SPA-ZC 200/SPA-ZC 202
IEC 60870-5-103/SPA-gateway

Standard Configuration Templates

ABB

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IEC 60870-5-103/SPA-gateway

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**SPA-ZC 200/
SPA-ZC 202**
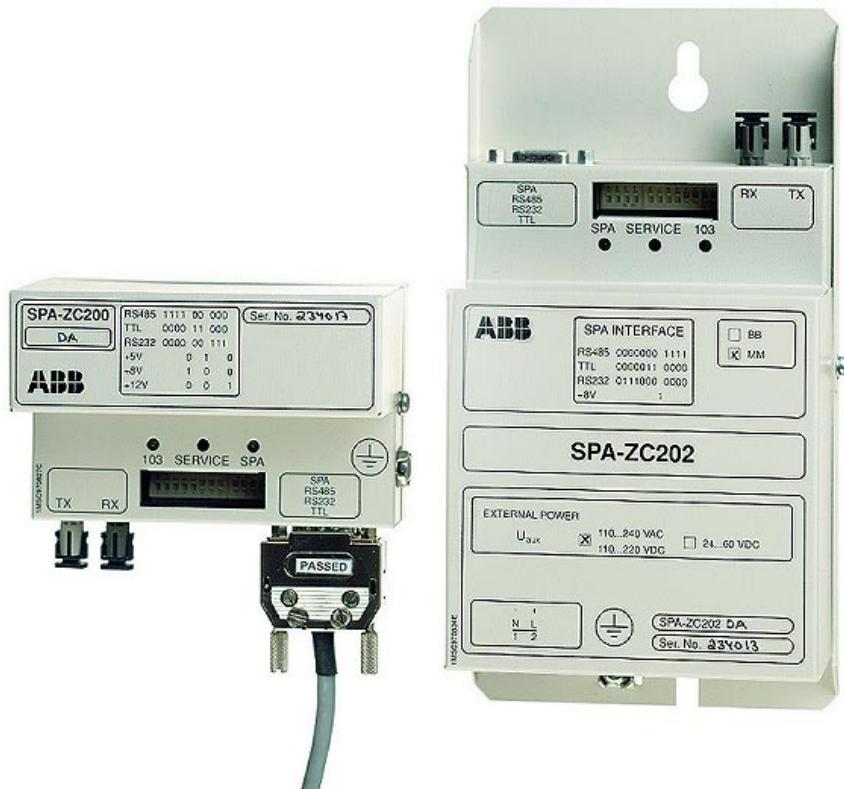
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Contents

1. Introduction

This document describes configurations designed for SPA-ZC 200 and SPA-ZC 202 devices, i.e. IEC 60870-5-103/SPA Gateways.

The configurations are ready-made and not directly editable by the user. The configurations are downloaded to the gateway with the ICT software, which is a configuration tool for the IEC 103/SPA Gateway. For more information about downloading, see the SPA-ZC 200/202 Commissioning Manual (1MRS752023-MUM).

The IEC 60870-5-103 bus is called IEC_103 later in this document.

2. General

Configuration templates edited with the ICT software are named by the specific SPACOM relay to which the gateway will be connected. Data signals that are transferred from the SPA bus to the IEC_103 and mappings of them, are defined in the configurations.

Before transferring analog input data, the values are scaled in the following way:

Scaled value = SPA value / scaling factor

The user defines with the ICT a scaling factor for each measurand (or measurand group).

A restart of the SPA unit (SPA event E50) and an event buffer overflow of the SPA-unit (SPA event E51) are reported to IEC_103 as follows:

- ASDU type 1: time-tagged message.
- cause of transmission = 1 (spontaneous).
- function type = 249 (private range).
- values of information number.
- E50 -> 110-118 (110 + position of SPA unit (0…8) in the SPA-unit list).
- E51 -> 120-128 (120 + position of SPA unit (0…8) in the SPA-unit list).

This function has been implemented in the gateway firmware. The number of information numbers used, depends on the number of SPA units defined in the configuration. Function type and information number pairs used for presenting SPA events E50 and E51 are listed in the description of the different configurations.

2.1. The general principle of data mapping

The interface between the SPACOM relay and the IEC_103 is created according to one of the following alternatives:

Alternative A (= standard mapping)

If a corresponding SPA signal is defined by the IEC 60870-5-103 standard, alternative A is used.

Alternative B (= VDEW recommendations for control data)

Refer to "Digitale Stationsleittechnik - Ergänzende Empfehlungen zur Anwendung in Verteilnetzstationen" by Vereinigung Deutscher Elektrizitätswerke.

Alternative P (= private definitions)

Private definitions are basically used of the following two reasons:

1. The standard (IEC 60870-5-103) does not define the signal.
2. The signal is defined by the standard but the SPA signal interface differs radically from this model.

2.2.   Data mappings

Below an explanation of the data mapping tables:

Table 2.2.-1   Explanation of data mapping tables

St	Status A = According to the IEC 60870-5-103 standard B = According to VDEW recommendations P = Private definition
Ftyp	Function type
InfNum	Information element number
GI	General interrogation 0 = Not in interrogation 1 = Interrogable
Typ	TypeId
COT	Cause of transmission values 1= Spontaneous 9= Interrogated 12 Remote command
COT cmd	Cause of transmission values in command direction 20 = General command
COT resp	Cause of transmission values in response direction 20 = Positive acknowledgement 21 = Negative acknowledgement
Num data	The number of the data values in the class 2 message data part

3.   Supported relays

Relays supported by the IEC_103/SPA gateway are.

