector

2.1.3 Transmission speed

- 2 400 bit/s
- 4 800 bit/s
- 9 600 bit/s
- 19 200 bit/s
- 38 400 bit/s
- 57 600 bit/s

2.2 Link layer

There are no choices for the link layer.

2.3 Application layer

2.3.1 Transmission mode for application data

Mode 1 (least significant octet first), as defined in 4.10 of IEC 60870-5-4, is used exclusively in this companion standard.

2.3.2 Common Address of ASDU

- One Common Address of ASDU (identical with station address)
 More than one Common Address of ASDU

2.3.3 Selection of standard information numbers in monitor direction

2.3.3.1 System functions in monitor direction

INF	Semantics
<input checked="" type="checkbox"/>	<0> End of general interrogation
<input checked="" type="checkbox"/>	<0> Time synchronization
<input checked="" type="checkbox"/>	<2> Reset FCB
<input checked="" type="checkbox"/>	<3> Reset CU
<input checked="" type="checkbox"/>	<4> Start/restart
<input checked="" type="checkbox"/>	<5> Power on

2.3.3.2 Status indications in monitor direction

INF	Semantics
<input checked="" type="checkbox"/>	<16> Auto-recloser active
<input type="checkbox"/>	<17> Teleprotection active
<input checked="" type="checkbox"/>	<18> Protection active
<input type="checkbox"/>	<19> LED reset
<input checked="" type="checkbox"/>	<20> Monitor direction blocked
<input checked="" type="checkbox"/>	<21> Test mode
<input checked="" type="checkbox"/>	<22> Local parameter setting
<input checked="" type="checkbox"/>	<23> Characteristic 1
<input checked="" type="checkbox"/>	<24> Characteristic 2
<input checked="" type="checkbox"/>	<25> Characteristic 3
<input checked="" type="checkbox"/>	<26> Characteristic 4
<input type="checkbox"/>	<27> Auxiliary input 1
<input type="checkbox"/>	<28> Auxiliary input 2
<input type="checkbox"/>	<29> Auxiliary input 3
<input type="checkbox"/>	<30> Auxiliary input 4

2.3.3.3 Supervision indications in monitor direction

INF	Semantics
<input checked="" type="checkbox"/>	<32> Measurand supervision I
<input type="checkbox"/>	<33> Measurand supervision V
<input checked="" type="checkbox"/>	<35> Phase sequence supervision
<input type="checkbox"/>	<36> Trip circuit supervision
<input type="checkbox"/>	<37> I>> back-up operation
<input checked="" type="checkbox"/>	<38> VT fuse failure
<input type="checkbox"/>	<39> Teleprotection disturbed
<input checked="" type="checkbox"/>	<46> Group warning
<input checked="" type="checkbox"/>	<47> Group alarm

2.3.3.4 Earth fault indications in monitor direction

INF	Semantics
<input checked="" type="checkbox"/>	<48> Earth fault L1
<input checked="" type="checkbox"/>	<49> Earth fault L2
<input checked="" type="checkbox"/>	<50> Earth fault L3
<input checked="" type="checkbox"/>	<51> Earth fault forward
<input checked="" type="checkbox"/>	<52> Earth fault reverse

2.3.3.5 Fault indications in monitor direction

INF	Semantics
<input checked="" type="checkbox"/>	<64> Start /pick-up L1
<input checked="" type="checkbox"/>	<65> Start /pick-up L2
<input checked="" type="checkbox"/>	<66> Start /pick-up L3
<input checked="" type="checkbox"/>	<67> Start /pick-up N
<input checked="" type="checkbox"/>	<68> General trip
<input type="checkbox"/>	<69> Trip L1
<input type="checkbox"/>	<70> Trip L2
<input type="checkbox"/>	<71> Trip L3
<input type="checkbox"/>	<72> Trip I>> (back-up operation)
<input type="checkbox"/>	<73> Fault location X in ohms
<input type="checkbox"/>	<74> Fault forward/line
<input type="checkbox"/>	<75> Fault reverse/busbar
<input type="checkbox"/>	<76> Teleprotection signal transmitted
<input type="checkbox"/>	<77> Teleprotection signal received
<input type="checkbox"/>	<78> Zone 1
<input type="checkbox"/>	<79> Zone 2
<input type="checkbox"/>	<80> Zone 3
<input type="checkbox"/>	<81> Zone 4
<input type="checkbox"/>	<82> Zone 5
<input type="checkbox"/>	<83> Zone 6
<input checked="" type="checkbox"/>	<84> General start/pick-up
<input checked="" type="checkbox"/>	<85> Breaker failure
<input type="checkbox"/>	<86> Trip measuring system L1
<input type="checkbox"/>	<87> Trip measuring system L2
<input type="checkbox"/>	<88> Trip measuring system L3
<input type="checkbox"/>	<89> Trip measuring system E
<input checked="" type="checkbox"/>	<90> Trip I>
<input checked="" type="checkbox"/>	<91> Trip I>>
<input checked="" type="checkbox"/>	<92> Trip IN>
<input checked="" type="checkbox"/>	<93> Trip IN>>

2.3.3.6 Auto-reclosure indications in monitor direction

INF	Semantics
<input checked="" type="checkbox"/>	<128> CB 'on' by AR
<input type="checkbox"/>	<129> CB 'on' by long-time AR
<input checked="" type="checkbox"/>	<130> AR blocked

2.3.3.7 Measurands in monitor direction

INF	Semantics
<input type="checkbox"/>	<144> Measurand I
<input checked="" type="checkbox"/>	<145> Measurands I, V
<input type="checkbox"/>	<146> Measurands I, V, P, Q
<input type="checkbox"/>	<147> Measurands IN, VEN
<input type="checkbox"/>	<148> Measurands IL1,2,3, VL1,2,3, P, Q, f

2.3.3.8 Generic functions in monitor direction

INF Semantics

- <240> Read headings of all defined groups
- <241> Read values or attributes of all entries of one group
- <243> Read directory of a single entry
- <244> Read value or attribute of a single entry
- <245> End of general interrogation of generic data
- <249> Write entry with confirmation
- <250> Write entry with execution
- <251> Write entry aborted

2.3.4 Selection of standard information numbers in control direction

2.3.4.1 System functions in control direction

INF Semantics

- <0> Initiation of general interrogation
- <0> Time synchronization

2.3.4.2 General commands in control direction

INF Semantics

- <16> Auto-recloser on/off
- <17> Teleprotection on/off
- <18> Protection on/off
- <19> LED reset
- <23> Activate characteristic 1
- <24> Activate characteristic 2
- <25> Activate characteristic 3
- <26> Activate characteristic 4

2.3.4.3 Generic functions in control direction

INF Semantics

- <240> Read headings of all defined groups
- <241> Read values or attributes of all entries of one group
- <243> Read directory of a single entry
- <244> Read value or attribute of a single entry
- <245> General interrogation of generic data
- <248> Write entry
- <249> Write entry with confirmation
- <250> Write entry with execution
- <251> Write entry abort

2.3.5 Basic application functions

- Test mode
- Blocking of monitor direction
- Disturbance data
- Generic services

2.3.6 Miscellaneous

Measurand	Max. MVAL = rated value times	
	1,2	or 2,4
Current L1	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Current L2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Current L3	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Voltage L1-E	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Voltage L2-E	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Voltage L3-E	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Active power P	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reactive power Q	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Frequency f	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Voltage L1 - L2	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Point List

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3.1 General Command (control direction)

3.1.1 Double Point Command

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
20	240	160	52Breaker	Trip / Close Breaker switch	-
20	240	161	Disconnect	Trip / Close Disconnect switch	-
20	240	164	Gnd switch	Trip / Close Ground switch	-
20	240	162	Switch 1	Trip / Close switch 1	-
20	240	163	Switch 2	Trip / Close switch 2	-
20	240	175	Switch 3	Trip / Close switch 3	-

3.1.2 Single Point Command

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
20	160	16	auto-recl.ac.	activation of Auto-reclosure function	-
20	160	18	Protection	Protection activation	-
20	160	19	Reset LEDs	Reset LEDs	-
20	160	23	Group A	Select parametergroup A and deactivate parametergroup B,C,D	-
20	160	24	Group B	Select parametergroup B and deactivate parametergroup A,C,D	-
20	160	25	Group C	Select parametergroup C and deactivate parametergroup A,B,D	-
20	160	26	Group D	Select parametergroup D and deactivate parametergroup A,B,C	-

3.1.3 User defined Single Point Command

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
20	160	30	output 501	User define 1	-
20	160	31	output 502	User define 2	-
20	160	32	output 503	User define 3	-
20	160	33	output 504	User define 4	-
20	160	34	output 505	User define 5	-

3.2 Indications in monitor direction

3.2.1 Automatic reclosure status

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	40	1	>79 ON	>79 ON; Automatic reclosure ON; ON = 1, OFF = 0	2701
1	40	2	>79 OFF	>79 OFF; ON = 1, OFF = 0	2702
1	40	3	> BLOCK 79	>BLOCK 79; ON = 1, OFF = 0	2703
2	40	15	>79 TRIP 1p	>Start 79 Ground programm; ON = 1, OFF = 0	2715
2	40	16	>79 TRIP 3p	>Start 79 Phase programm; ON = 1, OFF = 0	2716
1	40	20	>Enable ANSI#-2	>Enable 50/67-(N)-2 (override 79 blk); ON = 1, OFF = 0	2720
1	40	30	>CB Ready	>Circuit breaker READY for reclosing; ON = 1, OFF = 0	2730
1	40	81	79 OFF	79 Auto recloser is switched OFF; ON = 1, OFF = 0	2781
2	40	85	79 DynBlock	79 – Auto-reclose is dynamically BLOCKED; ON = 1, OFF = 0	2785
1	40	101	79 in progress	79 – in progress; ON = 1, OFF = 0	2801
1	40	162	79 Successful	79 – cycle successful; ON = 1, OFF = 0	2862
2	40	163	79 Lockout	79 – Lockout; ON = 1, OFF = 0	2863
2	40	180	79 L_N Sequence	79-A/R single phase reclosing sequence; Program earthfault is running = 1, Program is deactivated = 0	2878
2	40	181	79 L-L Sequence	79-A/R multi-phase reclosing sequence; ON = 1, OFF = 0	2879
1	160	16	79 ON	79 Auto recloser is switched ON; ON = 1, OFF = 0	2782
1	160	128	79 Close	79 – Close command; ON = 1	2851

