SILG

Feeder Relay



DNP3.0 PROTOCOL MANUAL

1. DNP3.0 PROTOCOL 3
1.2. Implementation Table 7
1.3. Point List 9
1.3.1. BINARY INPUT (OBJECT 1) -> Assigned to Class 0 9
1.3.2. BINARY INPUT (OBJECT 1) -> Assigned to Class 1 9
1.3.3. BINARY OUTPUT (OBJECT 10) -> Assigned to Class 0. 24
1.3.4. BINARY OUTPUT CHANGE (OBJECT 11) -> Assigned to Class 1. 24
1.3.5. ANALOG INPUT (OBJECT 30) -> Assigned to Class 0. 26
1.3.6. ANALOG INPUT CHANGE (OBJECT 32) -> Assigned to Class 2. 26
1.3.7. COUNTER (OBJECT 20) -> Assigned to Class 0. 28
1.3.8. COUNTER EVENT (OBJECT 22) -> Assigned to Class 1. 28
1.3.9. FROZEN COUNTER (OBJECT 21) 28
1.3.10. CONTROL RELAY OUTPUT BLOCK (OBJECT 12) 28
1.4. Example of Time and Date synchronization 30
1.5. Unsolicited Responses 31

1. DNP3.0 PROTOCOL

As communication parameters are common for all the protocols, they can be adjusted on General Gettings of the relay, on the following menus:

- Rear Serial COM menu (for DNP 3.0 Serial):
  - Protocol -
  - Baudrate (19200 by default)
  - Serial Setting – Parity (8-N-1 by default)

- Rear TCP COM menu (for DNP 3.0 TCP/IP)
  - Protocol -
  - IP: 192.168.200.100 (by default)
  - Subnet: 255.255.255.0 (by default)
  - Gateway: 192.168.200.1 (by default)

Inside each protocol:

- DNP3 Serial:
  - Slave Address (3 by default)
  - Master Addres (1 by default)
  - Multimaster (Default No)
  - Unsolicited retries (by default 10)
  - Unsolicited timeout (by default 2s)

- DNP3 TCP:
  - Slave Address (3 by default)
  - Master Addres (1 by default)
  - Port number: 20000 (by default)
  - Multimaster (Default No)
  - Unsolicited retries (by default 10)
  - Unsolicited timeout (by default 2s)
  - Activity timeout (by default 5min).

1.1. Device Profile Document

DNP V3.00

DEVICE PROFILE DOCUMENT

This document must be accompanied by : **Implementation Table** and **Point List**.

Vendor Name: FANOX **FANOX Electronic, S.L.**

Device Name: **SILG**

Highest DNP Level Supported:	Device Function:
For Requests **2** For Responses **2**	☐ Master ☒ **Slave**

Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):

Objects with variations on 16-bits and objects with variations on 32-bit without flags shall not be requested. Object 2 with variation 1 shall not be requested. No data is associated to object 60 variation 4 (class 3).

Unsolicited responses are supported, enabling and disabling them by using object group 60 and function code 20 (enable) or 21 (Disable).

Read request for many specific objects and variations can be responded.

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted **255** Received **255**	Transmitted **217** Received **217**

Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
☒ **None** ☐ Fixed at _____ ☐ Configurable.	☐ None ☐ Fixed at 10. ☒ **Configurable**

Requires Data Link Layer Confirmation:

☒ Never
☐ Always
☐ Sometimes. If 'Sometimes', when? _____
☐ Configurable as Never, Only for multi-frame messages, or Always. Default Never

Requires Application Layer Confirmation:

- ☐ Never
- ☐ Always (not recommended)
- ☒ **When reporting Event Data (Slave devices only)**
- ☐ When sending multi-fragment responses (Slave devices only)
- ☐ Sometimes. If 'Sometimes', when?
- ☐ Configurable as: "Only when reporting event data", or "When reporting event data or multi-fragment messages."

Timeouts while waiting for:

Data Link Confirm	☒ **None**	☐ Default at 5000ms	☐ Variable	☐ Configurable
Complete Appl. Fragment	☒ **None**	☐ Fixed at ____	☐ Variable	☐ Configurable
Application Confirm	☐ None	☐ Fixed at 2s	☐ Variable	☒ **Configurable**
Complete Appl. Response	☒ **None**	☐ Fixed at ____	☐ Variable	☐ Configurable

Others

Sends/Executes Control Operations:

WRITE Binary Outputs	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
SELECT (3) / OPERATE (4)	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
DIRECT OPERATE (5)	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
DIRECT OPERATE - NO ACK (6)	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
Count > 1	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Pulse On	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Pulse Off	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Latch On	☐ Never	☒**Always**	☐ Sometimes	☐ Configurable
Latch Off	☐ Never	☒**Always**	☐ Sometimes	☐ Configurable
Queue	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Clear Queue	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable

Attach explanation:

All points support the same Function Codes: Select Before Operate (SBO) and Direct Operate (DO).
All points support the same Control Codes: Latch ON, Latch OFF.

FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:

Reports Binary Input Change Events when no specific variation requested:

- ☐ Never
- ☒ **Only time-tagged**
- ☐ Only non-time-tagged
- ☐ Configurable to send both, one or the other (attach explanation)

Reports time-tagged Binary Input Change Events when no specific variation requested:

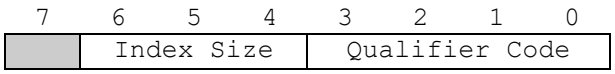
- ☐ Never
- ☒ **Binary Input Change with Time**
- ☐ Binary Input Change with Relative Time
- ☐ Configurable (attach explanation)