SPACOM relay	SPA-bus interface
SPAA 120 C	TTL
SPAA 121 C	TTL
SPAJ 140 C	TTL
SPAJ 141 C	TTL
SPAJ 142 C	TTL
SPAJ 144 C	TTL
SPAJ 160 C	TTL
SPAJ 115 C	TTL
SPAU 110 C	TTL
SPAU 130 C	TTL
SPAM 150 C	TTL
SPAA 341 C2	TTL
SPAC 310 C	RS-485
SPAC 315 C	RS-485
SPAC 320 C	RS-485
SPAD 346 C3	TTL
SPAS 348 C	TTL
SPAU 330 C1	TTL
SPAU 341 C1	TTL

4.   References

- Installation Manual 1MRS752018-MUM
- Commissioning Manual 1MRS752023-MUM
- RER 125 User's Manual 1MRS751295-MUM
- http://www.abb.com/substationautomation

5.   Configurations

5.1.   SPAA 120 C

For the unit to operate properly, the following settings are required::

- The slave number of the SPCJ 4D44 module must be 1.
- The value of the event mask V155 must be 255.
- The value of the event mask V156 must be 255.
- The data transfer rate on the SPA-bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAA 120 C User's Manual.

Table 5.1.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I > Start	O1	E1/2	A	160	84	1	1	1, 9
I > Trip	-	E3/4	A	160	90	0	1	1
I >> Start	O3	E5/6	P	162	94	1	1	1, 9
I >> Trip	-	E7/8	A	160	91	0	1	1
I_{01} > Start	O5	E9/10	P	163	67	1	1	1, 9
I_{01} > Trip	-	E11/12	P	163	92	0	1	1
U_0 > Start	O7	E13/14	P	170	84	1	1	1, 9
I_{02} > Trip	-	E15/16	P	163	93	0	1	1
Main settings	V150	-	A	160	23	1	1	1, 9
Second settings	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D44)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D44)	-	E51	P	249	120	0	1	1

Table 5.1.-2   Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings	V150	A	160	23	20	20	20, 21
Second settings	V150	A	160	24	20	20	20, 21

Table 5.1.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, <empty>, I_{L3}, I_0, U_0	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
-	Data2 (empty = 0)
I_{L3}	Data3 (SPA data: I2)
I_0	Data4 (SPA data: I4)
U_0	Data5 (SPA data: I3)

5.2.   SPAA 121 C

For the unit to operate properly, the following settings are required::

- The slave number of the SPCJ 4D44 module must be 1.
- The value of the event mask V155 must be 255.
- The value of the event mask V156 must be 255.
- The data transfer rate on the SPA-bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAA 121 C User's Manual.

Table 5.2.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I > Start	O1	E1/2	A	160	84	1	1	1, 9
I > Trip	-	E3/4	A	160	90	0	1	1
I >> Start	O3	E5/6	P	162	94	1	1	1, 9
I >> Trip	-	E7/8	A	160	91	0	1	1
I_{01} > Start	O5	E9/10	P	163	67	1	1	1, 9
I_{01} > Trip	-	E11/12	P	163	92	0	1	1
U_0 > Start	O7	E13/14	P	170	84	1	1	1, 9
I_{02} > Trip	-	E15/16	P	163	93	0	1	1
Main settings	V150	-	A	160	23	1	1	1, 9
Second settings	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D44)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D44)	-	E51	P	249	120	0	1	1

Table 5.2.-2   Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings	V150	A	160	23	20	20	20, 21
Second settings	V150	A	160	24	20	20	20, 21

Table 5.2.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, <empty>, I_{L3}, I_0, U_0	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
-	Data2 (empty = 0)
I_{L3}	Data3 (SPA data: I2)
I_0	Data4 (SPA data: I4)
U_0	Data5 (SPA data: I3)

5.3. SPAA 341 C2

For the unit to operate properly, the following settings are required::

- The slave number of the SPCJ 4D28 module must be 1.
- The slave number of the SPCT 5D54 module must be 2.
- The value of the event mask V155 of the SPCJ 4D28 module must be 4095.
- The value of the event mask V156 of the SPCJ 4D28 module must be 4095.
- The data transfer rate on the SPA-bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAA 341 C2 User's Manual..