3.2.2 Time Overcurrent protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	60	1	>BLOCK 50-2	>BLOCK 50-2; ON = 1, OFF = 0	1721
1	60	2	>BLOCK 50-1	>BLOCK 50-1; ON = 1, OFF = 0	1722
1	60	3	>BLOCK 51	>BLOCK 51; ON = 1, OFF = 0	1723
1	60	4	>BLOCK 51N-2	>BLOCK 50N-2; ON = 1, OFF = 0	1724
1	60	5	>BLOCK 50N-1	>BLOCK 50N-1; ON = 1, OFF = 0	1725
1	60	6	>BLOCK 51N	>BLOCK 51N; ON = 1, OFF = 0	1726
1	60	21	50/51 PH OFF	O/C switched OFF; ON = 1, OFF = 0	1751
1	60	22	50/51 PH BLK	O/C is BLOCKED; ON = 1, OFF = 0	1752
1	60	23	50/51 PH ACT	50/51 O/C is ACTIVE; ON = 1, OFF = 0	1753
1	60	26	50N/51N OFF	50N/51N is OFF; ON = 1, OFF = 0	1756
1	60	27	50N/51N BLK	50N/51N BLK; ON = 1, OFF = 0	1757
1	60	28	50N/51N ACT	50N/51N is ACTIVE; ON = 1, OFF = 0	1758
2	60	49	50-2 Time Out	50-2 Time Out; ON = 1	1804
2	60	53	50-1 Time Out	50-1 Time Out; ON = 1	1814
2	60	57	51 Time Out	51 Time Out; ON = 1	1824
2	60	58	51 TRIP	51 TRIP; ON = 1, OFF = 0	1825
2	60	59	50N-2 picked up	50N-2 picked up; ON = 1, OFF = 0	1831
2	60	60	50N-2 TimeOut	50N-2 Time Out; ON = 1	1832
2	60	62	50N-1 picked up	50N-1 picked up; ON = 1, OFF = 0	1834
2	60	63	50N-1 TimeOut	50N-1 Time Out; ON = 1	1835
2	60	64	51N picked up	51N picked up; ON = 1, OFF = 0	1837
2	60	65	51N TimeOut	51N Time Out; ON = 1	1838
2	60	66	51N TRIP	51N TRIP; ON = 1, OFF = 0	1839
2	60	75	50-2 picked up	50-2 picked up; ON = 1, OFF = 0	1800
2	60	76	50-1 picked up	50-1 picked up; ON = 1, OFF = 0	1810
2	60	77	51 picked up	51 picked up; ON = 1, OFF = 0	1820
1	60	243	>BLK CLP stpTim	>BLOCK Cold-Load-Pickup stop timer; ON = 1, OFF = 0	1731
1	60	244	CLP OFF	Cold-Load-Pickup switched OFF; ON = 1, OFF = 0	1994
1	60	245	CLP BLOCKED	Cold-Load-Pickup is BLOCKED; Blocked = 1, Unblocked = 0	1995
1	60	246	CLP running	Cold-Load-Pickup is RUNNING; ON = 1, OFF = 0	1996
1	60	247	Dyn set. ACTIVE	Dynamic settings are ACTIVE; ON = 1, OFF = 0	1997
2	160	64	50/51 Ph A PU	50/51 Phase A picked up; ON = 1, OFF = 0	1762
2	160	65	50/51 Ph B PU	50/51 Phase B picked up; ON = 1, OFF = 0	1763
2	160	66	50/51 Ph C PU	50/51 Phase C picked up; ON = 1, OFF = 0	1764

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
2	160	67	50N/51NPickedup	50N/51N picked up; ON = 1, OFF = 0	1765
2	160	68	50 (N)/51(N)TRIP	50(N)/51(N) TRIP; ON = 1	1791
2	160	84	50 (N) / 51 (N) PU	50(N)/51(N) O/C PICKUP; ON = 1, OFF = 0	1761
2	160	90	50-1 TRIP	50-1 TRIP; ON = 1	1815
2	160	91	50-2 TRIP	50-2 TRIP; ON = 1	1805
2	160	92	50N-1 TRIP	50N-1 TRIP; ON = 1	1836
2	160	93	50N-2 TRIP	50N-2 TRIP; ON = 1	1833

3.2.3 InRush Function

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
2	60	80	50-1 InRushPU	50-1 InRush picked up; ON = 1, OFF = 0	7551
2	60	81	50N-1 InRushPU	50N-1 InRush picked up; ON = 1, OFF = 0	7552
2	60	82	51 InRushPU	51 InRush picked up; ON = 1, OFF = 0	7553
2	60	83	51N InRushPU	51N InRush picked up; ON = 1, OFF = 0	7554
2	60	84	67-1 InRushPU	67-1 InRush picked up; ON = 1, OFF = 0	7559
2	60	85	67N-1 InRushPU	67N-1 InRush picked up; ON = 1, OFF = 0	7560
2	60	86	67-TOC InRushPU	67-TOC InRush picked up; ON = 1, OFF = 0	7561
2	60	87	67N-TOC InRushPU	67N-TOC InRush picked up; ON = 1, OFF = 0	7562
2	60	88	Gnd InRush PU	Ground InRush picked up; ON = 1, OFF = 0	7564
2	60	89	Ia InRush PU	Phase A InRush picked up; ON = 1, OFF = 0	7565
2	60	90	Ib InRush PU	Phase B InRush picked up; ON = 1, OFF = 0	7566
2	60	91	Ic InRush PU	Phase C InRush picked up; ON = 1, OFF = 0	7567
1	60	92	InRush OFF	InRush OFF; ON = 1, OFF = 0	7556
1	60	93	InRushPhBLOCKED	InRush Phase BLOCKED; ON = 1, OFF = 0	7557
2	60	94	InRush Gnd BLK	InRush Ground BLOCKED; ON = 1, OFF = 0	7558
2	60	101	PhA InrushBlk	Phase A trip blocked by inrush detection; ON = 1, OFF = 0	1840
2	60	102	PhB InrushBlk	Phase B trip blocked by inrush detection; ON = 1, OFF = 0	1841
2	60	103	PhC InrushBlk	Phase C trip blocked by inrush detection; ON = 1, OFF = 0	1842
2	60	104	INRUSH X-BLK	Cross blk: PhX blocked Phy; ON = 1, OFF = 0	1843

3.2.4 Directional time overcurrent protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	63	1	>BLOCK 67-1	>BLOCK 67-1; ON = 1, OFF = 0	2621
1	63	2	>BLOCK 67-TOC	>BLOCK 67-TOC; ON = 1, OFF = 0	2622
1	63	3	>BLOCK 67N-1	>BLOCK 67N-1; ON = 1, OFF = 0	2623
1	63	4	>BLOCK 67N-TOC	>BLOCK 67N-TOC; ON = 1, OFF = 0	2624
1	63	10	67/67-TOC OFF	67/67-TOC switched OFF; ON = 1, OFF = 0	2651
1	63	11	67 BLOCKED	67/67-TOC is BLOCKED; blocked = 1, unblocked = 0	2652
1	63	12	67 ACTIVE	67/67-TOC is ACTIVE; activate = 1, deactivate = 0	2653
1	63	13	67N OFF	67N/67N-TOC switched OFF; ON = 1, OFF = 0	2656
1	63	14	67N BLOCKED	67N/67N-TOC is BLOCKED; blocked = 1, unblocked = 0	2657
1	63	15	67N ACTIVE	67N/67N-TOC is ACTIVE; activate = 1, deactivate = 0	2658
2	63	20	67-1 picked up	67-1 picked up; ON = 1, OFF = 0	2660
2	63	24	67-1 Time Out	67-1 Time Out; ON = 1, OFF = 0	2664
2	63	25	67-1 TRIP	67-1 TRIP; ON = 1, OFF = 0	2665
2	63	30	67-TOC pickedup	67-TOC picked up; ON = 1, OFF = 0	2670
2	63	34	67-TOC Time Out	67-TOC Time Out; ON = 1, OFF = 0	2674
2	63	35	67-TOC TRIP	67-TOC TRIP; ON = 1, OFF = 0	2675
2	63	41	67N-1 picked up	67N-1 picked up; ON = 1, OFF = 0	2681
2	63	42	67N-1 Time Out	67N-1 Time Out; ON = 1, OFF = 0	2682
2	63	43	67N-1 TRIP	67N-1 TRIP; ON = 1, OFF = 0	2683
2	63	44	67N-TOCPickedup	67N-TOC picked up; ON = 1, OFF = 0	2684
2	63	45	67N-TOC TimeOut	67N-TOC Time Out; ON = 1, OFF = 0	2685
2	63	46	67N-TOC TRIP	67N-TOC TRIP; ON = 1, OFF = 0	2686
2	63	50	67/67N pickedup	67/67N picked up; ON = 1, OFF = 0	2691
2	63	51	67 A picked up	67/67-TOC Phase A picked up; ON = 1, OFF = 0	2692
2	63	52	67 B picked up	67/67-TOC Phase B picked up; ON = 1, OFF = 0	2693
2	63	53	67 C picked up	67/67-TOC Phase C picked up; ON = 1, OFF = 0	2694
2	63	54	67N picked up	67N/67N-TOC picked up; ON = 1, OFF = 0	2695
2	63	55	67/67N TRIP	67/67N TRIP; ON = 1, OFF = 0	2696
2	63	62	67N-2 picked up	67N-2 picked up; ON = 1, OFF = 0	2646
2	63	63	67N-2 Time Out	67N-2 Time Out; ON = 1, OFF = 0	2648
2	63	64	67N-2 TRIP	67N-2 TRIP; ON = 1, OFF = 0	2679
2	63	67	67-2 picked up	67-2 picked up; ON = 1, OFF = 0	2642
2	63	71	67-2 Time Out	67-2 Time Out; ON = 1, OFF = 0	2647
2	63	72	67-2 TRIP	67-2 TRIP; ON = 1, OFF = 0	2649

