RS 485 Ziehl protocol TR 800 – send data without request

Unit RS 485 Address = 0; Mode 0 will be send every 3s. no request must be send.
Unit RS 485 Address = 91; Mode 1 will be send every 3s. no request must be send.
Unit RS 485 Address = 92; Mode 2 will be send every 3s. no request must be send.
Unit RS 485 Address = 93; Mode 3 will be send every 3s. no request must be send.

RS 485 Ziehl protocol TR 800 - master requests data

Start of message	s		
	Or S		
	Or <STX> (= 0x02 Hex)	1 Byte	ASCII
Address of unit	00 .. 99	2 Byte	ASCII
Command	r (read)		
	R (read)	1 Byte	ASCII
Mode *)	0 .. 9	1 Byte	ASCII
Block check (BCC)	EXOR of all transmitted bytes	3 Byte	ASCII
Carriage Return (CR)	<CR>	1 Byte	
Line Feed (LF)	<LF>	1 Byte	
	Sum:	10 Byte	
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0 = protocol compatible with TR 600 -> ASCII-data
1 = TR 800 (data and alarm) -> ASCII-data
2 = TR 800 (data and alarm) -> binary data
3 = TR 800 (configuration) -> binary data

Timeout = 2s. If within 2s no character is received, the internal receive buffer is deleted.

RS 485 Ziehl protocol TR 800 – answer mode 0 (compatible with TR 600)

Only 6 sensors und 4 alarms are transmitted.

Start of message	s S <STX> (= 0x02 Hex)	(= Start of message from request) 1 Byte ASCII
Name of unit	TR600	5 Byte ASCII (+ 1 Byte Delimiter ";")
Address of unit	00 .. 99	2 Byte ASCII (+ 1 Byte Delimiter ";")
Mode	0	1 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 1	*)	4 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 2	*)	4 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 3	*)	4 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 4	*)	4 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 5	*)	4 Byte ASCII (+ 1 Byte Delimiter ";")

Current value sensor 6	*)	4 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 1	0 .. 1	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 2	0 .. 1	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 3	0 .. 1	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 4	0 .. 1	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 5 no function	0	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 6 no function	0	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Alarm 7 at error	= Alarm 4 (0 .. 1)	1 Byte	ASCII (+ 1 Byte Delimiter ";")
Error code	00 .. 99	2 Byte	ASCII (+ 1 Byte Delimiter ";")
Block check	EXOR of all transmitted bytes	3 Byte	
Carriage Return (CR)	<CR>	1 Byte	
Line Feed (LF)	<LF>	1 Byte	
			= 64 Byte

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Sensor nc:	+980
Sensor short-circuit:	-999
Sensor break:	+999
<u>temperature sensor*2)</u>	
range (thermocouple):	-199 .. +950
<u>Current input *3)</u>	
range:	+000 .. +240
<u>Voltage input *3)</u>	
range:	+000 .. +120
<u>Resistor input *3)</u>	
range:	+000 .. +500 +000 .. +300
<u>Sensor scaling *3)</u>	
range:	-998 .. +950
<u>difference sensor *3)</u>	
range:	-998 .. +950

*2) depending on sensor type
*3) output without decimal point

RS 485 Ziehl protocol TR 800 - answer mode 1

Start of message	s S <STX> (= 0x02 Hex)	(= Start of message from request) 1 Byte ASCII
Name of unit	TR800	5 Byte ASCII (+ 1 Byte Delimiter ";")
Address of unit	00 .. 99	2 Byte ASCII (+ 1 Byte Delimiter ";")
Mode	1	1 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 1	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 2	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 3	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 4	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 5	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 6	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 7	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Current value sensor 8	*)	7 Byte ASCII (+ 1 Byte Delimiter ";")
Alarm 1	0 .. 1	1 Byte ASCII (+ 1 Byte Delimiter ";")
Alarm 2	0 .. 1	1 Byte ASCII (+ 1 Byte Delimiter ";")
Alarm 3	0 .. 1	1 Byte ASCII (+ 1 Byte Delimiter ";")
Alarm 4	0 .. 1	1 Byte ASCII (+ 1 Byte Delimiter ";")
Error code	00 .. 99	2 Byte ASCII (+ 1 Byte Delimiter ";")
Block check Carriage Return (CR)	EXOR of all transmitted bytes <CR>	3 Byte 1 Byte
Line Feed (LF)	<LF>	1 Byte
		= 92 Byte

