Thank you for choosing a NIVELCO instrument.
We are sure that you will be satisfied throughout its use

NIVOSONAR

RS 485 Interface for SM-300 Remote Control Unit

USER'S MANUAL

3d edition

Manufacturer:
Nivelco Process Control Co. Ltd.
H-1043 Budapest, Dugonics u. 11.
Phone: (36-1) 369-7575 Fax: (36-1) 369-8585-
E-mail: sales@nivelco.hu http://www.nivelco.hu

TABLE OF CONTENTS

1. INTRODUCTION

The **NIVOSONAR RS 485 Interface** designed for Remote Control Unit to provide it with standard serial data communications facility.

2. TECHNICAL DATA AND ACCESSORIES

2.1. TECHNICAL DATA

		Standard	Explosion proof (Ex)
Baud rate (selectable on SM-300 Remote Control unit)		1200 to 19200 Baud	200 to 119200 Baud
Input resistance (JP1 open)		12 kΩ	12 kΩ
Resistance of built-in termination		120 Ω	120 Ω
Max. load of built-in termination		0.9W	0.9W
Input current (at reception)	U_{IN}=12V U_{IN}=-7V	max. 1mA max. -0.8mA	max. 1mA max. -0.8mA
Input transient protection		0.6kW/1ms	0.6kW/1ms
Input overload protection		PTC	Fuse
Input overload protection parameters		switch-on current: 200mA breakdown voltage: 60V	switch-on current: 250mA breakdown voltage: 250V
DC isolation		opto-isolator	opto-coupler (Ex version)

2.2. Accessories

1 x Plug-in type 3-pole terminal strip
1 x Jumper
1 x User's Manual

3. OPERATION

3.1. Electric Design

The **NIVOSONAR RS 485 Interface** provides the Remote Control Unit with serial data communications facility in compliance with the RS485 standard specifying balanced output.

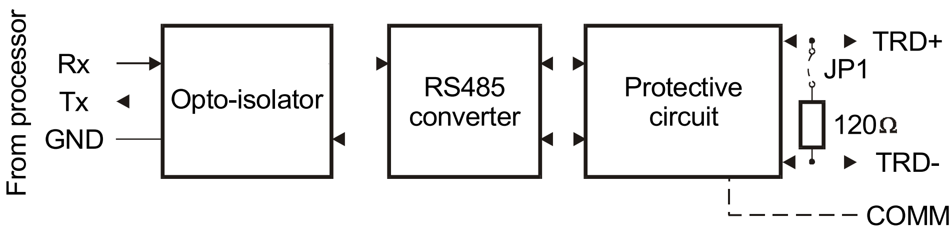

*Figure 1. Block scheme of **RS 485 Interface***

The RS 485 Interface converts the TTL levelled, unbalanced (full duplex serial) signals of the Remote Control Unit to symmetrical, balanced standard RS485 (half duplex) signals.
The RS 485 Interface ensures galvanic separation by using opto-isolators.
The "TRD + " and "TRD - " lines can be terminated, at the Interface's output, by inserting a 120 ohm terminating resistor with the JP1 jumper.

3.2. Interconnecting of Remote Control Units with RS485 Interface

The RS485 Interface allows the Remote Control Unit(s) to be used in a data collecting network. With this solution, a very simple and low cost two-wire twisted pair networks can be established. When installing the network, the rules, generally adopted in network installation, should be complied with.

3.3. Network installation practices

It is a major rule that, the transmission line should be terminated at both ends (at the farthest points) by resistors. It is important to keep in mind that it is the transmission line and not the Remote Control Unit that needs to be terminated. The resistance value of the terminating resistor depends on the characteristic impedance of the wire used. For the most commonly used twisted wire-pair, terminating resistors of about 100 ohm are recommended. In this Interface, a 120 ohm termination is provided, by jumper JP1 which can be used or ignored.

