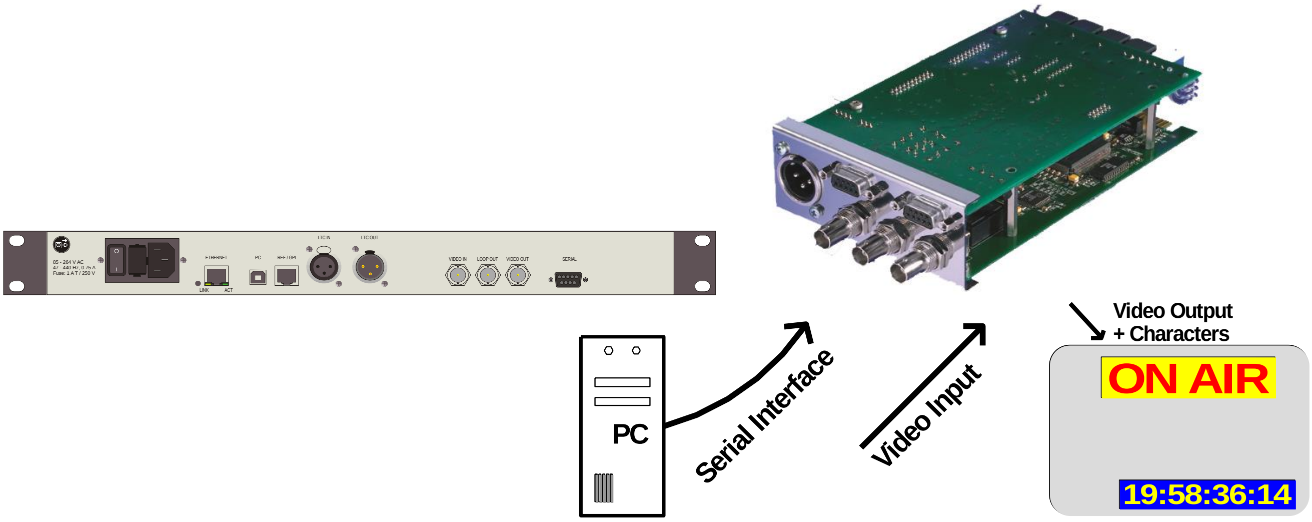
plura
TIMING SOLUTIONS

Rubidium Series
TCC70XS
Standalone Systems

Serial Remote Control

Standard Protocols



Rubidium AT / XT and TCC70XS Application Note
Appendix to “Functional Description and Specifications” for RUB AT/XT modules and “Installation & Operation Manual” for TCC70XS
Version: 4.3
February 7, 2024

CONTENTS

A1 Revision History

No.	Date	Subject
1.0	October 26, 2004	First released document.
1.1	March 10, 2005	“Mute on/off” command added.
1.2	January 11, 2006	Revised.
2.0	May 25, 2007	New document describes the standard protocols.
2.1	February 13, 2008	“Remote Control via RS485” added.
2.2	September 02, 2008	Chapter 4.2 “Connecting a TCU” added.
3.0	January 15, 2010	“TC60 Automatic” added.
3.1	December 13, 2010	New commands “Insert On” and “Insert Off”.
3.2	January 24, 2011	At chapter “Commands: Text and Time Code Inserter”: *3 corrected. New chapter “Parameter Get”.
3.3	January 27,2011	New commands at “Text and Time Code Inserter”.
3.4	May 05, 2011	Applicable to XT modules as well.
3.5	October 28, 2011	At chapter “Commands: Text and Time Code Inserter”: Added unknown video standards in *14.
3.6	May 24, 2012	Chapter “RS232 Remote Control via Computer” and chapter “RS422 Remote Control via a Controlling Device”: specification of adapter cable revised.
3.7	June 10, 2013	Hint on termination (chapter 1) added.
4.0	February 10, 2014	Applicable to TCC70XS as well.
4.1	September 30, 2019	Changed address of Plura Europe GmbH.
4.2	November 30, 2020	Re-formatted in new design.
4.3	February 7, 2024	Added TCC70XS2

The latest document describes the functions of the latest product’s software. You can download the latest software version from:

https://www.plurainc.com

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A3 General Remarks

This guide is an appendix to the manuals:

- "Functional Description and Specifications" for RUBIDIUM AT or XT modules, as well as
- "Installation & Operation Manual" for TCC70XS.

Concerning RUIBIDIUM modules: Full functionality applies to module's firmware revision **2.0.110** or higher.

