SIR-A

Feeder Protection and Recloser Control Relay



IEC60870-5-103 PROTOCOL MANUAL

1 IEC 60870-5-103 PROTOCOL 3
1.1 Physical Layer 3
1.2 Application layer 3
1.2.1 States Map for firmware version 01.10.02 or below 4
1.2.2 States Map for firmware version 01.10.03 or above 18
1.2.3 Measurements Range 29
1.2.4 Commands for firmware version 01.10.02 or below 30
1.2.5 Commands for firmware version 01.10.03 or above 31

1 IEC 60870-5-103 PROTOCOL

This section describes the protocol IEC 60870-5-103 implementated in the unit.

IEC 60870-5-103 is defined as a companion standard for the informative element of protection equipment. And it defines communication for a serial, unbalanced link only.

This protocol states Even Parity for its comunications, so the Rear Serial COM need to be adjusted accordingly.

1.1 Physical Layer

Electrical interface:

X	RS-485
32	Number of loads for one protection equipment

1.2 Application layer

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.

The following functions are supported:

- Initialization.
- General Interrogation.
- Synchronization.
- Commands transmission.

Information in monitor direction:

<1>:= time-tagged message.
<2>:= time-tagged message with relative time.
<3>:= measurands.
<5>:= identification.
<6>:= time synchronization.
<8>:= general interrogation termination.

Information in control direction:

<6>:= time synchronization.
<7>:= general interrogation.
<20>:= general command.

Common address of ASDU:

X	One COMMON ADDRESS OF ASDU (identical with station address)
	More than one COMMON ADDRESS OF ASDU
255	GLOBAL ADDRESS

1.2.1 States Map for firmware version 01.10.02 or below

Selection of standard information numbers in monitor direction:

SIR-A	FUN	INF	Description	TYP	COT
System functions in monitor direction					
X	255	0	End of general interrogation	8	End of GI
X	255	0	Time synchronization	6	TS
Status indications in monitor direction					
X	160	16	79 Standby	1	SE,GI
X	160	17	Local Control	1	SE,GI
X	160	18	Ready	1	SE,GI
X	160	22	Settings Changed	1	SE,GI
X	160	27	Input 1	1	SE,GI
X	160	28	Input 2	1	SE,GI
X	160	29	Input 3	1	SE,GI
X	160	30	Input 4	1	SE,GI
Supervision indications in monitor direction					
X	160	36	74TCS Trip	1	SE,GI
Fault indications in monitor direction					
X	160	64	Pickup Phase A	1	SE,GI
X	160	65	Pickup Phase B	1	SE,GI
X	160	66	Pickup Phase C	1	SE,GI
X	160	67	Pickup N	1	SE,GI
X	160	68	General trip	1	SE,GI
X	160	69	Trip Phase A	1	SE,GI
X	160	70	Trip Phase B	1	SE,GI
X	160	71	Trip Phase C	1	SE,GI
X	160	84	General Pickup	1	SE,GI
X	160	85	Breaker failure (52 Error)	1	SE,GI
Auto-reclosure indications in monitor direction					
X	160	128	79 Closing Time	1	SE,GI

X	160	130	79 Lockout	1	SE,GI
Measurements in monitor direction					
X	160	<148>	Measurements IL123, VL123, P, Q, f	9	CYC
Generic functions in monitor direction					
X	200	1	Measure Error	1	SE,GI
X	200	2	Net Freq. 50 Hz	2	SE,GI
X	200	10	Hardware Error	1	SE,GI
X	200	17	HMI Reset	1	SE,GI
X	200	20	Date and Time Setting	1	SE,GI
X	200	21	SER Deleted	1	SE,GI
X	200	22	Default settings	1	SE,GI
X	200	23	Settings Error	1	SE,GI
X	200	24	Configuration Changed	1	SE,GI
X	200	25	New DFR	1	SE,GI
X	200	26	Phase Trip	1	SE,GI
X	200	27	Trip Block	1	SE,GI
X	200	28	Neutral Trip	1	SE,GI
X	200	30	Auxiliary input 5	1	SE,GI
X	200	31	Auxiliary input 6	1	SE,GI
X	200	32	Auxiliary input 7	1	SE,GI
X	200	33	Auxiliary input 8	1	SE,GI
X	200	34	Auxiliary input 9	1	SE,GI
X	200	35	Auxiliary input 10	1	SE,GI
X	200	36	Auxiliary input 11	1	SE,GI