Current value sensor ***)**

Sensor short-circuit:	+32767
Sensor break:	+32766
Thermocouple poled wrong:	+32765
Overflow:	+32750
Underflow:	+32749
Sensor nc:	+32748
<u>temperature sensor</u>	
range (°C):	−0270.0 .. +1800.0
range (°F):	−000454 .. +003272
<u>Current input</u>	
range:	+000.00 .. +024.00
<u>Voltage input</u>	
range:	+000.00 .. +012.00
<u>Resistor input</u>	
range:	+0000.0 .. +0500.0 +00.000 .. +30.000
<u>Sensor scaling</u>	
range:	−01.999 .. +09.999 −019.99 .. +099.99 −0199.9 .. +0999.9 −001999 .. +009999

RS 485 Ziehl protocol TR 800 - answer mode 2

Start of message	s S <STX>	(= Start of message from request) 1 Byte		(ASCII) (ASCII) = 0x02 Hex
Name of unit	TR800	5 Byte	(+ 1 Byte Delimiter ";")	(ASCII)
Address of unit	00 .. 99	2 Byte	(+ 1 Byte Delimiter ";")	(ASCII)
Mode	2	1 Byte	(+ 1 Byte Delimiter ";")	(ASCII)
Number of the next data bytes (without block check)	28	2 Byte	Unsigned Int16	low / high Byte
Current value sensor 1 Decimal point Sensor 1		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 2 Decimal point Sensor 2		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 3 Decimal point Sensor 3		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 4 Decimal point Sensor 4		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 5 Decimal point Sensor 5		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 6 Decimal point Sensor 6		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 7 Decimal point Sensor 7		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Current value sensor 8 Decimal point Sensor 8		2 Byte 1 Byte	Signed Int16 Unsigned Char	low / high Byte
Alarm status		1 Byte	Unsigned Char	
Alarm from sensor		2 Byte	Unsigned Char	low / high Byte
Error code		1 Byte	Unsigned Char	
Block check	CRC16	2 Byte	Unsigned Int16	low / high Byte

CRC16 Modbus (Polynomial 0xA001) 44 Byte

Current value sensor:

Sensor short-circuit:	32767 (0x7FFF Hex)	
Sensor break:	32766 (0x7FFE Hex)	
Thermocouple poled wrong:	32765 (0x7FFD Hex)	
Overflow:	32750 (0x7FEE Hex)	
Underflow:	32749 (0x7FED Hex)	
Sensor nc:	32748 (0x7FEC Hex)	
temperature sensor		
range (°C):	-2700 .. 18000	0xF574 .. 0x4560
range (°F):	-454 .. 3272	0xFE3A .. 0x0CC8
Current input		
range:	0 .. 2400	0x000 .. 0x0960
Voltage input		
range:	0 .. 1200	0x000 .. 0x04B0

Resistor input		
range:	0 .. 5000	0x000 .. 0x1388
	0 .. 30000	0x000 .. 0x7530
Sensor scaling		
range:	-1999 .. 9999	0xF831 .. 0x270F

Decimal point:	xxxx	0
	xxx.x	1
	xx.xx	2
	x.xxx	3

Alarm status:	Alarm 1	bit 0	= 1 if Alarm
	Alarm 2	bit 1	= 1 if Alarm
	Alarm 3	bit 2	= 1 if Alarm
	Alarm 4	bit 3	= 1 if Alarm

Alarm from sensor:	Senor 1	bit 0	= 1 if the sensor triggers an alarm
	Senor 2	bit 1	
	Senor 3	bit 2	
	Senor 4	bit 3	
	Senor 5	bit 4	
	Senor 6	bit 5	
	Senor 7	bit 6	
	Senor 8	bit 7	