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	63	73	>BLOCK 67-2	>BLOCK 67-2; ON = 1, OFF = 0	2615
1	63	74	>BLOCK 67N-2	>BLOCK 67N-2; ON = 1, OFF = 0	2616
1	63	81	Phase A forward	Phase A forward; ON = 1, OFF = 0	2628
1	63	82	Phase B forward	Phase B forward; ON = 1, OFF = 0	2629
1	63	83	Phase C forward	Phase C forward; ON = 1, OFF = 0	2630
1	63	84	Phase A reverse	Phase A reverse; ON = 1, OFF = 0	2632
1	63	85	Phase B reverse	Phase B reverse; ON = 1, OFF = 0	2633
1	63	86	Phase C reverse	Phase C reverse; ON = 1, OFF = 0	2634
1	63	87	Ground forward	Ground forward; ON = 1, OFF = 0	2635
1	63	88	Ground reverse	Ground reverse; ON = 1, OFF = 0	2636

3.2.5 Unbalanced load protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	70	126	>46 BLOCK	>BLOCK 46; ON = 1, OFF = 0	5143
1	70	131	46 OFF	46 switched OFF; ON = 1, OFF = 0	5151
1	70	132	46 BLOCKED	46 is BLOCKED; ON = 1, OFF = 0	5152
1	70	133	46 ACTIVE	46 is ACTIVE; ON = 1, OFF = 0	5153
1	70	138	46-2 picked up	46-2 picked up; ON = 1, OFF = 0	5159
1	70	141	46-TOC pickedup	46-TOC picked up; ON = 1, OFF = 0	5166
1	70	149	46 TRIP	46 TRIP picked up; ON = 1, OFF = 0	5170
1	70	150	46-1 picked up	46-1 picked up; ON = 1, OFF = 0	5165

3.2.6 Frequency protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	70	176	>BLOCK 810/U	>BLOCK 810/U; ON = 1, OFF = 0	5203
1	70	177	>BLOCK 81-1	>BLOCK 81-1; ON = 1, OFF = 0	5206
1	70	178	>BLOCK 81-2	>BLOCK 81-2; ON = 1, OFF = 0	5207
1	70	179	>BLOCK 81-3	>BLOCK 81-3; ON = 1, OFF = 0	5208
1	70	180	>BLOCK 81-4	>BLOCK 81-4; ON = 1, OFF = 0	5209
1	70	181	81 OFF	81 OFF; ON = 1, OFF = 0	5211
1	70	182	81 BLOCKED	81 BLOCKED; ON = 1, OFF = 0	5212
1	70	183	81 ACTIVE	81 ACTIVE; ON = 1, OFF = 0	5213
2	70	230	81-1 picked up	81-1 picked up; ON = 1, OFF = 0	5232
2	70	231	81-2 picked up	81-2 picked up; ON = 1, OFF = 0	5233
2	70	232	81-3 picked up	81-3 picked up; ON = 1, OFF = 0	5234
2	70	233	81-4 picked up	81-4 picked up; ON = 1, OFF = 0	5235
2	70	234	81-1 TRIP	81-1 TRIP; ON = 1, OFF = 0	5236
2	70	235	81-2 TRIP	81-2 TRIP; ON = 1, OFF = 0	5237
2	70	236	81-3 TRIP	81-3 TRIP; ON = 1, OFF = 0	5238
2	70	237	81-4 TRIP	81-4 TRIP; ON = 1, OFF = 0	5239

3.2.7 Voltage protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	74	3	>BLOCK 27	>BLOCK 27 undervoltage protection; ON = 1, OFF = 0	6503
1	74	5	>27 I SUPRVSN	>27-Switch current supervision ON; ON = 1, OFF = 0	6505
1	74	6	>BLOCK 27-1	>BLOCK 27-1 undervoltage protection; ON = 1, OFF = 0	6506
1	74	8	>BLOCK 27-2	>BLOCK 27-2 undervoltage protection; ON = 1, OFF = 0	6508
1	74	9	>FAIL: FEEDER VT	>Failure: Feeder VT; ON = 1, OFF = 0	6509
1	74	10	>FAIL: BUS VT	>Failure: Busbar VT; ON = 1, OFF = 0	6510
1	74	13	>BLCOK 59-1	>BLOCK 59-1 overvoltage protection; ON = 1, OFF = 0	6513
1	74	15	>59 I SUPRVSN	>59-Switch current supervision ON; ON = 1, OFF = 0	6515
1	74	30	27 OFF	27 Undervoltage protection switched OFF; ON = 1, OFF = 0	6530
1	74	31	27 BLOCKED	27 Undervoltage protection is BLOCKED; ON = 1, OFF = 0	6531
1	74	32	27 ACTIVE	27 Undervoltage protection is ACTIVE; ON = 1, OFF = 0	6532
2	74	33	27-1 picked up	27-1 Undervoltage picked up; ON = 1, OFF = 0	6533
2	74	34	27-1 PU CS	27-1 Undervoltage PICKUP w/curr. superv; ON = 1, OFF = 0	6534
2	74	37	27-2 picked up	27-2 Undervoltage picked up; ON = 1, OFF = 0	6537
2	74	38	27-2 PU CS	27-2 Undervoltage PICKUP w/curr. superv; ON = 1, OFF = 0	6538
2	74	39	27-1 TRIP	27-1 Undervoltage TRIP; ON = 1, OFF = 0	6539
2	74	40	27-2 TRIP	27-2 Undervoltage TRIP; ON = 1, OFF = 0	6540
1	74	65	59 OFF	59-Overvoltage protection switched OFF; ON = 1, OFF = 0	6565
1	74	66	59 BLOCKED	59-Overvoltage protection is BLOCKED; ON = 1, OFF = 0	6566
1	74	67	59 ACTIVE	59-Overvoltage protection is ACTIVE; ON = 1, OFF = 0	6567
2	74	68	59-1 picked up	59 picked up; ON = 1, OFF = 0	6568
1	74	70	59-1 TRIP	59 TRIP; ON = 1, OFF = 0	6570

3.2.8 Internal Mode Status

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	101	1	>Door open	>Door open; ON = 1, OFF = 0	-
1	101	2	>CB wait	>Circuit breaker wait; ON = 1, OFF = 0	-
1	101	85	Control auth	Control authority; 0=Remote; 1=Local	-
1	101	86	ModeLOCAL	Mode Local; 0=lokal operation with interlocking; 1=lokal operation without interlocking;	-
1	135	48	>Time Synch	>Synchronize Internal Real Time Clock; ON = 1,	3
1	135	49	>Trig. Wave.Cap.	>Trigger Waveform Capture; ON = 1, OFF = 0	4
1	135	50	>Reset LED's	>Reset LED's; ON = 1	5
1	135	51	>Set Group Bit0	>Setting Group Select Bit 0	7
1	135	52	>Set Group Bit1	>Setting Group Select Bit 1	8
1	135	81	Relay OK	Relay OK; ON = 1, OFF = 0	51
1	135	130	Event Lost	Event lost; ON = 1	110
1	135	136	Flag Lost	Flag lost; ON = 1, OFF = 0	113
1	135	145	Chatter ON	Chatter ON	125
1	135	182	Failure \19I	Failure: Current Summation; ON = 1, OFF = 0	162
1	135	183	Failure I balance	Failure: Current Balance; ON = 1, OFF = 0	163
1	135	186	Failure V balance	Failure: Voltage Balance; ON = 1, OFF = 0	167
1	135	191	Fail Ph. Seq. I	Failure: Phase Sequence Current; ON = 1, OFF = 0	175
1	135	192	Fail Ph. Seq. V	Failure: Phase Sequence Voltage; ON = 1, OFF = 0	176
1	135	197	Meas. Supervision OFF	Measurement Supervision is switched OFF	197
1	135	203	Wave. deleted	Waveform data deleted; ON = 1	203
1	135	229	SP. Op Hours>	Setpoint Operation Hours; ON = 1, OFF = 0	272
1	135	230	SP. I A dmd	Set Point Phase A dmd>; ON = 1, OFF = 0	273
1	135	234	SP. I B dmd	Set Point Phase B dmd>; ON = 1, OFF = 0	274
1	135	235	SP. I C dmd	Set Point Phase C dmd>; ON = 1, OFF = 0	275
1	135	236	SP. I1dmd>	Set Point positive sequence I1dmd>; ON = 1, OFF = 0	276
1	135	237	SP. Pdmd >	Set Point Pdmd >; ON = 1, OFF = 0	277
1	135	238	SP. Qdmd >	Set Point Qdmd >; ON = 1, OFF = 0	278
1	135	239	SP. Sdmd >	Set Point Sdmd >; ON = 1, OFF = 0	279
1	135	244	37 alarm	37 Undercurrent alarm; ON = 1, OFF = 0	284
1	135	245	SP. cos1A alarm	Set point 55 Power factor alarm; ON = 1, OFF = 0	285
1	150	6	>Manual Close	>Manual close command; ON = 1, OFF = 0	356
2	150	151	Relay Pickup	Relay Pickup; ON = 1, OFF = 0	501
2	150	161	Relay TRIP	General TRIP of the relay; ON = 1	511

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	160	5	Initial Start	Initial Start of the Relay; ON = 1	56
1	160	16	protection act.	Protection activation	2782
1	160	20	DataStop	Data stop; ON = 1, OFF = 0; (ref to chap.)	16
1	160	21	Test mode	Test mode; ON = 1, OFF = 0	15
1	160	22	Running	Setting calculation is running; ON = 1, OFF = 0	70
1	160	23	Group A	Protection Parameter Group A; 0 = Group A is deactivated, 1= Group A is activated and Group B,C,D are deactivated.	-
1	160	24	Group B	Protection Parameter Group B; 0 = Group B is deactivated, 1= Group B is activated and Group A,C,D are deactivated.	-
1	160	25	Group C	Protection Parameter Group C; 0 = Group C is deactivated, 1= Group C is activated and Group A,B,D are deactivated.	-
1	160	26	Group D	Protection Parameter Group D; 0 = Group D is deactivated, 1= Group D is activated and Group A,B,C are deactivated.	-
1	160	32	I Supervision	Failure: Current balance Supervision; ON = 1, OFF = 0	161
1	160	35	Fail Ph. Seq.	Failure: Phase Sequence; ON = 1, OFF = 0	171
1	160	38	>No volt	No Volt; ON = 1, OFF = 0	
1	160	46	Alarm Sum Event	Alarm Summary Event; ON = 1, OFF = 0 (ref. to chap. 1.1.2)	160
1	160	47	Error Sum Alarm	Error with a summary alarm; ON = 1, OFF = 0 (ref. to chap. 1.1.1)	140
1	160	130	CS is not ready	79 Auto recloser is NOT ready	2784

