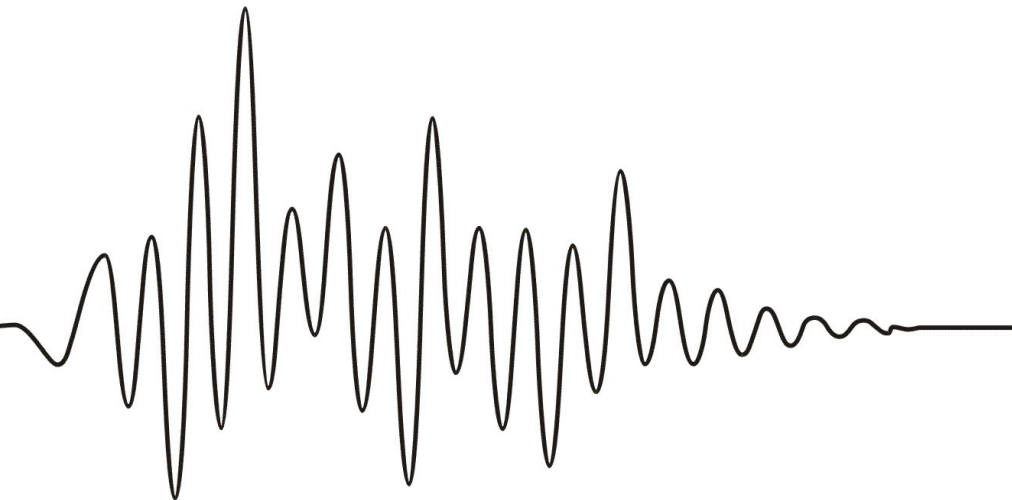


feel free.

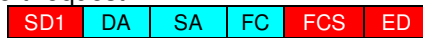
Intelligent Solutions for
Measurement and Test Automation



1. Telegrams

1.1 Universal:

Short request:



Answer:



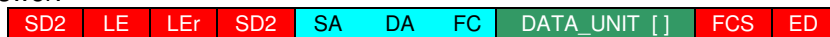
or



Request variable length:



Answer:



Or:



Request with fixed length:



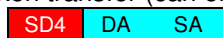
Answer:



Or:



Token transfer (can only be done by the master):

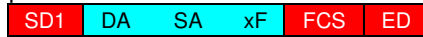


Some telegrams are answered by a "Short Quit" (SC) → this is a 1-byte answer.

SD1 ...	Start delimiter no data 0x10
SD2 ...	Start delimiter with variable data length 0x68
SD3 ...	Start delimiter with fixed data length (8 Byte) 0xA2
SD4 ...	Start delimiter for token transfer 0xDC
LE ...	Length of protocol data unit (incl. DA, SA, FC, DSAP, SSAP)
LEr ...	Repetition length of protocol data unit (Hamming distance = 4)
DA ...	Destination address 0x00 .. 0x7F (> 0x7F -> DSAP)
SA ...	Source address 0x00 .. 0x7F (> 0x7F -> SSAP)
FC ...	Frame control
	0Xx3 ... Send data with acknowledge
	0Xx4 ... Send data without acknowledge
	0Xx5 ... Send data with acknowledge
	0Xx6 ... Send data without acknowledge
	0Xx8 ... Answer data LOW
	0Xx9 ... Get FDL status
	0XxA ... Answer data HIGH (diagnostic data has changed)
	0XxC ... Send and receive data
	0XxD ... Send and receive data
	0XxE ... Get ident
	0XxF ... Get LSAP status
FCS ...	Frame Checking Sequence, calculated by simply adding up the bytes within the specified length (an overflow is ignored here)
ED ...	End delimiter 0x16
Code ..	0x00 positive, 0x01 negative, 0x03 no service (data exchange not possible)
SC ..	Short Quit (0x16)
DATA_UNIT...	protocol data, first 2 bytes of the DATA_UNIT are DSAP and SSAP (depending on the DA and SA)

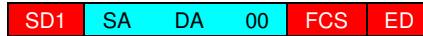
1.2 LSAP Status:

Request:



FC=xF ... request LSAP status

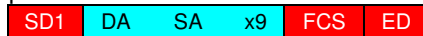
Answer:



FC=00 ... OK

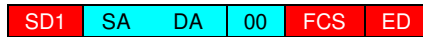
1.3 FDL Status:

Request:



FC=x9 ... request FDL status

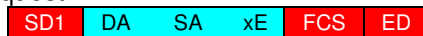
Answer:



FC=00 ... OK

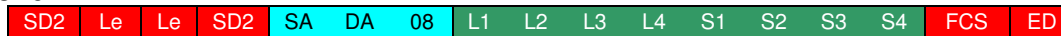
1.4 Get Ident:

Request:



FC=xE ... request IDENT with a reply

Answer:

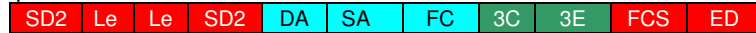


DPIdentStr

L1 ... Length S1, L2 ... Length of S2, L3 ... Length of S3, L4 ... Length of S4
S1 ... Vendor name, S2 ... Module name, S3 ... HW release, S4 ... SW release

1.5 Get Diagnose:

Request:



FC = 0x5D, 0x6D or 0x7D

Answer:



DPDiagStr

or



DPDiagExtStr

Status_1	bit_7	always 0	0x02	Start value (not ready for data exchange)
	bit_6	invalid data during set parameter	0x00	RUN (no config error)
	bit_5	always 0	0x06	Check configuration failed
	bit_4	invalid command received	0x42	Set parameter failed
	bit_3	extended diagnose data available	0x12	Invalid command received
	bit_2	invalid configuration data (check configuration)		
	bit_1	not ready for the data exchange		
bit_0	always 0			
Status_2	bit_7	always 0	0x05	Start value (no parameter available)
	bit_6	always 0	0x04	RUN (Watchdog is OFF)
	bit_5	always 0	0x0C	RUN (Watchdog is ON)
	bit_4	always 0		
	bit_3	Watchdog is active		
	bit_2	always 1		
	bit_1	always 0		
bit_0	no parameter available			
Status_3	always 0x00			
Master_Addr	Master address (Set Parameter)			
Id_Nr (MSB)	0x67			
Id_Nr (LSB)	0x85 (0x6784 Gantner Instruments e.bloxx 0x6785 Gantner Instruments Q.bloxx)			
L	Length of the extended diagnostic data			
Diag	Extended diagnostic data (diagnostic data, DIN19245-3, page 44)			

1.6 Get Configuration:

Request:



FC = 0x5D, 0x6D or 0x7D

Answer:



1.7 Check Configuration:

Request:



FC = 0x5D, 0x6D or 0x7D

Answer:



1.8 Set Parameter:

Request:



Answer:



Status

- bit_7 -> table
- bit_6 -> table
- bit_5 Sync_Req
- bit_4 Freeze
- bit_3 Watchdog (0=OFF, 1=ON)
- bit_2 reserved
- bit_1 reserved
- bit_0 reserved

bit_7	bit_6	Meaning
0	0	MinTSDR set, all other parameters stay the same
X	1	DP slave released for other masters Master_Addr = 0xFF Diag_Status_1 = 0x02 Diag_Status_2 = 0x05
1	0	DP slave gets locked for the other masters Master_Addr = SA MinTSDR set new Watchdog set new (= 10 ms * WD_1 * WD_2), when bit_3 = 1

WD_1, WD_2 Watchdog = 10 ms * WD_1 * WD_2

MinTSDR station delay in bit time

Id_Nr (MSB) 0x67

Id_Nr (LSB) 0x84

Group 0x00

1.9 Data Exchange no Output Data:

Request:



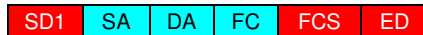
FC = 0x5D, 0x6D or 0x7D

Answer:



FC = 0x08 or 0x0A für Data,
Data[] = DPInputData

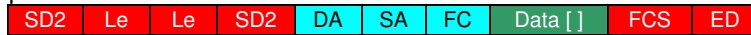
or:



FC=0x03 → error message „not ready for data exchange“

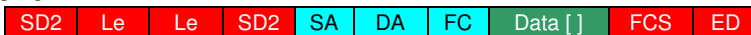
1.10 Data Exchange with Output Data:

Request:



FC = 0x5D, 0x6D or 0x7D
Data[] = DPOutputData

Answer:



FC = 0x08 or 0x0A and input data ... 0x08 answer data low → no diagnostic data changed ... 0x0A answer data high → new diagnostic data available
Data[] = DPInputData