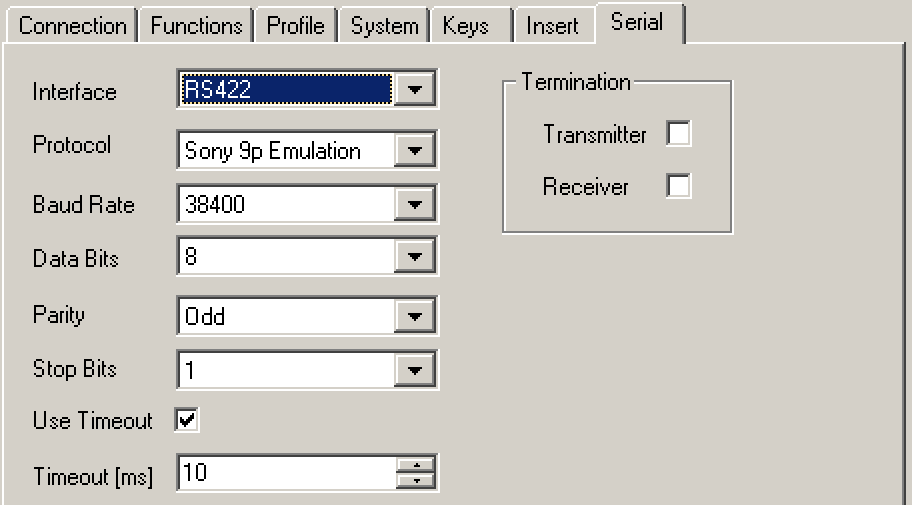
Concerning TCC70XS: TCC70XS2 needs to have option "S" installed.

1 The Serial Interface

The devices are equipped with a serial interface (I/O pins at the SERIAL connector). The electrical format could be selected according to RS232 or RS422 or RS485 standard.

The set-up of this interface is done utilizing one of the configuration tools (via USB or Browser): configuration page **Serial**.

Configuration (example shows a screen shot of the PC program tab):



Interface: RS422
Protocol: Sony 9p Emulation
Baud Rate: 38400
Data Bits: 8
Parity: Odd
Stop Bits: 1
Use Timeout: ☑
Timeout [ms]: 10

Termination
Transmitter □
Receiver □

Interface Select the electrical interface:
Off interface switched off
RS232 interface according to RS232 standard
RS422 interface according to RS422 standard
RS485 interface according to RS485 standard

Protocol Select a data protocol from the dropdown list, notice the following chapters

Baud Rate Choose the baud rate:
2 400 / 4 800 / 9 600 / 19 200 / 38 400 / 57 600 / 115 200

Data Bits *7* or *8* data bits

Parity Select the parity mode:
None without parity
Even even parity bit
Odd odd parity bit

Stop Bits *1* or *2* stop bits

Use Timeout A timeout may be used for synchronisation.

Timeout [ms] Choose a timer value for the timeout counter. Please choose a value suitable to the selected baud rate.

Termination If RS422 has been selected, transmitter and receiver lines can get a termination. If RS485 has been selected, the transmitter line can get a termination. The termination influences the data level! In case of any communication problems please check whether any change at this set-up may solve the problem.

2 The “Sony 9p” Protocol

2.1 General Description

Utilizing one of the configuration tools (via USB or Browser) this protocol can be selected: ‘Protocol = Sony 9p Emulation’.
The parameters of the serial interface may be selected according to your application, but ‘Data Bits = 8’ is essential.

Selecting this protocol, the module may be partially remote-controlled.

The module responds to commands or requests. The received or sent data string has the following structure:

Word 1	Word 2	Word 3	Word 4	…	Word n+2	Word n+3
CMD1 / DC	CMD2	DATA 1	DATA 2	…	DATA n	CHECK

CMD1 Command 1, specifies the group of commands:
0 = System control
4 = Set data
6 = Request data

DC Number of data words (Data Count), $0 - $F.

CMD2 Command 2, specifies the command within the group.

DATA 1… Data words, number as specified by DC.

CHECK hexadecimal sum of words 1 to n+2 without carry.

- A transmitted data string must be coherent, i.e. the time gap between individual words shall not exceed >10 ms.
- A new command should only be transmitted if the return of the preceding command has been received.
- **Please note**: unlike for operation with one of the configuration tools, changes of the set-up can be executed most frequently using serial interface commands. Basically, changes of the set-up will be stored non-volatile. This applies even for a text input. Erase/write cycles are limited, so care should be taken not to exceed this limit. In case of a permanent serial communication it is recommended to send the “Auto-Store Off” command, this disables the erase/write process.