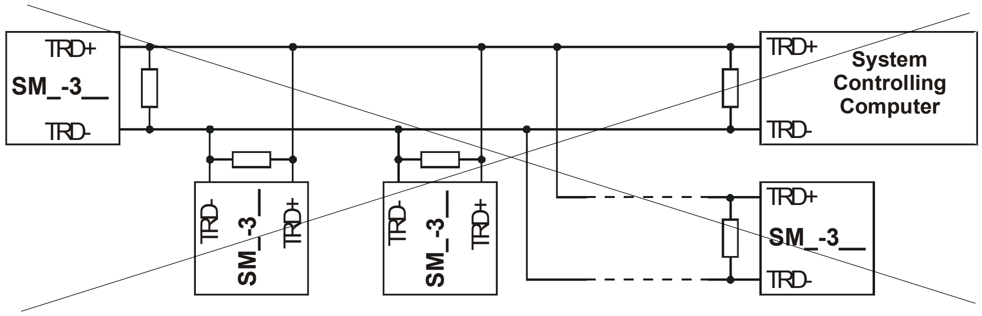

Figure 2. Example of a wrong network configuration

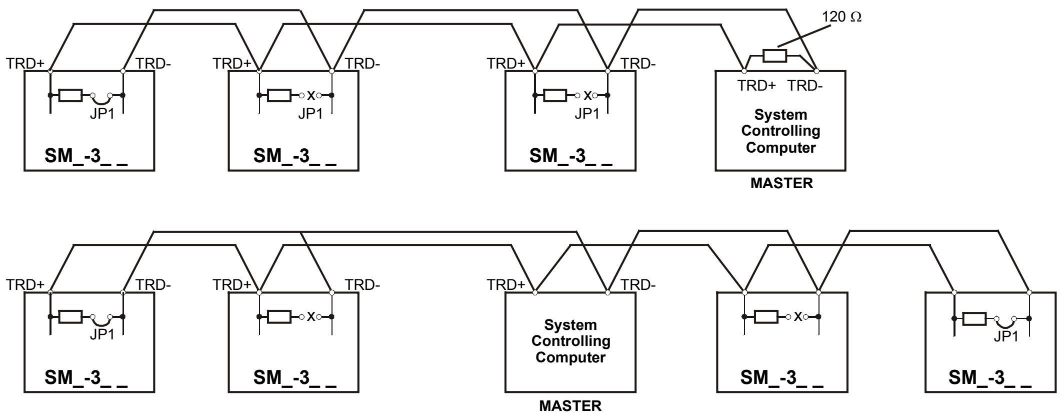

Figure 3. Examples of a proper network configuration

Another important condition is that, only one transmission line should be seen by each Remote Control Unit. Any configuration where the line is overloaded by more than two terminating resistor being present, or where the terminations are not at the farthest points is wrong. In such cases, communication interference may occur if the communication path is too long.

It is recommended to cascade the Remote Control Units in order to ensure that each Remote Control Unit sees only one transmission line (Figure 3.). Configurations using star topology should be avoided.

3.4. Circumstances that may limit the applicability

There are some applications involving industrial environment with considerable electromagnetic interference, where the signals may need to be transmitted to large distances. In such cases the Interface internal protection provided against transient surges or overloads may prove inefficient. At the input and output of the interface, any type of protection (such as lightning or transient surges) can be applied that do not interfere with the communication process, i. e. protection measures leaving the transfer bandwidth unaffected and having no effects whatever in the -7 V to +12 V voltage range (in relation to the terminal labelled COMMON). Where large transmission paths are involved, the use of shielded wires is recommended. The shielding should be connected to the galvanically isolated COMMON terminal of Interface. The principle of cascaded wiring applies to the COMMON „line" (shielding) as well, and it should be connected (and exlusively) to the protective grounding of the System Controlling Computer. The total theoretical length for the transmission line is 1000 m. This value can only be achieved if the network is properly terminated and wired.

3.5. Application examples

The following units can be installed in a "network":

- Any SMM-300 Remote Control Unit
- SMM-300 Remote Control Unit with SLM-308 Scanner
- System Controlling Computer.

In Figure 4, a typical configuration is shown consisting of a Remote Control Unit + Scanner combination, three Remote Control Units and a System Controlling Computer.