Sends Unsolicited Responses: ☐ Never ☐ Configurable ☐ Only certain objects (Class 1) ☐ Sometimes (attach explanation) ☒ **ENABLE / DISABLE UNSOLICITED Function codes supported**	Sends Static Data in Unsolicited Responses: ☒ **Never** ☐ When Device Restarts ☐ When Status Flags Change No other options are permitted.
Default Counter Object/Variation: ☐ No Counters Reported ☐ Configurable (attach explanation) ☒ **Default Object 20** **Default Variation 01** ☐ Point-by-point list attached	Counters Roll Over at: ☐ No Counters Reported ☐ Configurable (attach explanation) ☐ 16 Bits ☒ **32 Bits** ☐ Other Value _____ ☐ Point-by-point list attached
Sends Multi-Fragment Responses: ☐ Yes ☒ No	

QUICK REFERENCE FOR DNP3.0 LEVEL 2 FUNCTION CODES & QUALIFIERS

Function Codes

1	Read
2	Write
3	Select
4	Operate
5	Direct Operate
6	Direct Operate-No ACK
13	Cold Start
14	Warm Start
20	Enable Unsol. Messages
21	Disable Unsol. Messages
23	Delay Measurement
129	Response
130	Unsolicited Message



Index Size

0- No Index, Packed
1- 1 Byte Index
2- 2 Byte Index
3- 4 Byte Index
4- 1 Byte Object Size
5- 2 Byte Object Size
6- 4 Byte Object Size

Qualifier Code

0- 8-Bit Start and Stop Indices
1- 16-Bit Start and Stop Indices
2- 32-Bit Start and Stop Indices
3- 8-Bit Absolute Address Ident.
4- 16-Bit Absolute Address Ident.
5- 32-Bit Absolute Address Ident.
6- No Range Field (All)
7- 8-Bit Quantity
8- 16-Bit Quantity
9- 32-Bit Quantity
11-(0xB) Variable array

1.2. Implementation Table

The following implementation table indentifies which object groups and variations, function codes and qualifiers the device supports in both requests and responses. The *Requests* columns identify all requests that may be sent by a master, or all requests that must be parsed by an outstation. The *Response* columns identify all responses that must be parsed by a Master, or all responses that may be sent by an outstation.

In the table below, text shaded as (start-stop) indicates subset Level 3 functionality (beyond Subset Level 2).

In the table below, text shaded as (limited qty) indicates functionality beyond Subset Level 3.

OBJECT			REQUEST (BCD will parse)		RESPONSE (BCD will respond)		
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes (dec)**	**Qual Codes (hex)**	**Notes**
1	0	Binary Input - Any variation	1 (read)	06 (no range, or all)			
1	1	Binary Input - Packed Format **(Default)**	1 (read)	06 (no range, or all)	129 (response)	01 (start - stop)	
1	2	Binary Input - With Flags	1 (read)	06 (no range, or all)	129 (response)	01 (start - stop)	Assigned to Class 0
2	0	Binary Input Event - Any variation	1 (read)	06 (no range, or all)			
2	2	Binary Input Event – with absolute Time **(Default)**	1 (read)	06 (no range, or all)	129 (response), 130 (unsolicited)	28 (index)	Assigned to Class 1.
10	0	Binary Output – Any variation	1 (read)	06 (no range, or all)			
10	2	Binary Output – Output status with flags **(Default)**	1 (read)	06 (no range, or all)	129 (response)	01 (start - stop)	Assigned to Class 0.
11	0	Binary Output Event – Any Variation	1 (read)	06 (no range, or all)			
11	2	Binary Output Event – Status with Time **(Default)**	1 (read)	06 (no range, or all)	129 (response) 130 (unsolicited)	28 (index)	Assigned to Class 1
12	1	Binary Command – Control Relay Output Block (CROB)	3 (Select) 4 (Operate) 5 (Direct Operate)	28 (index)*	129 (response)	Echo of request	
20	0	Counter – Any Variation	1 (read)	06 (no range, or all)			
20	1	Counter – 32 Bit with flag **(Default)**	1 (read)	06 (no range, or all)	129 (response)	01 (start - stop)	Assigned to Class 0

OBJECT			REQUEST (BCD will parse)		RESPONSE (BCD will respond)		
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes (dec)**	**Qual Codes (hex)**	**Notes**
21	0	Frozen Counter – Any Variation	1 (read)	06 (no range, or all)			
21	1	Frozen Counter – 32 Bit with flag **(Default)**	1 (read)	06 (no range, or all)	129 (response)	01 (start - stop)	
22	0	Counter Event – Any Variation	1 (read)	06 (no range, or all)			Assigned to Class 1
22	1	Counter Event – 32 Bit with flag **(Default)**	1 (read)	06 (no range, or all)	129 (response) 130 (unsolicited)	28 (index)	
30	0	Analog Input – Any Variation	1 (read)	06 (no range, or all)			
30	1	Analog Input – 32-Bit with flag **(Default)**	1 (read)	06 (no range, or all)	129 (response)	00 (start - stop)	Assigned to Class 0
32	0	Analog Input Event – Any variation	1 (read)	06 (no range, or all)			
32	1	Analog Input Event – 32-Bit without Time **(Default)**	1 (read)	06 (no range, or all)	129 (response) 130 (unsolicited)	28 (index)	Assigned to Class 2
50	1	Time and Data – Absolute time	1 (read) 2 (write)	07 (limited qty = 1)			
60	1	Class Objects – Class 0 Data	1 (read)	06 (no range, or all)			
60	2	Class Objects – Class 1 Data	1 (read)	06 (no range, or all)			
60	3	Class Objects – Class 2 Data	1 (read)	06 (no range, or all)			

Note: From version M01.02.00, Binary Command – Control Relay Output Block (CROB) (Obj 12, var 1) also accepts qualifier 17.

1.3. Point List

1.3.1. BINARY INPUT (OBJECT 1) -> Assigned to Class 0

1.3.2. BINARY INPUT (OBJECT 1) -> Assigned to Class 1

From version M01.02.00 of the firmware, configurable point list is added with memory for up to 256 configurable binary inputs. We recommend configuring only the necessary binary inputs, it is not necessary to configure all 256 signals. Gaps in the configuration are accepted. Non-configured signals will report "0" value and “off-line” flag when requested.