3.2.9 Highly sensitive earth fault protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	151	6	>Start Flt. Loc	>Start Fault Locator; ON = 1, OFF = 0	1106
1	151	101	>BLOCK 64	>BLOCK 64; ON = 1, OFF = 0	1201
1	151	102	>BLOCK 50Ns-2	>BLOCK 50Ns-2; ON = 1, OFF = 0	1202
1	151	103	>BLOCK 50Ns-1	>BLOCK 50Ns-1; ON = 1, OFF = 0	1203
1	151	104	>BLOCK 51Ns	>BLOCK 51Ns; ON = 1, OFF = 0	1204
1	151	107	>BLK 50Ns/67Ns	>BLOCK 50Ns/67Ns; ON = 1, OFF = 0	1207
1	151	111	50Ns/67Ns OFF	50Ns/67Ns is OFF; ON = 1, OFF = 0	1211
1	151	112	50Ns/67Ns ACT	50Ns/67Ns is ACTIVE; ON = 1, OFF = 0	1212
2	151	115	64 Pickup	64 displacement voltage pick up; ON = 1, OFF = 0	1215
2	151	117	64 Trip	64 displacement voltage element TRIP; ON = 1, OFF = 0	1217
2	151	121	50Ns-2 Pickup	50Ns-2 Pickup; ON = 1, OFF = 0	1221
2	151	123	50Ns-2 TRIP	50Ns-2 TRIP; ON = 1, OFF = 0	1223
1	151	124	50Ns-1 Pickup	50Ns-1 Pickup; ON = 1, OFF = 0	1224
1	151	126	50Ns-1 TRIP	50Ns-1 TRIP; ON = 1, OFF = 0	1226
1	151	127	51Ns Pickup	51Ns Pickup; ON = 1, OFF = 0	1227
1	151	129	51Ns TRIP	51Ns TRIP; ON = 1, OFF = 0	1229
1	151	130	Sens. Gnd block	Sensitive ground fault detection BLOCKED; ON = 1, OFF = 0	1230
1	151	171	Sens. Gnd Pickup	Sensitive ground fault pick up; ON = 1, OFF = 0	1271
1	151	178	SensGnd undef.	Sensitive Gnd fault direction undefined; ON = 1, OFF = 0	1278
1	160	48	Sens. Gnd Ph A	Sensitive Ground fault picked up in Ph A; ON = 1, OFF = 0	1272
1	160	49	Sens. Gnd Ph B	Sensitive Ground fault picked up in Ph B; ON = 1, OFF = 0	1273
1	160	50	Sens. Gnd Ph C	Sensitive Ground fault picked up in Ph C; ON = 1, OFF = 0	1274
1	160	51	SensGnd Forward	Sensitive Gnd fault in forward direction; ON = 1, OFF = 0	1276
1	160	52	SensGnd Reverse	Sensitive Gnd fault in reverse direction; ON = 1, OFF = 0	1277

3.2.10 Trip coil monitor

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	153	16	74TC BLOCKED	74TC Trip circuit supervision is BLOCKED; ON = 1, OFF = 0	6862
1	153	17	74TC ACTIVE	74TC Trip circuit supervision is ACTIVE; ON = 1, OFF = 0	6863
1	170	51	>74TC trip rel.	>74TC Trip circuit superv.: trip relay; ON = 1, OFF = 0	6852
1	170	52	>74TC brk rel.	>74TC Trip circuit superv.: bkr relay; ON = 1, OFF = 0	6853
1	170	53	74TC OFF	74TC Trip circuit supervision OFF; ON = 1, OFF = 0	6861
1	170	54	74 ProgFail	74TC blocked. Bin. input is not set; ON = 1, OFF = 0	6864
1	170	55	FAIL: Trip cir.	74TCFailure Trip Circuit; ON = 1, OFF = 0	6865

3.2.11 Circuit breaker failure protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	160	85	50BF TRIP	50BF TRIP; ON = 1	1471
1	166	103	>BLOCK 50BF	BLOCK 50BF; ON = 1, OFF = 0	1403
1	166	104	>50BF ext SRC	50BF initiated externally; ON = 1, OFF = 0	1431
1	166	151	50BF OFF	50BF is switched OFF; ON = 1, OFF = 0	1451
1	166	152	50BF BLOCK	50BF is BLOCKED; ON = 1, OFF = 0	1452
1	166	153	50BF ACTIVE	50BF is ACTIVE; ON = 1, OFF = 0	1453
2	166	156	50BF int Pickup	50BF (internal) PICKUP; ON = 1, OFF = 0	1456
2	166	157	50BF ext Pickup	50BF (external) PICKUP; ON = 1, OFF = 0	1457
2	166	180	50BF int TRIP	50BF (internal) TRIP; ON = 1, OFF = 0	1480
2	166	181	50BF ext TRIP	50BF (external) TRIP; ON = 1, OFF = 0	1481

3.2.12 Thermal overload protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	167	3	>49 O/L BLOCK	>BLOCK 49 Overload Protection; ON = 1, OFF = 0	1503
1	167	7	>EmergencyStart	>Emergency start of motors; ON = 1, OFF = 0	1507
1	167	11	49 O / L OFF	49 Overload Protection is OFF; ON = 1, OFF = 0	1511
1	167	12	49 O/L BLOCK	49 Overload Protection is BLOCKED; ON = 1, OFF = 0	1512
1	167	13	49 O/L ACTIVE	49 Overload Protection is ACTIVE; ON = 1, OFF = 0	1513
1	167	15	49 O/L I Alarm	Overload Current Alarm (I alarm); ON = 1, OFF = 0	1515
1	167	16	49 O/L \16 Alarm	49 Overload Alarm! Near Thermal Trip; ON = 1, OFF = 0	1516
1	167	17	49 Windings O/L	49 Winding Overload; ON = 1, OFF = 0	1517
2	167	21	49 Th O/L TRIP	49 Thermal Overload TRIP; ON = 1, OFF = 0	1521

3.2.13 Motor start protection

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	168	51	>66 emer. start	>Emergency start; ON = 1, OFF = 0	4823
1	168	52	66 OFF	66 Motor start protection OFF; ON = 1, OFF = 0	4824
1	168	53	66 BLOCKED	66 Motor start protection BLOCKED; ON = 1, OFF = 0	4825
1	168	54	66 ACTIVE	66 Motor start protection ACTIVE; ON = 1, OFF = 0	4826
1	168	55	66 TRIP	66 Motor start protection TRIP; ON = 1, OFF = 0	4827

3.2.14 Start-up supervision

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	169	51	START-SUP OFF	Startup supervision is OFF; ON = 1, OFF = 0	6811
1	169	52	START-SUP BLK	Startup supervision is BLOCKED; ON = 1, OFF = 0	6812
1	169	53	START-SUP ACT	Startup supervision is ACTIVE; ON = 1, OFF = 0	6813
2	169	54	START-SUP TRIP	Startup supervision TRIP; ON = 1, OFF = 0	6821
2	169	55	Rotor locked	Rotor locked; ON = 1, OFF = 0	6822
1	169	56	START-SUP pu	Startup supervision Pickup; ON = 1, OFF = 0	6823

3.2.15 Control switches return position indication(double point commands)

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	240	160	52 Breaker	input state of switch breaker; 1=open, 2=close	-
1	240	161	Disconnect switch	input state of disconnect switch; 1=open, 2=close	-
1	240	164	Gnd switch	input state of ground switch;1=open, 2=close	-
1	240	162	Switch 1	input state of switch 1; 1=open, 2=close	-
1	240	163	Switch 2	input state of switch 2; 1=open, 2=close	-
1	240	175	Switch 3	input state of switch 3; 1=open, 2=close	-

3.2.16 Output channels return position indication (Single point commands)

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	240	181	protection act.	Protection activation	-
1	240	182	>switch 1	0 = Open (off), 1= Close (on)	-
1	240	183	>switch 2	0 = Open (off), 1= Close (on)	-

3.2.17 Free channels

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	160	110	>input channel 1	User input 1	-
1	160	111	>input channel 2	User input 2	-
1	160	112	>input channel 3	User input 3	-
1	160	113	>input channel 4	User input 4	-
1	166	110	>input channel 5	User input 5	-
1	166	111	>input channel 6	User input 6	-
1	166	112	>input channel 7	User input 7	-
1	166	113	>input channel 8	User input 8	-
1	166	114	>input channel 9	User input 9	-
1	166	115	>input channel 10	User input 10	-
1	166	116	>input channel 11	User input 11	-
1	166	117	>input channel 12	User input 12	-
1	166	118	>input channel 13	User input 13	-
1	166	119	>input channel 14	User input 14	-

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ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	167	30	>input channel 15	User input 15	-
1	167	31	>input channel 16	User input 16	-
1	167	32	>input channel 17	User input 17	-
1	167	33	>input channel 18	User input 18	-
1	167	34	>input channel 19	User input 19	-
1	167	35	>input channel 20	User input 20	-
1	167	36	>input channel 21	User input 21	-
1	167	37	>input channel 22	User input 22	-
1	167	38	>input channel 23	User input 23	-
1	167	39	>input channel 24	User input 24	-
1	168	60	>input channel 25	User input 25	-
1	168	61	>input channel 26	User input 26	-
1	168	62	>input channel 27	User input 27	-
1	168	63	>input channel 28	User input 28	-
1	168	64	>input channel 29	User input 29	-
1	168	65	>input channel 30	User input 30	-
1	168	66	>input channel 31	User input 31	-
1	168	67	>input channel 32	User input 32	-
1	168	68	>input channel 33	User input 33	-
1	168	69	>input channel 34	User input 34	-
1	169	60	>input channel 35	User input 35	-
1	169	61	>input channel 36	User input 36	-
1	169	62	>input channel 37	User input 37	-
1	169	63	>input channel 38	User input 38	-
1	169	64	>input channel 39	User input 39	-
1	169	65	>input channel 40	User input 40	-
1	169	66	>input channel 41	User input 41	-
1	169	67	>input channel 42	User input 42	-
1	169	68	>input channel 43	User input 43	-
1	169	69	>input channel 44	User input 44	-
1	169	70	>input channel 45	User input 45	-
1	170	60	>input channel 46	User input 46	-
1	170	61	>input channel 47	User input 47	-
1	170	62	>input channel 48	User input 48	-
1	170	63	>input channel 49	User input 49	-

