RS485-Protokollbeschreibung
BISI

Revision:

6.1.2014	ReadStatus aktualisiert
15.7.2013	Dummy-Checksumme für cmd 16, cmd 23 hinzu
2.1.2011	erste Ausgabe

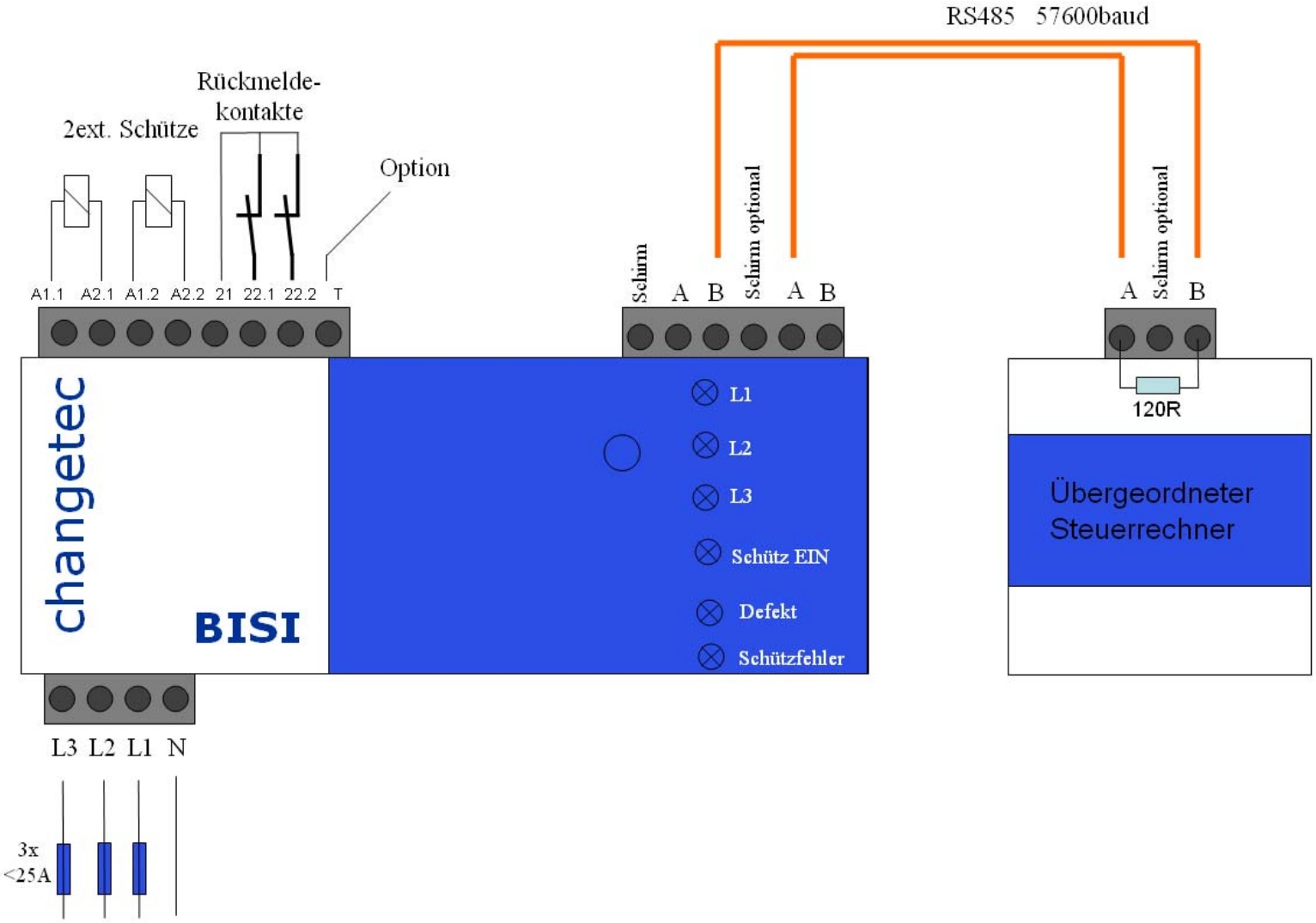
proprietäres MODBUS RTU -Protokoll
Baudrate: 57600

Das BISI reagiert als Slave nur auf Anforderung vom Master

Am Master muß zwischen A+B ein Abschlußwiderstand von 120Ohm sein. Im BISI ist ein 120 Ohm Abschlußwiderstand vorhanden.