Table 5.3.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I > Start	O1	E1/2	A	160	84	1	1	1, 9
I > Trip	-		A	160	90	0	1	1
I >> Start	O3	E5/6	P	162	94	1	1	1, 9
I >> Trip	-	E7/8	A	160	91	0	1	1
I >>> Start	O5	E9/10	P	162	96	1	1	1, 9
I >>> Trip	-	E11/12	P	162	98	0	1	1
I_0 > Start	O7	E13/14	A	160	67	1	1	1, 9
I_0 > Trip	-	E15/16	P	160	92	0	1	1
I_0 >> Start	O9	E17/18	P	162	95	1	1	1, 9
I_0 >> Trip	-	E19/20	P	162	93	0	1	1
ΔI > Start	-	E21/22	P	173	84	0	1	1
ΔI > Trip	-	E23/24	P	173	90	0	1	1
Q0, CB1Pos	I2	-	B	240	160	1	1	1, 9
AR Shot in use	V153	-	A	160	16	1	1	1, 9
Main settings	V150	-	A	160	23	1	1	1, 9
Second settings	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D44)	-	E50	P	249	110	0	1	1
Unit restart (CPCT 5D54)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPCJ 4D28)	-	E51	P	249	120	0	1	1
Event buffer overflow (SPCT 5D54)	-	E51	P	249	121	0	1	1

Table 5.3.-2   Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
AR Shot in use	V153	A	160	16	20	20	20, 21
LED reset	V101	A	160	19	20	20	20, 21
Main settings	V150	A	160	23	20	20	20, 21
Second settings	V150	A	160	24	20	20	20, 21

Table 5.3.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.4.   SPAC 310 C

For the unit to operate properly, the following settings are required::

⚠️
- The slave number of the SPTO 1D2 module must be 1.
- The slave number of the SPCJ 4D29 module must be 2.
- The value of the event mask V155 of the SPCJ 4D29 module must be 255.
- The value of the event mask V156 of the SPCJ 4D29 module must be 255.
- The value of the event mask 1V155 of the SPTO 1D2 module must be 15.
- The value of the event mask 2V155 of the SPTO 1D2 module must be 15.
- The value of the event mask 3V155 of the SPTO 1D2 module must be 15.
- The circuit breaker (Q0) must be connected to channel 2.
- The disconnector (Q1) must be connected to channel 1.
- The earth switch (Q8) must be connected to channel 3.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAC 310 C User's Manual.

Table 5.4.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I > Start	O1	E1/2	A	160	84	1	1	1, 9
I > Trip	-	E3/4	A	160	90	0	1	1
I >> Start	O3	E5/6	P	162	94	1	1	1, 9
I >> Trip	-	E7/8	A	160	91	0	1	1
I_0 > Start	O5	E9/10	A	160	67	1	1	1, 9
I_0 > Trip	-	E11/12	A	160	92	0	1	1
I_0 >> Start	O7	E13/14	P	162	95	1	1	1, 9
I_0 >> Trip	-	E15/16	A	160	93	0	1	1
Q0, CB1Pos	(0).2I1	-	B	240	160	1	1	1, 9
Q1, DCPos	(0).1I1	-	B	240	161	1	1	1, 9
Q8, EarthPos	(0).3I1	-	B	240	164	1	1	1, 9
LocalState	V6	-	P	250	220	1	1	1, 9
Main settings (SPCJ 4D29)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 4D29)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPTO 1D2)	-	E50	P	249	110	0	1	1
Unit restart (SPCJ 4D29)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPTO 1D2)	-	E51	P	249	120	0	1	1
Event buffer overflow (SPCJ 4D29)	-	E51	P	249	121	0	1	1

Table 5.4.-2   Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	Cot cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 4D29)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 4D29)	V150	A	160	24	20	20	20, 21
Q0, CB1Control	(0).2O1	B	240	160	20	20	20, 21

Table 5.4.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.5.   SPAC 315 C

For the unit to operate properly, the following settings are required::

⚠ - The slave number of the SPTO 1D6 module must be 1.
- The slave number of the SPCJ 4D29 module must be 2.
- The value of the event mask V155 of the SPCJ 4D29 module must be 255.
- The value of the event mask V156 of the SPCJ 4D29 module must be 255.
- The value of the event mask 1V155 of the SPTO 1D6 module must be 15.
- The value of the event mask 2V155 of the SPTO 1D6 module must be 15.
- The value of the event mask 3V155 of the SPTO 1D6 module must be 15.
- The circuit breaker (Q0) must be connected to channel 2.
- The disconnector (Q1) must be connected to channel 1.
- The earth switch (Q8) must be connected to channel 3.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAC 315 C User's Manual.

Table 5.5.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I > Start	O1	E1/2	A	160	84	1	1	1, 9
I > Trip	-	E3/4	A	160	90	0	1	1
I >> Start	O3	E5/6	P	162	94	1	1	1, 9
I >> Trip	-	E7/8	A	160	91	0	1	1
I_0 > Start	O5	E9/10	A	160	67	1	1	1, 9
I_0 > Trip	-	E11/12	A	160	92	0	1	1
I_0 >> Start	O7	E13/14	P	162	95	1	1	1, 9
I_0 >> Trip	-	E15/16	A	160	93	0	1	1
Q0, CB1Pos	(0).2I1	-	B	240	160	1	1	1, 9
Q1, DCPos	(0).1I1	-	B	240	161	1	1	1, 9
Q8, EarthPos	(0).3I1	-	B	240	164	1	1	1, 9
LocalState	V6	-	P	250	220	1	1	1, 9
Main settings (SPCJ 4D29)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 4D29)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPTO 1D6)	-	E50	P	249	110	0	1	1
Unit restart (SPCJ 4D29)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPTO 1D6)	-	E51	P	249	120	0	1	1
Event buffer overflow (SPCJ 4D29)	-	E51	P	249	121	0	1	1

Table 5.5.-2   Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 4D29)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 4D29)	V150	A	160	24	20	20	20, 21
Q0, CB1Control	(0).2O1	B	240	160	20	20	20, 21