RS 485 Ziehl Protocol TR 800 - answer Mode 3

Start of message	s S <STX>	(= Start of message from request) 1 Byte		(ASCII) (ASCII) = 0x02 Hex
Name of unit	TR800	5 Byte	(+ 1 Byte Delimiter ";")	(ASCII)
Address of unit	00 .. 99	2 Byte	(+ 1 Byte Delimiter ";")	(ASCII)
Mode	3	1 Byte	(+ 1 Byte Delimiter ";")	(ASCII)
Number of the next data bytes (without block check)	560 (0x0230 Hex)	2 Byte	Unsigned Int16	low / high Byte
Sensor Type	Sensor 1	2 Byte	Unsigned Int16	low / high Byte
Wire compensation	Sensor 1	2 Byte	Signed Int16	low / high Byte
Unit	Sensor 1	2 Byte	Signed Int16	low / high Byte
Scaling active	Sensor 1	2 Byte	Unsigned Int16	low / high Byte
Scaling zero point	Sensor 1	2 Byte	Signed Int16	low / high Byte
Scaling full-scale	Sensor 1	2 Byte	Signed Int16	low / high Byte
Scaling decimal point	Sensor 1	2 Byte	Unsigned Int16	low / high Byte
Alarm 1 active	Sensor 1 - Alarm1	2 Byte	Unsigned Int16	low / high Byte
Value - Alarm 1 ON	Sensor 1 - Alarm1	2 Byte	Signed Int16	low / high Byte
Value - Alarm 1 OFF	Sensor 1 - Alarm1	2 Byte	Signed Int16	low / high Byte
Value - Alarm 1 ON (Night)	Sensor 1 - Alarm1	2 Byte	Signed Int16	low / high Byte
Value - Alarm 1 OFF (Night)	Sensor 1 - Alarm1	2 Byte	Signed Int16	low / high Byte
Alarm 2 active	Sensor 1 - Alarm2	2 Byte	Unsigned Int16	low / high Byte
Value - Alarm 2 ON	Sensor 1 - Alarm2	2 Byte	Signed Int16	low / high Byte
Value - Alarm 2 OFF	Sensor 1 - Alarm2	2 Byte	Signed Int16	low / high Byte
Value - Alarm 2 ON (Night)	Sensor 1 - Alarm2	2 Byte	Signed Int16	low / high Byte
Value - Alarm 2 OFF (Night)	Sensor 1 - Alarm2	2 Byte	Signed Int16	low / high Byte
Alarm 3 active	Sensor 1 - Alarm3	2 Byte	Unsigned Int16	low / high Byte
Value - Alarm 3 ON	Sensor 1 - Alarm3	2 Byte	Signed Int16	low / high Byte
Value - Alarm 3 OFF	Sensor 1 - Alarm3	2 Byte	Signed Int16	low / high Byte
Value - Alarm 3 ON (Night)	Sensor 1 - Alarm3	2 Byte	Signed Int16	low / high Byte
Value - Alarm 3 OFF (Night)	Sensor 1 - Alarm3	2 Byte	Signed Int16	low / high Byte
Alarm 4 active	Sensor 1 - Alarm4	2 Byte	Unsigned Int16	low / high Byte
Value - Alarm 4 ON	Sensor 1 - Alarm4	2 Byte	Signed Int16	low / high Byte
Value - Alarm 4 OFF	Sensor 1 - Alarm4	2 Byte	Signed Int16	low / high Byte
Value - Alarm 4 ON (Night)	Sensor 1 - Alarm4	2 Byte	Signed Int16	low / high Byte
Value - Alarm 4 OFF (Night)	Sensor 1 - Alarm4	2 Byte	Signed Int16	low / high Byte
	:			
	Sensor 2	54 Byte		
	Sensor 3	54 Byte		
	Sensor 4	54 Byte		
	Sensor 5	54 Byte		
	Sensor 6	54 Byte		
	Sensor 7	54 Byte		
	Sensor 8	54 Byte		
delay Alarm on	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
delay Alarm off	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
alarm on error	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
alarm locked	Alarm 1	2 Byte	Unsigned Int16	low / high Byte