X	200	37	Auxiliary input 12	1	SE,GI
X	200	38	Auxiliary input 13	1	SE,GI
X	200	39	Auxiliary input 14	1	SE,GI
X	200	40	Auxiliary input 15	1	SE,GI
X	200	41	Auxiliary input 16	1	SE,GI
X	200	42	Auxiliary input 17	1	SE,GI
X	200	43	Auxiliary input 18	1	SE,GI
X	200	44	Auxiliary input 19	1	SE,GI
X	200	45	Auxiliary input 20	1	SE,GI
X	200	46	Auxiliary input 21	1	SE,GI
X	200	47	Auxiliary input 22	1	SE,GI
X	200	48	Auxiliary input 23	1	SE,GI
X	200	49	Auxiliary input 24	1	SE,GI
X	200	50	PGC Open	1	SE,GI
X	200	51	PGC Close	1	SE,GI
X	200	52	PGC 79 Block	1	SE,GI
X	200	53	PGC 79 Unblock	1	SE,GI
X	200	54	PGC Local	1	SE,GI
X	200	55	PGC Remote	1	SE,GI
X	200	56	PGC 52a	1	SE,GI
X	200	57	PGC 52b	1	SE,GI
X	200	58	PGC Seetings Group x1	1	SE,GI
X	200	59	PGC Seetings Group x2	1	SE,GI

X	200	60	PGC Hot Line Tag	1	SE,GI
X	200	61	PGC 79 Enable	1	SE,GI
X	200	62	PGC 79N1 Start	1	SE,GI
X	200	63	PGC 79N2 Start	1	SE,GI
X	200	64	PGC 79N3 Start	1	SE,GI
X	200	65	PGC 79N4 Start	1	SE,GI
X	200	66	PGC DFR Start	1	SE,GI
X	200	67	PGC 50BF Start	1	SE,GI
X	200	68	PGC SOTF Start	1	SE,GI
X	200	69	PGC Reset Thermal Image Command	1	SE,GI
X	200	70	PGC 74TCS Coil A Continuity	1	SE,GI
X	200	71	PGC 74TCS Coil B Continuity	1	SE,GI
X	200	72	PGC Neutral Trip Block	1	SE,GI
X	200	73	PGC Phase Trip Block	1	SE,GI
X	200	74	PGC Seetings Group x4	1	SE,GI
X	200	75	PGC External trip	1	SE,GI
X	200	76	SZM Start	1	SE,GI
X	200	77	Alarm 1	1	SE,GI
X	200	78	Alarm 2	1	SE,GI
X	200	79	Alarm 3	1	SE,GI
X	200	80	Alarm 4	1	SE,GI
X	200	81	Alarm 5	1	SE,GI
X	200	82	Alarm 6	1	SE,GI

X	200	83	Alarm 7	1	SE,GI
X	200	84	Alarm 8	1	SE,GI
X	200	85	SHB Phase Block	1	SE,GI
X	200	86	CLP	1	SE,GI
X	200	87	SOTF Pickup	1	SE,GI
X	200	88	SOTF Trip	1	SE,GI
X	200	89	50-1 Phase Pickup	1	SE,GI
X	200	90	50-1 Phase Trip	1	SE,GI
X	200	91	50-2 Phase Pickup	1	SE,GI
X	200	92	50-2 Phase Trip	1	SE,GI
X	200	93	67-1 Phase Pickup	1	SE,GI
X	200	94	67-1 Phase Trip	1	SE,GI
X	200	95	67-2 Phase Pickup	1	SE,GI
X	200	96	67-2 Phase Trip	1	SE,GI
X	200	97	67-3 Phase Pickup	1	SE,GI
X	200	98	67-3 Phase Trip	1	SE,GI
X	200	99	67-4 Phase Pickup	1	SE,GI
X	200	100	67-4 Phase Trip	1	SE,GI
X	200	101	50G Ground Pickup	1	SE,GI
X	200	102	50G Ground Trip	1	SE,GI
X	200	103	50N Neutral Pickup	1	SE,GI
X	200	104	50N Neutral Trip	1	SE,GI
X	200	105	67G-1 Ground Pickup	1	SE,GI

X	200	106	67G-1 Ground Trip	1	SE,GI
X	200	107	67G-1 Directionality	1	SE,GI
X	200	108	67G-2 Ground Pickup	1	SE,GI
X	200	109	67G-2 Ground Trip	1	SE,GI
X	200	110	67G-2 Directionality	1	SE,GI
X	200	111	67N-1 Neutral Pickup	1	SE,GI
X	200	112	67N-1 Neutral Trip	1	SE,GI
X	200	113	67N-1 Directionality	1	SE,GI
X	200	114	67N-2 Neutral Pickup	1	SE,GI
X	200	115	67N-2 Neutral Trip	1	SE,GI
X	200	116	67N-2 Directionality	1	SE,GI
X	200	117	46 Pickup	1	SE,GI
X	200	118	46 Trip	1	SE,GI
X	200	119	46BC Pickup	1	SE,GI
X	200	120	46BC Trip	1	SE,GI
X	200	121	49 Alarm	1	SE,GI
X	200	122	49 Trip	1	SE,GI
X	200	123	37 Pickup	1	SE,GI
X	200	124	37 Trip	1	SE,GI
X	200	125	50BF Pickup	1	SE,GI
X	200	126	50BF Trip	1	SE,GI
X	200	127	27-1 Pickup	1	SE,GI
X	200	128	27-1 Trip	1	SE,GI