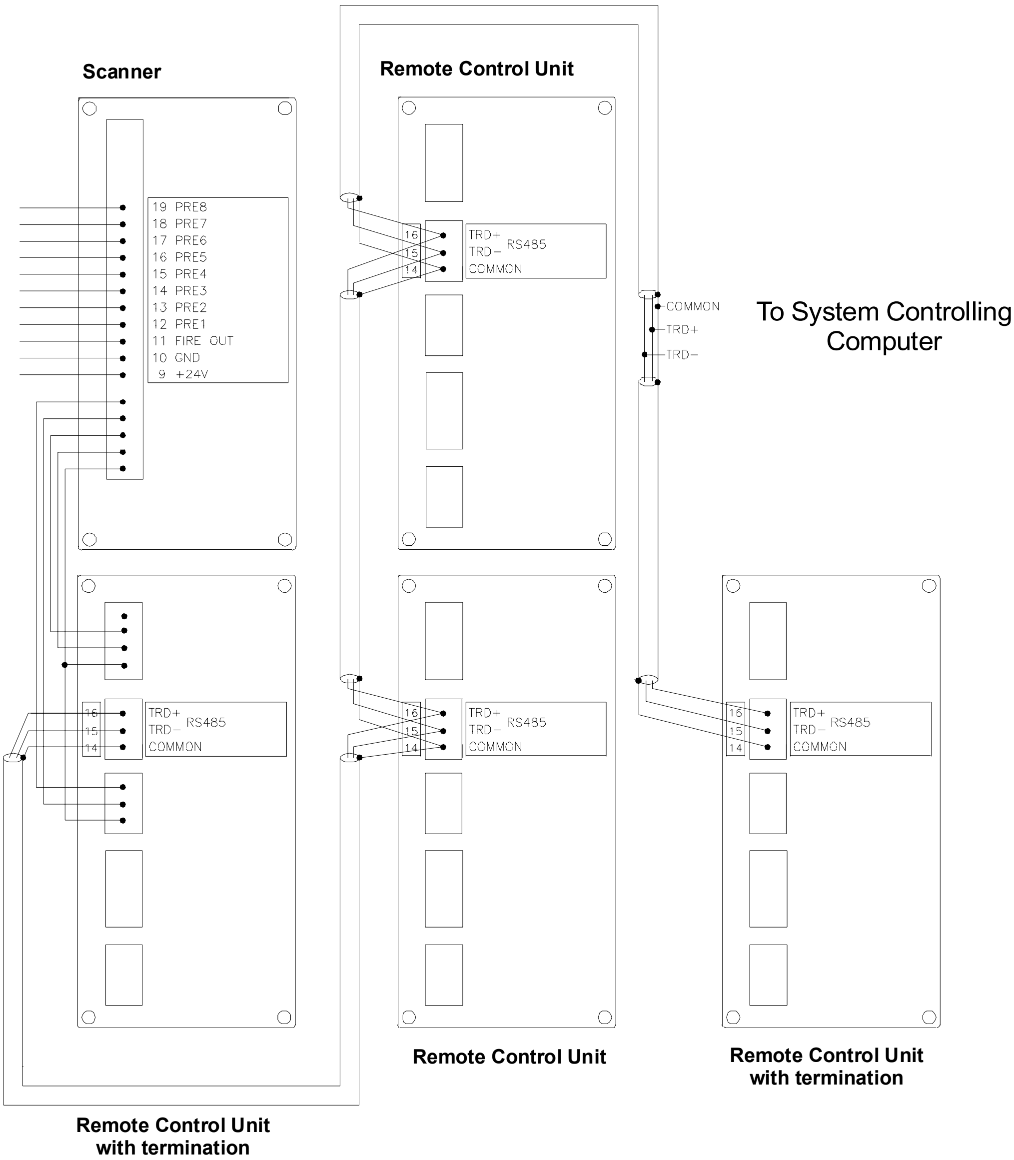

Figure 4. A typical configuration

Note: Prior to installation of the Remote Control Unit, the JP1 jumper should be set (for the termination) in accordance with the required purpose.

4. MECHANICAL DESIGN

Encapsulated in synthetic resin in a synthetic case, the interface constitutes an integral part of the Remote Control Unit models SM_-33_, SM_-34_, SM_-37_ and SM_-38_. The location of the RS 485 Interface is shown in Figure 5a. and 5b. Jumper JP1 provides terminating resistor for the data communications line.
To access the Jumper JP1 on the main PCB of Remote Control Unit, the device must be dismantled in the following way:

- Unscrew the two fixing screws at the rear side of the housing.
- Open the front of the housing up by forcing-off the front-panel.
- Gently pull the entire electronic module out.

