SIL-G

Feeder & Generator Protection Relay



IEC60870-5-103 PROTOCOL MANUAL

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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 01.02.03 or below

Selection of standard information numbers in monitor direction:

SIL-G	FUN	INF	Description	TYP	COT
System functions in monitor direction					
X	160	0	End of general interrogation	8	End of GI
X	160	0	Time synchronization	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	79 Standby	1	SE,GI
X	160	17	Teleprotection active	1	SE,GI
X	160	18	Ready	1	SE,GI
X	160	22	Settings Changed	1	SE,GI
X	160	27	Auxiliary input 1	1	SE,GI
X	160	28	Auxiliary input 2	1	SE,GI
X	160	29	Auxiliary input 3	1	SE,GI
X	160	30	Auxiliary input 4	1	SE,GI
Supervision indications in monitor direction					
X	160	36	Trip circuit supervision	1	SE,GI
Fault indications in monitor direction					
X	160	64	Pickup L1	2	SE,GI
X	160	65	Pickup L2	2	SE,GI
X	160	66	Pickup L3	2	SE,GI
X	160	67	Pickup N	2	SE,GI
X	160	68	General trip	1	SE,GI
X	160	69	Trip L1	2	SE,GI
X	160	70	Trip L2	2	SE,GI
X	160	71	Trip L3	2	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	50 Hz	2	SE,GI
X	200	10	Hardware Error	1	SE,GI
X	200	17	Reset	1	SE,GI
X	200	20	Set date and time	1	SE,GI
X	200	21	Events Erased	1	SE,GI
X	200	22	Settings Changed	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	Arc Flash Detector Input 1	1	SE,GI
X	200	35	Arc Flash Detector Input 2	1	SE,GI
X	200	36	Arc Flash Detector Input 3	1	SE,GI
X	200	37	Arc Flash Detector Input 4	1	SE,GI
X	200	38	Auxiliary input 9	1	SE,GI
X	200	39	Auxiliary input 10	1	SE,GI
X	200	40	Auxiliary input 11	1	SE,GI
X	200	41	Auxiliary input 12	1	SE,GI
X	200	42	Auxiliary input 13	1	SE,GI
X	200	43	Auxiliary input 14	1	SE,GI
X	200	44	Auxiliary input 15	1	SE,GI
X	200	45	Auxiliary input 16	1	SE,GI
X	200	50	PGC Open Command	1	SE,GI
X	200	51	PGC Close Command	1	SE,GI
X	200	52	PGC 79 Block Command	1	SE,GI
X	200	53	PGC 79 Unblock Command	1	SE,GI
X	200	54	PGC Local Command	1	SE,GI
X	200	55	PGC Remote Command	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 1	1	SE,GI
X	200	59	PGC Seetings Group 2	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	201	1	CB closed / open	2	SE,GI
X	201	2	52 Maximum number of openings	1	SE,GI
X	201	3	52 I^2t	1	SE,GI
X	201	4	52 Openings/Time	1	SE,GI
X	201	10	50-1 Pickup	1	SE,GI
X	201	11	50-1 Trip	1	SE,GI
X	201	20	50-2 Pickup	1	SE,GI
X	201	21	50-2 Trip	1	SE,GI
X	201	30	67-1 Pickup	1	SE,GI
X	201	31	67-1 Trip	1	SE,GI
X	201	32	67-1 Phase A Directionality	1	SE,GI
X	201	33	67-1 Phase B Directionality	1	SE,GI