Bei Bedarf kann für die Kommandos eine C-Library oder ein Plug-In für PC-Software zur Verfügung gestellt werden.

RS485 – Anbindung an übergeordneten Steuerrechner



Bisi-Commands

11h - Bisi-command 1 “ set OFF/ON times”
12h - Bisi-command 2 “set Bisi-time”
13h - Bisi-command 3 “ ReadProdData”
14h - Bisi-command 4 “read ErrorCounters
16h - Bisi-commmand 6 “start / stop measurement”
17h - Bisi-command 7 “clear ErrorCounters”
19h - Bisi-command 9 “ForceRecovery”
1Ah - Bisi command A “RESET”
1Ch - Bisi command C “ReadErrorEnvironments"
1Eh - BiSi command E „ReadLastErrors“
1Fh - BiSi command F „ReadThresholds“
23h - BiSi command 23 „ReadStatus“
32h - DB2 „RequestLast5BiSiErrors“ (BiSi-cmd 1E)

10 customer specific Commands

41h - customer command 1
42h - customer command 2

.....

4Ah - customer command 10

Command details

Addresses

C0h - BiSi address
D0h - Display address
F0h - PC /master

Format

The cmd-length is same for all commands (14-bytes, dummy bytes used to maintain the length)

neg. response length:
(is equal for all commands): 9 bytes

pos. response length:

cmd 1,5,6,7,8,9,A,B,D, 20:	8 byte
cmd 2,3, F, 36:	18 byte
cmd 4, C:	30 byte
cmd E	43 byte

Checksum-Algorithm

```
static void chk_crc8(unsigned char d_serdata_tuc[14])
{
        unsigned char i, j, d_currbyte_tuc, d_crc_tuc;

          /* start with DST and repeat the checksum calculation for all bytes until CHKS8 (excl.) */
          d_crc_tuc = 0; //              init the checksum

          for( j = DST; j < CHKS8; j ++  )
          {
                          d_currbyte_tuc = d_serdata_tuc[ j ];

                        for( i = 8; i > 0; i --  )
                        {
                                 /*  if  current bit != 0 */
                                if(    (d_crc_tuc ^ d_currbyte_tuc) & BIT0  )
                                {
                                                d_crc_tuc ^= 0x18;
                                            d_crc_tuc >>= 1;
                                            d_crc_tuc |= BIT7;
                                }
                                else{d_crc_tuc >>= 1;}
                                 d_currbyte_tuc >>= 1;                  //                  prepare for next databit
                        }
          } // this byte is finished

        /* checksum is complete now - result always ORed with 0x80  and then compare */
        /* calculated and received checksum */
        d_crc_tuc |= BIT7;
```

Bisi-command **11** " set OFF/ON times"

set the OFF-time = 21:00Uhr, ON-time = 05:00Uhr

STX	Dest	SRC	length –lo	length –Hi	CMD	OFF-time	ON-time	dummy-bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	11h	21h	05h	00h 00h 00h 00h	9B	03h

02 C0 F0 09 00 11 21 05 00 00 00 00 9B 03

positive response from Bisi

STX	Src	DST	len–lo	len–Hi	CMD+80h	CHKS+80h	ETX
02h	F0h	C0h	03h	00h	91h	B4h	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **12** " set Bisi-time"

set the RTC-time = 20:18Uhr and Date 21.11.2011

The current date and time is taken from an input in the GUI.

BISI will write the values into RTC and the read it back from RTC and put the values in its positive response. PC can use this to verify the data written.

In case of summer season – starts from last sunday in march - the hour value shall be decremented by 1 before writing it to the Bisi.

In case of winter season - starts from last sunday in October- the hour-value is written as it is.

STX	Dest	SRC	length –lo	length –Hi	CMD	HOUR	MIN	DATE	MONTH	YEAR	dummy byte	CHKS+80h	ETX
02	c0	f0	09	00	12	20	18	21	11	11	00	cd	03

positive response from Bisi

STX	Src	DST	lengh –lo	length –Hi	CMD+80h	HOUR	MIN	DATE	MONTH	YEAR	dummy	dummy	dummy	dummy	dummy	CHKS+80h	ETX
02	f0	c0	0d	00	92	14	12	15	0b	0b	00	00	00	00	00	e5	03

Note: PC must send the values in hex format with decimal appearance ! But the response from BISI will be in hex format.
For E.g. PC must send as 20hex (for 20Uhr) and the BISI will send back as 14hex for the same.