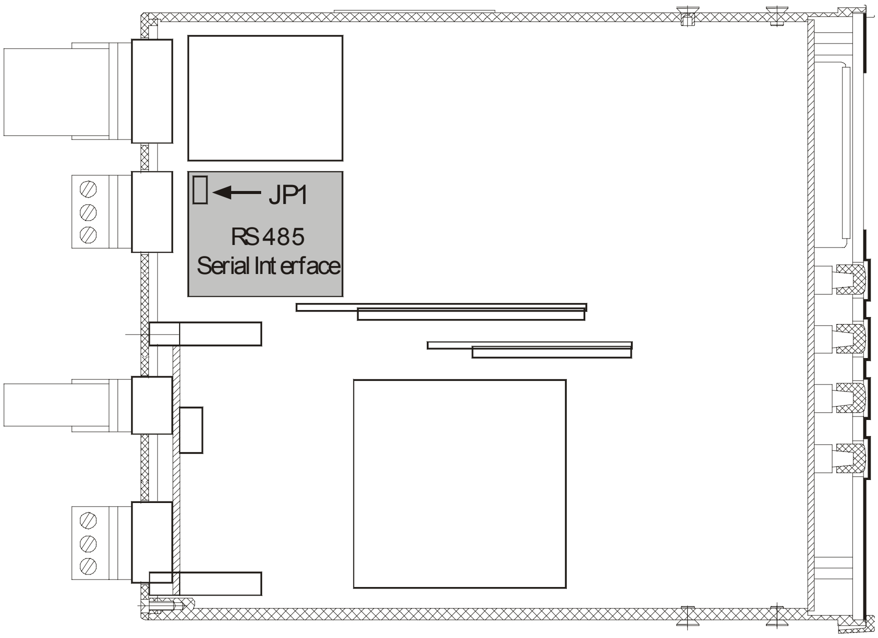

Figure 5a. The location of RS 485 Interface in RCU of the panel mounted version

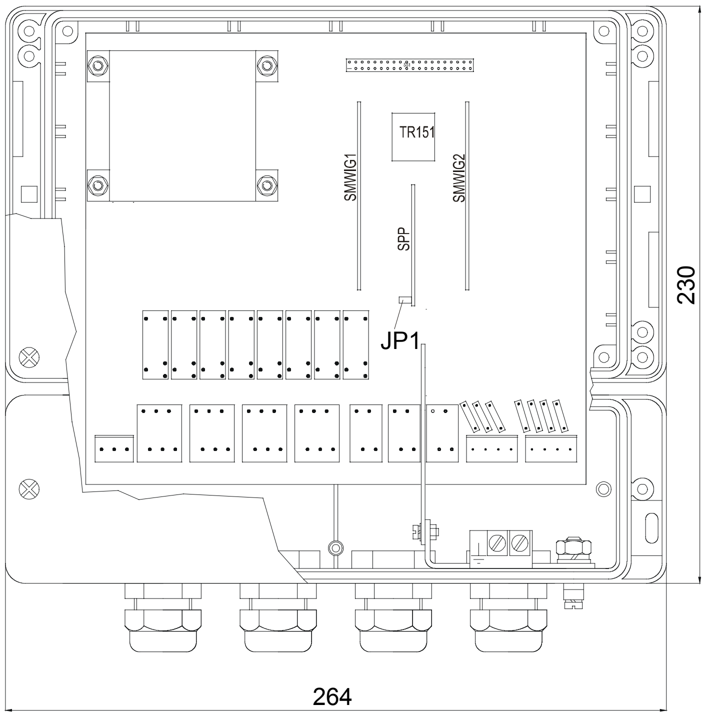

Figure 5b. The location of RS 485 Interface in RCU of the panel mounted version

5. DATA COMMUNICATION

The data communication between the Remote Control Units and the System Controlling Computer via the transmission line (network) based on the protocol described in Section 7. A network should have at least one but only one, Master Unit. Each Remote Control Unit has its own address, which can be set in the 1 and 99 range.
The System Controlling Computer uses the addresses to initiate communication with the Remote Control Units. In addition to its identification address, each Remote Control Unit has a secondary address. The latter will be used if the existing configuration contains an SLM Scanner or a dual channel “wall mounted version” of the RCU (see later in this document).

The baud rate and the structure of data package of Remote Control Unit is shown in Table below:

Baud rate	Selectable between 1200 and 19200 Baud
Data	8 bits
Stop bits	2 bits
Parity	Odd

The System Controlling Computer sends the following commands to the Remote Control Unit or receive the following responses from it (see the Table below):

Command	***Code***	**Response**	***Cod***	**Function**
Request for measurement result	***C2***	Measuring result	***F2***	Query
Load parameter	***C3***	acknowledgement	***F3***	Programming
Request for Parameter	***C6***	One parameter	***F6***	Query
Request for measurement values using SLM	***C5***	Measurement values using SLM	***F5***	Query

On each query received from the System Controlling Computer, the addressed Remote Control Unit will send a response within a certain length of time. The System Controlling Computer has to wait for the answer for a given time. If no response were received from the Remote Control Unit within this time the following should be checked for:

- The transfer (TR) line was turned off or the connection is broken
- There was a change in the Remote Control Unit’s program (RS 485 Interface was turned off)
- Due to some interference on the communication line the queried Remote Control Unit is unable to understand the command or the System Controlling Computer the reply. In such cases the command should be repeated.

All messages are checked for errors by a checksum, therefore the erroneous messages can be detected.
Programming the RS 485 Interface the following timing parameters should be taken into account.