2.2 Commands: System Control and Time Code

Command/Request					**Return**				
Description	CMD 1/DC	CMD 2	DATA	CHECK	Description	CMD 1/DC	CMD 2	DATA	CHECK
Device type Request	$00	$11	-	$11	Device type	$12	$11	*1	$CHECK
Auto-Store Off	$01	$9C	$00	$9D	ACK	$10	$01	-	$11
Auto-Store On	$01	$9C	$01	$9E	ACK	$10	$01	-	$11
Generator “Start“	$01	$86	$00	$87	ACK	$10	$01	-	$11
Generator “Stop“	$01	$86	$01	$88	ACK	$10	$01	-	$11
Generator “Set-Start“ *2	$01	$86	$02	$89	ACK	$10	$01	-	$11
LTC output “Mute off“	$01	$87	$00	$88	ACK	$10	$01	-	$11
LTC output “Mute on“	$01	$87	$01	$89	ACK	$10	$01	-	$11
Pre-set generator time	$44	$04	*3	$CHECK	ACK	$10	$01	-	$11
Pre-set generator binary groups	$44	$05	*4	$CHECK	ACK	$10	$01	-	$11
Timer mode	$60	$36	-	$96	Timer mode	$71	$36	$00	$A7
Request generator time	$61	$0A	$01	$6C	Generator time	$74	$08	*3	$CHECK
Request generator user	$61	$0A	$10	$7B	Generator user	$74	$09	*4	$CHECK
Request generator time+user	$61	$0A	$11	$7C	Generator time + user	$78	$08	*5	$CHECK
Request reader	$61	$0C	*6	$CHECK	Reader time / user	*6	*6	*6	$CHECK
Request status	$61	$20	*7	$CHECK	Status return	*7	*7	*7	$CHECK

$CHECK hexadecimal sum of the previous words
ACK Acknowledge, ‘ok’ return
NAK In case of any error, a NAK (= not acknowledge) = error message may be sent as a return: $11 $12 $ERROR $CHECK, with $ERROR =

Bit 7: -
Bit 6: framing error
Bit 5: overrun
Bit 4: parity
Bit 3: -
Bit 2: check sum
Bit 1: incongruent data
Bit 0: undefined command

***1** DATA 1: Bit 7 = 1 |
Bit 6 = 0 | Bits 7..5 = Device type
Bit 5 = 1 |
Bit 4: 1 = VITC generator installed, 0 = not installed
Bit 3: 1 = LTC reader installed, 0 = not installed
Bit 2: 1 = LTC generator installed, 0 = not installed
Bit 1: 1 = Inserter installed, 0 = not installed
Bit 0: 1 = VITC reader installed, 0 = not installed
DATA 2: Firmware version

***2** The time value which has last been chosen as a pre-set value will be transferred to the generator, and the generator keeps on counting continuously from this pre-set value on. If the generator has been in stop mode before it now switches to start mode.

***3** DATA 1 = BCD frames
DATA 2 = BCD seconds
DATA 3 = BCD minutes
DATA 4 = BCD hours

***4** DATA 1 = BG1/2 user bits (“frames”)
DATA 2 = BG3/4 user bits (“seconds”)
DATA 3 = BG5/6 user bits (“minutes”)
DATA 4 = BG7/8 user bits (“hours”)

***5** DATA 1...4 = time as for *3, DATA 5-8 = user bits as for *4.

***6** Requesting time data or binary group bits (user bits). DATA 1 bits:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		VITC User	LTC User	Timer 2	Timer 1	VITC Time	LTC Time

Request DATA 1	Response CMD1/CMD2	Data
0x10	0x74 / 0x05	LTC User
0x20	0x74 / 0x07	VITC User
0x30	0x74 / 0x07 or 0x74 / 0x05	VITC User – if READ input has been VITC else TC User – any READ time code input
0x01	0x74 / 0x04	LTC Time
0x11	0x78 / 0x04	LTC Time + User
0x02	0x74 / 0x06	VITC Time
0x22	0x78 / 0x06	VITC Time + User
0x0n	0x74 / 0x06 or 0x74 / 0x04	VITC Time – if READ input has been VITC else TC Time – any READ time code input
0xmn	0x78 / 0x06 or 0x78 / 0x04	VITC Time+User – if READ input has been VITC else TC Time+User – any READ time code input

Response of LTC data only if LTC reader has been installed.
Response of VITC data only if VITC reader has been installed.

It depends on the commands send from the controller in which way the time code readers of the module have to be configured:

If LTC only will be requested an external LTC has to be connected.

If VITC only will be requested the VITC/D-VITC has to be decoded out of the video.

If LTC **and** VITC or any timer or any other combination will be requested, the data will be returned from the "general" reader, i.e. the reader which gets its configuration at the configuration page **Read**. This general reader is able to read external LTC, VITC/D-VITC or – in case of RUB modules – any TC_link time code (telegram).