On the following tables, default configuration for versions before and after this change are shown.

Before M01.02.00	M01.02.00 or after	Criteria	Point
1	1	MEASUREMENTS	Measurement Error
2	-		Net frequency 50HZ
3	-		Line Frequency Blocked
4	-		Busbar Frequency Blocked
5	-	SELF DIAGNOSIS	Model Error
6	2		Hardware Error
-	-		Slot 3 Empty
-	-		Slot 4 Empty
-	-		Slot 5 Empty
7	3		Comunication Error
8	-		Test Mode
9	4		Settings By Default
10	5		Settings Error
11	6		Default Configuration
12	7		Configuration Error
-	-		Curves error
13	8	GENERAL	General Trip
14	9		Ready
15	10		Wrong Access
16	-		Set Date And Time
17	11		Local Control
18	-		SER (Events) Error
19	-		Events Erased
20	12		Wrong Access
21	-		Settings Changed
-	-		SER Overflow
22	-		Configuration Changed
23	-		LDP Erased
24	-		New DFR
25	13		Phase Trip

26	14		Trip Block
27	15		General Pickup
28	16		Phase A Pickup
29	17		Phase B Pickup
30	18		Phase C Pickup
31	19		Neutral Pickup
32	20		Phase A Trip
33	21		Phase B Trip
34	22		Phase C Trip
35	23		Neutral Trip
36	24		Settings Group 1
37	25		Settings Group 2
38	26		Settings Group 3
39	27		Settings Group 4
-	-		Set to False
-	-		Set to True
-	-	52	52 Startup
40	-		52 Error
41	-		52 Open
-	-		52 Opening Time
42	-		52 Opening Error
43	28		52 Closed
-	-		52 Closing Time
44	-		52 Closing Error
45	-		52 Number of Openings Alarm
46	-		52 I2t Alarm
47	-		52 Openings/Time Alarm
48	-	INPUTS	Input 1
49	-		Input 2
50	-		Input 3
51	-		Input 4
52	-		Input 5
53	-		Input 6
54	-		Input 7
55	-		Input 8
56	-		Input 9
57	-		Input 10
58	-		Input 11
59	-		Input 12
60	-		Input 13
61	-		Input 14

62	-		Input 15
63	-		Input 16
64	-		Input 17
65	-		Input 18
66	-		Input 19
67	-		Input 20
68	-		Input 21
69	-		Input 22
70	-		Input 23
71	-		Input 24
72	-	AFD	AFD Input 1
73	-		AFD Input 2
74	-		AFD Input 3
75	-		AFD Input 4
76	-		AFD Input 1 Test OK
77	-		AFD Input 2 Test OK
78	-		AFD Input 3 Test OK
79	-		AFD Input 4 Test OK
80	-	PGC	PGC Open Command
81	-		PGC Close Command
82	-		PGC 79 Block Command
83	-		PGC 79 Unblock Command
84	-		PGC Local Command
85	-		PGC Remote Command
-	-		52A
-	-		52B
-	-		Setting Group x1
-	-		Setting Group x2
86	-		PGC Hot Line Tag
87	-		PGC 79 Enable
88	-		PGC 79N1 Start
89	-		PGC 79N2 Start
90	-		PGC 79N3 Start
91	-		PGC 79N4 Start
-	-		PGC DFR Start
-	-		PGC 50BF Start
-	-		PGC SOTF Start
92	-		PGC Thermal Image Reset
-	-		PGC 74TCS Coil A Continuity
-	-		PGC 74TCS Coil B Continuity
93	-		PGC Neutral Block

94	-		PGC Phase Block
-	-		PGC External Trip
-	-		PGC - 1
-	-		PGC – 2
-	-		PGC – 3
-	-		PGC – 4
-	-		PGC – 5
-	-		PGC – 6
-	-		PGC – 7
95	-	LEDs (*)	
96	-		Alarm 02
97	-		Alarm 03
98	-		Alarm 04
99	-		Alarm 05
100	-		Alarm 06
101	-		Alarm 07
102	-		Alarm 08
-	-		Logic Alarm 9
-	-		Logic Alarm 10
-	-		Logic Alarm 11
-	-		Logic Alarm 12
-	-		Logic Alarm 13
-	-		Logic Alarm 14
-	-		Logic Alarm 15
-	-		Logic Alarm 16
-	-		Logic Alarm 17
-	-		Logic Alarm 18
-	-		Logic Alarm 19
-	-		Logic Alarm 20
-	-		Logic Alarm 21
-	-		Logic Alarm 22
-	-		Logic Alarm 23
-	-		Logic Alarm 24
-	-		Logic Alarm 25
-	-		Logic Alarm 26
-	-		Logic Alarm 27
-	-		Logic Alarm 28
-	-		Logic Alarm 29
-	-		Logic Alarm 30
-	-		Logic Alarm 31
-	-		Logic Alarm 32

-	-	50-1	50-1 Phase A Pickup
-	-		50-1 Phase B Pickup
-	-		50-1 Phase C Pickup
103	-		50-1 Pickup
-	-		50-1 Phase A Trip
-	-		50-1 Phase B Trip
-	-		50-1 Phase C Trip
104	-		50-1 Trip
-	-	50-2	50-2 Phase A Pickup
-	-		50-2 Phase B Pickup
-	-		50-2 Phase C Pickup
105	-		50-2 Pickup
-	-		50-2 Phase A Trip
-	-		50-2 Phase B Trip
-	-		50-2 Phase C Trip
106	-		50-2 Trip
-	-	SOTF	SOTF Phase A Pickup
-	-		SOTF Phase B Pickup
-	-		SOTF Phase C Pickup
107	34		SOTF Pickup
-	-		SOTF Phase A Trip
-	-		SOTF Phase B Trip
-	-		SOTF Phase C Trip
108	35		SOTF Trip
-	-		SOTF Activation
-	-	67-1	67-1 Phase A Pickup
-	-		67-1 Phase B Pickup
-	-		67-1 Phase C Pickup
109	-		67-1 Pickup
-	-		67-1 Phase A Trip
-	-		67-1 Phase B Trip
-	-		67-1 Phase C Trip
110	-		67-1 Trip
-	-		67-1 Directionality Phase A
-	-		67-1 Directionality Phase B
-	-		67-1 Directionality Phase C
-	-	67-2	67-2 Phase A Pickup
-	-		67-2 Phase B Pickup
-	-		67-2 Phase C Pickup
111	-		67-2 Pickup
-	-		67-2 Phase A Trip