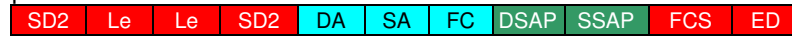
or:



FC = 0x03 → failure message "not ready for data exchange"

1.11 Read Input Data:

Request:



FC = 0x5D or 0x7D
Le = 0x05
DSAP = 0x38
SSAP = 0x3E

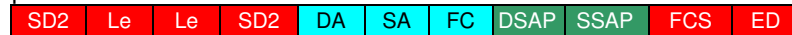
Answer:



FC = 0x08 or 0x0A and input data ... 0x08 answer data low → no diagnostic data changed ... 0x0A answer data high → new diagnostic data available
DSAP = 0x38
SSAP = 0x3E
Data[] = DPInputData

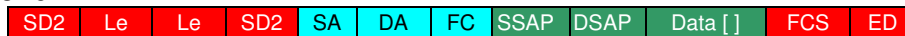
1.12 Read Output Data:

Request:



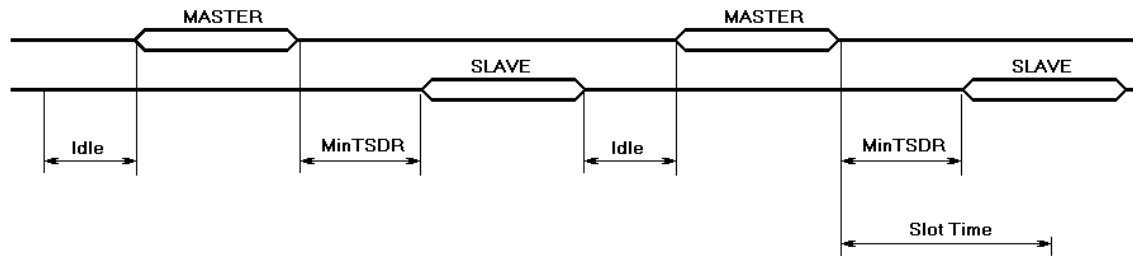
FC = 0x5D or 0x7D
Le = 0x05
DSAP = 0x39
SSAP = 0x3E

Answer:



FC = 0x08
DSAP = 0x39
SSAP = 0x3E
Data[] = DPOutputData

1.13 Timing:



Idle: The master must wait for the duration of the idle time after each slave's answer before the master can start with the next communication. This time is always a 33-bit timestamp.

MinTSDR: This is the minimum time when the slave can answer. The master defines this time with the command "Set Parameter". This time has a minimum 11-bit timestamp.

MaxTSDR: This is the maximum time until the slave can answer. This time is set by the master and depends on the baud rate and the slave (60 to 150-bit timestamp)

SlotTime: SlotTime is a little bit longer than the MaxTSDR because within this time the switching time of up to 5 repeaters is considered.

2. Example:

2.1 Example 1:

Master address = 2
Highest station address = 12
NO SLAVE CONNECTED

DC 02 02	Token transfer to its own address
10 00 02 49 4B 16	Status request to slave 0
DC 02 02	Token transfer to its own address
10 01 02 49 4C 16	Status request to slave 1
DC 02 02	Token transfer to its own address
10 03 02 49 4E 16	Status request to slave 3
10 04 02 49 4F 16	Status request to slave 4
DC 02 02	Token transfer to its own address
10 05 02 49 50 16	Status request to slave 5
DC 02 02	Token transfer to its own address
DC 02 02	Token transfer to its own address
10 06 02 49 51 16	Status request to slave 6
DC 02 02	Token transfer to its own address
10 07 02 49 52 16	Status request to slave 7
10 08 02 49 53 16	Status request to slave 8
DC 02 02	Token transfer to its own address
10 09 02 49 54 16	Status request to slave 9
DC 02 02	Token transfer to its own address
10 0A 02 49 55 16	Status request to slave 10
DC 02 02	Token transfer to its own address
10 0B 02 49 56 16	Status request to slave 11
10 0C 02 49 57 16	Status request to slave 12
DC 02 02	Token transfer to its own address
10 00 02 49 4B 16	Status request to slave 0
DC 02 02	Token transfer to its own address
10 01 02 49 4C 16	Status request to slave 1
DC 02 02	Token transfer to its own address