***7** Status return: sets bits PLAY, STAND-BY and SERVO LOCK only.

2.3 Commands: Text and Time Code Inserter

2.3.1 Parameter Set

Command/Request					**Return**				
Description	CMD 1/ DC	CMD 2	DATA	CHECK	Description	CMD 1/ DC	CMD 2	DATA	CHECK
Window Hide (not visible)	$02	$90	***1** $00	$CHECK	ACK	$10	$01	-	$11
Window Show (visible)	$02	$90	***1** $01	$CHECK	ACK	$10	$01	-	$11
Window Background Colour	$04	$91	***1** ***2**	$CHECK	ACK	$10	$01	-	$11
Window Background Mode	$02	$92	***1** ***3**	$CHECK	ACK	$10	$01	-	$11
Text Content (Pre)	$0x	$93	***1** ***4**	$CHECK	ACK	$10	$01	-	$11
Remove Text Content (Pre)	$01	$93	***1**	$CHECK	ACK	$10	$01	-	$11
Text Content (Post)	$0x	$94	***1** ***4**	$CHECK	ACK	$10	$01	-	$11
Remove Text Content (Post)	$01	$94	***1**	$CHECK	ACK	$10	$01	-	$11
Character Colour	$04	$95	***1** ***2**	$CHECK	ACK	$10	$01	-	$11
Font Size	$02	$96	***1** ***5**	$CHECK	ACK	$10	$01	-	$11
Time Code Source	$02	$97	***1** ***6**	$CHECK	ACK	$10	$01	-	$11
Time Code Format	$02	$98	***1** ***7**	$CHECK	ACK	$10	$01	-	$11
Time Code Delimiter	$02	$99	***1** ***8**	$CHECK	ACK	$10	$01	-	$11
Time Code Identifier	$02	$9A	***1** ***9**	$CHECK	ACK	$10	$01	-	$11
Window Position	$05	$9B	***1** ***10**	$CHECK	ACK	$10	$01	-	$11
Clear All	$00	$9D	-	$9D	ACK	$10	$01	-	$11
Insert Off	$01	$9E	$00	$9F	ACK	$10	$01	-	$11
Insert On	$01	$9E	$01	$A0	ACK	$10	$01	-	$11
Font Size +Status	$02	$9F	***1** ***5**	$CHECK	Status Font Size	$72	$9F	***1** ***5**	$CHECK
Window Position + Status	$05	$A4	***1** ***10**	$CHECK	Status Window Position	$75	$A4	***1** ***10**	$CHECK
Special Window Position + Status	$02	$A6	***1** ***13**	$CHECK	Status Window Position	$75	$A6	***1** ***10**	$CHECK

2.3.2 Parameter Get

Command/Request					**Return**				
Description	CMD 1/ DC	CMD 2	DATA	CHECK	Description	CMD 1/ DC	CMD 2	DATA	CHECK
Window's Visibility	$61	$90	*1	$CHECK	Window's Visibility	$72	$90	*1 *11	$CHECK
Window Background Colour	$61	$91	*1	$CHECK	Window Background Colour	$74	$91	*1 *2	$CHECK
Window Background Mode	$61	$92	*1	$CHECK	Window Background Mode	$72	$92	*1 *3	$CHECK
Text Content (Pre)	$61	$93	*1	$CHECK	Text Content (Pre)	$7x	$93	*1 *4	$CHECK
Text Content (Post)	$61	$94	*1	$CHECK	Text Content (Post)	$7x	$94	*1 *4	$CHECK
Character Colour	$61	$95	*1	$CHECK	Character Colour	$74	$95	*1 *2	$CHECK
Font Size	$62	$96	*1	$CHECK	Font Size	$72	$96	*1 *5	$CHECK
Time Code Source	$61	$97	*1	$CHECK	Time Code Source	$72	$97	*1 *6	$CHECK
Time Code Format	$61	$98	*1	$CHECK	Time Code Format	$72	$98	*1 *7	$CHECK
Time Code Delimiter	$61	$99	*1	$CHECK	Time Code Delimiter	$72	$99	*1 *8	$CHECK
Time Code Identifier	$61	$9A	*1	$CHECK	Time Code Identifier	$72	$9A	*1 *9	$CHECK
Window Position	$61	$9B	*1	$CHECK	Window Position	$75	$9B	*1 *10	$CHECK
Auto-Store	$60	$9C	-	$FC	Auto-Store	$71	$9C	*12	$CHECK
Insert Visibility	$60	$9E	-	$FE	Insert Visibility	$71	$9E	*11	$CHECK
Video Standard	$60	$A5	-	$05	Video Standard	$7B	$A5	*14	$CHECK