-	-		67-2 Phase B Trip
-	-		67-2 Phase C Trip
112	-		67-2 Trip
-	-		67-2 Directionality Phase A
-	-		67-2 Directionality Phase B
-	-		67-2 Directionality Phase C
-	-	67-3	67-3 Phase A Pickup
-	-		67-3 Phase B Pickup
-	-		67-3 Phase C Pickup
113	-		67-3 Pickup
-	-		67-3 Phase A Trip
-	-		67-3 Phase B Trip
-	-		67-3 Phase C Trip
114	-		67-3 Trip
-	-		67-3 Directionality Phase A
-	-		67-3 Directionality Phase B
-	-		67-3 Directionality Phase C
-	-	67-4	67-4 Phase A Pickup
-	-		67-4 Phase B Pickup
-	-		67-4 Phase C Pickup
115	-		67-4 Pickup
-	-		67-4 Phase A Trip
-	-		67-4 Phase B Trip
-	-		67-4 Phase C Trip
116	-		67-4 Trip
-	-		67-4 Directionality Phase A
-	-		67-4 Directionality Phase B
-	-		67-4 Directionality Phase C
117	-	50G	50G Pickup
118	-		50G Trip
119	-	50N	50N Pickup
120	-		50N Trip
121	-	67G-1	67G-1 Pickup
122	-		67G-1 Trip
123	-		67G-1 Directionality
124	-	67G-2	67G-2 Pickup
125	-		67G-2 Trip
126	-		67G-2 Directionality
127	-	67N-1	67N-1 Pickup
128	-		67N-1 Trip
129	-		67N-1 Directionality

130	-	67N-2	67N-2 Pickup
131	-		67N-2 Trip
132	-		67N-2 Directionality
-	-	67GI	67GI Pickup
-	-		67GI Trip
-	-		67GI Directionality
-	-	67NI	67GI Pickup
-	-		67GI Trip
-	-		67GI Directionality
-	-	64REF	64REF Pickup
-	-		64REF Trip
-	-		64REF In2hBlock
133	-	46	46 Pickup
134	-		46 Trip
135	-	46BC	46BC Pickup
136	-		46BC Trip
137	-	49	49 Alarm
138	-		49 Trip
-	-	37	37 Phase A Pickup
-	-		37 Phase B Pickup
-	-		37 Phase C Pickup
139	-		37 Pickup
-	-		37 Phase A Trip
-	-		37 Phase B Trip
-	-		37 Phase C Trip
140	-		37 Trip
-	-	27-1	27-1 Phase A Pickup
-	-		27-1 Phase B Pickup
-	-		27-1 Phase C Pickup
141	-		27-1 Pickup
-	-		27-1 Phase A Trip
-	-		27-1 Phase B Trip
-	-		27-1 Phase C Trip
142	-		27-1 Trip
-	-		27-1 AB Trip
-	-		27-1 BC Trip
-	-		27-1 CA Trip
-	-	27-2	27-2 Phase A Pickup
-	-		27-2 Phase B Pickup
-	-		27-2 Phase C Pickup
143	-		27-2 Pickup

-	-		27-2 Phase A Trip
-	-		27-2 Phase B Trip
-	-		27-2 Phase C Trip
144	-		27-2 Trip
-	-		27-2 AB Trip
-	-		27-2 BC Trip
-	-		27-2 CA Trip
145	-	27V1	27V1 Pickup
146	-		27V1 Trip
147	-	27L	27L Pickup
148	-		27L Trip
-	-	59-1	59-1 Phase A Pickup
-	-		59-1 Phase B Pickup
-	-		59-1 Phase C Pickup
149	-		59-1 Pickup
-	-		59-1 Phase A Trip
-	-		59-1 Phase B Trip
-	-		59-1 Phase C Trip
150	-		59-1 Trip
-	-		59-1 AB Trip
-	-		59-1 BC Trip
-	-		59-1 CA Trip
-	-	59-2	59-2 Phase A Pickup
-	-		59-2 Phase B Pickup
-	-		59-2 Phase C Pickup
151	-		59-2 Pickup
-	-		59-2 Phase A Trip
-	-		59-2 Phase B Trip
-	-		59-2 Phase C Trip
152	-		59-2 Trip
-	-		59-2 AB Trip
-	-		59-2 BC Trip
-	-		59-2 CA Trip
153	-	59N-1	59N-1 Pickup
154	-		59N-1 Trip
155	-	59N-2	59N-2 Pickup
156	-		59N-2 Trip
157	-	47	47 Pickup
158	-		47 Trip
159	-	59L	59L Pickup
160	-		59L Trip