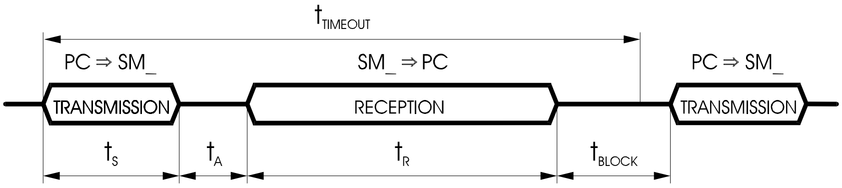

Figure 6. Timing parameters

PC= System Controlling Computer
SM= Remote Control Unit
$\mathbf{t}_S$= the length of transmission
$\mathbf{t}_A$= the processing time **(! required after each byte !)**
$\mathbf{t}_R$= the length of reception
$\mathbf{t}_{TIMEOUT}$= the total time available for the Remote Control Unit to reply
$\mathbf{t}_{BLOCK}$= the time during which the RS 485 interface is disabled and the Remote Control Unit can not receive any new message.

	t_S	t_A	t_R	t_{BLOCK}	$t_{TIMEOUT}$
Requesting a measuring result	~70 [ms]	<100 [ms]	~350 [ms]	5 [sec]	5 [sec]
Loading a parameter	~120 [ms]	<400 [ms]	~120 [ms]	5 [sec]	5 [sec]
Querying a parameter	~80 [ms]	<400 [ms]	~175 [ms]	5 [sec]	5 [sec]

After each answer, the RS 485 Interface is blocked by the Remote Control Unit for the $\mathbf{t}_{BLOCK}$ (5 sec) period. If the Remote Control Unit fails to respond to the System Controlling Computer upon the command within the $\mathbf{t}_{TIMEOUT}$ (5 sec) period, there must have been some error in the communication process. In such cases the command is repeatable.

6. PROGRAMMING

The SM-300 Remote Control Units can operate in either of the two modes:

- *Manual Mode*
- *Remote Mode (RS485)*

For operation via RS485, the Remote Control Unit must be switched over to "Remote mode”.

The Remote Control Unit automatically switches into *Remote mode* by manually entering the "network address" (a value other than 00 in the parameter P00).

In *Remote Mode* the front panel keys are disabled and the Remote Control Unit will accept no manual parameter modification, however parameters can be accessed for viewing.

P00: vxyz **Control Mode**

vx	Control Mode
00	Manual Mode
01..99	Network Address in the remote mode

Example:

*a). Value of **P00** before specifying an address for the Remote Control Unit **P00: 0001***

*b). Address of Remote Control Unit for RS485 communication: **19***

*c). New value of **P00: 1901***

P97: - - xy **Communication set-up**

x	Baud rate of RS485
y	Not used

Code	Baud rate
0	1200
1	1400
2	4800
3	9600
4	19200

P87: **RS485 test**

Go to programming mode and enter the parameter P87 (**[87] [E] [E]**).
The Remote Control Unit will send the following message to the RS485 port, each time the Display is updated:

”NIVELCO DIST= xx.xx [m]”

7. THE PROTOCOL

The carrier of information between the System Controlling Computer and the Remote Control Unit is called "telegram".
The telegram is a sequence of bytes. The telegram contains a byte indicating the message start, the Remote Control Unit address, the secondary address, bytes specific to the command or the response, a byte indicating the message end and finally, a checksum.
The checksum is at the end of the message. Its value is established from the EXCLUSIVE-OR (XOR) logical relation of all of the bytes preceding it. In the following section, the various telegram formats are described.

7.1. Data acquisition (reading out measurement data from the Remote Control Unit)

Read-out request for measurement data

Communication:

PC -> Remote Control Unit

Syntactic:

Telegram length: 7 byte

Format:

01	***A10***	***A1***	***SA***	C2	04	***CS***

A10, A1 (A10= tens, A1= ones)
Structure of Remote Control Unit address bytes (01 to 99)

MSB LSB

1	0	1	1	xxxx

xxxx= Decimal

SA
Structure of Secondary address byte:
MSB LSB

1	0	0	0	x	yyy

For SMM (not used)
x= 0
yyy= 000

For SMM working with SLM scanner
(To increase communication speed, see later: "Read out request for measurement data for all sensors")
x= 0
yyy= 000 (S1)…111 (S8)

For SMW
x= 0: Sensor 1 (S1)
x= 1: Sensor 2 (S2)
yyy= 000

CS
Checksum: XOR of bytes "01" to "04"

Sending measurement data

Communication:

Remote Control Unit -> PC

Syntactic:

Telegram length: 27 bytes

Format: MSB 6 digit value LSB

01	***A10***	***A1***	***SA***	F2	***5***	***4***	***3***	***2***	***1***	***0***

A10, A1
Same as before

SA
Same as before

543210 (5= MSB, 0= LSB)
Value of the measured level (LEV) or the overall totaliser (TOT2) according to the setting of parameter P02.