X	201	34	67-1 Phase C Directionality	1	SE,GI
X	201	40	67-2 Pickup	1	SE,GI
X	201	41	67-2 Trip	1	SE,GI
X	201	42	67-2 Phase A Directionality	1	SE,GI
X	201	43	67-2 Phase B Directionality	1	SE,GI
X	201	44	67-2 Phase C Directionality	1	SE,GI
X	201	50	67-3 Pickup	1	SE,GI
X	201	51	67-3 Trip	1	SE,GI
X	201	52	67-3 Phase A Directionality	1	SE,GI
X	201	53	67-3 Phase B Directionality	1	SE,GI
X	201	54	67-3 Phase C Directionality	1	SE,GI
X	201	60	67-4 Pickup	1	SE,GI
X	201	61	67-4 Trip	1	SE,GI
X	201	62	67-4 Phase A Directionality	1	SE,GI
X	201	63	67-4 Phase B Directionality	1	SE,GI
X	201	64	67-4 Phase C Directionality	1	SE,GI
X	201	70	50G Pickup	1	SE,GI
X	201	71	50G Trip	1	SE,GI
X	201	80	50N Pickup	1	SE,GI
X	201	81	50N Trip	1	SE,GI
X	201	90	67G-1 Pickup	1	SE,GI
X	201	91	67G-1 Trip	1	SE,GI
X	201	92	67G-1 Directionally	1	SE,GI
X	201	100	67G-2 Pickup	1	SE,GI

X	201	101	67G-2 Trip	1	SE,GI
X	201	102	67G-2 Directionally	1	SE,GI
X	201	110	67N-1 Pickup	1	SE,GI
X	201	111	67N-1 Trip	1	SE,GI
X	201	112	67N-1 Directionally	1	SE,GI
X	201	120	67N-2 Pickup	1	SE,GI
X	201	121	67N-2 Trip	1	SE,GI
X	201	122	67N-2 Directionally	1	SE,GI
X	201	130	46 Pickup	1	SE,GI
X	201	131	46 Trip	1	SE,GI
X	201	140	46BC Pickup	1	SE,GI
X	201	141	46BC Trip	1	SE,GI
X	201	150	49 Alarm	1	SE,GI
X	201	151	49 Trip	1	SE,GI
X	201	160	37 Pickup	1	SE,GI
X	201	161	37 Trip	1	SE,GI
X	201	170	27-1 Pickup	1	SE,GI
X	201	171	27-1 Trip	1	SE,GI
X	201	180	27-2 Pickup	1	SE,GI
X	201	181	27-2 Trip	1	SE,GI
X	201	190	27V1 Pickup	1	SE,GI
X	201	191	27V1 Trip	1	SE,GI
X	201	200	27L Pickup	1	SE,GI
X	201	201	27L Trip	1	SE,GI

X	201	210	59-1 Pickup	1	SE,GI
X	201	211	59-1 Trip	1	SE,GI
X	201	220	59-2 Pickup	1	SE,GI
X	201	221	59-2 Trip	1	SE,GI
X	201	230	59G-1 Pickup	1	SE,GI
X	201	231	59G-1 Trip	1	SE,GI
X	201	240	59G-2 Pickup	1	SE,GI
X	201	241	59G-2 Trip	1	SE,GI
X	201	250	47 Pickup	1	SE,GI
X	201	251	47 Trip	1	SE,GI
X	202	1	59L Pickup	1	SE,GI
X	202	2	59L Trip	1	SE,GI
X	202	10	32-1 Pickup	1	SE,GI
X	202	11	32-1 Trip	1	SE,GI
X	202	20	32-2 Pickup	1	SE,GI
X	202	21	32-2 Trip	1	SE,GI
X	202	30	32-3 Pickup	1	SE,GI
X	202	31	32-3 Trip	1	SE,GI
X	202	40	32-4 Pickup	1	SE,GI
X	202	41	32-4 Trip	1	SE,GI
X	202	50	81-1 Pickup	1	SE,GI
X	202	51	81-1 Trip	1	SE,GI
X	202	60	81-2 Pickup	1	SE,GI
X	202	61	81-2 Trip	1	SE,GI