-	-	32-1	32-1 Phase A Pickup
-	-		32-1 Phase B Pickup
-	-		32-1 Phase C Pickup
161	-		32-1 Pickup
-	-		32-1 Phase A Trip
-	-		32-1 Phase B Trip
-	-		32-1 Phase C Trip
162	-		32-1 Trip
-	-	32-2	32-2 Phase A Pickup
-	-		32-2 Phase B Pickup
-	-		32-2 Phase C Pickup
163	-		32-2 Pickup
-	-		32-2 Phase A Trip
-	-		32-2 Phase B Trip
-	-		32-2 Phase C Trip
164	-		32-2 Trip
-	-	32-3	32-3 Phase A Pickup
-	-		32-3 Phase B Pickup
-	-		32-3 Phase C Pickup
165	-		32-3 Pickup
-	-		32-3 Phase A Trip
-	-		32-3 Phase B Trip
-	-		32-3 Phase C Trip
166	-		32-3 Trip
-	-	32-4	32-4 Phase A Pickup
-	-		32-4 Phase B Pickup
-	-		32-4 Phase C Pickup
167	-		32-4 Pickup
-	-		32-4 Phase A Trip
-	-		32-4 Phase B Trip
-	-		32-4 Phase C Trip
168	-		32-4 Trip
169	-	81-1	81-1 Pickup
170	-		81-1 Trip
171	-	81-2	81-2 Pickup
172	-		81-2 Trip
173	-	81-3	81-3 Pickup
174	-		81-3 Trip
175	-	81-4	81-4 Pickup
176	-		81-4 Trip
177	-	81R-1	81R-1 Pickup

178	-		81R-1 Trip
179	-	81R-2	81R-2 Pickup
180	-		81R-2 Trip
181	-	81R-3	81R-3 Pickup
182	-		81R-3 Trip
183	-	81R-4	81R-4 Pickup
184	-		81R-4 Trip
185	-	78	78 Trip
186	-	24-1	24-1 Pickup
187	-		24-1 Trip
188	-	24-2	24-2 Pickup
189	-		24-2 Trip
190	29	79	79 Standby
191	-		79 Reclose Time
192	-		79 Is 52 Open
193	-		79 Hold Time
194	-		79 Close Time
195	-		79 Reset Time
196	30		79 Lockout
197	-		79 Safe Time
198	31		79 Block
-	-		Reclose Number 1
-	-		Reclose Number 2
-	-		Reclose Number 3
-	-		Reclose Number 4
199	-	25	25 Synchrocheck
200	-		25 DLDB
201	-		25 DLLB
202	-		25 LLDB
203	-		25 LLLB
204	-		25 Voltage Difference
205	-		25 Frequency Difference
206	-		25 Phase Difference
207	38	74TCS	74TCS Pickup
208	39		74TCS Trip
209	40	60CTS	60CTS Pickup
210	41		60CTS Trip
211	42	60VTS	60VTS Pickup
212	43		60VTS Trip
-	-		60VTS Phase A Trip
-	-		60VTS Phase B Trip

-	-		60VTS Phase C Trip
213	36	50BF	50BF Pickup
214	37		50BF Trip
-	-	SHB	SHB Phase A Block
-	-		SHB Phase B Block
-	-		SHB Phase C Block
215	32		SHB Block
-	-	CLP	CLP Disable
-	-		52 Closed
-	-		52 Open
-	-		52 Definitive opening
-	-		Closed CLP
-	-		Open CLP
216	33		CLP Activation
217	-	HMI	HMI 52 Open Command
218	-		HMI 52 Close Command
219	-		HMI 79 Block Command
220	-		HMI 79 Unblock Command
221	-		HMI Local Control Command
222	-		HMI Remote Control Command
223	-		HMI Reset
224	-		HMI Reset Thermal Image
-	-		HMI Hot Line Tag ON
-	-		HMI Hot Line Tag OFF
-	-		HMI User Command 1
-	-		HMI User Command 2
-	-		HMI User Command 3
-	-		HMI User Command 4
-	-		HMI User Command 5
-	-		HMI User Command 6
-	-		HMI Set counter
-	-		HMI Key Reset
-	-		HMI Activity
225	44		HMI Identification
226	-	USB COM	USB 52 Open Command
227	-		USB 52 Close Command
228	-		USB 79 Block Command
229	-		USB 79 Unblock Command
230	-		USB Local Control Command
231	-		USB Remote Control Command
232	-		USB Reset

233	-		USB Reset Thermal Image
-	-		USB Hot Line Tag ON
-	-		USB Hot Line Tag OFF
-	-		USB User Command 1
-	-		USB User Command 2
-	-		USB User Command 3
-	-		USB User Command 4
-	-		USB User Command 5
-	-		USB User Command 6
-	-		USB Set counter
-	-		USB Activity
234	45		USB Identification
235	-	WIFI COM	WIFI 52 Open Command
236	-		WIFI 52 Close Command
237	-		WIFI 79 Block Command
238	-		WIFI 79 Unblock Command
239	-		WIFI Local Control Command
240	-		WIFI Remote Control Command
241	-		WIFI Reset
242	-		WIFI Reset Thermal Image
-	-		WIFI Hot Line Tag ON
-	-		WIFI Hot Line Tag OFF
-	-		WIFI User Command 1
-	-		WIFI User Command 2
-	-		WIFI User Command 3
-	-		WIFI User Command 4
-	-		WIFI User Command 5
-	-		WIFI User Command 6
-	-		WIFI Set counter
-	-		WIFI Activity
243	-		WIFI Identification
244	-	Modbus RTU	Modbus RTU 52 Open Command
245	-		Modbus RTU 52 Close Command
246	-		Modbus RTU 79 Block Command
247	-		Modbus RTU 79 Unblock Command
248	-		Modbus RTU Local Control Command
249	-		Modbus RTU Remote Control Command
250	-		Modbus RTU Reset
251	-		Modbus RTU Reset Thermal Image
-	-		Modbus RTU Hot Line Tag ON