X	200	129	27-2 Pickup	1	SE,GI
X	200	130	27-2 Trip	1	SE,GI
X	200	131	27-L Pickup	1	SE,GI
X	200	132	27-L Trip	1	SE,GI
X	200	133	27LB Pickup	1	SE,GI
X	200	134	27LB Trip	1	SE,GI
X	200	135	27V1 Pickup	1	SE,GI
X	200	136	27V1 Trip	1	SE,GI
X	200	137	27V1-L Pickup	1	SE,GI
X	200	138	27V1-L Trip	1	SE,GI
X	200	139	59-1 Pickup	1	SE,GI
X	200	140	59-1 Trip	1	SE,GI
X	200	141	59-2 Pickup	1	SE,GI
X	200	142	59-2 Trip	1	SE,GI
X	200	143	59-L Pickup	1	SE,GI
X	200	144	59-L Trip	1	SE,GI
X	200	145	59LB Pickup	1	SE,GI
X	200	146	59LB Trip	1	SE,GI
X	200	147	59N-1 Pickup	1	SE,GI
X	200	148	59N-1 Trip	1	SE,GI
X	200	149	59N-2 Pickup	1	SE,GI
X	200	150	59N-2 Trip	1	SE,GI
X	200	151	59N-L Pickup	1	SE,GI

X	200	152	59N-L Trip	1	SE,GI
X	200	153	47 Pickup	1	SE,GI
X	200	154	47 Trip	1	SE,GI
X	200	155	47-L Pickup	1	SE,GI
X	200	156	47-L Trip	1	SE,GI
X	200	157	32-1 Pickup	1	SE,GI
X	200	158	32-1 Trip	1	SE,GI
X	200	159	32-2 Pickup	1	SE,GI
X	200	160	32-2 Trip	1	SE,GI
X	200	161	32-3 Pickup	1	SE,GI
X	200	162	32-3 Trip	1	SE,GI
X	200	163	32-4 Pickup	1	SE,GI
X	200	164	32-4 Trip	1	SE,GI
X	200	165	81-1 Pickup	1	SE,GI
X	200	166	81-1 Trip	1	SE,GI
X	200	167	81-2 Pickup	1	SE,GI
X	200	168	81-2 Trip	1	SE,GI
X	200	169	81-3 Pickup	1	SE,GI
X	200	170	81-3 Trip	1	SE,GI
X	200	171	81-4 Pickup	1	SE,GI
X	200	172	81-4 Trip	1	SE,GI
X	200	173	81-5 Pickup	1	SE,GI
X	200	174	81-5 Trip	1	SE,GI

X	200	175	81-6 Pickup	1	SE,GI
X	200	176	81-6 Trip	1	SE,GI
X	200	177	81R-1 Pickup	1	SE,GI
X	200	178	81R-1 Trip	1	SE,GI
X	200	179	81R-2 Pickup	1	SE,GI
X	200	180	81R-2 Trip	1	SE,GI
X	200	181	78 Trip	1	SE,GI
X	200	182	74TCS Pickup	1	SE,GI
X	200	183	60CTS Pickup	1	SE,GI
X	200	184	60CTS Trip	1	SE,GI
X	200	185	60VTS Pickup	1	SE,GI
X	200	186	60VTS Trip	1	SE,GI
X	200	187	HMI Open Breaker	1	SE,GI
X	200	188	HMI Close Breaker	1	SE,GI
X	200	189	HMI 79 Block	1	SE,GI
X	200	190	HMI 79 Unblock	1	SE,GI
X	200	191	HMI Local Control	1	SE,GI
X	200	192	HMI Remote Control	1	SE,GI
X	200	194	HMI Thermal Image Reset	1	SE,GI
X	200	195	HMI Identification	1	SE,GI
X	200	196	USB COM Open Breaker	1	SE,GI
X	200	197	USB COM Close Breaker	1	SE,GI
X	200	198	USB COM 79 Block	1	SE,GI

X	200	199	USB COM 79 Unblock	1	SE,GI
X	200	200	USB COM Local Control	1	SE,GI
X	200	201	USB COM Remote Control	1	SE,GI
X	200	202	USB COM Reset	1	SE,GI
X	200	203	USB COM Thermal Image Reset	1	SE,GI
X	200	204	USB COM Identification	1	SE,GI
X	200	205	WIFI Open Breaker		
X	200	206	WIFI Close Breaker		
X	200	207	WIFI 79 Block		
X	200	208	WIFI 79 Unblock		
X	200	209	WIFI Local Control		
X	200	210	WIFI Remote Control		
X	200	211	WIFI Reset		
X	200	212	WIFI Thermal Image Reset		
X	200	213	WIFI Identification		
X	200	214	MODBUS RTU Open Breaker	1	SE,GI
X	200	215	MODBUS RTU Close Breaker	1	SE,GI
X	200	216	MODBUS RTU 79 Block	1	SE,GI
X	200	217	MODBUS RTU 79 Unblock	1	SE,GI
X	200	218	MODBUS RTU Local Control	1	SE,GI
X	200	219	MODBUS RTU Remote Control	1	SE,GI
X	200	220	MODBUS RTU Reset	1	SE,GI
X	200	221	MODBUS RTU Reset thermal image	1	SE,GI