***1** DATA 1: Window Number

$01:	Window 1
…	
$0F:	Window 15

***2** DATA2-4: Colour (not for an AT module)

DATA2:	Y
DATA3:	Cb
DATA4:	Cr

Limits:

$$16 \leq Y \leq 235$$
$$1 \leq Cb \leq 254$$
$$1 \leq Cr \leq 254$$

Calculating Y, Cb and Cr from 8-bit RGB values:

$$\begin{aligned} Y &= 0.257 * R + 0.504 * G + 0.098 * B + 16 \\ Cb &= -0.148 * R - 0.291 * G + 0.439 * B + 128 \\ Cr &= 0.439 * R - 0.368 * G - 0.071 * B + 128 \end{aligned}$$

***3** DATA2: Window Background Mode (not for an AT module)

$00:	off	
$01:	solid	
$02:	dimmed	(not for an AT module)

***4** DATA2-DATAn-1 = Text.

Text insert DATA2 to DATAn-1 corresponding left to right.
Character code according to chapter "Character Code Table".

***5** DATA 2 = Font, Character Size

$00 - $0F: Select font, please notice chapter "Character Code Table".

The $02/$96 command sets the font even if it doesn't exist in the unit. In that case, the insertion windows disappear. The $02/$9F command instead sets the next existing font and returns its status.

***6** DATA 2 = Time Code Source

$00:	Read
$01:	Generate
$03:	LTC Read
$05:	(D-)VITC Read
$07:	Telegram 1
$08:	Telegram 2
$09:	Telegram 3

*7 DATA 2 = Time Code Format

$00:	Text only	
$01:	Time, 8 Digits	HH:MM:SS:FF
$02:	Time, 6 Digits	HH:MM:SS
$03:	Time, 4 Digits	HH:MM
$04:	User 8 Digits	
$05:	User, 6 Digits	
$06:	User, ASCII	
$07:	Date, DD MM YYYY	
$08:	Date, MM DD YYYY	
$09:	Date, YYYY MM DD	
$0A:	Date, DD MM YY	
$0B:	Date, MM DD YY	
$0C:	Date, YY MM DD	
$0D:	MTD Time A	
$0E:	MTD Time B	
$0F:	MTD Time C	
$10:	MTD Time D	
$11:	MTD Time E	
$12:	MTD Time F	
$13:	MTD Real Time	
$14:	MTD Date	
$15:	MTD Main 1	
$16:	MTD Main 2	
$17:	MTD Main 3	
$18:	reserved	
$19:	User, 1st Digit	
$1A:	User, 4 Digits	
$1B:	Time, 6 Digits	MM:SS:FF
$1C:	Time, 4 Digits	MM:SS
$1D:	Time, 4 Digits	SS:FF
$1E:	Time, 5 Digits	MMM:SS

*8 DATA 2 = Time Code Delimiter

$00:	Off
$01:	Space
$02:	: (Colon)
$03:	. (Dot)
$04:	- (Dash)
$05:	/ (Slash)

*9 DATA 2 = Time Code Identifier

$00:	Off
$01:	Letter
$02:	String
$03:	Frame Pair

***10** DATA 2-5 = Window Position

DATA2: Horizontal Position (High Byte)
DATA3: Horizontal Position (Low Byte)
DATA4: Vertical Position (High Byte)
DATA5: Vertical Position (Low Byte)

Limits:

625/50 system: $0 \leq \text{Horizontal Position} \leq 700$
$23 \leq \text{Vertical Position} \leq 300$

525/60 system: $0 \leq \text{Horizontal Position} \leq 700$
$21 \leq \text{Vertical Position} \leq 250$

The $05/$9B command returns NAK if a position value exceeds the allowed range. The $05/$A4 command instead adjusts the values and then returns the current position.

***11** DATA 1 = Visibility

$00: Window or insertion not visible (off)
$01: Window or insertion visible (on)

This return indicates the current status of the individual window only, not the status of the general visibility (as set by command "Insert On" or "Insert Off").

***12** DATA 1 = Auto-Store

$00: Auto-Store off
$01: Auto-Store on

***13** DATA 2 = Special Window Positions

$01: Top left
$02: Top centre
$03: Top right
$04: Bottom left
$05: Bottom centre
$06: Bottom right
$07: Top; horizontal position unchanged
$08: Bottom; horizontal position unchanged
$09: Left; vertical position unchanged
$0A: Centre; vertical position unchanged
$0B: Right; vertical position unchanged