-	-		Modbus RTU Hot Line Tag OFF
-	-		Modbus RTU User Command 1
-	-		Modbus RTU User Command 2
-	-		Modbus RTU User Command 3
-	-		Modbus RTU User Command 4
-	-		Modbus RTU User Command 5
-	-		Modbus RTU User Command 6
-	-		Modbus RTU Set counter
-	-		Modbus RTU Activity
252	-		Modbus RTU Identification
253	-	DNP3 Serial	DNP3 52 Open Command
254	-		DNP3 52 Close Command
255	-		DNP3 79 Block Command
256	-		DNP3 79 Unblock Command
257	-		DNP3 Local Control Command
258	-		DNP3 Remote Control Command
259	-		DNP3 Reset
260	-		DNP3 Reset Thermal Image
-	-		DNP3 Hot Line Tag ON
-	-		DNP3 Hot Line Tag OFF
-	-		DNP3 User Command 1
-	-		DNP3 User Command 2
-	-		DNP3 User Command 3
-	-		DNP3 User Command 4
-	-		DNP3 User Command 5
-	-		DNP3 User Command 6
-	-		DNP3 Activity
261	-	IEC60870-5-103 Serial	IEC103 52 Open Command
262	-		IEC103 52 Close Command
263	-		IEC103 79 Block Command
264	-		IEC103 79 Unblock Command
265	-		IEC103 Local Control Command
266	-		IEC103 Remote Control Command
267	-		IEC103 Reset
	-		IEC103 Reset Thermal Image
268	-		IEC103 Activity
269	-	Modbus TCP	Modbus TCP 52 Open Command
270	-		Modbus TCP 52 Close Command
271	-		Modbus TCP 79 Block Command
272	-		Modbus TCP 79 Unblock Command
273	-		Modbus TCP Local Control Command

274	-		Modbus TCP Remote Control Command
275	-		Modbus TCP Reset
276	-		Modbus TCP Reset Thermal Image
-	-		Modbus TCP Hot Line Tag ON
-	-		Modbus TCP Hot Line Tag OFF
-	-		Modbus TCP User Command 1
-	-		Modbus TCP User Command 2
-	-		Modbus TCP User Command 3
-	-		Modbus TCP User Command 4
-	-		Modbus TCP User Command 5
-	-		Modbus TCP User Command 6
-	-		Modbus TCP Set counter
-	-		Modbus TCP Activity
277	-		Modbus TCP Identification
-	-	IEC60870-5-104 Serial	IEC104 52 Open Command
-	-		IEC104 52 Close Command
-	-		IEC104 79 Block Command
-	-		IEC104 79 Unblock Command
-	-		IEC104 Local Control Command
-	-		IEC104 Remote Control Command
-	-		IEC104 Reset
-	-		IEC104 Reset Thermal Image
-	-		IEC1043 Activity
278	-	DNP3 TCP	DNP3 TCP 52 Open Command
279	-		DNP3 TCP 52 Close Command
280	-		DNP3 TCP 79 Block Command
281	-		DNP3 TCP 79 Unblock Command
282	-		DNP3 TCP Local Control Command
283	-		DNP3 TCP Remote Control Command
284	-		DNP3 TCP Reset
-	-		DNP3 TCP Hot Line Tag ON
-	-		DNP3 TCP Hot Line Tag OFF
-	-		DNP3 TCP User Command 1
-	-		DNP3 TCP User Command 2
-	-		DNP3 TCP User Command 3
-	-		DNP3 TCP User Command 4
-	-		DNP3 TCP User Command 5
-	-		DNP3 TCP User Command 6
-	-		DNP3 TCP Set counter
-	-		DNP3 TCP Activity

285	-		DNP3 TCP Reset Thermal Image
286	-	Web Server	Web 52 Open Command
287	-		Web 52 Close Command
288	-		Web 79 Block Command
289	-		Web 79 Unblock Command
290	-		Web Local Control Command
291	-		Web Remote Control Command
292	-		Web Reset
293	-		Web Reset Thermal Image
-	-		Web Hot Line Tag ON
-	-		Web Hot Line Tag OFF
-	-		Web User Command 1
-	-		Web User Command 2
-	-		Web User Command 3
-	-		Web User Command 4
-	-		Web User Command 5
-	-		Web User Command 6
-	-		Web Activity
294	-	IEC61850	IEC61850 52 Open Command
295	-		IEC6185052 Close Command
296	-		IEC61850 79 Block Command
297	-		IEC61850 79 Unblock Command
298	-		IEC61850 Local Control Command
299	-		IEC61850 Remote Control Command
300	-		IEC61850 Reset
301	-		IEC61850 Reset Thermal Image
-	-		IEC61850 Hot Line Tag ON
-	-		IEC61850 Hot Line Tag OFF
-	-		IEC61850 User Command 1
-	-		IEC61850 User Command 2
-	-		IEC61850 User Command 3
-	-		IEC61850 User Command 4
-	-		IEC61850 User Command 5
-	-		IEC61850 User Command 6
-	-		IEC61850 Activity

(*) Only assigned to Class 0.

1.3.3. BINARY OUTPUT (OBJECT 10) -> Assigned to Class 0.

1.3.4. BINARY OUTPUT CHANGE (OBJECT 11) -> Assigned to Class 1.

For FW versions before M01.02.00:

Index	SILGxxxxxx0xxx SILGxxxxxx5xxx	SILGxxxxxx7xxx	SILGxxxxxx6xxx	SILGxxxxxxAxxx
1	Output 1	Output 1	Output 1	Output 1
2	Output 2	Output 2	Output 2	Output 2
3	Output 3	Output 3	Output 3	Output 3
4	Output 4	Output 4	Output 4	Output 4
5	Output 5	Output 5	Output 5	Output 5
6	Output 6	Output 6	Output 6	Output 6
7	Output 7	Output 7	Output 7	Output 7
8	Logic Signal 8	Output 8	Output 8	Logic Signal 8
9	Logic Signal 9	Output 9	Output 9	Logic Signal 9
10	Logic Signal 10	Output 10	Output 10	Logic Signal 10
11	Logic Signal 11	Output 11	Output 11	Logic Signal 11
12	Logic Signal 12	Logic Signal 12	Output 12	Logic Signal 12
13	Logic Signal 13	Logic Signal 13	Output 13	Logic Signal 13
14	Logic Signal 14	Logic Signal 14	Output 14	Logic Signal 14
15	Logic Signal 15	Logic Signal 15	Output 15	Logic Signal 15
16	Logic Signal 16	Logic Signal 16	Output 16	Logic Signal 16
17	Logic Signal 17	Logic Signal 17	Output 17	Logic Signal 17
18	Logic Signal 18	Logic Signal 18	Output 18	Logic Signal 18
19	AFD Output 1 *	AFD Output 1 *	AFD Output 1 *	AFD Output 1
20	AFD Output 2 *	AFD Output 2 *	AFD Output 2 *	AFD Output 2
21	AFD Output 3 *	AFD Output 3 *	AFD Output 3 *	AFD Output 3
22	AFD Output 4 *	AFD Output 4 *	AFD Output 4 *	AFD Output 4