X	200	222	MODBUS RTU Identification	1	SE,GI
X	200	223	DNP3 Serial Open Breaker	1	SE,GI
X	200	224	DNP3 Serial Close Breaker	1	SE,GI
X	200	225	DNP3 Serial 79 Block	1	SE,GI
X	200	226	DNP3 Serial 79 Unblock	1	SE,GI
X	200	227	DNP3 Serial Local Control	1	SE,GI
X	200	228	DNP3 Serial Remote Control	1	SE,GI
X	200	229	DNP3 Serial Reset	1	SE,GI
X	200	230	DNP3 Serial Thermal Image Reset	1	SE,GI
X	200	231	IEC60870-103 Open Breaker	1	SE,GI
X	200	232	IEC60870-103 Close Breaker	1	SE,GI
X	200	233	IEC60870-103 79 Block	1	SE,GI
X	200	234	IEC60870-103 79 Unblock	1	SE,GI
X	200	235	IEC60870-103 Local Control	1	SE,GI
X	200	236	IEC60870-103 Remote Control	1	SE,GI
X	200	237	IEC60870-103 Reset	1	SE,GI
X	200	238	IEC60870-103 Thermal Image Reset	1	SE,GI
X	200	239	MODBUS TCP Open Breaker	1	SE,GI
X	200	240	MODBUS TCP Close Breaker	1	SE,GI
X	200	241	MODBUS TCP 79 Block	1	SE,GI
X	200	242	MODBUS TCP 79 Unblock	1	SE,GI
X	200	243	MODBUS TCP Local Control	1	SE,GI
X	200	244	MODBUS TCP Remote Control	1	SE,GI

X	200	245	MODBUS TCP Reset	1	SE,GI
X	200	246	MODBUS TCP Thermal Image Reset	1	SE,GI
X	200	247	MODBUS TCP Identification	1	SE,GI
X	200	248	DNP3 TCP Open Breaker	1	SE,GI
X	200	249	DNP3 TCP Close Breaker	1	SE,GI
X	201	50	DNP3 TCP 79 Block	1	SE,GI
X	201	51	DNP3 TCP 79 Unblock	1	SE,GI
X	201	52	DNP3 TCP Local Control	1	SE,GI
X	201	53	DNP3 TCP Remote Control	1	SE,GI
X	201	54	DNP3 TCP Reset	1	SE,GI
X	201	55	DNP3 TCP Thermal Image Reset	1	SE,GI
X	201	56	IEC60870-104 Open Breaker	1	SE,GI
X	201	57	IEC60870-104 Close Breaker	1	SE,GI
X	201	58	IEC60870-104 79 Block	1	SE,GI
X	201	59	IEC60870-104 79 Unblock	1	SE,GI
X	201	60	IEC60870-104 Local Control	1	SE,GI
X	201	61	IEC60870-104 Remote Control	1	SE,GI
X	201	62	IEC60870-104 Reset	1	SE,GI
X	201	63	IEC60870-104 Thermal Image Reset	1	SE,GI
X	201	64	WEB SERVER Open Breaker	1	SE,GI
X	201	65	WEB SERVER Close Breaker	1	SE,GI
X	201	66	WEB SERVER 79 Block	1	SE,GI
X	201	67	WEB SERVER 79 Unblock	1	SE,GI

X	201	68	WEB SERVER Local Control	1	SE,GI
X	201	69	WEB SERVER Remote Control	1	SE,GI
X	201	70	WEB SERVER Reset	1	SE,GI
X	201	71	WEB SERVER Thermal Image Reset	1	SE,GI
X	201	72	WEB SERVER Identify	1	SE,GI
X	201	73	61850 Open Breaker	1	SE,GI
X	201	74	61850 Close Breaker	1	SE,GI
X	201	75	61850 79 Block	1	SE,GI
X	201	76	61850 79 Unblock	1	SE,GI
X	201	77	61850 Local Control	1	SE,GI
X	201	78	61850 Remote Control	1	SE,GI
X	201	79	61850 Reset	1	SE,GI
X	201	80	61850 Thermal Image Reset	1	SE,GI
X	201	81	61850 Identify	1	SE,GI
X	201	82	25 Synchrocheck	1	SE,GI
X	201	83	Dead Line Dead Bar	1	SE,GI
X	201	84	Dead Line Live Bar	1	SE,GI
X	201	85	Live Line Dead Bar	1	SE,GI
X	201	86	Live Line Live Bar	1	SE,GI
X	201	87	67GI Ground Pickup	1	SE,GI
X	201	88	67GI Ground Trip	1	SE,GI
X	201	89	67GI Directionality	1	SE,GI
X	201	90	67NI Ground Pickup	1	SE,GI

