SIA-C

Self & Dual Powered Overcurrent & Earth Fault Protection Relay

IEC60870-5-103 PROTOCOL MANUAL

1 INTEROPERABILITY PROFILE FOR IEC60870-5-103

This document describes the IEC 60870-5-103 data points and structures available in the IED. The point lists describe a superset of all data available through the standard configuration/s.

1.1 Physycal layer

1.1.1 Electrical interface

- ☒ EIA RS-485
- ☐ Number of Loads **32** for one protection equipment.

NOTE: EIA RS-485 standard defines unit loads so that 32 of them can be operated on one line. For detailed information to clause 3 of EIA RS-485 standard.

1.1.2 Optical Interface

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

1.1.3 Transmission speed

- ☒ 4800 bits/s.
- ☒ 9600 bits/s.
- ☒ 19200 bits/s.
- ☐ 38400 bits/s.
- ☐ 57600 bits/s.
- ☐ 115200 bits/s.

NOTE: Data Size: 8 bits.
Parity: EVEN.
Stop Bits: 1.

1.2 Link Layer

There are no choices for the link layer.

1.3 Application Layer

1.3.1 Transmission mode for application data

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

1.3.2 COMMON ADDRESS of ASDU

- ☒ One COMMON ADDRESS OF ASDU (identical with station address)
- ☐ More than one COMMON ADDRESS OF ASDU.

1.3.3 Selection of standard information numbers in monitor direction

The following functionalities are supported:

- ☒ Initialization.
- ☒ General Interrogation.
- ☒ Synchronization.
- ☒ Commands Transmission.

Type in monitor direction:

	TYP	Semantics
☒	<1>	Time-tagged message.
☒	<2>	Time-tagged message with relative time.
☒	<3>	Measurements I.
☒	<5>	Identification.
☒	<6>	Time synchronization.
☒	<8>	General interrogation termination.

Type in control direction:

	TYP	Semantics
☒	<6>	Time synchronization.
☒	<7>	General Interrogation.
☒	<20>	General command.

SIA-C	FUN	INF	Description	TYP	COT
System functions in monitor direction					
X	160	<0>	End of General Interrogation	8	End of GI
X	160	<0>	Sincronización	6	TS
X	160	<2>	Reset FCB	5	Reset FCB
X	160	<3>	Reset CU	5	Reset CU
X	160	<4>	Start/restart	5	Start/restart
Status indications in monitor direction					
X	160	<16>	Auto-recloser active	1	SE, GI
X	160	<17>	Teleprotection active	1	SE, GI
X	160	<18>	Protection active	1	SE, GI
X	160	<22>	Local parameter setting	1	SE, GI
X	160	<27>	Auxiliary Input 1	1	SE, GI
X	160	<28>	Auxiliary Input 2	1	SE, GI
Fault indications in monitor direction					
X	160	<64>	Pickup L1	2	GI
X	160	<65>	Pickup L2	2	GI
X	160	<66>	Pickup L3	2	GI
X	160	<67>	Pickup N	2	GI
X	160	<68>	General Trip	2	SE, GI
X	160	<69>	Trip L1	2	GI
X	160	<70>	Trip L2	2	GI
X	160	<71>	Trip L3	2	GI
X	160	<84>	General Pickup	2	SE*, GI
X	160	<85>	Breaker Failure	2	SE*, GI
X	160	<90>	51 Trip (Trip I >)	2	SE, GI
X	160	<91>	50P Trip (Trip I >>)	2	GI
X	160	<92>	51N Trip (Trip IN >)	2	SE*, GI
X	160	<93>	50N Trip (Trip IN >>)	2	GI

SIA-C	FUN	INF	Description		TYP	COT
Auto-reclosure indication in monitor direction						
X	160	<128>	CB 'on' by AR		1	SE, GI
X	160	<130>	79 Lockout		1	SE, GI
Measurements in monitor direction						
X	160	<148>	Measurements IL1,2,3, V L1,2,3, P, Q, f **(**)**		9	CYC
Generic function in monitor direction						
X	200	<1>	**52**	CB close / open	2	SE, GI
X	200	<2>		52 Openning time	2	SE*, GI
X	200	<3>		52 Opening Error	2	SE*, GI
X	200	<4>		52 Closing Time	2	SE*, GI
X	200	<5>		52 Closing Error	2	SE*, GI
X	200	<6>		52 Excessive Openings	1	SE, GI
X	200	<7>		52 Accumulated Amperes Alarm (I2t)	1	SE, GI
X	200	<8>		52 Excessive Openings per time window	1	SE, GI
X	200	<10>	**Remote IEC103**	Reset TI	2	SE*, GI
X	200	<11>		Open CB	2	SE*, GI
X	200	<12>		Close CB	2	SE*, GI
X	200	<13>		79 Block	2	SE*, GI
X	200	<14>		79 Unblock	2	SE*, GI
X	200	<20>	**79**	79 Reclosing Time	2	SE*, GI
X	200	<21>		Is 52 Open?	2	SE*, GI
X	200	<22>		79 Hold Time	2	SE*, GI
X	200	<23>		79 Reset Time	2	SE*, GI
X	200	<24>		79 SafeTime	2	SE*, GI
X	200	<25>		79 Manual Opening Time	2	SE*, GI