relay on alarm	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
	:			
	Alarm 2	10 Byte		
	Alarm 3	10 Byte		
	Alarm 4	10 Byte		
Data (scaled value)	Sensor 1	2 Byte	Signed Int16	low / high Byte
Data (not scaled value)	Sensor 1	2 Byte	Signed Int16	low / high Byte
Sensor error	Sensor 1	2 Byte	Unsigned Int16	low / high Byte
	:			
	Sensor 2	6 Byte		
	Sensor 3	6 Byte		
	Sensor 4	6 Byte		
	Sensor 5	6 Byte		
	Sensor 6	6 Byte		
	Sensor 7	6 Byte		
	Sensor 8	6 Byte		
simulated sensor		2 Byte	Unsigned Int16	low / high Byte
Status alarm	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
Status delay alarm on	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
Status delay alarm off	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
Status locked alarm	Alarm 1	2 Byte	Unsigned Int16	low / high Byte
	:			
	Alarm 2	8 Byte		
	Alarm 3	8 Byte		
	Alarm 4	8 Byte		
Status relays		2 Byte	Unsigned Int16	low / high Byte
Error code		2 Byte	Unsigned Int16	low / high Byte
Data- counter		2 Byte	Unsigned Int16	low / high Byte
Block check	CRC16	2 Byte	Unsigned Int16	low / high Byte
CRC16 Modbus (Polynomial 0xA001)				

573 Byte
\+ 3 Byte (Delimiter)
576 Byte

Values of the register

Sensor Type	
Value	meaning
0	nc
1	Pt 100
2	Pt 1000
3	KTY 83
4	KTY 84
5	Thermocouple B
6	Thermocouple E
7	Thermocouple J
8	Thermocouple K
9	Thermocouple L
10	Thermocouple N
11	Thermocouple R
12	Thermocouple S
13	Thermocouple T
14	Voltage 0 .. 10V
15	Current 0 .. 20mA
16	Current 4 .. 20mA
17	Resistor 500 Ohm
18	Resistor 30 kOhm
19	Difference of two inputs

Wire compensation	
Value	meaning
-1	3-wire
0	0 Ohm
1	0,1 Ohm
:	:
1000	100,0 Ohm

Unit	
Value	meaning
0	°C
1	°F
2	V
3	mA
4	Ohm
5	kOhm
6	%
7	User

Scaling on	
Value	meaning
0	inactive
1	active

Scaling zero point Scaling full-scale	
Value	meaning
-1999 : 9999	

Scaling Decimal point	
Value	meaning
0	xxxx
1	xxx.x
2	xx.xx
3	x.xxx

Alarm active	
Value	meaning
0	off
1	on
Alarm value -	
	Alarm x on Alarm x off Alarm x on (night) Alarm x off (night)
-9999 : 30000	

delay alarm on delay alarm off	
Value	meaning
0	[s]
:	:
9999	[s]

Alarm on error	
Value	meaning
0	off
1	on

Alarm locked	
Value	meaning
0	off
1	on

Relay on alarm	
Value	meaning
0	de-energized
1	energized

Data- Sensor 1 .. 8

Data (scaled value) Data (not scaled value)	
Value	meaning
-9999 : 30000	
32767	Sensor short-circuit:
32766	Sensor break:
32765	Thermocouple poled wrong:
32750	Overflow:
32749	Underflow:
32748	Sensor nc:

Sensor error	
Value	meaning
0	OK
1	Sensor short-circuit
2	Sensor break:
3	
4	Thermocouple connected wrong:

Sensor Simulation

Simulated sensor	
Value	meaning
bit 0 : bit 7	Sensor 1 : Sensor 8

Status

Status alarm on Status delay alarm on Status delay alarm off Status locked alarm	
Value	meaning
0	off
bit0	Alarm Sensor 1
bit1	Alarm Sensor 2
bit2	Alarm Sensor 3
bit3	Alarm Sensor 4
bit4	Alarm Sensor 5
bit5	Alarm Sensor 6
bit6	Alarm Sensor 7
bit7	Alarm Sensor 8
bit8	Device error

Other

Status relays	
Value	meaning
bit 0 : bit 3	Relays K1 Relays K4

Data- counter	
Value	meaning
0 : 65535	is incremented at each measurement

Error code	
Value	meaning
0	No error
bit 0	AD-error (Er 8)
bit 1	Internal communication error (Er 5)
bit 2	Internal communication error (Er 6)
bit 3	EEPROM error (Er 9)