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **13** " Read ProdData"

reads the production data

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-Bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	13h	00h 00h 00h 00h 00h 00h	B2h	03h

02 C0 F0 09 00 13 00 00 00 00 00 00 B2 03

positive response from Bisi

FW-version v21, S/N 000234, production date 27.03.2009 and HW-ID "442", BB-VERSION „40"

STX	Dest	SRC	length –lo	length –Hi	CMD+80h	FW-VERSION	S/N	PROD_DATE	HW-ID	BB-VERSION	CHKS+80h	ETX
02h	F0h	C0h	0Dh	00h	93h	21h	00h EAh	27h 03h 20h 09h	01h BAh	28h	xxh	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **14** " Read ErrorCounters"

reads the error occurrence counters

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-Bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	14h	00h 00h 00h 00h 00h 00h	81h	03h

02 C0 F0 09 00 14 00 00 00 00 00 00 81 03

positive response from Bisi

counter1=00100, counter2=00200 ....counter11=01100

STX	Dest	SRC	len–lo	len–Hi	CMD+80h	CNT1	CNT2	CNT3	CNT4	CNT5	CNT6	CNT7	CNT8	CNT9	CNT10	CNT11	CHKS+80h	ETX
02h	F0h	C0h	0Dh	00h	94h	00h 64h	00h C8h	01h 2Ch	01h 90h	01h F4h	02h 58h	02h BCh	03h 20h	03h 84h	03h E8h	04h 4Ch	xxh	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **16** “Start/Stop Measurementt”

starts or stops cyclic sending of measurement values @100ms, broadcasting starts/stops after sending the positive response
ONOFF = 01 start, ONOFF = 00 STOP

STX	Dest	SRC	length –lo	length –Hi	CMD	ONOFF	dummy-Bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	16h	01h	00h 00h 00h 00h 00h	CCh	03h

02 C0 F0 09 00 16 01 00 00 00 00 00 CC 03
02 C0 F0 09 00 16 00 00 00 00 00 00 FB 03

positive response from Bisi

STX	Dest	SRC	length –lo	length –Hi	CMD+80h	CHKS+80h	ETX
02h	F0h	C0h	03h	00h	96h	B7h	03h

followed by the 28 measurement values every 100ms (refer description on the next page)

STX	Dest	SRC	length –lo	length –Hi	CMD+80h	1	2	3	4	5	6	7	8	9	10	11	12	13	28	CHKS-dummy (always FF)	ETX
02h	F0h	C0h	1Eh	00h	96h	00h	00h	00h	00h	00h	00h	00h	00h	00h	00h	00h	00h	....	00h	FFh	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

description of 28 measurement values

01:	R4	--> display as decimal value w/o physical unit		
02:	R5	”		
03:	R6	”		
04:	RMS L1	”		
05:	RMS L2	”		
06:	RMS L3	”		
07:	L1-L2	“	phys. = hex x2	range: 0...512V
08:	L2-L3	“	phys. = hex x2	range: 0...512V
09:	L3-L1	“	phys. = hex x2	range: 0...512V
10:	filter L1pos.	”	phys. = (hex + 20)	range: 0...500V
11:	frequency Hi-byte	--> display as frequency value with 4 decimal points:	phys. = hex/200	range: 0...300Hz
12:	frequency Lo-byte	“		
13:	battery voltage	--> display as voltage value in Volts with 3 decimal points:	phys.= hex*5000/256	range: 0...5V
14:	poti-voltage	--> display as voltage value in Volts with 2 decimal points:	phys.= hex*5000/256	range: 0...5V
15:	ADC-Reference	--> display as voltage value in Volts with 3 decimal points:	phys.= hex*5000/256	range: 0...5V
16:	status byte	--> display as decimal value w/o physical unit	phys. = hex	range: 0 ...23
17:	RTC-hour	display as hour	phys. = hex	range: 0 ...24
18:	RTC-minute	display as minute	phys. = hex	range: 0 ...60
19:	Fehler aktuell	--> display as hex value w/o physical unit	phys. = hex	range: 0...255
20:	Filt 1min	--> display as decimal value w/o physical unit	phys. = (hex + 20)	range: 0...500V
21:	R1	--> display as decimal value w/o physical unit	phys. = hex	range: 0...255
22:	R2	--> display as decimal value w/o physical unit	phys. = hex	range: 0...255
23:	Quarz Hi	Hi-byte --> display as decimal value w/o physical unit		range: 0 ... 65000
24:	Quarz Lo	Lo-byte "		
25:	Variante	--> display as decimal value w/o physical unit		range: 0...99
26:	Hour OFF	display as hour	phys. = hex	range: 0 ...24
27:	Hour ON	display as hour	phys. = hex	range: 0 ...24
28:	R3	display as decimal value w/o physical unit	phys. = hex	range: 0...255