Table 5.5.-3   Clas 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.6. SPAC 320 C

For the unit to operate properly, the following settings are required::

- The slave number of the SPTO 1D5 module must be 1.
- The slave number of the SPCJ 4D34 module must be 2.
- The value of the event mask V155 of the SPCJ 4D34 module must be 204.
- The value of the event mask V156 of the SPCJ 4D34 module must be 255.
- The value of the event mask V157 of the SPCJ 4D34 module must be 255.
- The value of the event mask V158 of the SPCJ 4D34 module must be 15.
- The value of the event mask 1V155 of the SPTO 1D5 module must be 15.
- The value of the event mask 2V155 of the SPTO 1D5 module must be 15.
- The value of the event mask 3V155 of the SPTO 1D5 module must be 15.
- The circuit breaker (Q0) must be connected to channel 2.
- The disconnector (Q1) must be connected to channel 1.
- The earth switch (Q8) must be connected to channel 3.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAC 320 C User's Manual.

Table 5.6.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I_θ Start	O1	E3/4	P	11	90	1	1	1, 9
I_θ Trip	-	E7/8	P	11	92	0	1	1
$I_s >$ or $I_s^2 xt_s$ Start	O4	E9/10	P	11	93	1	1	1, 9
$I_s >$ or $I_s^2 xt_s$ Trip	-	E11/12	P	11	94	0	1	1
I >> Start	O6	E13/14	P	11	95	1	1	1, 9
I >> Trip	-	E15/16	P	11	96	0	1	1
$I_0 >$ Start	O8	E17/18	P	11	97	1	1	1, 9
$I_0 >$ Trip	-	E19/20	P	11	98	0	1	1
ΔI Start	O10	E21/22	P	11	99	1	1	1, 9
ΔI Trip	-	E23/24	P	11	100	0	1	1
I < Start	O12	E25/26	P	11	101	1	1	1, 9
I < Trip	-	E27/28	P	11	102	0	1	1
Q0, CB1Pos	(0).2I1	-	B	240	160	1	1	1, 9
Q1, DCPos	(0).1I1	-	B	240	161	1	1	1, 9
Q8, EarthPos	(0).3I1	-	B	240	164	1	1	1, 9
LocalState	V6	-	P	250	220	1	1	1, 9
Unit restart (SPTO 1D5)	-	E50	P	249	110	0	1	1
Unit restart (SPCJ 4D34)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPTO 1D5)	-	E51	P	249	120	0	1	1
Event buffer overflow (SPCJ 4D34)	-	E51	P	249	121	0	1	1

Table 5.6.-2   Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	P	11	19	20	20	20, 21
Q0, CB1Control	(0).2O1	B	240	160	20	20	20, 21

Table 5.6.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.7. SPAD 346 C3

For the unit to operate properly, the following settings are required::

- The slave number of the SPCD 3D53 module must be 1.
- The value of the event mask 1V155 must be 15.
- The value of the event mask 2V155 must be 15.
- The value of the event mask 3V155 must be 15.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAD 346 C3 User's Manual.

Table 5.7.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
3∆I>Trip L1	-	(0).1E1/2	A	176	69	0	1	1
3∆I>Trip L2	-	(0).2E1/2	A	176	70	0	1	1
3∆I>Trip L3	-	(0).3E1/2	A	176	71	0	1	1
3∆I>>Trip L1	-	(0).1E3/4	P	178	69	0	1	1
3∆I>>Trip L2	-	(0).2E3/4	P	178	70	0	1	1
3∆I>>Trip L3	-	(0).3E3/4	P	178	71	0	1	1
Main settings (SPCD 3D53)	V150	-	A	176	23	1	1	1, 9
Second settings (SPCD 3D53)	V150	-	A	176	24	1	1	1, 9
Unit restart (SPCD 3D53)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCD 3D53)	-	E51	P	249	120	0	1	1

Table 5.7.-2 Class 1 command

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	176	19	20	20	20, 21
Main settings (SPCD 3D53)	V150	A	176	23	20	20	20, 21
Second settings (SPCD 3D53)	V150	A	176	24	20	20	20, 21

Table 5.7.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
HV I_{L1}, D I_{L1}, D I_{L2}, D I_{L3}, LV I_{L1}, RegD I_{L1}, RegD I_{L2}, RegD I_{L3}	P	135	208	9	8

The ASDU octets will look like the following table:

9	TypeID
8	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
208	Information number
HV I_{L1}	Data1 (SPA data: I1)
D I_{L1}	Data2 (SPA data: I4)
D I_{L2}	Data3 (SPA data: I5)
D I_{L3}	Data4 (SPA data: I6)
LV I_{L1}	Data5 (SPA data: I7)
RegD I_{L1}	Data6 (SPA data: V11)
RegD I_{L2}	Data7 (SPA data: V12)
RegD I_{L3}	Data8 (SPA data: V13)

5.8.   **SPAJ 115 C**

For the unit to operate properly, the following settings are required::

- the slave number of the SPCJ 2C30 module must be 1
- the value of the event mask V155 must be 63
- data transfer rate on the SPA bus must be 9600 bit/s

For more information about the above mentioned settings, see the SPAJ 115 C User's Manual.