X	202	70	81-3 Pickup	1	SE,GI
X	202	71	81-3 Trip	1	SE,GI
X	202	80	81-4 Pickup	1	SE,GI
X	202	81	81-4 Trip	1	SE,GI
X	202	90	81R-1 Pickup	1	SE,GI
X	202	91	81R-1 Trip	1	SE,GI
X	202	100	81R-2 Pickup	1	SE,GI
X	202	101	81R-2 Trip	1	SE,GI
X	202	110	81R-3 Pickup	1	SE,GI
X	202	111	81R-3 Trip	1	SE,GI
X	202	120	81R-4 Pickup	1	SE,GI
X	202	121	81R-4 Trip	1	SE,GI
X	202	130	78 Trip	1	SE,GI
X	202	140	79 Blocked	1	SE,GI
X	202	150	25 Syncrocheck	1	SE,GI
X	202	151	25 Dead Line Dead Bar	1	SE,GI
X	202	152	25 Dead Line Live Bar	1	SE,GI
X	202	153	25 Live Line Dead Bar	1	SE,GI
X	202	154	25 Live Line Live Bar	1	SE,GI
X	202	160	74TCS Pickup	1	SE,GI
X	202	170	60CTS Pickup	1	SE,GI
X	202	171	60CTS Trip	1	SE,GI
X	202	180	60VTS Pickup	1	SE,GI
X	202	181	60VTS Trip	1	SE,GI

X	202	190	50BF Pickup	1	SE,GI
X	202	191	50BF Trip	1	SE,GI
X	202	200	SHB	1	SE,GI
X	202	210	CLP	1	SE,GI

1.2.2 States Map for firmware version 01.02.04 or above

Selection of standard information numbers in monitor direction:

SIL-G	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 Hot Line Tag	1	SE,GI
X	117	211	PGC 79 Enable	1	SE,GI
X	117	212	PGC 79N1 Start	1	SE,GI
X	117	213	PGC 79N2 Start	1	SE,GI
X	117	214	PGC 79N3 Start	1	SE,GI
X	117	215	PGC 79N4 Start	1	SE,GI
X	117	216	PGC DFR Start	1	SE,GI

X	117	217	PGC 50BF Start	1	SE,GI
X	117	218	PGC SOTF Start	1	SE,GI
X	117	219	PGC Reset Thermal Image Command	1	SE,GI
X	117	220	PGC 74TCS Coil A Continuity	1	SE,GI
X	117	221	PGC 74TCS Coil B Continuity	1	SE,GI
X	117	222	PGC Neutral Trip Block	1	SE,GI
X	117	223	PGC Phase Trip Block	1	SE,GI
X	117	224	PGC 49T	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	24-1 Pickup	1	SE,GI

X	73	68	24-1 Trip	1	SE,GI
X	72	84	24-2 Pickup	1	SE,GI
X	72	68	24-2 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
X	68	84	81R-3 Pickup	1	SE,GI
X	68	68	81R-3 Trip	1	SE,GI
X	67	84	81R-4 Pickup	1	SE,GI
X	67	68	81R-4 Trip	1	SE,GI
X	66	200	Arc Flash Detector Input 1	1	SE,GI
X	66	201	Arc Flash Detector Input 2	1	SE,GI
X	66	202	Arc Flash Detector Input 3	1	SE,GI
X	66	203	Arc Flash Detector Input 4	1	SE,GI
X	65	200	25 Synchrocheck	1	SE,GI
X	65	201	25 Dead Line & Dead Bar	1	SE,GI
X	65	202	25 Dead Line & Live Bar	1	SE,GI
X	65	203	25 Live Line & Dead Bar	1	SE,GI
X	65	204	25 Live Line & Live Bar	1	SE,GI
X	64	84	27-L Pickup	1	SE,GI
X	64	68	27-L Trip	1	SE,GI
X	63	84	59-L Pickup	1	SE,GI

X	63	68	59-L 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 01.02.03 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	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

1.2.5 Commands for firmware version 01.02.04 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



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