***14** DATA 1-10 = Information to the current video standard

DATA1: Current video standard

SD standards			
0	Unknown SD		
1	625i/25		
2	525i/29.97		
HD standards			
3	1080i/25		
4	1080i/30	or	1080i/29.97
5	1080i/24	or	1080i/23.98
6	720p/50		
7	720p/60	or	720p/59.94
8	1080p/25		
9	1080p/30	or	1080p/29.97
10	1080p/24	or	1080p/23.98
11	720p/24	or	720p/23.98
12	720p/25		
13	720p/30	or	720p/29.97
14	1035i/30	or	1035i/29.97
15	Unknown HD		
3G standards			
16	Unknown 3G		
17	1080p/50		
18	1080p/60	or	1080p/59,94

DATA2:	minimum horizontal position (High Byte)
DATA3:	minimum horizontal position (Low Byte)
DATA4:	maximum horizontal position (High Byte)
DATA5:	maximum horizontal position (Low Byte)
DATA6:	minimum vertical position (High Byte)
DATA7:	minimum vertical position (Low Byte)
DATA8:	maximum vertical position (High Byte)
DATA9:	maximum vertical position (Low Byte)
DATA10:	minimum font
DATA11:	maximum font

2.4 Character Code Table

	...0	...1	...2	...3	...4	...5	...6	...7	...8	...9	...A	...B	...C	...D	...E	...F
0...	EX	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs
1...	SP	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs	rs
2...	SP	!	–	–	–	–	–	–	–	–	*	+	,	–	.	/
3...	0	1	2	3	4	5	6	7	8	9	:	–	–	=	–	?
4...	–	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5...	P	Q	R	S	T	U	V	W	X	Y	Z	–	–	–	–	–
6...	–	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
7...	P	Q	R	S	T	U	V	W	X	Y	Z	–	–	–	–	SP
8...	–	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
9...	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
A...	SP	SP	SP	–	SP	SP	SP	–	SP	SP	SP	SP	SP	SP	SP	SP
B...	–	SP	–	SP	SP	–	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
C...	SP	SP	SP	SP	–	A	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
D...	SP	SP	SP	SP	SP	SP	–	SP	SP	SP	SP	SP	–	SP	SP	–
E...	SP	SP	SP	SP	–	A	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
F...	SP	SP	SP	SP	SP	SP	–	SP	SP	SP	SP	SP	–	SP	SP	SP

EX = Terminates the text string.
rs = Reserved, these codes should not be used.
SP = Space.

This table shows all the characters available as default. A character can have different sizes. All the characters of equal size form a font. There are several fonts stored in the module. The number of fonts is limited by available memory space. Customer-specific fonts can be created using the "Font Editor". Using this tool, the number of fonts can be varied.

2.5 Example of Text Display

This protocol allows entering a text of up to 14 characters. To visibly insert the text on a video monitor, execute the following steps at the **Insert** configuration page utilizing one of the configuration tools (via USB or Browser):

- Click on the 'visible' checkbox for the selected window.
- Configuration 'Source = Serial'.
- Configuration 'Format = Text only'.

The following data string inserts "STOP" at window number 5:

```
0x05 0x93 0x05 0x53 0x54 0x4F 0x50 0xE3
```

Entering a new text will clear the current text.

3 The “Echo” Protocol

3.1 General Description

Utilizing one of the configuration tools (via USB or Browser) this protocol can be selected: ‘Protocol = Echo’.
The parameters of the serial interface may be selected according to your application.

This protocol defines no commands. The device returns every word which has been received without errors. Maximum delay will be 15 ms. This may be used to test the interface. Comparing the transmitted word with the returned word enables you to verify the cable and the interface parameters.

4 The “MTD Slave” Protocol

4.1 General Description

Utilizing one of the configuration tools (via USB or Browser) this protocol can be selected: ‘Protocol = MTD Slave’.
The parameters of the serial interface may be selected according to your application, but ‘Data Bits = 8’ is essential.

This protocol enables the device to visibly insert the time of a stop timer. Utilizing one of the configuration tools (via USB or Browser) ‘Source = Serial’ has to be selected for the corresponding window at the **Insert** configuration page. Recommended selection for the format is “Time, HH:MM:SS“.

The structure of this protocol corresponds to the “Sony 9p“ protocol. A valid command will be acknowledged (ACK = 0x10 0x01 0x11), in case of an error a “NAK“ (not acknowledge) will be returned: $11 $12 $ERROR $CHECK (for details please notice chapter “The Sony 9p Protocol“). The command consists of the following string:

Word 1	Word 2	Word 3	Word 4	Word 5	Word 6	Word 7
0x44	0x05	BCD frames + sign	BCD seconds	BCD minutes	BCD hours	CHECK

CHECK hexadecimal sum of the previous words.

The upper bit of word 3 carries the sign: 0 = “+“, 1 = “−“.