SIA-C	FUN	INF	Description		TYP	COT
X	200	<30>	Logic	52a	1	SE, GI
X	200	<31>		52b	1	SE, GI
X	200	<32>		Block 50/51	1	SE, GI
X	200	<33>		Block 50G/51G	1	SE, GI
X	200	<34>		79 Start	1	SE, GI
X	200	<35>		79 Enable	1	SE, GI
X	200	<36>		79 Level Block	1	SE, GI
X	200	<37>		Settings Group 1	1	SE, GI
X	200	<38>		Settings Group 2	1	SE, GI
X	200	<39>		50BF Start	1	SE, GI
X	200	<41>	Outputs	Output 2	1	SE, GI
X	200	<42>		Output 3	1	SE, GI
X	200	<43>	LED's	LED 1	1	GI
X	200	<44>		LED 2	1	GI
X	200	<45>		LED 3	1	GI
X	200	<50>	General	DFR Start	2	SE, GI
X	200	<51>		50 Hz	1	GI
X	200	<52>		Measurement Error	1	SE, GI
X	200	<53>		Time synchronization	2	SE, GI
X	200	<54>		Default EEPROM	1	SE, GI
X	200	<55>		EEPROM Error	1	SE, GI
X	200	<56>		EEPROM Change	1	SE, GI
X	200	<57>		Trip Power Error	2	SE, GI
X	200	<58>		Auxiliary Power	2	GI
X	200	<59>		Sel-powered	2	GI
X	200	<60>		Battery	2	GI

SIA-C	FUN	INF	Description		TYP	COT
X	200	<65>	50G-1	Neutral Pickup	2	SE, GI
X	200	<66>		Neutral Trip	2	SE*, GI
X	200	<70>	50G-2	Neutral Pickup	2	SE, GI
X	200	<71>		Neutral Trip	2	SE*, GI
X	200	<80>	50-1	Phase A Pickup	2	SE, GI
X	200	<81>		Phase B Pickup	2	SE, GI
X	200	<82>		Phase C Pickup	2	SE, GI
X	200	<83>		Phase Pickup	2	SE, GI
X	200	<84>		Phase A Trip	2	SE*, GI
X	200	<85>		Phase B Trip	2	SE*, GI
X	200	<86>		Phase C Trip	2	SE*, GI
X	200	<87>		Phase Trip	2	SE, GI
X	200	<90>	50-2	Phase A Pickup	2	SE, GI
X	200	<91>		Phase B Pickup	2	SE, GI
X	200	<92>		Phase C Pickup	2	SE, GI
X	200	<93>		Phase Pickup	2	SE, GI
X	200	<94>		Phase A Trip	2	SE*, GI
X	200	<95>		Phase B Trip	2	SE*, GI
X	200	<96>		Phase C Trip	2	SE*, GI
X	200	<97>		Phase Trip	2	SE, GI
X	200	<100>	51G	Neutral Pickup	2	SE, GI
X	200	<110>	51	Pickup Phase A	2	SE, GI
X	200	<111>		Pickup Phase B	2	SE, GI
X	200	<112>		Pickup Phase C	2	SE, GI
X	200	<113>		Phase Pickup	2	SE, GI
X	200	<114>		Phase A Trip	2	SE*, GI
X	200	<115>		Phase B Trip	2	SE*, GI
X	200	<116>		Phase C Trip	2	SE*, GI

SIA-C	FUN	INF	Description		TYP	COT
Generic functions in monitor direction						
X	200	<130>	**Modbus Local**	Open CB	2	SE, GI
X	200	<131>		Close CB	2	SE, GI
X	200	<132>		79 Block	2	SE, GI
X	200	<133>		79 Unblock	2	SE, GI
X	200	<134>		Reset TI	2	SE, GI
X	200	<160>	**49**	Alarm	2	SE, GI
X	200	<161>		Trip	2	SE, GI
X	200	<170>	**46**	Pickup	2	SE, GI
X	200	<171>		Trip	2	SE, GI
X	200	<180>	**46BC**	Pickup	2	SE, GI
X	200	<181>		Trip	2	SE, GI
X	200	<190>	**50BF**	Pickup	2	SE, GI
X	200	<191>		Trip	2	SE, GI
X	200	<200>	**74CT**	Pickup	2	SE, GI
X	200	<201>		Alarm	2	SE, GI
X	200	<57>	**74TCS**	Enable	2	GI
X	200	<220>	**SHB**	Phase Block	2	SE, GI

NOTE: the spontaneous events marked with (*) notify the activation but not the deactivation. Deactivation event is only available by general interrogation in those states.

1.3.4 Miscellaneous

Type Identification 9: Measurands II (Measurements IL123, VL123, P, Q, f).

SIAC relay uses this type to send the value of the currents IL1, IL2 and IL3, the other measures remain with value 0.

- $\boldsymbol{I_{L1}, I_{L2}}$ and $\boldsymbol{I_{L3}}$ current values are in the range 0 – 4095 where 4095 corresponds to $\boldsymbol{1,2 * I_n}$.
- For values higher than $\boldsymbol{1,2 * I_n}$ an overflow situation is indicated.

e.g : A received value of 806 with nominal value $I_n = 5\ A$ corresponds to $1{,}18\ A$.

Selection of standard information numbers in control address:

SIA-C	FUN	INF	Descripción	TYP	COT
System functions in control address					
X	160	<0>	Initiation of general interrogation	7	Init of GI
X	160	<0>	Synchronization	6	TS
General commands in control address					
X	160	<16>	Auto-recloser Unblock (ON) / Block (OFF)	20	ACK, NACK
Particular commands in control address					
X	200	<1>	CB Open (OFF) / Close (ON)	20	ACK, NACK
X	200	<10>	Reset TI (OFF)	20	ACK, NACK

Bizkaia Technology Park

Building, 604

Derio, 48160 Bizkaia SPAIN

T. +34 94 471 14 09

fanox@fanox.com

www.fanox.com