Table 5.8.-1   Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
ΔI_0>Trip	-	E3/4	A	160	93	0	1	1
I_0>Start	0O2	E5/6	A	160	67	1	1	1, 9
I_0>Trip	-	E7/8	A	160	92	0	1	1
Main settings (SPCJ 2C30)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 2C30)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 2C30)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 2C30)	-	E51	P	249	120	0	1	1

Table 5.8.-2   Class 1 command

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 2C30)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 2C30)	V150	A	160	24	20	20	20, 21

Table 5.8.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
ΔI_0, <empty>	A	160	147	3	2

The ASDU octets will look like the following table:

3	TypeID
2	VSQ = Num of data
2	COT
ADR	Common address of ASDU
160	Function type
147	Information number
ΔI_0	Data1 (SPA data: I2)
-	Data2 (empty = 0)

5.9. SPAJ 140 C

For the unit to operate properly, the following settings are required::

- The slave number of the SPCJ 4D29 module must be 1.
- The value of the event mask V155 must be 255.
- The value of the event mask V156 must be 255.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAJ 140 C User's Manual.

Table 5.9.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I>Start	O1	E1/2	A	160	84	1	1	1, 9
I>Trip	-	E3/4	A	160	90	0	1	1
I>>Start	O3	E5/6	P	162	94	1	1	1, 9
I>>Trip	-	E7/8	A	160	91	0	1	1
I_0>Start	O5	E9/10	A	160	67	1	1	1, 9
I_0>Trip	-	E11/12	A	160	92	0	1	1
I_0>>Start	O7	E13/14	P	162	95	1	1	1, 9
I_0>>Trip	-	E15/16	A	160	93	0	1	1
Main settings (SPCJ 4D29)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 4D29)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D29)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D29)	-	E51	P	249	120	0	1	1

Table 5.9.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 4D29)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 4D29)	V150	A	160	24	20	20	20, 21

Table 5.9.-3   Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.10. SPAJ 141 C

For the unit to operate properly, the following settings are required::

⚠️
- The slave number of the SPCJ 4D24 module must be 1.
- The value of the event mask V155 must be 255.
- The value of the event mask V156 must be 255.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAJ 141 C User's Manual.

Table 5.10.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I>Start	O1	E1/2	A	160	84	1	1	1, 9
I>Trip	-	E3/4	A	160	90	0	1	1
I>>Start	O3	E5/6	P	162	94	1	1	1, 9
I>>Trip	-	E7/8	A	160	91	0	1	1
I_0>Start	O5	E9/10	A	160	67	1	1	1, 9
I_0>Trip	-	E11/12	A	160	92	0	1	1
I_0>>Start	O7	E13/14	P	162	95	1	1	1, 9
I_0>>Trip	-	E15/16	A	160	93	0	1	1
Main settings (SPCJ 4D24)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 4D24)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D24)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D24)	-	E51	P	249	120	0	1	1

Table 5.10.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 4D24)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 4D24)	V150	A	160	24	20	20	20, 21

Table 5.10.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.11.   SPAJ 142 C

For the unit to operate properly, the following settings are required::

⚠ - The slave number of the SPCJ 4D29 module must be 1.
- The value of the event mask V155 must be 255.
- The value of the event mask V156 must be 255.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAJ 142 C User's Manual.

Table 5.11.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I>Start	O1	E1/2	A	160	84	1	1	1, 9
I>Trip	-	E3/4	A	160	90	0	1	1
I>>Start	O3	E5/6	P	162	94	1	1	1, 9
I>>Trip	-	E7/8	A	160	91	0	1	1
I_0>Start	O5	E9/10	A	160	67	1	1	1, 9
I_0>Trip	-	E11/12	A	160	92	0	1	1
I_0>>Start	O7	E13/14	P	162	95	1	1	1, 9
I_0>>Trip	-	E15/16	A	160	93	0	1	1
Main settings (SPCJ 4D29)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 4D29)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D29)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D29)	-	E51	P	249	120	0	1	1

Table 5.11.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 4D29)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 4D29)	V150	A	160	24	20	20	20, 21

Table 5.11.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.12.   SPAJ 144 C

For the unit to operate properly, the following settings are required::

- The slave number of the SPCJ 4D28 module must be 1.
- The value of the event mask V155 must be 4095.
- The value of the event mask V156 must be 4095.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAJ 144 C User's Manual.

Table 5.12.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I>Start	O1	E1/2	A	160	84	1	1	1, 9
I>Trip	-	E3/4	A	160	90	0	1	1
I>>Start	O3	E5/6	P	162	94	1	1	1, 9
I>>Trip	-	E7/8	P	162	91	0	1	1
I>>>Start	O5	E9/10	P	162	96	1	1	1, 9
I>>>Trip	-	E11/12	P	162	98	0	1	1
I_0>Start	O7	E13/14	A	160	67	1	1	1, 9
I_0>Trip	-	E15/16	A	160	92	0	1	1
I_0>>Start	O9	E17/18	P	162	95	1	1	1, 9
I_0>>Trip	-	E19/20	A	160	93	0	1	1
ΔI>Start	-	E21/22	P	173	84	0	1	1
ΔI>Trip	-	E23/24	P	173	90	0	1	1
Main settings (SPCJ 4D28)	V150	-	A	160	23	1	1	1, 9
Second settings (SPCJ 4D28)	V150	-	A	160	24	1	1	1, 9
Unit restart (SPCJ 4D28)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D28)	-	E51	P	249	120	0	1	1

Table 5.12.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	A	160	19	20	20	20, 21
Main settings (SPCJ 4D28)	V150	A	160	23	20	20	20, 21
Second settings (SPCJ 4D28)	V150	A	160	24	20	20	20, 21

Table 5.12.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.13.   SPAJ 160 C

For the unit to operate properly, the following settings are required::

⚠ - The slave number of the SPCJ 4D40 must be 1.