*Note: for models without AFD outputs, these points will not be updated.

From FW version M01.02.00 onwards:

The map of the binary outputs is created according to the number of outputs of the relay, to optimize the data transfer.

Index	SILGxxxxxx0xxx SILGxxxxxx5xxx	SILGxxxxxx7xxx	SILGxxxxxx6xxx	SILGxxxxxxAxxx
1	Output 1	Output 1	Output 1	Output 1
2	Output 2	Output 2	Output 2	Output 2
3	Output 3	Output 3	Output 3	Output 3
4	Output 4	Output 4	Output 4	Output 4
5	Output 5	Output 5	Output 5	Output 5
6	Output 6	Output 6	Output 6	Output 6
7	Output 7	Output 7	Output 7	Output 7
8	-	Output 8	Output 8	AFD Output 1
9	-	Output 9	Output 9	AFD Output 2
10	-	Output 10	Output 10	AFD Output 3
11	-	Output 11	Output 11	AFD Output 4
12	-	-	Output 12	-
13	-	-	Output 13	-
14	-	-	Output 14	-
15	-	-	Output 15	-
16	-	-	Output 16	-
17	-	-	Output 17	-
18	-	-	Output 18	-

1.3.5. ANALOG INPUT (OBJECT 30) -> Assigned to Class 0.

1.3.6. ANALOG INPUT CHANGE (OBJECT 32) -> Assigned to Class 2.

From version M01.02.00 of the firmware, configurable point list is added with memory for 32 configurable analog inputs. We recommend configuring only the necessary analog inputs, it is not necessary to configure all 32 signals. Gaps in the configuration are accepted. Non-configured signals will report "0" value and “off-line” flag when requested.

On the following tables, default configuration for versions before and after this change are shown:

Index		Criteria
Before M01.02.00	M01.02.00 or after	
1	1	Phase A current IA
2	2	Phase B current IB
3	3	Phase C current IC
4	4	Neutral current IN
5	5	Phase A Voltage VA
6	6	Phase B Voltage VB
7	7	Phase C Voltage VC
8	8	Phase N Voltage VR
9	9	Line B Voltage VL
10	10	Phase UAB Voltage UAB
11	-	Phase UBC Voltage UBC
12	-	Phase UCA Voltage UCA
13	-	3I-0
14	-	Positive sequence current I-1
15	-	Negative sequence current I-2
17	-	Maximum phase current IMAX
19	-	Phase A second harmonic current IA-2H
20	-	Phase B second harmonic current IB-2H
21	-	Phase C second harmonic current IC-2H
22	-	Phase N Voltage 3V0
23	-	Positive phase sequence voltage V-1
24	-	Negative phase sequence voltage V-2
25	-	Maximum Phase Voltage V-Max
26	-	Total Active Power P-3P
27	-	Total Reactive Power Q-3P
28	-	Total Apparent Power S-3P
29	-	Phase A Active Power PA
30	-	Phase A Reactive Power QA
31	-	Phase A Apparent Power SA
32	-	Phase B Active Power PB
33	-	Phase B Reactive Power QB
34	-	Phase B Apparent Power SB

35	-	Phase C Active Power PC
36	-	Phase C Reactive Power QC
37	-	Phase C Apparent Power SC
36	-	Bar frequency
37	-	Line frequency
38	-	df/dt
42	-	Ang IA
43	-	Ang IB
44	-	Ang IC
45	-	Ang IN
46	-	Ang 3I0
47	-	Ang VA
48	-	Ang VB
49	-	Ang VC
50	-	Ang VR
51	-	Ang 3V0
52	-	Ang UAB
53	-	Ang UBC
54	-	Ang UCA
55	-	Ang VL
-	-	V/Hz
18	-	Thermal Image
16	-	I-2/I-1
-	-	Neutral second harmonic current IN-2H
-	-	cosPhi A
-	-	cosPhi B
-	-	cosPhi C
-	-	cosPhi
-	-	THD IA
-	-	THD IB
-	-	THD IC

Measurements are in primary values with a scalefactor of 100.

i.e. A current measurement of 2A in secondary with a RT=20 will be shown as:

2*20*100 = 4000

The DeadBand of the current measurements is adjustable by General settings, on the Measurements menu and it is the per unit of the Nominal Current (x*In).

i.e. If In = 1A and the deadband is adjusted to 0.1, then:

0.1*1A = 0.1A (100mA)

The measurement will be reported by event when it changes more than 100 mA and if the In = 5A, the deadband will be 0.1*5A = 0.5 (500mA), the measurement will be reported by event when it changes more than 500 mA.