X	201	91	67NI Ground Trip	1	SE,GI
X	201	92	67NI Directionality	1	SE,GI
X	201	93	SZM Standby	1	SE,GI
X	201	94	SZM Wait to Open	1	SE,GI
X	201	95	SZM Wait to Close	1	SE,GI
X	201	96	SZM Reset Time	1	SE,GI
X	201	97	SZM Open	1	SE,GI
X	201	98	SZM Lockout	1	SE,GI
X	201	99	SCM Standby	1	SE,GI
X	201	100	SCM Wait to Open	1	SE,GI
X	201	101	SCM Lockout	1	SE,GI
X	201	102	SCM Wait to 79	1	SE,GI
X	201	103	SCM Reset Time	1	SE,GI
X	200	104	Auxiliary AFD input 1	1	SE,GI
X	200	105	Auxiliary AFD input 2	1	SE,GI
X	200	106	Auxiliary AFD input 3	1	SE,GI
X	200	107	Auxiliary AFD input 4	1	SE,GI
X	202	140	79 Blocked	1	SE,GI

NOTE: The states updated by spontaneous events (SE) will only be updated if these events are unmasked in the configuration. If they are masked, they are only updated after the general interrogation (GI).

1.2.2 States Map for firmware version 01.10.03 or above

Selection of standard information numbers in monitor direction :

SIR-A	FUN	INF	Description	TYP	COT
Status indications in monitor direction					
X	160	16	79 Standby	1	SE,GI,OP
X	160	17	Local Control	1	SE,GI,OP
X	160	18	Ready	1	SE,GI
X	160	22	Settings Changed	1	SE,GI
X	160	23	Settings Group 1	1	SE,GI,OP
X	160	24	Settings Group 2	1	SE,GI,OP
X	160	25	Settings Group 3	1	SE,GI,OP
X	160	26	Settings Group 4	1	SE,GI,OP
X	160	27	Input 1	1	SE,GI
X	160	28	Input 2	1	SE,GI
X	160	29	Input 3	1	SE,GI
X	160	30	Input 4	1	SE,GI
X	160	31	52 Closed	2	SE,GI,OP
Supervision indications in monitor direction					
X	160	36	Trip Circuit Supervision	1	SE,GI
Fault indications in monitor direction					
X	160	64	Phase A Pickup	1	SE,GI
X	160	65	Phase B Pickup	1	SE,GI
X	160	66	Phase C Pickup	1	SE,GI
X	160	67	Neutral Pickup	1	SE,GI

X	160	68	General Trip	1	SE,GI
X	160	69	Phase A Trip	1	SE,GI
X	160	70	Phase B Trip	1	SE,GI
X	160	71	Phase C Trip	1	SE,GI
X	160	84	General Pickup	1	SE,GI
X	160	85	52 Error	1	SE,GI
Auto-reclosure indications in monitor direction					
X	160	128	79 Closing Time	1	SE,GI
X	160	130	79 Lockout	1	SE,GI
Measurements in monitor direction					
X	160	<148>	Measurements IL123, VL123, P, Q, f	9	
Generic functions in monitor direction					
X	127	19	Reset	1	SE,GI,OP
X	127	20	Reset Thermal Image	1	SE,GI,OP
X	127	21	Hot Line Tag On	1	SE,GI,OP
X	127	22	User Command 1	1	SE,GI,OP
X	127	23	User Command 2	1	SE,GI,OP
X	127	24	User Command 3	1	SE,GI,OP
X	127	25	User Command 4	1	SE,GI,OP
X	127	26	User Command 5	1	SE,GI,OP
X	127	27	User Command 6	1	SE,GI,OP
X	126	200	52 Maximum number of openings	1	SE,GI
X	126	201	52 I^2t	1	SE,GI

X	126	202	52 Openings/Time	1	SE,GI
X	125	200	Blocked	1	SE,GI
X	124	200	Set date and time	1	SE,GI
X	124	201	Events Erased	1	SE,GI
X	124	202	Configuration Changed	1	SE,GI
X	124	203	New DFR	1	SE,GI
X	124	204	Phase Trip	1	SE,GI
X	124	205	Trip Block	1	SE,GI
X	124	206	Neutral Trip	1	SE,GI
X	123	200	Measurement Error	1	SE,GI
X	123	201	Frecuency 50Hz	1	SE,GI
X	122	200	Hardware Error	1	SE,GI
X	122	201	Settings by default	1	SE,GI
X	122	202	Settings Error	1	SE,GI
X	121	200	Input 5	1	SE,GI
X	121	201	Input 6	1	SE,GI
X	121	202	Input 7	1	SE,GI
X	121	203	Input 8	1	SE,GI
X	121	204	Input 9	1	SE,GI
X	121	205	Input 10	1	SE,GI
X	121	206	Input 11	1	SE,GI
X	121	207	Input 12	1	SE,GI
X	121	208	Input 13	1	SE,GI