- The value of the event mask V155 must be 255.

- The value of the event mask V156 must be 255.

- The value of the event mask V157 must be 15.

- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAJ 160 C User's Manual.

Table 5.13.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I_b> Start	O1	E1/2	P	10	90	1	1	1, 9
I_b> Trip	-	E3/4	P	10	91	0	1	1
I_a> Start	O3	E5/6	P	10	92	1	1	1, 9
I_a> Trip	-	E7/8	P	10	93	0	1	1
I< Start	O5	E9/10	P	10	94	1	1	1, 9
I< Trip	-	E11/12	P	10	95	0	1	1
ΔI1>Start	O7	E13/14	P	10	96	1	1	1, 9
ΔI1>Trip	-	E15/16	P	10	97	0	1	1
ΔI2> Start	O9	E17/18	P	10	98	1	1	1, 9
ΔI2>Trip	-	E19/20	P	10	99	0	1	1
Unit restart (SPCJ 4D40)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D40)	-	E51	P	249	120	0	1	1

Table 5.13.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	P	10	19	20	20	20, 21

Table 5.13.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, <empty>, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
-	Data4 (empty = 0)
-	Data5 (empty = 0)

5.14.   **SPAM 150 C**

For the unit to operate properly, the following settings are required::

- The slave number of the SPCJ 4D34 module must be 1.
- The value of the event mask V155 must be 252.
- The value of the event mask V156 must be 255.
- The value of the event mask V157 must be 255.
- The value of the event mask V158 must be 15.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAM 150 C User's Manual.

Table 5.14.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I_θ Start	O1	E3/4	P	11	90	1	1	1, 9
I_θ Alarm	O2	E5/6	P	11	91	1	1	1, 9
I_θ Trip	-	E7/8	P	11	92	0	1	1
$I_s>$ or $I_s^2xt_s$ Start	O4	E9/10	P	11	93	1	1	1, 9
$I_s>$ or $I_s^2t_s$ Trip	-	E11/12	P	11	94	0	1	1
I>> Start	O6	E13/14	P	11	95	1	1	1, 9
I>> Trip	-	E15/16	P	11	96	0	1	1
$I_0>$ Start	O8	E17/18	P	11	97	1	1	1, 9
$I_0>$ Trip	-	E19/20	P	11	98	0	1	1
ΔI Start	O10	E21/22	P	11	99	1	1	1, 9
ΔI Trip	-	E23/24	P	11	100	0	1	1
I< Start	O12	E25/26	P	11	101	1	1	1, 9
I< Trip	-	E27/28	P	11	102	0	1	1
Unit restart (SPCJ 4D34)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCJ 4D34)	-	E51	P	249	120	0	1	1

Table 5.14.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	P	11	19	20	20	20, 21

Table 5.14.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, I_0, <empty>	P	135	140	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
140	Information number
I_{L1}	Data1 (SPA data: I1)
I_{L2}	Data2 (SPA data: I2)
I_{L3}	Data3 (SPA data: I3)
I_0	Data4 (SPA data: I4)
-	Data5 (empty = 0)

5.15. **SPAS 348 C**

For the unit to operate properly, the following settings are required::

- The slave number of the SPCS 4D11 module must be 1.
- The slave number of the SPCS 4D12 module must be 2.
- The slave number of the SPCS 2D26 module must be 3.
- The value of the event mask V155 of the SPCS 4D11 and the SPCS 4D12 modules must be 63.
- The value of the event mask V156 of the SPCS 4D11 and the SPCS 4D12 modules must be 255.
- The value of the event mask V155 of the SPCS 2D26 module must be 4095.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAS 348 C User's Manual.

Table 5.15.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
I> Start ---> (SPCS 4D11)	O1	E1/2	P	164	74	1	1	1, 9
I> Start <--- (SPCS 4D11)	O2	E3/4	P	164	75	1	1	1, 9
I> Start ---> (SPCS 4D12)	O1	E1/2	P	164	174	1	1	1, 9
I> Start <--- (SPCS 4D12)	O2	E3/4	P	164	175	1	1	1, 9
I> Trip (SPCS 4D11)	-	E5/6	P	164	90	0	1	1
I>>Trip (SPCS 4D11)	-	E9/10	P	164	91	0	1	1
I>>>Trip (SPCS 4D11)	-	E13/14	P	164	98	0	1	1
I> Trip (SPCS 4D12)	-	E5/6	P	164	190	0	1	1
I>>Trip (SPCS 4D12)	-	E9/10	P	164	191	0	1	1
I>>>Trip (SPCS 4D12)	-	E13/14	P	164	198	0	1	1
U_{0b}> Start (SPCS 2D26)	O1	E1/2	P	12	90	1	1	1, 9
U_{0b}> Trip (SPCS 2D26)	-	E3/4	P	12	91	0	1	1
I_{01}>/U_{01}> Start (SPCS 2D26)	O3	E5/6	P	12	92	1	1	1, 9
I_{01}>/U_{01}> Trip (SPCS 2D26)	-	E7/8	P	12	93	0	1	1
I_{02}>/U_{02}> Start (SPCS 2D26)	O5	E9/10	P	12	94	1	1	1, 9
I_{02}>/U_{02}> Trip (SPCS 2D26)	-	E11/12	P	12	95	0	1	1
Unit restart (SPCS 4D11)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCS 4D11)	-	E51	P	249	120	0	1	1
Unit restart (SPCS 4D12)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPCS 4D12)	-	E51	P	249	121	0	1	1
Unit restart (SPCS 2D26)	-	E50	P	249	112	0	1	1
Event buffer overflow (SPCS 2D26)	-	E51	P	249	122	0	1	1