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
1	170	64	>input channel 50	User input 50	-
1	170	65	>input channel 51	User input 51	-
1	170	66	>input channel 52	User input 52	-
1	170	67	>input channel 53	User input 53	-
1	170	68	>input channel 54	User input 54	-
1	170	69	>input channel 55	User input 55	-
1	170	70	>input channel 56	User input 56	-
1	240	114	>input channel 57	User input 57	-
1	240	115	>input channel 58	User input 58	-
1	240	116	>input channel 59	User input 59	-
1	240	117	>input channel 60	User input 60	-
1	240	118	>input channel 61	User input 61	-
1	240	181	>input channel 62	User input 62	-
1	240	182	>input channel 63	User input 63	-
1	240	183	>input channel 64	User input 64	-
1	240	184	>input channel 65	User input 65	-
1	240	185	>input channel 66	User input 66	-
1	240	186	>input channel 67	User input 67	-
1	240	187	>input channel 68	User input 68	-
1	240	188	>input channel 69	User input 69	-
1	240	189	>input channel 70	User input 70	-
1	240	190	>input channel 71	User input 71	-
1	240	191	>input channel 72	User input 72	-
1	240	192	>input channel 73	User input 73	-
1	240	193	>input channel 74	User input 74	-
1	240	194	>input channel 75	User input 75	-
1	240	195	>input channel 76	User input 76	-
1	240	196	>input channel 77	User input 77	-
1	240	197	>input channel 78	User input 78	-

3.3 Measurements

3.3.1 ASDU3 (Measurements I)

Function type	Information number	Position	Name	Description	Obj. - Adr.
160	145	1	Ib=	Current phase b	602
160	145	2	Va-b=	Voltage phase a to phase b	624

3.3.2 ASDU9 (Measurements II)

Function type	Information number	Position	Name	Description	Obj. - Adr.
134	137	1	Ia=	Current phase a	601
134	137	2	Ib=	Current phase b	602
134	137	3	Ic=	Current phase c	603
134	137	4	I0=	Current I0	604
134	137	5	Va=	Voltage phase a	621
134	137	6	Vb=	Voltage phase b	622
134	137	7	Vc=	Voltage phase c	623
134	137	8	Va-b=	Voltage phase a to phase b	624
134	137	9	Vb-c=	Voltage phase b to phase c	625
134	137	10	Vc-a=	Voltage phase c to phase a	626
134	137	11	P=	Active power	641
134	137	12	Q=	Reactive power	642
134	137	13	Freq=	frequency	644
134	137	14	cos ϕ =	power factor	901
134	137	15	IEE real=	earth fault current active	701
134	137	16	IEE reactive=	earth fault current reactive	702

3.3.3 User defined ASDU9 (Measurements II)

Function type	Information number	Position	Name	Description	Obj. - Adr.
130	135	1	Res1	User define 1	-
130	135	2	Res2	User define 2	-
130	135	3	Res3	User define 3	-
130	135	4	Res4	User define 4	-
130	135	5	Res5	User define 5	-
130	135	6	Res6	User define 6	-
130	135	7	Res7	User define 7	-
130	135	8	Res8	User define 8	-
130	135	9	Res9	User define 9	-
130	135	10	Res10	User define 10	-
130	135	11	Res11	User define 11	-
130	135	12	Res12	User define 12	-
130	135	13	Res13	User define 13	-
130	135	14	Res14	User define 14	-
130	135	15	Res15	User define 15	-
130	135	16	Res16	User define 16	-

3.3.4 Time Tagged Measurements

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
4	150	177	(0)Ia=	Trip Current phase a	533
4	150	178	(0)Ib=	Trip Current phase b	534
4	150	179	(0)Ic=	Trip Current phase c	535
4	151	18	(0)Xsec=	Fault impedance	1118
4	151	19	(0)dist=	Fault location	1119

3.3.5 Metering values

ASDU	Function type	Information number	Name	Description	Obj. - Adr.
205	133	51	Wp+=	Wp Forward (metered measurand derived from measured value)	924
205	133	52	Wq+=	Wq Forward (metered measurand derived from measured value)	925
205	133	53	Wp-=	Wp Reverse (metered measurand derived from measured value)	928
205	133	54	Wq-=	Wq Reverse (metered measurand derived from measured value)	929
205	133	55	Wp(puls) =	Pulsed Energy Wp (active)(metering impulses at binary input)	888
205	133	56	Wq(puls) =	Pulsed Energy Wq (reactive)(metering impulses at binary input)	889

3.4 Settings



Note

The settings which can be read and written are given in the following table. The setting options are indicated in column "Generic identification data". If no values are indicated the setting is a number. For the valid setting range please refer to the user manual of the device.

GIN = Generic Identification Number

For the position and format of the GIN within the telegram please refer to the official IEC 60870-5-103 standard.

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	0	1201	50, 51 Phase Time Overcurrent	22 ON 23 OFF	
1	1	1217	50-3 Pickup		
1	2	1218	50-3 Time Delay		
1	3	1202	50-2 Pickup		
1	4	1203	50-2 Time Delay		
1	5	1204	50-1 Pickup		
1	6	1205	50-1 Time Delay		
1	7	1207	51 Pickup		
1	8	1208	51 Time Delay		
1	9	1209	51 Time Dial		
1	10	1210	Drop-out characteristic	12964 Instantaneous 12965 Disk Emulation	
1	11	1211	IEC Curve	12559 Normal Inverse 12560 Very Inverse 12561 Extremely Inv. 12837 Long Inverse	
1	12	1212	ANSI Curve	12808 Inverse 12809 Short Inverse 12810 Long Inverse 12811 Moderately Inv. 12812 Very Inverse 12813 Extremely Inv. 12814 Definite Inv.	
1	13	1223	51V V< Threshold for Release Ip	24 NO 30013 Volt. controll. 30014 Volt. Restraint	

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GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	14	1224	51V Voltage Influence		
1	15	1301	50N, 51N Ground Time Overcurrent	22 ON 23 OFF	
1	16	1317	50N-3 Pickup		
1	17	1318	50N-3 Time Delay		
1	18	1302	50N-2 Pickup		
1	19	1303	50N-2 Time Delay		
1	20	1304	50N-1 Pickup		
1	21	1305	50N-1 Time Delay		
1	22	1307	51N Pickup		
1	23	1308	51N Time Dial		
1	24	1309	51N Time Dial		
1	25	1310	Drop-Out Characteristic	12964 Instantaneous 12965 Disk Emulation	
1	26	1311	IEC Curve	12559 Normal Inverse 12560 Very Inverse 12561 Extremely Inv. 12837 Long Inverse	
1	27	1312	ANSI Curve	12808 Inverse 12809 Short Inverse 12810 Long Inverse 12811 Moderately Inv. 12812 Very Inverse 12813 Extremely Inv. 12814 Definite Inv.	
1	28	1501	67, 67-TOC Phase Time Overcurrent	22 ON 23 OFF	
1	29	1502	67-2 Pickup		
1	30	1503	67-2 Time Delay		
1	31	1504	67-1 Pickup		
1	32	1505	67-1Time Delay		
1	33	1507	67-TOC Pickup		
1	34	1508	67-TOC Time Dial		
1	35	1509	67-TOC Time Dial		
1	36	1510	Drop-Out Characteristic	12964 Instantaneous 12965 Disk Emulation	
1	37	1511	IEC Curve	12559 Normal Inverse 12560 Very Inverse 12561 Extremely Inv. 12837 Long Inverse	

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	38	1512	ANSI Curve	12808 Inverse 12809 Short Inverse 12810 Long Inverse 12811 Moderately Inv. 12812 Very Inverse 12813 Extremely Inv. 12814 Definite Inv.	
1	39	1516	Phase Direction	12514 Forward 12515 Reverse	
1	40	1523	67-2 Direction	12514 Forward 12515 Reverse	
1	41	1524	67-1 Direction	12514 Forward 12515 Reverse	
1	42	1525	67-TOC Direction	12514 Forward 12515 Reverse	
1	43	1601	67N, 67N-TOC Ground Time Overcurrent	22 ON 23 OFF	
1	44	1602	67N-2 Pickup		
1	45	1603	67N-2 Time Delay		
1	46	1604	67N-1 Pickup		
1	47	1605	67N-1 Pickup		
1	48	1607	67N-TOC Pickup		
1	49	1608	67N-TOC Time Dial		
1	50	1609	67N-TOC Time Dial		
1	51	1610	Drop-Out Characteristic	12964 Instantaneous 12965 Disk Emulation	
1	52	1611	IEC Curve	12559 Normal Inverse 12560 Very Inverse 12561 Extremely Inv. 12837 Long Inverse	
1	53	1612	ANSI Curve	12808 Inverse 12809 Short Inverse 12810 Long Inverse 12811 Moderately Inv. 12812 Very Inverse 12813 Extremely Inv. 12814 Definite Inv.	
1	54	1616	Ground Direction	12514 Forward 12515 Reverse	
1	55	1617	Ground Polarization	25128 with VN and IN 25130 with V2 and I2	
1	56	1623	67N-2 Direction	12514 Forward 12515 Reverse	

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GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	57	1624	67N-1 Direction	12514 Forward 12515 Reverse	
1	58	1625	67N-TOC Direction	12514 Forward 12515 Reverse	
1	59	2701	50 1Ph	22 ON 23 OFF	
1	60	2702	50 1Ph-2 Pickup		
1	61	2703	50 1Ph-2 Pickup		
1	62	2704	50 1Ph-2 Time Delay		
1	63	2705	50 1Ph-1 Pickup		
1	64	2706	50 1Ph-1 Pickup		
1	65	2707	50 1Ph-1 Time Delay		
1	66	5101	27 Undervoltage Protection	22 ON 23 OFF 12700 Alarm Only	
1	67	5102	27-1 Pickup		
1	68	5103	27-1 Pickup		
1	69	5106	27-1 Time Delay		
1	70	5110	27-2 Pickup		
1	71	5111	27-2 Pickup		
1	72	5112	27-2 Time Delay		
1	73	5001	59 Overvoltage Protection	22 ON 23 OFF 12700 Alarm Only	
1	74	5002	59-1 Pickup		
1	75	5003	59-1 Pickup		
1	76	5019	59-1 Pickup V1		
1	77	5015	59-1 Pickup Overvoltage (neg. seq.)		
1	78	5004	59-1 Time Delay		
1	79	5005	59-2 Pickup		
1	80	5006	59-2 Pickup		
1	81	5020	59-2 Pickup V1		
1	82	5016	59-2 Pickup Overvoltage (neg. seq.)		
1	83	5007	59-2 Time Delay		
1	84	4001	46 Negative Sequence Protection	22 ON 23 OFF	
1	85	4002	46-1 Pickup		
1	86	4003	46-1 Time Delay		