X	121	209	Input 14	1	SE,GI
X	121	210	Input 15	1	SE,GI
X	121	211	Input 16	1	SE,GI
X	121	212	Input 17	1	SE,GI
X	121	213	Input 18	1	SE,GI
X	121	214	Input 19	1	SE,GI
X	121	215	Input 20	1	SE,GI
X	121	216	Input 21	1	SE,GI
X	121	217	Input 22	1	SE,GI
X	121	218	Input 23	1	SE,GI
X	121	219	Input 24	1	SE,GI
X	120	200	Output 1	1	SE,GI
X	120	201	Output 2	1	SE,GI
X	120	202	Output 3	1	SE,GI
X	120	203	Output 4	1	SE,GI
X	120	204	Output 5	1	SE,GI
X	120	205	Output 6	1	SE,GI
X	120	206	Output 7	1	SE,GI
X	120	207	Output 8	1	SE,GI
X	120	208	Output 9	1	SE,GI
X	120	209	Output 10	1	SE,GI
X	120	210	Output 11	1	SE,GI
X	120	211	Output 12	1	SE,GI

X	120	212	Output 13	1	SE,GI
X	120	213	Output 14	1	SE,GI
X	120	214	Output 15	1	SE,GI
X	120	215	Output 16	1	SE,GI
X	120	216	Output 17	1	SE,GI
X	120	217	Output 18	1	SE,GI
X	120	218	Output 19	1	SE,GI
X	120	219	Output 20	1	SE,GI
X	120	220	Output 21	1	SE,GI
X	120	221	Output 22	1	SE,GI
X	120	222	Output 23	1	SE,GI
X	120	223	Output 24	1	SE,GI
X	120	224	Output 25	1	SE,GI
X	120	225	Output 26	1	SE,GI
X	120	226	Output 27	1	SE,GI
X	120	227	Output 28	1	SE,GI
X	120	228	Output 29	1	SE,GI
X	120	229	Output 30	1	SE,GI
X	120	230	Output 31	1	SE,GI
X	120	231	Output 32	1	SE,GI
X	119	200	Alarm 01	1	SE,GI
X	119	201	Alarm 02	1	SE,GI
X	119	202	Alarm 03	1	SE,GI

X	119	203	Alarm 04	1	SE,GI
X	119	204	Alarm 05	1	SE,GI
X	119	205	Alarm 06	1	SE,GI
X	119	206	Alarm 07	1	SE,GI
X	119	207	Alarm 08	1	SE,GI
X	119	208	Alarm 09	1	SE,GI
X	119	209	Alarm 10	1	SE,GI
X	119	210	Alarm 11	1	SE,GI
X	119	211	Alarm 12	1	SE,GI
X	118	200	LED 52	1	SE,GI
X	118	201	LED 79	1	SE,GI
X	118	202	Local LED	1	SE,GI
X	117	200	PGC 52 Open Command	1	SE,GI
X	117	201	PGC 52 Close Command	1	SE,GI
X	117	202	PGC 79 Block Command	1	SE,GI
X	117	203	PGC 79 Unblock Command	1	SE,GI
X	117	204	PGC Local Command	1	SE,GI
X	117	205	PGC Remote Command	1	SE,GI
X	117	206	PGC 52a	1	SE,GI
X	117	207	PGC 52b	1	SE,GI
X	117	208	PGC Seetings Group 1	1	SE,GI
X	117	209	PGC Seetings Group 2	1	SE,GI
X	117	210	PGC Seetings Group 4	1	SE,GI

X	117	211	PGC Hot Line Tag	1	SE,GI
X	117	212	PGC 79 Enable	1	SE,GI
X	117	213	PGC 79N1 Start	1	SE,GI
X	117	214	PGC 79N2 Start	1	SE,GI
X	117	215	PGC 79N3 Start	1	SE,GI
X	117	216	PGC 79N4 Start	1	SE,GI
X	117	217	PGC DFR Start	1	SE,GI
X	117	218	PGC 50BF Start	1	SE,GI
X	117	219	PGC SOTF Start	1	SE,GI
X	117	220	PGC Reset Thermal Image Command	1	SE,GI
X	117	221	PGC 74TCS Coil A Continuity	1	SE,GI
X	117	222	PGC 74TCS Coil B Continuity	1	SE,GI
X	117	223	PGC Neutral Trip Block	1	SE,GI
X	117	224	PGC Phase Trip Block	1	SE,GI
X	117	225	PGC Seetings Group 3	1	SE, GI
X	117	226	PGC 49T	1	SE,GI
X	117	227	PGC SZM Start	1	SE, GI
X	116	84	50-1 Pickup	1	SE,GI
X	116	91	50-1 Trip	1	SE,GI
X	115	84	50-2 Pickup	1	SE,GI
X	115	91	50-2 Trip	1	SE,GI
X	114	84	67-1 Pickup	1	SE,GI
X	114	90	67-1 Trip	1	SE,GI