Table 5.15.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
Main settings (SPCS 4D11)	V150	P	164	23	20	20	20, 21
Second settings (SPCS 4D11)	V150	P	164	24	20	20	20, 21
Main settings (SPCS 4D12)	V150	P	164	123	20	20	20, 21
Second settings (SPCS 4D12)	V150	P	164	124	20	20	20, 21
Main settings (SPCS 2D26)	V150	P	12	23	20	20	20, 21
Second settings (SPCS 2D26)	V150	P	12	24	20	20	20, 21

Table 5.15.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, U_{12}, U_{23}, U_{31}, I_0, U_0	P	135	138	9	8

The ASDU octets will look like the following table:

9	TypeID
8	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
138	Information number
I_{L1}	Data1 (SPCS 4D11, SPA data: I1)
I_{L2}	Data2 (SPCS 4D12, SPA data: I4)
I_{L3}	Data3 (SPCS 4D11, SPA data: I4)
U_{12}	Data4 (SPCS 4D11, SPA data: I5)
U_{23}	Data5 (SPCS 4D11, SPA data: I2)
U_{31}	Data6 (SPCS 4D12, SPA data: I5)
I_0	Data7 (SPCS 2D26, SPA data: I2)
U_0	Data8 (SPCS 2D26, SPA data: I1)

5.16. SPAU 110 C

For the unit to operate properly, the following settings are required::

⚠ - The slave number of the SPCU 1C6 module must be 1.
- The value of the event mask V155 must be 255.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAU 110 C User's Manual.

Table 5.16.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
U_0>Start	O1	E1/2	P	170	84	1	1	1, 9
U_0>Trip	-	E3/4	P	170	90	0	1	1
U_0>>Start	O3	E5/6	P	170	94	1	1	1, 9
U_0>>Trip	-	E7/8	P	170	91	0	1	1
Settings by knobs	V150	-	P	170	23	1	1	1, 9
Remote settings	V150	-	P	170	24	1	1	1, 9
Unit restart (SPCU 1C6)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCU 1C6)	-	E51	P	249	120	0	1	1

Table 5.16.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	P	170	19	20	20	20, 21
Settings by knobs	V150	P	170	23	20	20	20, 21
Remote settings	V150	P	170	24	20	20	20, 21

Table 5.16.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
<empty>, U_0	P	170	147	3	2

The ASDU octets will look like the following table:

3	TypeID
2	VSQ = Num of data
2	COT
ADR	Common address of ASDU
170	Function type
147	Information number
-	Data1 (empty = 0)
U_0	Data4 (SPA data: I1)

5.17.   SPAU 130 C

For the unit to operate properly, the following settings are required::

- The slave number of the SPCU 3C13 module must be 1.
- The value of the event mask V155 must be 255.
- The data transfer rate on the SPA bus must be 9600 bit/s.
- The data transfer rate on the IEC103 bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAU 130 C User's Manual.

Table 5.17.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
U>Start	O1	E1/2	P	165	84	1	1	1, 9
U>Trip	-	E3/4	P	165	90	0	1	1
U<Start	O3	E5/6	P	166	84	1	1	1, 9
U<Trip	-	E7/8	P	166	90	0	1	1
Settings by knobs	V150	-	P	165	23	1	1	1, 9
Remote settings	V150	-	P	165	24	1	1	1, 9
Unit restart (SPCU 3C13)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCU 3C13)	-	E51	P	249	120	0	1	1

Table 5.17.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset	V101	P	165	19	20	20	20, 21
Settings by knobs	V150	P	165	23	20	20	20, 21
Remote settings	V150	P	165	24	20	20	20, 21

Table 5.17.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
<empty>, <empty>, <empty>, U_{12}, U_{23}, U_{31}	P	135	138	9	6

The ASDU octets will look like the following table:

9	TypeID
6	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
138	Information number
-	Data1 (empty = 0)
-	Data2 (empty = 0)
-	Data3 (empty = 0)
U_{12}	Data4 (SPA data: I1)
U_{23}	Data5 (SPA data: I2)
U_{31}	Data6 (SPA data: I3)

5.18.   SPAU 330 C

For the unit to operate properly, the following settings are required::

⚠️   - The slave number of the SPCU 1C6 module must be 1.
- The slave number of the SPCU 3C14 module must be 2.
- The value of the event mask V155 of the SPCU 1C6 module must be 255.
- The value of the event mask V155 of the SPCU 3C14 module must be 255.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAU 330 C User's Manual.