2.2 Establish Connection:

Master address = 2
 Highest station address = 12
 Slave address = 10
 Slave 10 has 5 measured values

DC	02	02														Token transfer to its own address	
10	09	02	49	54	16												Status request to slave 9
10	0A	02	49	55	16												Status request to slave 10
10	02	0A	00	0C	16												Answer slave 10
DC	02	02														Token transfer to its own address	
10	0B	02	49	56	16												Status request to slave 11
68	05	05	68	8A	82	6D	3C	3E	F3	16							Diagnostic request slave 10
68	0B	0B	68	82	8A	08	3E	3C	02	05	00	FF	67	85	7F	16	Answer slave 10

02	status_1: not ready for data exchange
05	status_2: no parameters are available
00	status_3:
FF	master address: FF -> slave is not locked to any master
67 85	Ident: device specific identification 0x6785 ... Gantner Instruments, Q.bloxx

68	0C	0C	68	8A	82	5D	3D	3E	88	14	01	0B	67	84	00	77	16	Set Parameter Slave 10
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	------------------------

E5 Short Quit of Slave 10

88	Status: Bit 8 ...Slave locked, master, is 02, minTSDR and watchdog time configured new Bit 5 ...watchdog is active
14 01	WD_1, WD_2: 20 * 01 * 10 ms = 200 ms watchdog time
0B	MinTSDR: 11-bit time response delay
67 84	Ident: device dependent identification (6785 = Q.bloxx)
00	Group:

68	0A	0A	68	8A	82	7D	3E	3E	93	93	93	91	93	E2	16	Check Configuration Slave 10
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	------------------------------

E5 Short Quit of Slave 10

93	93	93	91	93	float, float, float, int16, float (18-byte input data, no output data available)
----	----	----	----	----	--

68 05 05 68 8A 82 5D 3C 3E E3 16

Diagnostic request slave 10

68 0B 0B 68 82 8A 08 3E 3C 02 0C 00 02 67 84 89 16

Answer slave 10

02 Status_1: Bit 1 ...not ready for data exchange
 0C Status_2: Bit 3 ...watchdog is active
 Bit 2 ...always 1
 00 Status_3:
 02 Master address: slave has been configured by master 02

68 05 05 68 8A 82 5D 3C 3E E3 16

Diagnostic request slave 10

68 0B 0B 68 82 8A 08 3E 3C 00 0C 00 02 67 83 86 16

Answer slave 10

00 Status_1: Slave is ready for the data exchange
 0C Status_2: Bit 3 ...watchdog is active
 Bit 2 ...always 1
 00 Status_3:
 02 Master address: slave has been configured by master 02

10 04 02 49 4F 16

Status request address 4

DC 02 02

Token transfer to its own address

10 0A 02 7D 89 16

Data exchange slave 10

68 15 15 68 02 0A 08 00 00 49 16

Answer slave 10

DC 02 02

Token transfer to its own address

10 05 02 49 50 16

Status request address 5

DC 02 02

Token transfer to its own address

DC 02 02

Token transfer to its own address

10 06 02 49 51 16

Status request address 6

10 0A 02 7D 89 16

Data exchange slave 10

68 15 15 68 02 0A 08 00 00 49 16

Answer slave 10

DC 02 02

Token transfer to its own address

10 07 02 49 52 16

Status request address 7

10 08 02 49 53 16

Status request address 8

2.3 Read the Configuration:

Master address = 2
 Highest station address = 12
 Slave address = 10
 Slave 10 has 2 variables (91=int16, input | A1=int16, input/output)

DC 02 02 Token transfer to its own address

10 09 02 49 54 16 Status request to slave 9

10 0A 02 49 55 16 Status request to slave 10

10 02 0A 00 0C 16 Answer slave 10

DC 02 02 Token transfer to its own address

10 0B 02 49 56 16 Status request to slave 11

68 05 05 68 8A 82 7D 3C 3E 03 16 Diagnostic request slave 10

68 0B 0B 68 82 8A 08 3E 3C 02 05 00 FF 67 84 7F 16 Answer slave 10

02	Status_1: Bit 1 ...not ready for data exchange
05	Status_2: Bit 2 ...always 1 Bit 0 ...no parameters are available
00	Status_3:
FF	Master address: FF ... slave is not locked to any master
67 85	Ident: device dependent product code 0x6785 ... Gantner Instruments, Q.bloxx