The DeadBand of the voltage measurements are adjustable by General settings, on the Measurements menu. For phase-to-phase measures it is per nominal Voltage P-P (x * Vn P-P). For phase-to-neutral measures, it is per unit nominal Voltage P-N (x * (Vn P-P/√3)).

i.e. If Vn P-P = 110V and the deadband is adjusted to 0.1, then:

0.1*110V = 11V (for phase-to-phase measures)

0.1*110/√3 = 6.3V (for phase-to-neutral measures)

1.3.7. COUNTER (OBJECT 20) -> Assigned to Class 0.

1.3.8. COUNTER EVENT (OBJECT 22) -> Assigned to Class 1.

1.3.9. FROZEN COUNTER (OBJECT 21)

Index	Description	Event Deadband
0	Openings Number	1
1	Recloses Number	1
2	Accumulated Amperes	1
3	AE+	100.000
4	AE-	100.000
5	RE+	100.000
6	RE-	100.000

1.3.10. CONTROL RELAY OUTPUT BLOCK (OBJECT 12)

Description	Point Number
Open Breaker Command	0 (ON)
Closing Breaker Command	0 (OFF)
79 Block Command	1 (ON)
79 Unblock Command	1 (OFF)
Local Control Command	2 (ON)
Remote Control Command	2 (OFF)
Reset Command	3 (ON)
Thermal Image Command	4 (ON)

Note: when the relay is in local control mode, for safety reasons, it is not possible to put it in remote mode through remote communications.

On FW version M01.02.00 the following commands are added:

Description	Point number
Hot Line Tag ON	5 (ON)
Hot Line Tag OFF	5 (OFF)
User Command 1	6 (ON)
User Command 2	6 (OFF)
User Command 3	7 (ON)
User Command 4	7 (OFF)
User Command 5	8 (ON)
User Command 6	8 (OFF)

On FW version M01.02.02 the previous commands are changed to the following point numbers for better clarity:

Description	Point number
Hot Line Tag ON	5 (ON)
Hot Line Tag OFF	5 (OFF)
User Command 1	6 (ON)
User Command 2	7 (ON)
User Command 3	8 (ON)
User Command 4	9 (ON)
User Command 5	10 (ON)
User Command 6	11 (ON)

And on FW version M01.02.03 the following commands are added:

Description	Point number
Setting group 1	12 (ON)
Setting group 2	13 (ON)
Setting group 3	14 (ON)
Setting group 4	15 (ON)

1.4. Example of Time and Date synchronization

Unix time is a system for describing a point in time. It is the number of miliseconds that have elapsed since 00:00:00 Thursday, 1 January 1970.

Example of date:
07/15/2019 @ 08:58:35 am (UTC)

Is equivalent to:
1563173915 in seconds → 1563173915000 in miliseconds → 016B F46D 0978 in HEX

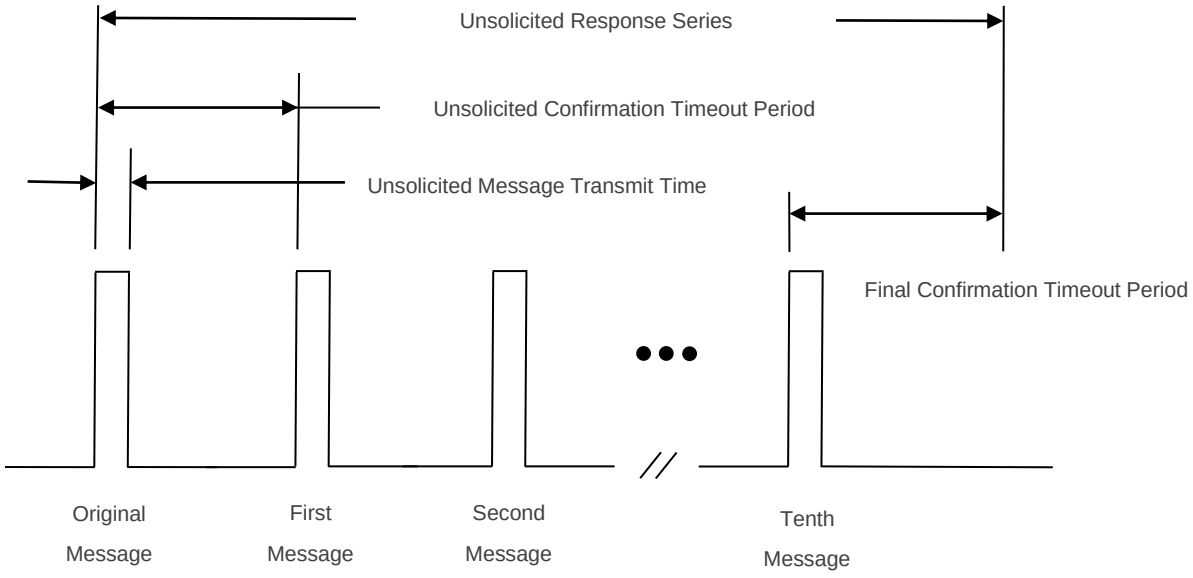
This date shall be sent inside the frame as follows (less to more singinficative octect):
78 09 6D F4 6B 01

1.5. Unsolicited Responses

Unsolicited responses are messages spontaneously sent from SILG without a specific request from a master station when something of significance occurs.

The SILG relay supports the functions code 29 (Enable Unsolicited Responses) and 30 (Disable Unsolicited Responses). The SILG default configuration has the unsolicited responses disable, if the user wants to start using these messages must perform the function code 29. After the function code 29 is sent, the user must open the communication port. This communication port is set to 20000 as default.

The unsolicited responses behavior follows the procedure decribed in the standard and it is illustrated in the following diagram:



After the original message in sent, the relay waits, by default, two seconds for the master confirmation, this time is shown as the *Unsolicited Confirmation Timeout Period* in the figure. If the relay does not receive any confirmation from the master, then the relay replies the original message in a serie of, by default, ten messages.

The timeout period and number of retries are configurable since the version 1.02.00 of the firmware.

All the Binary Inputs, Outputs and Counter changes described previously in this document are available to be sent in an Unsolicited Response message.

The measurements sent via Analog Input objects are available to be sent in an Unsolicited response considering the deadband variation previously explained in this document regarding the specific data object (Current and Voltage).



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