This protocol is used by some Plura devices of the MTD Timer System. It is especially designed to display a 6-digits stop timer value (HH:MM:SS), whereas the stop timer counts in a time code format using frames. The treatment of negative values therefore is tricky: with the sign bit set to 1 the received time will be subtracted from 24:00:00:00 and then added with 00:00:01:00. This results in a correct 6-digits display of an 8-digits down-counting (!) time.

Examples:

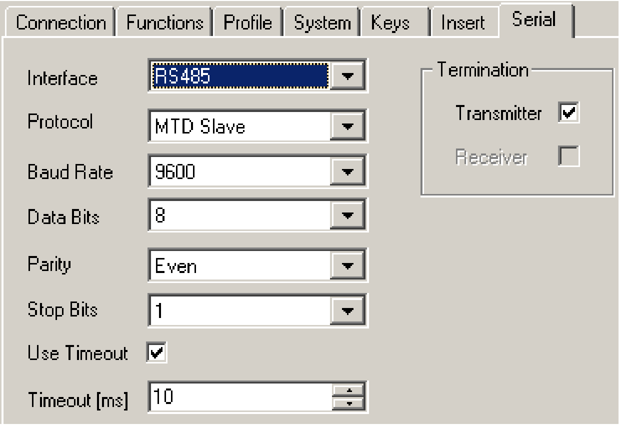
Stop Timer	Data String	Time Display (Inserter)
(+) 12:13:14:15	0x44 0x05 0x15 0x14 0x13 0x12 0x97	12:13:14
− 01:02:03:00	0x44 0x05 0x80 0x58 0x57 0x22 0x9A [HH:MM:SS:FF = 22:57:58:00]	−1:02:03

4.2 Connecting a TCU

The “MTD Slave“ protocol enables to communicate with a TCU (Timer Control Unit). TCU is a Plura user console to control stop timers.

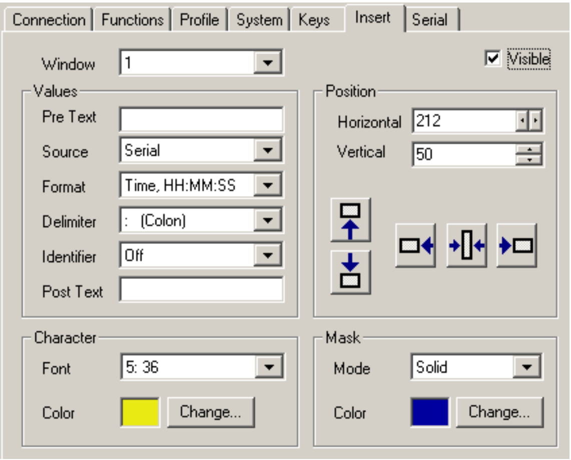
For this application TCU should be switched to the “Master“ (Mode “4“).TCU controls the local stop timer by its keys, and TCU transmits the time of the LED display as a serial RS485 data string.

The device should receive a set-up at the **Serial** and **Insert** configuration pages as shown (as an example):



Interface: RS485
Protocol: MTD Slave
Baud Rate: 9600
Data Bits: 8
Parity: Even
Stop Bits: 1
Use Timeout ☑
Timeout [ms]: 10

Termination
Transmitter ☑
Receiver □



Window: 1
☑ Visible

Values
Pre Text:
Source: Serial
Format: Time, HH:MM:SS
Delimiter: : (Colon)
Identifier: Off
Post Text:

Position
Horizontal: 212
Vertical: 50

Character
Font: 5: 36
Color: 🟨

Mask
Mode: Solid
Color: 🟦

Connecting the TCU can be done by a RJ45 – DSUB9M or DSUB9F – DSUB9M adapter cable.

Pin assignments:

TCU		Device (RUB module or TCC70XS)	
RJ45	DSUB9F female	DSUB9M male	Description
1	1	1	TRA
2	2	2	TRB
4	5	5	GND

Please leave all other pins unconnected.

5 The “TC60 Automatic” Protocol

5.1 Description

Utilizing one of the configuration tools (via USB or Browser) this protocol can be selected: ‘Protocol = TC60 automatic’.

The parameters of the serial interface may be selected according to your application, but ‘Data Bits = 8’ is essential.

This protocol automatically transmits every time code value of the “general” reader (“Read”). Please ensure that the individual time code reader has been enabled (at **Functions** configuration page) and has been selected at the **read** configuration page.

Time code of LTC type will be transmitted every frame, Time code of VITC type will be transmitted every field.