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	87	4004	46-2 Pickup		
1	88	4005	46-2 Time Delay		
1	89	4006	46 IEC Curve	12559 Normal Inverse 12560 Very Inverse 12561 Extremely Inv. 12837 Long Inverse	
1	90	4007	46 ANSI Curve	12808 Inverse 12809 Short Inverse 12810 Long Inverse 12811 Moderately Inv. 12812 Very Inverse 12813 Extremely Inv. 12814 Definite Inv.	
1	91	4008	46-TOC Pickup		
1	92	4009	46-TOC Time Dial		
1	93	4010	46-TOC Time Dial		
1	94	4011	46-TOC Drop Out	12964 Instantaneous 12965 Disk Emulation	
1	95	2201	Inrush Restraint	22 ON 23 OFF	
1	96	2202	2nd. harmonic in % of fundamental		
1	97	2203	Cross Block	24 NO 25 YES	
1	98	2204	Cross Block Time		
1	99	2205	Maximum Current for Inrush Restraint		
1	100	1701	Cold-Load-Pickup Function	22 ON 23 OFF	
1	101	1702	Start Condition		
1	102	1703	Circuit Breaker OPEN Time		
1	103	1704	Active Time		
1	104	1705	Stop Time		
1	105	1808	50c-3 Pickup		
1	106	1809	50c-3 Time Delay		
1	107	1801	50c-2 Pickup		
1	108	1802	50c-2 Time Delay		
1	109	1803	50c-1 Pickup		
1	110	1804	50c-1 Time Delay		
1	111	1805	51c Pickup		
1	112	1806	51c Time dial		
1	113	1807	51c Time dial		

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GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	114	1908	50Nc-3 Pickup		
1	115	1909	50Nc-3 Time Delay		
1	116	1901	50Nc-2 Pickup		
1	117	1902	50Nc-2 Time Delay		
1	118	1903	50Nc-1 Pickup		
1	119	1904	50Nc-1 Time Delay		
1	120	1905	51Nc Pickup		
1	121	1906	51Nc Time Dial		
1	122	1907	51Nc Time Dial		
1	123	2001	67c-2 Pickup		
1	124	2002	67c-2 Time Delay		
1	125	2003	67c-1 Pickup		
1	126	2004	67c-1 Time Delay		
1	127	2005	67c Pickup		
1	128	2006	67c Time Dial		
1	129	2007	67c Time Dial		
1	130	2101	67Nc-2 Pickup		
1	131	2102	67Nc-2 Time Delay		
1	132	2103	67Nc-1 Pickup		
1	133	2104	67Nc-1 Time Delay		
1	134	2105	67Nc-TOC Pickup		
1	135	2106	67Nc-TOC Time Dial		
1	136	2107	67Nc-TOC Time Dial		
1	137	4101	48 / 66 Motor (Startup Monitor/Counter)	22 ON 23 OFF	
1	138	4102	Startup Current		
1	139	4103	Startup Time		
1	140	4104	Permissible Locked Rotor Time		
1	141	4105	Startup Time for warm motor		
1	142	4106	Temperature limit for cold motor		
1	143	5401	81 Over/Under Frequency Protection	22 ON 23 OFF	
1	144	5402	Minimum required voltage for operation		
1	145	5403	81-1 Pickup		
1	146	5404	81-1 Pickup		
1	147	5405	81-1 Time Delay		

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	148	5406	81-2 Pickup		
1	149	5407	81-2 Pickup		
1	150	5408	81-2 Time Delay		
1	151	5409	81-3 Pickup		
1	152	5410	81-3 Pickup		
1	153	5411	81-3 Time delay		
1	154	5412	81-4 Pickup		
1	155	5413	81-4 Pickup		
1	156	5414	81-4 Time delay		
1	157	5421	81-1 Over/Under Frequency Protection	23 OFF 30703 ON f< 30704 ON f>	
1	158	5422	81-2 Over/Under Frequency Protection	24 OFF 30703 ON f< 30704 ON f>	
1	159	5423	81-3 Over/Under Frequency Protection	25 OFF 30703 ON f< 30704 ON f>	
1	160	5424	81-4 Over/Under Frequency Protection	26 OFF 30703 ON f< 30704 ON f>	
1	161	4201	49 Thermal overload protection	22 ON 23 OFF 12700 Alarm Only	
1	162	4202	49 K-Factor		
1	163	4203	Time Constant		
1	164	4204	49 Thermal Alarm Stage		
1	165	4205	Current Overload Alarm Setpoint		
1	166	4209	49 Temperature rise at rated sec. curr.		
1	167	4210	49 Temperature rise at rated sec. curr.		
1	168	4301	66 Startup Counter for Motors	22 ON 23 OFF	
1	169	4302	I Start / I Motor nominal		
1	170	4303	Maximum Permissible Starting Time		
1	171	4304	Temperature Equalization Time		
1	172	4305	Rated Motor Current		
1	173	4306	Maximum Number of Warm Starts		
1	174	4307	Number of Cold Starts - Warm Starts		
1	175	4308	Extension of Time Constant at Stop		

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GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	176	4309	Extension of Time Constant at Running		
1	177	4310	Minimum Restart Inhibit Time		
1	178	4311	Rotor Overload Protection	22 ON 23 OFF 12700 Alarm Only	
1	179	8101	Measurement Supervision	22 ON 23 OFF	
1	180	8102	Voltage Threshold for Balance Monitoring		
1	181	8103	Balance Factor for Voltage Monitor		
1	182	8104	Current Threshold for Balance Monitoring		
1	183	8105	Balance Factor for Current Monitor		
1	184	8106	Summated Current Monitoring Threshold		
1	185	8107	Summated Current Monitoring Factor		
1	186	8109	Fast Summated Current Monitoring	22 ON 23 OFF	
1	187	5201	VT broken wire supervision	22 ON 23 OFF	
1	188	5202	Threshold voltage sum		
1	189	5203	Maximum phase to phase voltage		
1	190	5204	Minimum phase to phase voltage		
1	191	5205	Symmetry phase to phase voltages		
1	192	5206	Minimum line current		
1	193	5208	Alarm delay time		
1	194	5301	Fuse Fail Monitor	23 OFF 30730 Solid grounded 30731 Coil.gnd./isol.	
1	195	5310	Block protection by FFM	24 NO 25 YES	
1	196	5302	Zero Sequence Voltage		
1	197	5303	Residual Current		
1	198	5307	I> Pickup for block FFM		
1	199	3101	(Sensitive) Ground Fault	23 OFF 22 ON 25408 ON with GF log 12700 Alarm Only	
1	200	3102	Current I1 for CT Angle Error		with sensitive groud CT
1	201	3102	Current I1 for CT Angle Error		with standard groud CT
1	202	3103	CT Angle Error at I1		
1	203	3104	Current I2 for CT Angle Error		with sensitive groud CT

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	204	3104	Current I2 for CT Angle Error		with standard ground CT
1	205	3105	CT Angle Error at I2		
1	206	3106	L-Gnd Voltage of Faulted Phase Vph Min		
1	207	3107	L-Gnd Voltage of Unfaulted Phase Vph Max		
1	208	3108	64-1 Ground Displacement Voltage		
1	209	3109	64-1 Ground Displacement Voltage		
1	210	3110	64-1 Ground Displacement Voltage		
1	211	3111	Time-DELAY Pickup		
1	212	3112	64-1 Time Delay		
1	213	3113	50Ns-2 Pickup		with sensitive ground CT
1	214	3113	50Ns-2 Pickup		with standard ground CT
1	215	3114	50Ns-2 Time Delay		
1	216	3115	67Ns-2 Direction	12514 Forward 12515 Reverse 12516 Non-Directional	
1	217	3117	50Ns-1 Pickup		with sensitive ground CT
1	218	3117	50Ns-1 Pickup		with standard ground CT
1	219	3118	50Ns-1 Time delay		
1	220	3119	50Ns-1 Pickup		with sensitive ground CT and Parameter 131 (sensitive) Ground fault is not Disabled or Definite Time only or Logarithmic inverse B and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	221	3119	50Ns-1 Pickup		with sensitive ground CT and Parameter 131 (sensitive) Ground fault is Logarithmic inverse B and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	222	3119	50Ns-1 Pickup		with standard ground CT and Parameter 131 (sensitive) Ground fault is not Disabled or Definite Time only

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GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	223	3120	51Ns Time Dial		Parameter 131 (sensitive) Ground fault is Time Overcurrent Curve IEC or User Defined Pickup Curve
1	224	3127	51Ns Current at const. Time Delay T min		
1	225	3120	51Ns Time Dial		Parameter 131 (sensitive) Ground fault is Time Overcurrent Curve ANSI
1	226	3144	51Ns IEC CURVE	12559 Normal Inverse 12560 Very Inverse 12561 Extremely Inv. 12837 Long Inverse	
1	227	3145	51Ns ANSI CURVE	12808 Inverse 12809 Short Inverse 12810 Long Inverse 12811 Moderately Inv. 12812 Very Inverse 12813 Extremely Inv. 12814 Definite Inv.	
1	228	3146	51Ns Drop-out characteristic	12964 Instantaneous 12965 Disk Emulation	
1	229	3127	51Ns Current at const. Time Delay T min		
1	230	3128	51Ns Current at Knee Point		
1	231	3128	51Ns Current at Knee Point		
1	232	3129	51Ns Time Delay at Knee Point		
1	233	3140	51Ns Minimum Time Delay		Parameter 131 (sensitive) Ground fault is not Logarithmic inverse A and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	234	3140	51Ns Minimum Time Delay		Parameter 131 (sensitive) Ground fault is Logarithmic inverse B and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	235	3141	51Ns Maximum Time Delay		Parameter 131 (sensitive) Ground fault is not Logarithmic inverse A and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	236	3141	51Ns Maximum Time Delay (at 51Ns PU)		Parameter 131 (sensitive) Ground fault is Logarithmic inverse B and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	237	3142	51Ns Time Dial		Parameter 131 (sensitive) Ground fault is not Logarithmic inverse A and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	238	3132	51Ns Time Dial		Parameter 131 (sensitive) Ground fault is Logarithmic inverse B and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	239	3143	51Ns Start Point of Inverse Charac.		
1	240	3122	67Ns-1 Direction	12514 Forward 12515 Reverse 12516 Non-Directional	
1	241	3123	Release directional element		with sensitive ground CT and VT and Parameter 131 (sensitive) Ground fault is not Disabled and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	241	3123	Release directional element		with standard ground CT and VT and Parameter 131 (sensitive) Ground fault is not Disabled and Parameter 130 (sensitive) Ground fault dir. characteristic is cos phi / sin phi measurement (standard)
1	243	3124	Correction Angle for Dir. Determination		
1	244	3125	Measurement method for Direction	12839 COS 12840 SIN	
1	245	3126	Reset Delay		
1	246	3130	Sensitive Ground Fault PICKUP criteria	12998 Vgnd OR INs 12999 Vgnd AND Ins	