Bisi-command **17** “Clear ErrorCounters”

clears all error counters and after send a positive response

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-Bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	17h	00h 00h 00h 00h 00h 00h	C6h	03h

02 C0 F0 09 00 17 00 00 00 00 00 00 C6 03

positive response from Bisi

STX	Dest	SRC	length –lo	length –Hi	CMD+80h	CHKS+80h	ETX
02h	F0h	C0h	03h	00h	97h	E9h	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **19** “ForceRecovery”

as long as the command is receiverd every 1s the recovery time is reduced to <2 seconds. The PC shall send this command @~1000ms once the broadcast has started. In case of active broadcast it shall be sent 50ms after the broadcast values are received.

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	19h	00h 00h 00h 00h 00h 00h	B9h	03h

02 C0 F0 09 00 19 00 00 00 00 00 00 B9 03

positive response from Bisi

STX	Dest	SRC	length –lo	length –Hi	CMD+80h	CHKS+80h	ETX
02h	F0h	C0h	03h	00h	99h	F6h	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **1A** "RESET"

once this command is received, the Bisi sends the positive response and performs a RESET

STX	Dest	SRC	length –lo	length –Hi	CMD	"RESET"	dummy-byte	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	1Ah	52h 45h 53h 45h 54h	00h	9Dh	03h

02 C0 F0 09 00 1a 52 45 53 45 54 00 9D 03

positive response from Bisi

STX	Dest	SRC	length –lo	length –Hi	CMD+80h	CHKS+80h	ETX
02h	F0h	C0h	03h	00h	9Ah	94h	03h

negative response1 from Bisi

STX	DST	SRC	length –lo	length –Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **1C** “ReadErrorEnvironments”

once this command is received, the Bisi sends the stored error environments for the last error occurrence:

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	1Ch	00h 00h 00h 00h 00h 00h	F0h	03h

02 C0 F0 09 00 1C 00 00 00 00 00 00 F0 03

positive response from Bisi (1.18)

environment E11: 400, E12: 245, E13: 246 *phase-difference (displayed with factor *2)*
environment E21: 14500 *frequency*
environment E31: 180, E32: 182, E33: 188 *avgx*
environment E41: 210, E42:230, E43:232 *RMSx*
environment E51: 120 *ADC*
environment E61: 220, E62: 223 *FB1, FB2*
environment E71: 41200 *TB*
environment E81: 380 *L1-RMS (displayed with factor *2)*
environment E91: 50 *L2-RMS with offset*
environment E101: 50, E102:200, E103:500 *L1L2RMS, L2L3RMS, L3L1RMS (displayed with factor *2)*
environment E111: 50 *reserved*

STX	Dest	SRC	len–lo	len–Hi	CMD+80h	E11	E12	E13	E21	E31	E32	E33	E41	E42	E43	E51	E61	E62
02h	F0h	C0h	15h	00h	9Ch	C8h	7Ah	7Bh	38h	A4h	B4h	B6h	BCh	D2h	E6h	E8h	78h	DCh	DFh

E71	E81	E91	E101	E102	E103	E111	CHKS+80h	ETX
A0h F0h	BEh	32h	19h	64h	FAh	32h	xxh	03h

negative response1 from Bisi

STX	DST	SRC	length–lo	length–Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **1E** "ReadLastErrors"

once this command is received, the Bisi sends the 5 last stored errors with date and time.

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	1Eh	00h 00h 00h 00h 00h 00h	8Ah	03h

02 c0 f0 09 00 1e 00 00 00 00 00 00 8a 03

positive response from Bisi (1.19)

error number 4, date, 16.08.11, time: 22:16 Uhr
error number 2, date, 16.08.11, time: 22:09 Uhr
error number 1, date, 16.08.11, time: 22:09 Uhr
error number 3, date, 16.08.11, time: 22:09 Uhr
error number 10, date, 16.08.11, time: 20:24 Uhr

If the "Valid" byte is 0xee then the above date and time stamp are correct. Any value other than 0xee represents either no fault is stored OR last storage is not successful. Then the PC software must always display the values only if the "Valid" byte is 0xee.