Byte structure:

MSB LSB

1	0	0	0	xxxx

xxxx= HEX 4 bit

LEV is sent in [mm] and TOT2 in [m^3], without decimal points

DISPLAY

MSB Displ. value LSB

Q	***5***	***4***	***3***	***2***	***1***	***0***	***DIM***

Q
Display mode

Byte structure:

MSB LSB

1	0	0	0	Xxxx

xxxx= 0: -
1: DIST
2: LEV
3: VOL
4: FLOW
5: TOT1
6: TOT2
7: RATE
8: DIFF LEV
9: TIME

543210 (5= MSB, 0= LSB)
Value indicated on the display.

Attention !
Since the display indication can also be changed via the front panel keys of the Remote Control Unit it is strongly recommended to program the parameter P03 for the single indication mode to prevent incorrect data transmission.
Example: P03= 2222 or P03= 0002 (if level indication is selected)

Byte structure:

MSB LSB

1	0	x	yyyyy

x: Decimal point
x= 0 no decimal point
x= 1 decimal point

yyyyy: Character of displayed value (0-1F):

0-9= 0-9	14= C
0A= -	15= h
0B= E	16= I
0C= H	17= r
0D= L	18= u
0E= P	19= t
0F= space	1A= A
10= p	1C= y
11= b	1D= J
12= d	1E= U
13= c	1F= n

DIM
Engineering unit of the displayed value
Byte structure:

MSB LSB

1	0	0	yyyyy

80= -	88= m^3	90= °F	98= ft^3/s
81= m	89= °C	91= ft	99= ft^3/s
82= l/s	8A= m/s	92= ft^3	9A= ft^3/h
83= m^3/s	8B= %	93= g (gallon)	9B= ft^3/day
84= l/h	8C= m/h	94= g/h	9C= inch
85= m^3/h	8D= s	95= g/day	9D= lb
86= l/day	8E= h	96= ft/s	
87= m^3/day	8F= t	97= ft/h	

	R8-5	R4-1						
	Ra	***Rb***	***MA***	***H3***	***H2***	***H1***	04	***CS***

Ra
Setting relays: R8-R5

Byte structure:

MSB LSB

1	0	0	0	R8	R7	R6	R5

0= relay de-energises
1= relay energises

Rb
Setting relays: R4-R1

Byte structure:

MSB LSB

1	0	0	0	R4	R3	R2	R1

0= relay de-energises
1= relay energises

MA
Address of the sensor that is presently measuring
MSB LSB

1	0	0	0	x	yyy

H3, H2, H1
Error codes (E1…E16)

H3 :	1	0	0	0	E16	..	..	E13
H2	1	0	E12	..	..	..	..	E7
H1	1	0	E6	..	..	..	..	E1

0= no error
1= error

CS
Checksum: XOR of bytes “01” to “04”

Read-out request for measurement data of all sensors

Use this request format when the SMM Remote Control Unit is working together with an SLM-308 Scanner (valid only for SMM with software versions 3. and higher.)

Communication speed will largely increase using this telegram, since all sensors will be read-out in a single step.

Communication:

PC -> Remote Control Unit

Syntactic:

Telegram length: 7 byte

Format:

01	***A10***	***A1***	***SA***	C5	04	***CS***

A10, A1
Same as before

SA
Structure of Secondary address byte
MSB LSB

1	0	0	0	x	yyy

For SMM (not used)
x=0
yyy= 000

For SMM working with SLM Scanner
Tu crease communication seed see later Read out request for measurement data for all sensors.
Note: Do out not forget to enter number of sensors (connected to the RCU) under P61!
x=0
yyy=000 (S1) … 111 (S8)

For SMW
x=0 sensors 1 (S1)
x=1 sensors 2 (S2)
yyy=000

C5
Telegram order code: read out request for measurement data of all sensors.

CS
Checksum: XOR of bytes "01" to "04"

Sending measurement data of all sensors

Communication:

Remote Control Unit -> PC

Syntactic:

Telegram length: (SA * 6)+9 bytes

DISPLAY value of the first sensor

Format: MSB 6 digit value LSB

01	***A10***	***A1***	***SA***	F5	***Q***	***DIM***	***D5***	***D4***	***D3***	***D2***	***D1***	***D0***

…bytes D5-D0 are repeated as many times as many sensors are indicated in

04	***CS***

A10, A1
Same as before

SA
Same as before

F5
Telegram code: send measurement value of all sensors

Q
Displayed value (sec 7.1)

DIM
Same as before

543210 (5= MSB, 0= LSB)
Values are indicated on the display.