Table 5.18.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
U_0>Start (SPCU 1C6)	O1	E1/2	P	170	84	1	1	1, 9
U_0>Trip (SPCU 1C6)	-	E3/4	P	170	90	0	1	1
U_0>>Start (SPCU 1C6)	O3	E5/6	P	170	94	1	1	1, 9
U_0>>Trip (SPCU 1C6)	-	E7/8	P	170	91	0	1	1
U>Start (SPCU 3C14)	O1	E1/2	P	165	84	1	1	1, 9
U>Trip (SPCU 3C14)	-	E3/4	P	165	90	0	1	1
U<Start (SPCU 3C14)	O3	E5/6	P	166	84	1	1	1, 9
U<Trip (SPCU 3C14)	-	E7/8	P	166	90	0	1	1
Settings by knobs (SPCU 3C14)	V150	-	P	165	23	1	1	1, 9
Remote settings (SPCU 3C14)	V150	-	P	165	24	1	1	1, 9
Settings by knobs (SPCU 1C6)	V150	-	P	170	23	1	1	1, 9
Remote settings (SPCU 1C6)	V150	-	P	170	24	1	1	1, 9
Unit restart (SPCU 1C6)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCU 1C6)	-	E51	P	249	120	0	1	1
Unit restart (SPCU 3C14)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPCU 3C14)	-	E51	P	249	121	0	1	1

Table 5.18.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
LED reset (SPCU 3C14)	V101	P	165	19	20	20	20, 21
Settings by knobs (SPCU 3C14)	V150	P	165	23	20	20	20, 21
Remote settings (SPCU 3C14)	V150	P	165	24	20	20	20, 21
LED reset (SPCU 1C6)	V101	P	170	19	20	20	20, 21
Settings by knobs (SPCU 1C6)	V150	P	170	23	20	20	20, 21
Remote settings (SPCU 1C6)	V150	P	170	24	20	20	20, 21

Table 5.18.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
<empty>, <empty>, <empty>, U_{12}, U_{23}, U_{31}, <empty>, energizing input voltage U0	P	135	138	9	8

The ASDU octets will look like the following table:

9	TypeID
8	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
138	Information number
-	Data1 (empty = 0)
-	Data2 (empty = 0)
-	Data3 (empty = 0)
U_{12}	Data4 (SPCU 3C14, SPA data: I1)
U_{23}	Data5 (SPCU 3C14, SPA data: I2)
U_{31}	Data6 (SPCU 3C14, SPA data: I3)
-	Data7 (empty = 0)
U_0	Data8 (SPCU 1C6, SPA data: I1)

5.19.   SPAU 341 C1

For the unit to operate properly, the following settings are required::

- The slave number of the SPCU 1D50 module must be 1.
- The slave number of the SPCN 1D56 module must be 2.
- The value of the event mask V155 of the SPCN 1D56 module must be 240.
- The data transfer rate on the SPA bus must be 9600 bit/s.

For more information about the above mentioned settings, see the SPAU 341 C1 User's Manual.

Table 5.19.-1 Class 1 data

Signal name	SPA data	SPA event	St	Ftyp	InfNum	GI	Typ	COT
Raise sgnl activ.	O1	E5/6	P	13	90	1	1	1, 9
Lower sgnl activ.	O2	E7/8	P	13	91	1	1	1, 9
Main settings (SPCU 1D50)	V150	-	P	13	23	1	1	1, 9
Second settings (SPCU 1D50)	V150	-	P	13	24	1	1	1, 9
Main settings (SPCN 1D56)	V150	-	P	13	123	1	1	1, 9
Second settings (SPCN 1D56)	V150	-	P	13	124	1	1	1, 9
Unit restart (SPCU 1D50)	-	E50	P	249	110	0	1	1
Event buffer overflow (SPCU 1D50)	-	E51	P	249	120	0	1	1
Unit restart (SPCN 1D56)	-	E50	P	249	111	0	1	1
Event buffer overflow (SPCN 1D56)	-	E51	P	249	121	0	1	1

Table 5.19.-2 Commands

Signal name	SPA data	St	Ftyp	InfNum	Typ	COT cmd	COT resp
Main settings (SPCU 1D50)	V150	P	13	23	20	20	20, 21
Second settings (SPCU 1D50)	V150	P	13	24	20	20	20, 21
Main settings (SPCN 1D56)	V150	P	13	123	20	20	20, 21
Second settings (SPCN 1D56)	V150	P	13	124	20	20	20, 21

Table 5.19.-3 Class 2 data

Measurands	St	Ftyp	InfNum	Typ	Num data
I_{L1}, I_{L2}, I_{L3}, U_m, Tap pos.	P	135	205	9	5

The ASDU octets will look like the following table:

9	TypeID
5	VSQ = Num of data
2	COT
ADR	Common address of ASDU
135	Function type
205	Information number
I_{L1}	Data1 (SPA data: I2)
I_{L2}	Data2 (SPA data: I3)
I_{L3}	Data3 (SPA data: I4)
U_m	Data4 (SPA data: I1)
Tap pos.	Data5 (SPA data: V3)

ABB