X	113	84	67-2 Pickup	1	SE,GI
X	113	90	67-2 Trip	1	SE,GI
X	112	84	67-3 Pickup	1	SE,GI
X	112	90	67-3 Trip	1	SE,GI
X	111	84	67-4 Pickup	1	SE,GI
X	111	90	67-4 Trip	1	SE,GI
X	110	67	50G Pickup	1	SE,GI
X	110	93	50G Trip	1	SE,GI
X	109	67	50N Pickup	1	SE,GI
X	109	93	50N Trip	1	SE,GI
X	108	67	67G-1 Pickup	1	SE,GI
X	108	92	67G-1 Trip	1	SE,GI
X	108	51	67G-1 Directionally	1	SE,GI
X	107	67	67G-2 Pickup	1	SE,GI
X	107	92	67G-2 Trip	1	SE,GI
X	107	51	67G-2 Directionally	1	SE,GI
X	106	67	67N-1 Pickup	1	SE,GI
X	106	92	67N-1 Trip	1	SE,GI
X	106	51	67N-1 Directionally	1	SE,GI
X	105	67	67N-2 Pickup	1	SE,GI
X	105	92	67N-2 Trip	1	SE,GI
X	105	51	67N-2 Directionally	1	SE,GI
X	104	84	50BF Pickup	1	SE,GI

X	104	72	50BF Trip	1	SE,GI
X	103	84	46 Pickup	1	SE,GI
X	103	68	46 Trip	1	SE,GI
X	102	84	46BC Pickup	1	SE,GI
X	102	68	46BC Trip	1	SE,GI
X	101	84	37 Pickup	1	SE,GI
X	101	68	37 Trip	1	SE,GI
X	99	200	SHB Block	1	SE,GI
X	98	84	74TCS Pickup	1	SE,GI
X	97	84	60CTS Pickup	1	SE,GI
X	97	68	60CTS Trip	1	SE,GI
X	96	200	CLP	1	SE,GI
X	95	84	49 Alarm	1	SE,GI
X	95	68	49 Trip	1	SE,GI
X	94	84	SOTF Pickup	1	SE,GI
X	94	68	SOTF Trip	1	SE,GI
X	93	84	60VTS Pickup	1	SE,GI
X	93	68	60VTS Trip	1	SE,GI
X	92	84	64REF Pickup	1	SE,GI
X	92	68	64REF Trip	1	SE,GI
X	91	67	67GI Pickup	1	SE,GI
X	91	92	67GI Trip	1	SE,GI
X	91	51	67GI Directionally	1	SE,GI

X	90	67	67NI Pickup	1	SE,GI
X	90	92	67NI Trip	1	SE,GI
X	90	51	67NI Directionally	1	SE,GI
X	89	84	27-1 Pickup	1	SE,GI
X	89	91	27-1 Trip	1	SE,GI
X	88	84	27-2 Pickup	1	SE,GI
X	88	91	27-2 Trip	1	SE,GI
X	87	84	27V1 Pickup	1	SE,GI
X	87	68	27V1 Trip	1	SE,GI
X	86	84	59-1 Pickup	1	SE,GI
X	86	91	59-1 Trip	1	SE,GI
X	85	84	59-2 Pickup	1	SE,GI
X	85	91	59-2 Trip	1	SE,GI
X	84	67	59N-1 Pickup	1	SE,GI
X	84	93	59N-1 Trip	1	SE,GI
X	83	67	59N-2 Pickup	1	SE,GI
X	83	93	59N-2 Trip	1	SE,GI
X	82	84	47 Pickup	1	SE,GI
X	82	68	47 Trip	1	SE,GI
X	81	84	32-1 Pickup	1	SE,GI
X	81	68	32-1 Trip	1	SE,GI
X	80	84	32-2 Pickup	1	SE,GI
X	80	68	32-2 Trip	1	SE,GI