Attention !
Since the display indication can also be changed by the front panel keys of the Remote Control Unit it is strongly recommended to program the parameter P03 for the single indication mode to prevent incorrect data transmission.
Example: P03= 2222 or P03= 0002 (if level indication is selected)

Byte structure:

MSB LSB

1	0	x	yyyyy

x: Decimal point
x= 0 no decimal point
x= 1 decimal point

yyyyy: Character of displayed value (0-1F):

0-9= 0-9	14= C
0A= -	15= h
0B= E	16= I
0C= H	17= r
0D= L	18= u
0E= P	19= t
0F= space	1A= A
10= p	1C= y
11= b	1D= J
12= d	1E= U
13= c	1F= n

CS
Checksum: XOR of bytes “01” to “04”

7.2. Remote programming

Sending a parameter or a command to the Remote Control Unit

Communication:

PC → Remote Control Unit

Syntactic:

Telegram length: 12 bytes

Format: MSB LSB

01	***A10***	***A1***	***SA***	C3	***PTR***	***3***	***2***	***1***	***0***	04	***CS***

A10, A1
Same as before

SA
Structure of Secondary address byte:
MSB LSB

1	0	0	0	x	yyy

For dual channel SMW
x= 0: Sensor 1 (S1)
x= 1: Sensor 2 (S2)
yyy= 000

For all other units:
x= 0
yyy= 000

PTR
Strucure of Parameter Address byte
MSB LSB

1	xxxxxxx

xxxxxxx: parameter address (HEX 7-bit)

0-99= Parameter address
100= PROG mode selection
101= MEAS mode selection
102= STEP
104= INIT

3210 (3= MSB, 0= LSB)
Strucure of Parameter value byte
MSB LSB

1	0	x	0	yyyy

x stands for the decimal point
x= 0 no decimal point
x= 1 decimal point

yyyy: Parameter value (HEX 4-bit)

CS
Checksum: XOR of bytes "01" to "04"

Acknowledgement of receiving a parameter or command

Communication:

Remote Control Unit → PC

Syntactic:

Telegram length: 9 byte

Format:

01	***A10***	***A1***	***SA***	F3	***PTR***	***ACK***	04	***CS***

A10, A1
Same as before

SA
Structure of Secondary address byte:
MSB LSB

1	0	0	0	x	yyy

For dual channel SMW
x= 0: Sensor 1 (S1)
x= 1: Sensor 2 (S2)
yyy= 000

For all other units:
x= 0
yyy= 000

F3
Telegram-code: acknowledgement of the receipt of parameter or order

PTR
Same as before

ACK
Structure of acknowledgement byte

1	0	0	0	0	0	0	x

x=0: No error

x= 1: Error (control routine of the remote control unit refuses the parameter value)

CS
Checksum: XOR of bytes "01" to "04"

Reading out a parameter from Remote Control Unit

Communication:

PC → Remote Control Unit

Syntactic:

Telegram length: 8 byte

Format:

01	***A10***	***A1***	***SA***	C6	***PTR***	04	***CS***

A10, A1
Same as before

SA
Structure of Secondary address byte:
MSB LSB

1	0	0	0	x	yyy

For dual channel SMW
x= 0: Sensor 1 (S1)
x= 1: Sensor 2 (S2)
yyy= 000

For all other units:
x= 0
yyy= 000

C6
Code of telegram: Reading out a parameter

PTR
Same as before

CS
Checksum: XOR of bytes "01" to "04"

Acknowledgement for receipt of the parameter

Communication:

Remote Control Unit → PC

Syntactic:

Telegram length: 12 byte

Format: MSB LSB

01	***A10***	***A1***	***SA***	F6	***PTR***	***3***	***2***	***1***	***0***	***DIM***	04	***CS***

A10, A1
Same as before

SA
Structure of Secondary address byte:
MSB LSB

1	0	0	0	x	yyy

For dual channel SMW
x= 0: Sensor 1 (S1)
x= 1: Sensor 2 (S2)
yyy= 000

For all other units:
x= 0
yyy= 000

F6
The telegram code: acknowledgement of sending

PTR
Same as before

3210 (3= MSB, 0= LSB)
Structure of parameter value byte
MSB LSB

1	0	x	0	yyyy

x stands for the decimal point
x= 0 no decimal point
x= 1 decimal point

yyyy: Parameter value (HEX 4-bit)

DIM
Same as before

CS
Checksum: XOR of bytes "01" to "04"

7.3. ECHOMAP data acquisition (P79)

(valid for SM-300 with software version 3.2 and higher)

<u>Request for read-out of the ECHOMAP</u>

Communication:

PC -> Remote Control Unit

Syntactic:

Telegram length: 7 byte

Format:

01	***A10***	***A1***	***SA***	C4	04	***CS***

A10, A1 (A10= tens, A1= ones)
Structure of Remote Control Unit address bytes (01 to 99)

MSB LSB

1	0	1	1	xxxx

xxxx = Decimal

SA
Structure of Secondary address byte:
MSB LSB

1	0	0	0	x	yyy

<u>For SMM working without SLM scanner</u>
x= 0
yyy = 000

<u>For SMM working with SLM scanner</u>
Serial number of the sensor
x= 0
yyy= 000 (S1)…111 (S8)

<u>For SMW</u>
x= 0: Sensor 1 (S1)
x= 1: Sensor 2 (S2)
yyy= 000

CS
Checksum: XOR of bytes "01" to "04"

Sending data of the ECHOMAP
Echoes will be sent with increasing distances.