The data string contains ten words:

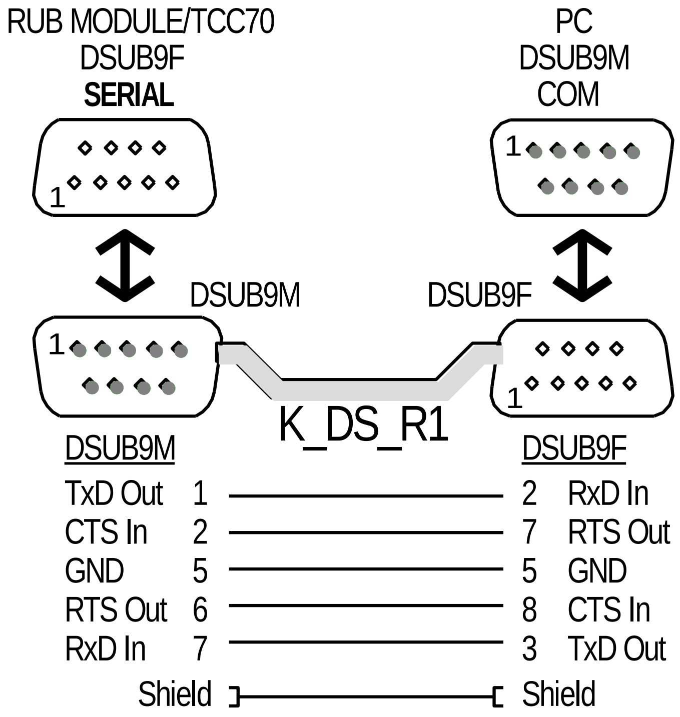
No.	High nibble, bits 4 – 7	Low nibble, bits 0 – 3
1	0	D (hexadecimal)
2	User digit 8	Tens of hours
3	User digit 7	Units of hours
4	User digit 6	Tens of minutes
5	User digit 5	Units of minutes
6	User digit 4	Tens of seconds
7	User digit 3	Units of seconds
8	User digit 2	Tens of frames
9	User digit 1	Units of frames
10	Check word = hexadecimal	sum of words 1 – 9 without carry

Example: Time = 10:23:17:19, user digits (binary groups) = 89ABCDEF

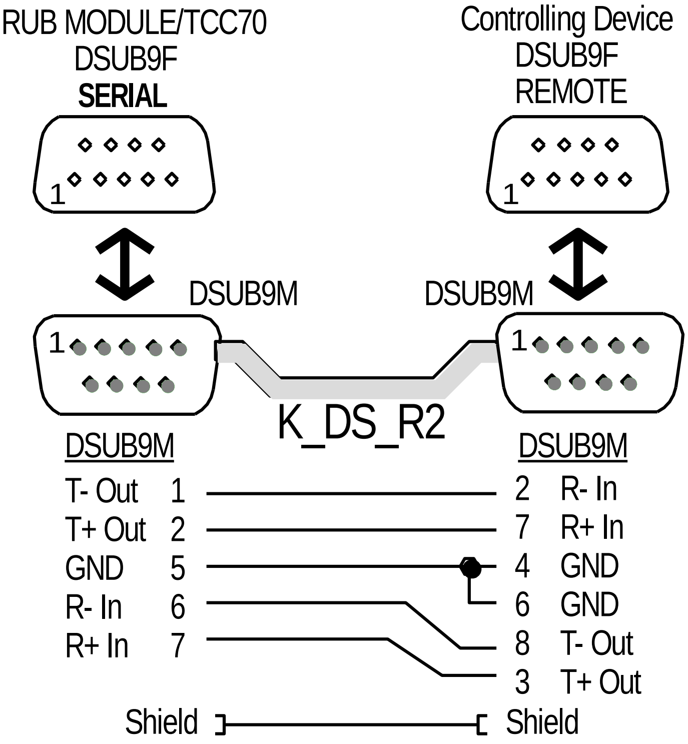
Data string:
0x0D
0x81
0x90
0xA2
0xB3
0xC1
0xD7
0xE1
0xF9
0xE5

6 Applications

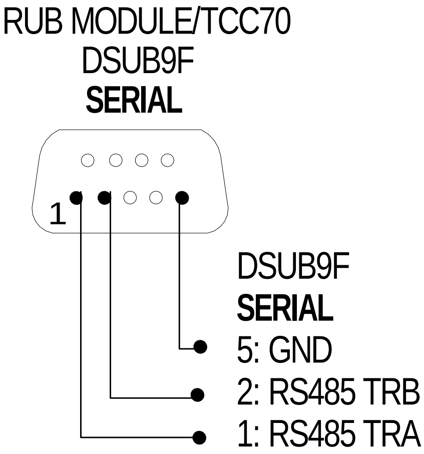
6.1 RS232 Remote Control via Computer



6.2 RS422 Remote Control via a Controlling Device



6.3 Remote Control via RS485



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