X	79	84	32-3 Pickup	1	SE,GI
X	79	68	32-3 Trip	1	SE,GI
X	78	84	32-4 Pickup	1	SE,GI
X	78	68	32-4 Trip	1	SE,GI
X	77	84	81-1 Pickup	1	SE,GI
X	77	68	81-1 Trip	1	SE,GI
X	76	84	81-2 Pickup	1	SE,GI
X	76	68	81-2 Trip	1	SE,GI
X	75	84	81-3 Pickup	1	SE,GI
X	75	68	81-3 Trip	1	SE,GI
X	74	84	81-4 Pickup	1	SE,GI
X	74	68	81-4 Trip	1	SE,GI
X	73	84	81-5 Pickup	1	SE,GI
X	73	68	81-5 Trip	1	SE,GI
X	72	84	81-6 Pickup	1	SE,GI
X	72	68	81-6 Trip	1	SE,GI
X	71	84	81R-1 Pickup	1	SE,GI
X	71	68	81R-1 Trip	1	SE,GI
X	70	84	81R-2 Pickup	1	SE,GI
X	70	68	81R-2 Trip	1	SE,GI
X	69	68	78 Trip	1	SE,GI

1.2.3 Measurements Range

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

- The communicated measurements are : $\boldsymbol{I_{L1}, I_{L2}, I_{L3}, V_{L1}, V_{L2}, V_{L3}, P, Q}$ and $\boldsymbol{f}$.
- The measurements are in the range 0 – 4095. Where 3413 corresponds to the ***nominal measurement*** and the 4095 value corresponds to ***1,2 x nominal measurement***.
- For values higer than ***1,2 x nominal measurement***, 4095 value and overflow situation are indicated.

Note : For voltage values, the nominal measurement will be **Nominal V. P-P setting / √3**.

Current example :

When the ***Phase*** and ***Neutral Nominal Current*** is adjusted to 1 A :

- If the injected current is 1 A, the value received is 3413.
- If the injected current is 1,2 A ($\boldsymbol{1,2 * I_n}$), the value received is 4095.
- If the injected current is higer than 1,2 A ($\boldsymbol{1,2 * I_n}$), 4095 value and overflow situation are received.

Voltage example :

When the ***Nominal Voltage Phase – Phase*** is adjusted to 100 V and VT connection is P-P or P-N:

- If the injected voltage is 63.5 V (100/ √3), the value received is 3413.
- If the injected current is 76,2 V ($\boldsymbol{1,2 * U_n}$), the value received is 4095.
- If the injected current is higer than 76,2 V ($\boldsymbol{1,2 * U_n}$), 4095 value and overflow situation are received.

1.2.4 Commands for firmware version 01.10.02 or below

Selection of standard information numbers in control direction:

Command Description	FUN	INF	TYP	Value	COT
System functions in control direction					
Initiation of general interrogation	160	<0>	7		Init of GI
Time synchronization	255	<0>	6		TS
General commands in control direction					
79 Block	160	16	20	ON	ACK, NACK
79 Unblock	160	16	20	OFF	ACK, NACK
Local Control	160	17	20	ON	ACK, NACK
Remote Control	160	17	20	OFF	ACK, NACK
Particular commands in control direction					
52 Open	201	1	20	ON	ACK, NACK
52 Close	201	1	20	OFF	ACK, NACK
Reset	200	17	20	ON	ACK, NACK
Reset Thermal Image	200	69	20	ON	ACK, NACK

1.2.5 Commands for firmware version 01.10.03 or above

Selection of standard information numbers in control direction:

Command Description	FUN	INF	TYP	Value	COT
System functions in control direction					
Initiation of general interrogation	160	<0>	7		Init of GI
Time synchronization	160	<0>	6		TS
General commands in control direction					
79 Block	160	16	20	ON	ACK, NACK
79 Unblock	160	16	20	OFF	ACK, NACK
Local Control	160	17	20	ON	ACK, NACK
Remote Control	160	17	20	OFF	ACK, NACK
Particular commands in control direction					
52 Open	160	31	20	ON	ACK, NACK
52 Close	160	31	20	OFF	ACK, NACK
Reset	127	19	20	ON	ACK, NACK
Reset Thermal Image	127	20	20	ON	ACK, NACK
Setting Group 1	160	23	20	ON	ACK, NACK
Setting Group 2	160	24	20	ON	ACK, NACK
Setting Group 3	160	25	20	ON	ACK, NACK
Setting Group 4	160	26	20	ON	ACK, NACK
Hot Line Tag ON	127	21	20	ON	ACK, NACK
Hot Line Tag OFF	127	21	20	OFF	ACK, NACK
User Command 1	127	22	20	ON	ACK, NACK
User Command 2	127	23	20	ON	ACK, NACK
User Command 3	127	24	20	ON	ACK, NACK
User Command 4	127	25	20	ON	ACK, NACK
User Command 5	127	26	20	ON	ACK, NACK
User Command 6	127	27	20	ON	ACK, NACK



Bizkaia Technology Park

Building, 604

Derio, 48160 Bizkaia SPAIN

T. +34 94 471 14 09

fanox@fanox.com

www.fanox.com

www.fanox.com