Communication:

Remote Control Unit -> PC

Syntactic:

Telegram length: depending on the number of the echoes (NE*8)+9

NE = number of the echoes

Format:

							data of the previous echo								
							distance				amplitude				
01	***A10***	***A1***	***SA***	F4	***NE***	***DIM***	***D3***	***D2***	***D1***	***D0***	***B3***	***B2***	***B1***	***B0***	…

data of the echo #n									
distance				amplitude					
D3	***D2***	***D1***	***D0***	***B3***	***B2***	***B1***	***B0***	04	***CS***

A10, A1
Same as before

SA
Same as before

NE
Number of the echoes (0-20)

DIM
Measurement unit of the echo distance

MSB			LSB
1	0	0	yyyyy

yyyyy = 0 0001 m
1 0001 ft
1 1100 inch

D3…D0 (D3=MSB, D0=LSB)
Distance of the echo.

MSB				LSB
1	0	x	0	yyyy

yyyy = 0…9
x = 0 no decimal point
x = 1 decimal point

B3…B0 (B3=MSB, B0=LSB)
Amplitude of the distance

MSB				LSB
1	0	0	0	yyyy

yyyy = 0…9

CS
Checksum: XOR of bytes “01” to “04”

Example:
Request for sending data of sensor #4 (connected to the PRE 4) by using scanner SLM. Address of the model: 21 (P00=210x)

01	***A10***	***A1***	***SA***	C4	04	***CS***

01	B2	B1	83	C4	04	41

HEX code of the 7 byte

01	***A10***	***A1***	***SA***	F4	***NE***	***DIM***	***D3***	***D2***	***D1***	***D0***	***B3***	***B2***	***B1***	***B0***	01	***CS***

					NE=1	m	**1**	**3.**	**8**	**2**	**0**	**0**	**9**	**1**		
01	B2	B1	83	F4	81	81	81	A3	88	82	80	80	89	81	04	51

HEX code of the 17 byte received as an answer

Serial number of the echo 1
Distance of the echo: 13.82 m
Amplitude of the echo: 91

RS485 program example

1. *Modifying a parameter*

Situation: - SMM-300 with SLM-308 scanner
- Address of Remote Control Unit: A=1

Modify P13 to P13=18.5m

Telegram to be sent out (PC⇒ SMM):

01	A10	A1	SA	C3	PTR	Data3	Data2	Data1	Data0	04	CS
01	B0	B1	80	C3	8D	80	81	A8	85	04	E6

bytes sent out in HEX code

0 1 8 5 → **18,5**

If the Remote Control Unit has received the data, the PROG LED will flash and the following telegram will be sent back (PC ⇐ SMM):

01	A10	A1	SA	F3	PTR	ACK	04	CS
01	B0	B1	80	F3	8D	80	04	7A

bytes sent out in HEX code

means: no error

If P01=6 (sensor is S…-320),
which means P13 can be 18.5m,
In case of sensor model S_ _-34_
(P01=3 representing max dist of 15m)
ACK 81 would mean error.

2. *Requesting a measurement value:*

Situation: - SMM-300 with SLM-308 scanner
- Address of Remote Control Unit: A=1
- Address of sensor: SA=3

Telegram to be sent out (PC⇒ SMM):

01	A10	A1	SA	C2	04	CS
01	B0	B1	82	C2	04	44

Reply of SMM if:
- DIST=16.5m
- R1 and R3 are energised
- R2 is de-energised
- SMM is currently measuring sensor No5

PC ⇐ SMM

01	A10	A1	SA	F2	L5	L4	L3	L2	L1	L0	DIST	D5	D4
01	B0	B1	82	F2	80	80	80	87	8D	80	81	8F	8F

DIST

L5-L0=0007D0 ami 7*256+13*16=2000 [mm] LEV=2m

D3	D2	D1	D0	DIM	R5-8	R1-4	MA	H3	H2	H1	04	CS
81	A6	85	80	81	80	85	84	80	80	80	04	5D
1	**6**	**5**	**0**	**[m]**								

16,5