STX	Dest	SRC	len–lo	len–Hi	CMD+80h	en1	D1	M1	Y1	H1	m1	en2	D2	M2	Y2	H2	m2	en3	D3	M3	Y3	H3	m3	en4	D4	M4	Y4	H4	m4
en5	D5	M5	Y5	H5	m5	Valid	CHKS+80h	ETX																					

02 f0 c0 26 00 9e 04 10 08 0b 16 10 02 10 08 0b 16 09 01 10 08 0b 16 09 03 10 08 0b 16 09 0a 10 08 0b 14 18 ee 00 00 00 00 b2 03

Bisi-command **1F** " ReadThresholds"

Reads the currently set thresholds from BiSi. The values are are displayed in the GUI, or in the display

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-Bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	1Fh	00h 00h 00h 00h 00h 00h	B7h	03h

02 C0 F0 09 00 1F 00 00 00 00 00 00 B7 03

positive response from Bisi

UMAX=264V, UMIN=184V, DIFMAX=460V, DIFMIN=320, FMAX=51,5Hz, FMIN=47,5Hz, UAVG=253V, Treact=190ms

Ranges and conversions:

*1: UMAX 100...600V phys. =(2*hex) + 100*
*2: UMIN 100...600V phys. =(2*hex) + 100*
*3: DIFMAX 100...600V phys. =(2*hex) + 100*
*4: DIFMIN 100...600V phys. =(2*hex) + 100*
*5: FMAX: 40...80Hz phys. = 4000000 / (4,3402777777 * hex)*
*6: FMIN: 40...80Hz phys. = 4000000 / (4,3402777777 * hex)*
*2: UAVG: 253...264V phys. =(2*hex) + 100*
3: Treact 100 / 190ms phys. = hex+100

STX	Src	DST	len–lo	len–Hi	CMD+80h	UMAX	UMIN	DIFMAX	DIFMIN	FMAX	FMIN	UAVG	TReact	CHKS+80h	ETX
02	f0	c0	0d	00	9F	52	2A	B4	6E	45e7	4bca	4c	5A	xx	03

negative response1 from Bisi

STX	DST	SRC	leng–lo	len–Hi	resp.-code	code	CHKS+80h	ETX
02h	F0h	C0h	04h	00h	7Fh	01h	AEh	03h

Bisi-command **23** " ReadStatus"

Reads the current status from BiSi.

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-Bytes	CHKS+80h	ETX
02h	C0h	F0h	09h	00h	23h	00h 00h 00h 00h 00h 00h	A6h	03h

02 C0 F0 09 00 23 00 00 00 00 00 00 A6 03

positive response from Bisi

STATUS1: 40: Nachtabschaltung aktiv
90: externe Abschaltung
20: Testauslösung durch Prüftaste
0,2,3,4,31,32,33,41,42,51,6: Selbsttests während Hochlauf
65: 1min. Wartezeit vor erster Zuschaltung, Netz ist fehlerfrei
50, 52: Fehler aktiv
53: Wartezeit nach Fehler, Fehler ist inaktiv
10…12: Normalbetrieb

STX	DST	SRC	len–lo	len–Hi	CMD+80h	STATUS	reserved	CHKS	ETX
02h	f0h	c0h	0d	00	A3h	28h	00h 00h 00h 00h 00h 00h 00h 00h 00h 00h	xx	03

command **32** DB2 " RequestLast5BisiErrors"

*Display requests the error information periodicly (BiSi cmd **E**) @20s, 40s, 60s .... The BiSi will respond with „respond with response of „ReadLastErrors". (Cmd_E). This response needs to be evaluated from Display. The extracted information will be indicated in line 2 of the display.*

STX	Dest	SRC	length –lo	length –Hi	CMD	dummy-Bytes	CHKS+80h	ETX
02h	C0h	D0h	09h	00h	32h	00h 00h 00h 00h 00h 00h	F8h	03h

02 C0 D0 09 00 32 00 00 00 00 00 00 F8 03

response from Bisi

*same as positive response of cmd **1E** !*