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
1	247	3150	50Ns-2 minimum voltage		7SJ64: with sensitive ground CT and VT and V_{GND} will be measured and Parameter 131 (sensitive) Ground fault is not Disabled
1	248	3150	50Ns-2 minimum voltage		7SJ62: with sensitive ground CT and VT and V_{GND} will be measured and Parameter 131 (sensitive) Ground fault is not Disabled
1	249	3150	50Ns-2 minimum voltage		with sensitive ground CT and VT and V_{GND} will not be measured and Parameter 131 (sensitive) Ground fault is not Disabled
1	250	3151	50Ns-2 angle phi		
1	251	3152	50Ns-2 angle delta phi		
1	252	3153	50Ns-1 minimum voltage		7SJ64
1	253	3153	50Ns-1 minimum voltage		7SJ62
1	254	3153	50Ns-1 minimum voltage		with sensitive ground CT and VT and V_{GND} will be measured and Parameter 131 (sensitive) Ground fault is not Disabled and Parameter 130 (sensitive) Ground fault dir. characteristic is V0/I0 phase angle measurement
1	255	3154	50Ns-1 angle phi		
2	0	3155	50Ns-1 angle delta phi		
2	1	3301	Intermittent earth fault protection	23 OFF 22 ON	
2	2	3302	Pick-up value of interm. E/F stage	5 ... 3500 (0.05 - 35.00 A)	Parameter 133 Intermittent earth fault protection is with Ignd (measured)
2	3	3302	Pick-up value of interm. E/F stage	5 ... 3500 (0.05 - 35.00 A)	Parameter 133 Intermittent earth fault protection is with 3I0 (calculated)
2	4	3302	Pick-up value of interm. E/F stage	5 ... 1500 (0.005 - 1.500 A)	Parameter 133 Intermittent earth fault protection is with Ignd , sensitive (measured)
2	5	3303	Detection extension time	0 ... 1000 (0.00 - 10.00 s)	
2	6	3304	Sum of detection times	0 ... 10000 (0.00 - 100.00 s)	
2	7	3305	Reset time	1 ... 600 (1- 600 s)	
2	8	3306	No. of det. for start of int. E/F prot	2 ... 10	

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	9	7101	79 Auto-Reclose Function	23 OFF 22 ON	
2	10	7103	AR blocking duration after manual close		
2	11	7105	79 Auto Reclosing reset time		
2	12	7108	Safety Time until 79 is ready		
2	13	7113	Check circuit breaker before AR?		
2	14	7114	AR start-signal monitoring time		
2	15	7115	Circuit Breaker (CB) Supervision Time		
2	16	7116	Maximum dead time extension		
2	17	7117	Action time		
2	18	7118	Maximum Time Delay of DeadTime Start		
2	19	7127	Dead Time 1: Phase Fault		
2	20	7128	Dead Time 1: Ground Fault		
2	21	7129	Dead Time 2: Phase Fault		
2	22	7130	Dead Time 2: Ground Fault		
2	23	7131	Dead Time 3: Phase Fault		
2	24	7132	Dead Time 3: Ground Fault		
2	25	7133	Dead Time 4: Phase Fault		
2	26	7134	Dead Time 4: Ground Fault		
2	27	7135	Number of Reclosing Cycles Ground		
2	28	7136	Number of Reclosing Cycles Phase		
2	29	7139	External 25 synchronisation	24 NO 25 YES	
2	30	7140	ZSC - Zone sequence coordination	23 OFF 22 ON	
2	31	7150	50-1	12886 No influence 12885 Starts 79 25011 Stops 79	
2	32	7151	50N-1	12887 No influence 12885 Starts 79 25011 Stops 79	
2	33	7152	50-2	12888 No influence 12885 Starts 79 25011 Stops 79	
2	34	7153	50N-2	12889 No influence 12885 Starts 79 25011 Stops 79	
2	35	7166	50-3	12890 No influence 12885 Starts 79 25011 Stops 79	

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GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	36	7167	50N-3	12891 No influence 12885 Starts 79 25011 Stops 79	
2	37	7154	51	12892 No influence 12885 Starts 79 25011 Stops 79	
2	38	7155	51N	12893 No influence 12885 Starts 79 25011 Stops 79	
2	39	7156	67-1	12894 No influence 12885 Starts 79 25011 Stops 79	
2	40	7157	67N-1	12895 No influence 12885 Starts 79 25011 Stops 79	
2	41	7158	67-2	12896 No influence 12885 Starts 79 25011 Stops 79	
2	42	7159	67N-2	12897 No influence 12885 Starts 79 25011 Stops 79	
2	43	7160	67 TOC	12898 No influence 12885 Starts 79 25011 Stops 79	
2	44	7161	67N TOC	12899 No influence 12885 Starts 79 25011 Stops 79	
2	45	7172	67Ns-1	12899 No influence 12885 Starts 79 25011 Stops 79	
2	46	7173	67Ns-1	12899 No influence 12885 Starts 79 25011 Stops 79	
2	47	7174	67Ns TOC	12899 No influence 12885 Starts 79 25011 Stops 79	
2	48	7163	46	12901 No influence 12885 Starts 79 25011 Stops 79	
2	49	7164	Binary Input	12902 No influence 12885 Starts 79 25011 Stops 79	
2	50	7165	3 Pole Pickup blocks 79	24 NO 25 YES	
2	51	7200	before 1. Cycle: 50-1	25345 Set value T=T 25344 instant. T=0 25343 blocked T=	

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	52	7201	before 1. Cycle: 50N-1	25346 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	53	7202	before 1. Cycle: 50-2	25347 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	54	7203	before 1. Cycle: 50N-2	25348 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	55	7248	before 1. Cycle: 50-3	25349 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	56	7249	before 1. Cycle: 50N-3	25350 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	57	7204	before 1. Cycle: 51	25351 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	58	7205	before 1. Cycle: 51N	25352 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	59	7206	before 1. Cycle: 67-1	25353 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	60	7207	before 1. Cycle: 67N-1	25354 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	61	7208	before 1. Cycle: 67-2	25355 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	62	7209	before 1. Cycle: 67N-2	25356 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	63	7210	before 1. Cycle: 67 TOC	25357 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	64	7211	before 1. Cycle: 67N TOC	25358 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	65	7175	before 1. Cycle: 67Ns-1	25358 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	66	7176	before 1. Cycle: 67Ns-2	25358 Set value T=T 25344 instant. T=0 25343 blocked T=	

Point List

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	67	7177	before 1. Cycle: 67Ns TOC	25358 Set value T=T 25344 instant. T=0 25343 blocked T=	
22	68	7212	before 2. Cycle: 50-1	25359 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	69	7213	before 2. Cycle: 50N-1	25360 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	70	7214	before 2. Cycle: 50-2	25361 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	71	7215	before 2. Cycle: 50N-2	25362 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	72	7250	before 2. Cycle: 50-3	25363 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	73	7251	before 2. Cycle: 50N-3	25364 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	74	7216	before 2. Cycle: 51	25365 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	75	7217	before 2. Cycle: 51N	25366 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	76	7218	before 2. Cycle: 67-1	25367 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	77	7219	before 2. Cycle: 67N-1	25368 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	78	7220	before 2. Cycle: 67-2	25369 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	79	7221	before 2. Cycle: 67N-2	25370 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	80	7222	before 2. Cycle: 67 TOC	25371 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	81	7223	before 2. Cycle: 67N TOC	25372 Set value T=T 25344 instant. T=0 25343 blocked T=	

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	82	7178	before 2. Cycle: 67Ns-1	25372 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	83	7179	before 2. Cycle: 67Ns-2	25372 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	84	7180	before 2. Cycle: 67Ns TOC	25372 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	85	7224	before 3. Cycle: 50-1	25373 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	86	7225	before 3. Cycle: 50N-1	25374 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	87	7226	before 3. Cycle: 50-2	25375 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	88	7227	before 3. Cycle: 50N-2	25376 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	89	7252	before 3. Cycle: 50-3	25377 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	90	7253	before 3. Cycle: 50N-3	25378 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	91	7228	before 3. Cycle: 51	25379 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	92	7229	before 3. Cycle: 51N	25380 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	93	7230	before 3. Cycle: 67-1	25381 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	94	7231	before 3. Cycle: 67N-1	25382 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	95	7232	before 3. Cycle: 67-2	25383 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	96	7233	before 3. Cycle: 67N-2	25384 Set value T=T 25344 instant. T=0 25343 blocked T=	

Point List

GIN		Obj-Adr.	Name	Generic identification data	Note
Group	Entry				
2	97	7234	before 3. Cycle: 67 TOC	25385 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	98	7235	before 3. Cycle: 67N TOC	25386 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	99	7181	before 3. Cycle: 67Ns-1	25386 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	100	7182	before 3. Cycle: 67Ns-2	25386 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	101	7183	before 3. Cycle: 67Ns TOC	25386 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	102	7236	before 4. Cycle: 50-1	25387 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	103	7237	before 4. Cycle: 50N-1	25388 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	104	7238	before 4. Cycle: 50-2	25389 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	105	7239	before 4. Cycle: 50N-2	25390 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	106	7254	before 4. Cycle: 50-3	25391 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	107	7255	before 4. Cycle: 50N-3	25392 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	108	7240	before 4. Cycle: 51	25393 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	109	7241	before 4. Cycle: 51N	25394 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	110	7242	before 4. Cycle: 67-1	25395 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	111	7243	before 4. Cycle: 67N-1	25396 Set value T=T 25344 instant. T=0 25343 blocked T=	