68 05 05 68 8A 82 5D 3B 3E E2 16 Get configuration of slave 10

68 0C 0C 68 82 8A 08 3E 3B 91 B1 CF 16 Answer slave 10

91	Variable 1 ... integer, 2 bytes, input
B1	Variable 2 ... integer, 2 bytes, input/output

DC 02 02 Token transfer to its own address

10 09 02 49 54 16 Status request to slave 9

10 0A 02 49 55 16 Status request to slave 10

10 02 0A 00 0C 16 Answer slave 10

DC 02 02 Token transfer to its own address

10 0B 02 49 56 16 Status request to slave 11

DC 02 02 Token transfer to its own address

2.4 Data Exchange with Diagnostic Data:

Master address = 2

Highest station address = 12

Slave address = 10

Slave 10 has 2 variables (91=int16 input, A1=int16 input/output)

DC	02	02
----	----	----

 Token transfer to its own address

10	09	02	49	54	16
----	----	----	----	----	----

 Status request to slave 9

10	0A	02	49	55	16
----	----	----	----	----	----

 Status request to slave 10

10	02	0A	00	0C	16
----	----	----	----	----	----

 Answer slave 10

DC	02	02
----	----	----

 Token transfer to its own address

10	0B	02	49	56	16
----	----	----	----	----	----

 Status request to slave 11

68	05	05	68	0A	02	5D	00	00	69	16
----	----	----	----	----	----	----	----	----	----	----

 Data exchange slave 10

68	07	07	68	02	0A	08	27	10	00	00	4B	16
----	----	----	----	----	----	----	----	----	----	----	----	----

 Answer slave 10

08

 FC = 0x08 -> Answer with "Low priority"

68	05	05	68	0A	02	7D	00	00	89	16
----	----	----	----	----	----	----	----	----	----	----

 Data exchange slave 10

68	07	07	68	02	0A	0A	26	E5	00	00	21	16
----	----	----	----	----	----	----	----	----	----	----	----	----

 Answer slave 10

0A

 FC = 0x0A -> Answer with "High priority" -> the diagnostic data has changed

....

68	05	05	68	8A	82	5D	3C	3E	E3	16
----	----	----	----	----	----	----	----	----	----	----

 Diagnostic request slave 10

68	0F	0F	68	82	8A	08	3E	3C	00	0C	00	02	67	84	04	00	01	00	94	16
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

00

 Status_1: Slave is ready for the data exchange

0C

 Status_2: Bit 3 ...watchdog is active
Bit 2 ...always 1

00

 Status_3:

02

 Master address: Slave has been configured by master 02

67	85
----	----

 Ident: device dependent product code 0x6785 ... Gantner Instruments Q.bloxx

04	00	01	00
----	----	----	----

 4-byte extended diagnostic data (slave has set 1 failure bit)

....

68	05	05	68	0A	02	5D	00	00	69	16
----	----	----	----	----	----	----	----	----	----	----

 Data Exchange Slave 10

68	07	07	68	02	0A	08	27	10	00	00	4B	16
----	----	----	----	----	----	----	----	----	----	----	----	----

 Answer slave 10

08

 FC = 0x08 -> Answer with "Low priority"

68 05 05 68 0A 02 5D 00 00 69 16

Data exchange slave 10

68 07 07 68 02 0A 08 27 10 00 00 4B 16

Answer slave 10

08 FC = 0x08 -> Answer with "Low priority"

68 05 05 68 0A 02 5D 00 00 69 16

Data exchange slave 10

68 07 07 68 02 0A 08 27 10 00 00 4B 16

Answer slave 10

08 FC = 0x08 -> Answer with "LOW Priority"

68 05 05 68 0A 02 7D 00 00 89 16

Data exchange slave 10

68 07 07 68 02 0A 0A 26 E5 00 00 21 16

Answer slave 10

0A FC = 0x0A -> Answer with "High priority" -> the diagnostic data has changed

68 05 05 68 8A 82 5D 3C 3E E3 16

Diagnostic request slave 10

68 0B 0B 68 82 8A 08 3E 3C 00 0C 00 02 67 84 87 16

Answer slave 10

00 Status_1: Slave is ready for the data exchange
 0C Status_2: Bit 3 ...watchdog is active
 Bit 2 ...always 1
 00 Status_3:
 02 Master address: slave has been configured by master 02
 67 85 Ident: device dependent product code 0x6785 ... Gantner Instruments Q.bloxx
 | No extended diagnostic data -> no failure bits are set