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	112	7244	before 4. Cycle: 67-2	25397 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	113	7245	before 4. Cycle: 67N-2	25398 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	114	7246	before 4. Cycle: 67 TOC	25399 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	115	7247	before 4. Cycle: 67N TOC	25400 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	116	7184	before 4. Cycle: 67Ns-1	25398 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	117	7185	before 4. Cycle: 67Ns-2	25399 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	118	7186	before 4. Cycle: 67Ns TOC	25400 Set value T=T 25344 instant. T=0 25343 blocked T=	
2	119	8201	74TC TRIP Circuit Supervision	23 OFF 22 ON	
2	120	8202	Delay Time for alarm		
2	121	8001	Start fault locator with	12552 Pickup 12553 TRIP	
2	122	7001	50BF Breaker Failure Protection	23 OFF 22 ON	
2	123	7004	Check Breaker contacts	23 OFF 22 ON	
2	124	7005	TRIP-Timer		
2	125	7006	50BF Pickup current threshold		
2	126	7007	50BF Pickup earth current threshold		
2	127	7008	Delay of 2nd stage for busbar trip		
2	128	6101	Synchronizing Function	23 OFF 22 ON	
2	129	6103	Minimum voltage limit: Vmin		
2	130	6104	Maximum voltage limit: Vmax		
2	131	6105	Threshold V1, V2 without voltage		
2	132	6106	Threshold V1, V2 with voltage		
2	133	6107	ON-Command at V1< and V2>	24 NO 25 YES	

Point List

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	134	6108	ON-Command at V1> and V2<	24 NO 25 YES	
2	135	6109	ON-Command at V1< and V2<	24 NO 25 YES	
2	136	6112	Maximum duration of Synchronization		
2	137	6120	Closing (operating) time of CB		
2	138	6121	Balancing factor V1/V2		
2	139	6123	Connection of V2	25350 A-G 25351 B-G 25352 C-G 25353 A-B 25354 B-C 25355 C-A	
2	140	6125	VT nominal voltage V2, primary		
2	141	6130	Maximum voltage difference V2>V1		
2	142	6131	Maximum voltage difference V2<V1		
2	143	6132	Maximum frequency difference f2>f1		
2	144	6133	Maximum frequency difference f2<f1		
2	145	6140	Switching at synchronous conditions	24 NO 25 YES	
2	146	6141	Frequency threshold ASYN <--> SYN		
2	147	6142	Maximum voltage difference V2>V1		
2	148	6143	Maximum voltage difference V2<V1		
2	149	6144	Maximum angle difference alpha2>alpha1		
2	150	6145	Maximum angle difference alpha2<alpha1		
2	151	6146	Release delay at synchronous conditions		
2	152	6150	Maximum voltage difference V2>V1		
2	153	6151	Maximum voltage difference V2<V1		
2	154	6152	Maximum frequency difference f2>f1		
2	155	6153	Maximum frequency difference f2<f1		
2	156	6154	Maximum angle difference alpha2>alpha1		
2	157	6155	Maximum angle difference alpha2<alpha1		
2	158	6201	Synchronizing Function	23 OFF 22 ON	
2	159	6203	Minimum voltage limit: Vmin		
2	160	6204	Maximum voltage limit: Vmax		
2	161	6205	Threshold V1, V2 without voltage		
2	162	6206	Threshold V1, V2 with voltage		

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	163	6207	ON-Command at V1< and V2>	24 NO 25 YES	
2	164	6208	ON-Command at V1> and V2<	24 NO 25 YES	
2	165	6209	ON-Command at V1< and V2<	24 NO 25 YES	
2	166	6212	Maximum duration of Synchronization		
2	167	6220	Closing (operating) time of CB		
2	168	6221	Balancing factor V1/V2		
2	169	6223	Connection of V2	25350 A-G 25351 B-G 25352 C-G 25353 A-B 25354 B-C 25355 C-A	
2	170	6225	VT nominal voltage V2, primary		
2	171	6230	Maximum voltage difference V2>V1		
2	172	6231	Maximum voltage difference V2<V1		
2	173	6232	Maximum frequency difference f2>f1		
2	174	6233	Maximum frequency difference f2<f1		
2	175	6240	Switching at synchronous conditions	24 NO 25 YES	
2	176	6241	Frequency threshold ASYN <--> SYN		
2	177	6242	Maximum voltage difference V2>V1		
2	178	6243	Maximum voltage difference V2<V1		
2	179	6244	Maximum angle difference alpha2>alpha1		
2	180	6245	Maximum angle difference alpha2<alpha1		
2	181	6246	Release delay at synchronous conditions		
2	182	6250	Maximum voltage difference V2>V1		
2	183	6251	Maximum voltage difference V2<V1		
2	184	6252	Maximum frequency difference f2>f1		
2	185	6253	Maximum frequency difference f2<f1		
2	186	6254	Maximum angle difference alpha2>alpha1		
2	187	6255	Maximum angle difference alpha2<alpha1		
2	188	6301	Synchronizing Function	23 OFF 22 ON	
2	189	6303	Minimum voltage limit: Vmin		
2	190	6304	Maximum voltage limit: Vmax		
2	191	6305	Threshold V1, V2 without voltage		

Point List

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	192	6306	Threshold V1, V2 with voltage		
2	193	6307	ON-Command at V1< and V2>	24 NO 25 YES	
2	194	6308	ON-Command at V1> and V2<	24 NO 25 YES	
2	195	6309	ON-Command at V1< and V2<	24 NO 25 YES	
2	196	6312	Maximum duration of Synchronization		
2	197	6320	Closing (operating) time of CB		
2	198	6321	Balancing factor V1/V2		
2	299	6323	Connection of V2	25350 A-G 25351 B-G 25352 C-G 25353 A-B 25354 B-C 25355 C-A	
2	200	6325	VT nominal voltage V2, primary		
2	201	6330	Maximum voltage difference V2>V1		
2	202	6331	Maximum voltage difference V2<V1		
2	203	6332	Maximum frequency difference f2>f1		
2	204	6333	Maximum frequency difference f2<f1		
2	205	6340	Switching at synchronous conditions	24 NO 25 YES	
2	206	6341	Frequency threshold ASYN <--> SYN		
2	207	6342	Maximum voltage difference V2>V1		
2	208	6343	Maximum voltage difference V2<V1		
2	209	6344	Maximum angle difference alpha2>alpha1		
2	210	6345	Maximum angle difference alpha2<alpha1		
2	211	6346	Release delay at synchronous conditions		
2	212	6350	Maximum voltage difference V2>V1		
2	213	6351	Maximum voltage difference V2<V1		
2	214	6352	Maximum frequency difference f2>f1		
2	215	6353	Maximum frequency difference f2<f1		
2	216	6354	Maximum angle difference alpha2>alpha1		
2	217	6355	Maximum angle difference alpha2<alpha1		
2	218	6401	Synchronizing Function	23 OFF 22 ON	
2	219	6403	Minimum voltage limit: Vmin		
2	220	6404	Maximum voltage limit: Vmax		

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	221	6405	Threshold V1, V2 without voltage		
2	222	6406	Threshold V1, V2 with voltage		
2	223	6407	ON-Command at V1< and V2>	24 NO 25 YES	
2	224	6408	ON-Command at V1> and V2<	24 NO 25 YES	
2	225	6409	ON-Command at V1< and V2<	24 NO 25 YES	
2	226	6412	Maximum duration of Synchronization		
2	227	6420	Closing (operating) time of CB		
2	228	6421	Balancing factor V1/V2		
2	229	6423	Connection of V2	25350 A-G 25351 B-G 25352 C-G 25353 A-B 25354 B-C 25355 C-A	
2	230	6425	VT nominal voltage V2, primary		
2	231	6430	Maximum voltage difference V2>V1		
2	232	6431	Maximum voltage difference V2<V1		
2	233	6432	Maximum frequency difference f2>f1		
2	234	6433	Maximum frequency difference f2<f1		
2	235	6440	Switching at synchronous conditions	24 NO 25 YES	
2	236	6441	Frequency threshold ASYN <--> SYN		
2	237	6442	Maximum voltage difference V2>V1		
2	238	6443	Maximum voltage difference V2<V1		
2	229	6444	Maximum angle difference alpha2>alpha 1		
2	240	6445	Maximum angle difference alpha2<alpha 1		
2	241	6446	Release delay at synchronous conditions		
2	242	6450	Maximum voltage difference V2>V1		
2	243	6451	Maximum voltage difference V2<V1		
2	244	6452	Maximum frequency difference f2>f1		
2	245	6453	Maximum frequency difference f2<f1		
2	246	6454	Maximum angle difference alpha2>alpha 1		
2	247	6455	Maximum angle difference alpha2<alpha 1		
2	248	4401	Load Jam Protection	23 OFF 22 ON 12700 Alarm Only	

Point List

GIN		Obj.- Adr.	Name	Generic identification data	Note
Group	Entry				
2	249	4406	Load Jam Blocking after motor start		
2	250	4402	Load Jam Tripping Threshold		
2	251	4403	Load Jam Trip Delay		
2	252	4404	Load Jam Alarm Threshold		
2	253	4405	Load Jam Alarm Delay		

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Glossary

AR	Automatic Recloser
CFC	Continuous Function Chart
DC	Double Command
DIGSI 4	Parameterization system for SIPROTEC devices
DP	Double-point Indication
IEC	International Electrotechnical Commission
GID	Generic identification data
GIN	Generic identification number
Input data/ input direction	Data from the IEC 60870-5-103 slave to the IEC 60870-5-103 master.
Mapping	Allocation of the SIPROTEC data objects to the IEC 60870-5-103 protocol.
Output data/ output direction	Data from the IEC 60870-5-103 master to the IEC 60870-5-103 slave.
RTU	Remote Terminal Unit
SC	Single Command
SP	Single-point Indication