68 05 05 68 0A 02 5D 00 00 69 16

Data exchange slave 10

68 07 07 68 02 0A 08 27 10 00 00 4B 16

Answer slave 10

08 FC = 0x08 -> Answer with "Low priority"

2.5 Data Exchange with Multiple Variables:

Master address = 2
 Highest station address = 12
 Slave address = 10
 Slave 10 has 8 variables

DC	02	02
----	----	----

 Token transfer to its own address

10	09	02	49	54	16
----	----	----	----	----	----

 Status request to slave 9

10	0A	02	49	55	16
----	----	----	----	----	----

 Status request to slave 10

10	02	0A	00	0C	16
----	----	----	----	----	----

 Answer slave 10

DC	02	02
----	----	----

 Token transfer to its own address

10	0B	02	49	56	16
----	----	----	----	----	----

 Status request to slave 11

68	05	05	68	8A	82	7D	3C	3E	03	16
----	----	----	----	----	----	----	----	----	----	----

 Diagnostic request slave 10

68	0B	0B	68	82	8A	08	3E	3C	02	05	00	FF	67	84	7F	16
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

 Answer slave 10

02	Status_1: Bit 1 ... not ready for data exchange
05	Status_2: Bit 2 ... always 1 Bit 0 ... no parameters are available
00	Status_3:
FF	Master address: FF ... slave is not locked to any master
67 85	Ident: device dependent product code 0x6785 ... Gantner Instruments Q.bloxx

68	05	05	68	8A	82	5D	3B	3E	E2	16
----	----	----	----	----	----	----	----	----	----	----

 Get configuration of slave 10

68	0D	0D	68	82	8A	08	3E	3B	91	B1	B0	90	B1	A1	A0	93	94	16
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

 Answer slave 10

91	Variable 1, 2 bytes, Input, int16
B1	Variable 2, 2 bytes, Input/Output, int16
B0	Variable 3, 1 byte, Input/Output, int8 or Boolean
90	Variable 4, 1 byte, Input, int8 or Boolean
B1	Variable 5, 2 bytes, Input/Output, int16
A1	Variable 6, 2 bytes, Output, int16
A0	Variable 7, 1 byte, Output, int8 or Boolean
93	Variable 8, 4 bytes, Input, int32 or float

10 04 02 49 4F 16

Status request to slave 4

DC 02 02

Token transfer to its own address

10 05 02 49 50 16

Status request to slave 5

DC 02 02

Token transfer to its own address

DC 02 02

Token transfer to its own address

10 06 02 49 51 16

Status request to slave 6

68 0B 0B 68 0A 02 5D 22 22 33 55 55 66 66 77 69 16 Data exchange slave 10

22 22
33
55 55
66 66
77

Variable 2 | Output data
Variable 3 | Output data
Variable 5 | Output data
Variable 6 | Output data
Variable 7 | Output data

68 0F 0F 68 02 0A 08 11 11 22 22 33 44 55 55 88 88 88 88 9A 16 Answer slave 10

11 11
22 22
33
44
55 55
88 88 88 88

Variable 1 | Input data
Variable 2 | Input data
Variable 3 | Input data
Variable 4 | Input data
Variable 5 | Input data
Variable 8 | Input data

DC 02 02

Token transfer to its own address

10 07 02 49 52 16

Status request to slave 7

10 08 02 49 53 16

Status request to slave 8

68 0B 0B 68 0A 02 5D 22 22 33 55 55 66 66 77 69 16 Data exchange slave 10

22 22
33
55 55
66 66
77

Variable 2 | Output data
Variable 3 | Output data
Variable 5 | Output data
Variable 6 | Output data
Variable 7 | Output data

68 0F 0F 68 02 0A 08 11 11 22 22 33 44 55 55 88 88 88 88 9A 16 Answer slave 10

11 11
22 22
33
44
55 55
88 88 88 88

Variable 1 | Input data
Variable 2 | Input data
Variable 3 | Input data
Variable 4 | Input data
Variable 5 | Input data
Variable 8 | Input data

3. Flowcharts:

3.1 Telegram processing:

