RS-232 PROTOCOL
CTOUCH RIVA R2

FOLLOW THE PROTOCOL

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CTOUCH®

REVISION HISTORY

Date	Revision	Changes
2023-04-05	1.0	Initial release

TABLE OF CONTENT

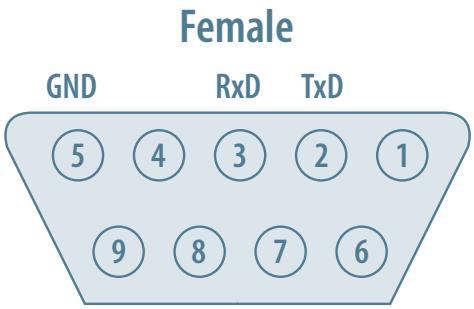
INTRODUCTION

This document represents simple UART protocol for controlling system operation using RS-232C.

COMMUNICATION PROTOCOL

RS-232C Pin Map

1	N.C.
2	TxD
3	RxD
4	N.C.
5	GND
6	N.C.
7	N.C.
8	N.C.
9	N.C.



Communication parameter
baud rate : 9600
data : 8
parity : NONE stop bit : 1

Communication general spec

- ID should show hexadecimal value of assigned ID.
- ID should be set on menu of the display.
- If you want to control every mechanism connected with Serial Cable regardless of its ID, set ID to « 0x00 » and send commands.

Then each SET will follow commands but it will not respond without ACK.

- Don't use 0x00, 0x8A(138) and 0xA9(168) for Set ID.

TRANSMISSION FORMAT

START	COMMAND	ID	DATA	DATA
0xA9	0xXX		0xXX	0x8A

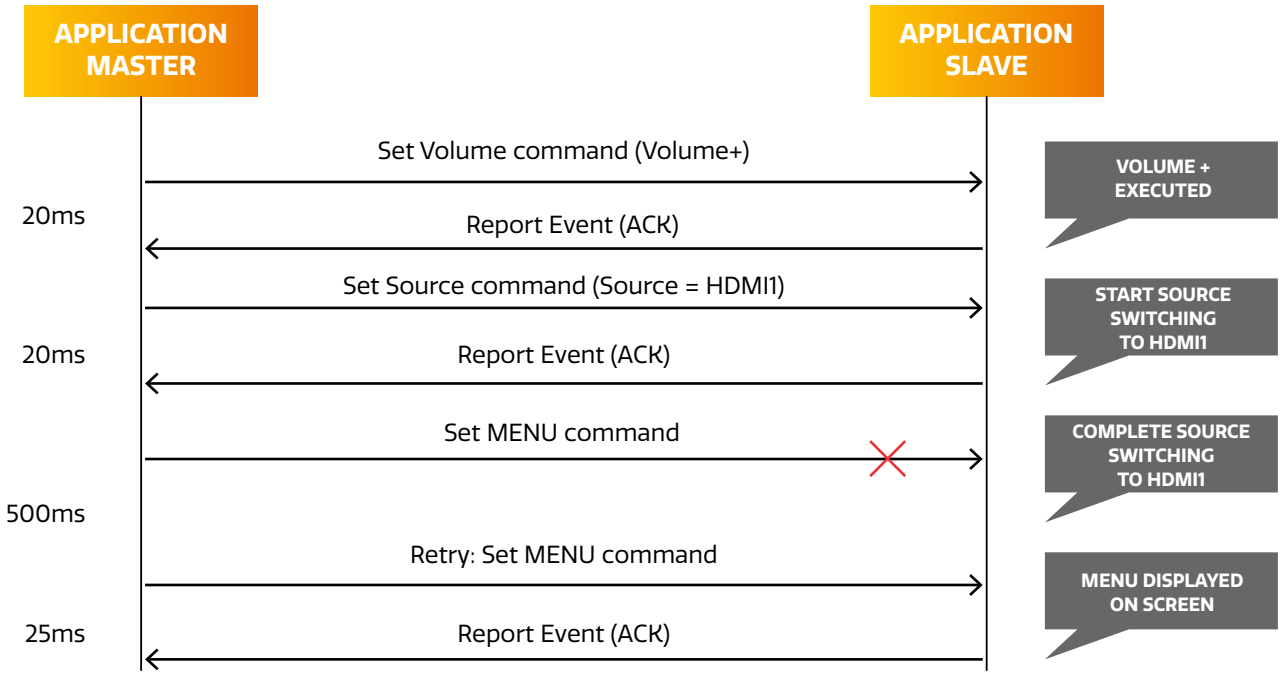
For example Power on & ID = 0x11

START	COMMAND	ID	DATA	DATA
0xA9	0x11		0x01	0x8A

COMMUNICATION PROCEDURE

Control commands can be sent from a computer/controller via the TCP/IP connection. In this setup, the computer/controller is the application master while the CTOUCH monitor is the application slave.

A new command should not be sent until the previous command is acknowledged. However, if a response is not received within 500 milliseconds, a retry may be triggered. This use case is true if commands are sent during the screen busy state and the screen set decides that the processing of the commands cannot be carried out. As a result, no acknowledgement will be sent. An example would be the application sends a set OSD command while the screen is still preforming source switching. No fixed retry mechanism is mandated by RS232 Serial communication and it's up to the application to decide upon if a retry I needed for command integrity. Overall, no new command should be sent before receiving an acknowledgement on its previous command. If no acknowledgement is received, the application can only send the next command (or retry the failed command) after the 500ms timeout is over. The sequence diagram below illustrates the communication procedure.



When the set is in standby, no commands sent over IP will be processed.

To be able to use RS232 over IP, the set needs to be switched on (either manual via the Power/Standby button, via the build-in on-timer functionality of the OPS or by sending a Magic Package as defined by Wake-on-LAN). Status of the set can be requested via the RS232 commands as defined in the RS232 specification.

COMMAND DETAILED EXPLANATION

POWER CONTROL

Power Control

Function
RS-232 Controller turns display power ON/OFF

Get Power ON/OFF status

START	COMMAND	ID	DATA	END
0xA9	0x11		0xAA	0x8A

Get Power ON/OFF*

START	COMMAND	ID	DATA 1	END
0xA9	0x11		Power	0x8A

Power: Power code to be set on display

0x01	Power ON
0x00	Power OFF

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	0x11		Power	0x8A	0x8A

A=0x41

Power: Power code to be set on display

0x01	Power ON
0x00	Power OFF

Nak

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	N		Power	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

* The Power ON command only works with DB9 cable. For Power ON over IP use a tool with magic package.

PANEL BACK LIGHT UNIT CONTROL

Panel Back Light Unit Control

Function
RS-232 Controller turns display panel BLU power On/Off.

Get BLU Power ON/OFF status

START	COMMAND	ID	DATA	END
0xA9	0x12		0xAA	0x8A

Set BLU Power ON/OFF

START	COMMAND	ID	DATA 1	END
0xA9	0x12		BLU Power	0x8A

BLU Power: BLU Power code to be set on display

0x01	Power ON
0x00	Power OFF

Ack

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	A		0x12	BLU Power	0x8A

A=0x41

Power: Power code to be set on display

0x01	Power ON
0x00	Power OFF

Nak

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	N		0x12	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

VOLUME CONTROL

Volume control

Function
Personal Computer changes volume of display

Get Volume status

START	COMMAND	ID	DATA	END
0xA9	0x13		0xAA	0x8A

Set Volume

START	COMMAND	ID	DATA 1	END
0xA9	0x13		Volume	0x8A

Volume:
Volume value code (0x0 (0) ~ 0x64 (100)) to be set on display

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x13	Volume	0x8A

A=0x41
Volume: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	N		0x13	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

MUTE CONTROL

Mute control

Function
RS-232 Controller set mute On/Off.

Get Mute ON/OFF status

START	COMMAND	ID	DATA	END
0xA9	0x14		0xAA	0x8A

Set Mute ON/OFF

START	COMMAND	ID	DATA	END
0xA9	0x14		Mute	0x8A

Mute: Mute code to be set on display

0x01	Mute ON
0x00	Mute OFF

Ack

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	A		0x14	Mute	0x8A

A=0x41
Mute: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x14	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

INPUT SOURCE CONTROL

Input source control

Function

RS-232 Controller changes input sources of display.

Get Input Source status

START	COMMAND	ID	DATA	END
0xA9	0x15		0xAA	0x8A

Set Input Source

START	COMMAND	ID	DATA	END
0xA9	0x15		Mute	0x8A

Input: Input source code to be set on display

DATA	INPUT
AV	0x01
DP	0x07
HDMI 1	0x05
HDMI 2	0x06
HDMI 3	0x08

DATA	INPUT
Android	0x0C
INSIDE PC	0x09
USB-C1	0x0E
USB-C2	0x0E
VGA	0x14
Home	0xBC
Audio	0x0F

* Only when a CTOUCH Module is inserted in the display.
Note: When switching to same source the display will respond after 3 seconds. We recommend to implement a get input source command.

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x15	BLU Power	0x8A

A=0x41

Input: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x15	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

INFRARED CONTROL

Infrared control

Function
Command for same thing with remote controller

Command Infrared control

START	COMMAND	ID	DATA	END
0xA9	0x16		Key Code	0x8A

Key Code: Infrared control code as Annex B

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x16	Key Code	0x8A

Key Code: Same as annex B

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x16	ERR	0x8A

Key Code: Same as annex B

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

CTOUCH BUTTON

CTOUCH button

Function
RS-232 Controller set CTOUCH button On/Off.

Get CTOUCH button On/Off status

START	COMMAND	ID	DATA	END
0xA9	0x17		0xAA	0x8A

Set CTOUCH button On/Off

START	COMMAND	ID	DATA	END
0xA9	0x17		Lock	0x8A

CTOUCH button: CTOUCH button code to be set on display

0x01	CTOUCH button ON
0x00	CTOUCH button OFF

Ack

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	A		0x17	Lock	0x8A

A=0x41
Lock: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x17	ERR	0x8A

N=0x4E
ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

PICTURE MODE CONTROL

Picture mode control

Function
RS-232 Controller changes picture mode of display.

Get Picture Mode status

START	COMMAND	ID	DATA	END
0xA9	0x18		0xAA	0x8A

Set Picture Mode

START	COMMAND	ID	DATA	END
0xA9	0x18		Mode	0x8A

Picture Mode: Picture Mode code to be set on display

DATA	INPUT
Dynamic	0x00
Standard	0x01
Soft	0x02
User	0x03

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x18	Input	0x8A

A=0x41

Input: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x18	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

SOUND MODE CONTROL

Sound mode control

Function
RS-232 Controller changes sound mode of display.

Get Sound Mode status

START	COMMAND	ID	DATA	END
0xA9	0x19		0xAA	0x8A

Set Sound Mode

START	COMMAND	ID	DATA	END
0xA9	0x19		Mode	0x8A

Sound Mode: Sound Mode code to be set on display

DATA	INPUT
Standard	0x00
Music	0x01
Movie	0x02
Sport	0x03
User	0x04

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x19	Input	0x8A

A=0x41

Input: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x19	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

BAUD RATE CONTROL

Baud Rate Control

Function
RS-232 Controller changes baud rate.

Get Baud Rate

START	COMMAND	ID	DATA	END
0xA9	0x1A		0xAA	0x8A

Set Baud Rate

START	COMMAND	ID	DATA	END
0xA9	0x1A		BaudRate	0x8A

Baud Rate: Baud Rate code to be set on display

DATA	INPUT
BAUD_1200	0x00
BAUD_2400	0x01
BAUD_4800	0x02
BAUD_9600	0x03

DATA	INPUT
BAUD_19200	0x04
BAUD_38400	0x05
BAUD_57600	0x06
BAUD_115200	0x07

Ack

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x1A	Input	0x8A

A=0x41
Input: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	A		0x1A	ERR	0x8A

N=0x4E

ERR:

0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

FREEZE CONTROL

Freeze Control

Function

RS-232 Controller set Freeze Control On/Off.

Get Freeze Control On/Off Status

START	COMMAND	ID	DATA	END
0xA9	0x1B		0xAA	0x8A

Set Freeze Control On/Off

START	COMMAND	ID	DATA	END
0xA9	0x1B		Freeze	0x8A

Freeze: Freeze code to be set on display

0x01	Freeze ON
0x00	Freeze OFF

Ack

START	ACK/NAK	ID	R-CMD	DATA 1	END
0xA9	A		0x1B	Freeze	0x8A

A=0x41

Lock: Same as above

Nak

START	ACK/NAK	ID	R-CMD	DATA	END
0xA9	N		0x1B	ERR	0x8A

N=0x4E

ERR:

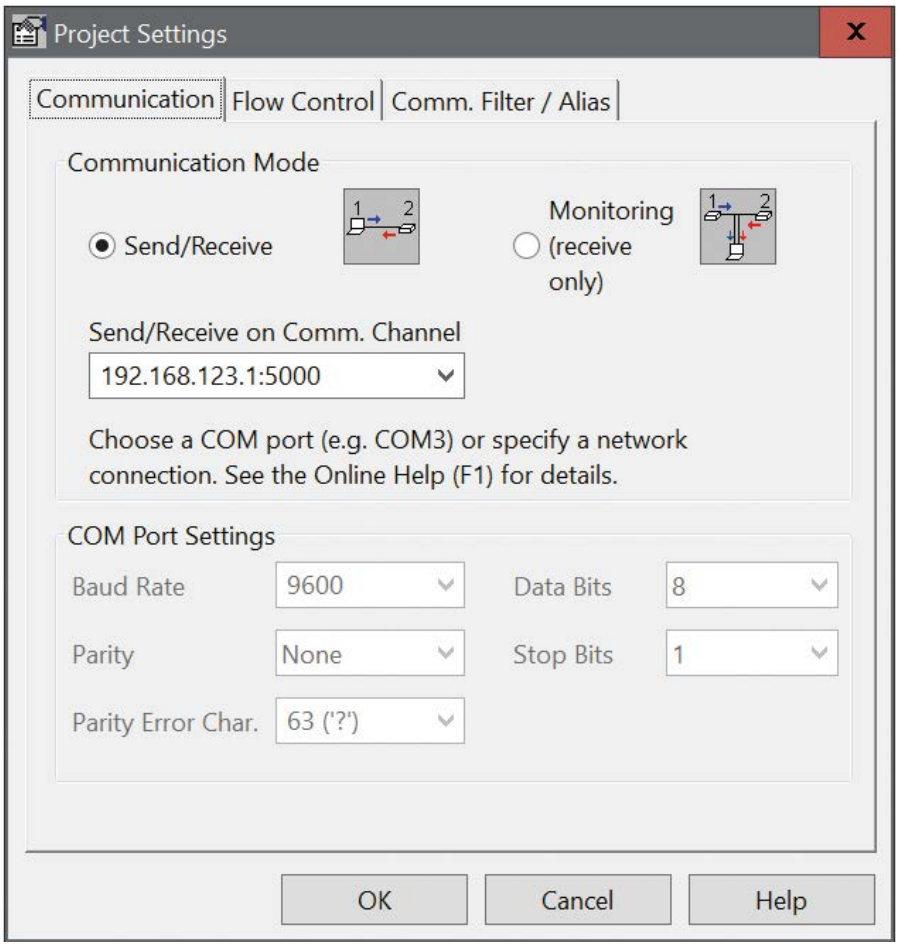
0x01	Invalid Command
0x02	Invalid Data
0xFF	Etc

TOOLS & TESTING

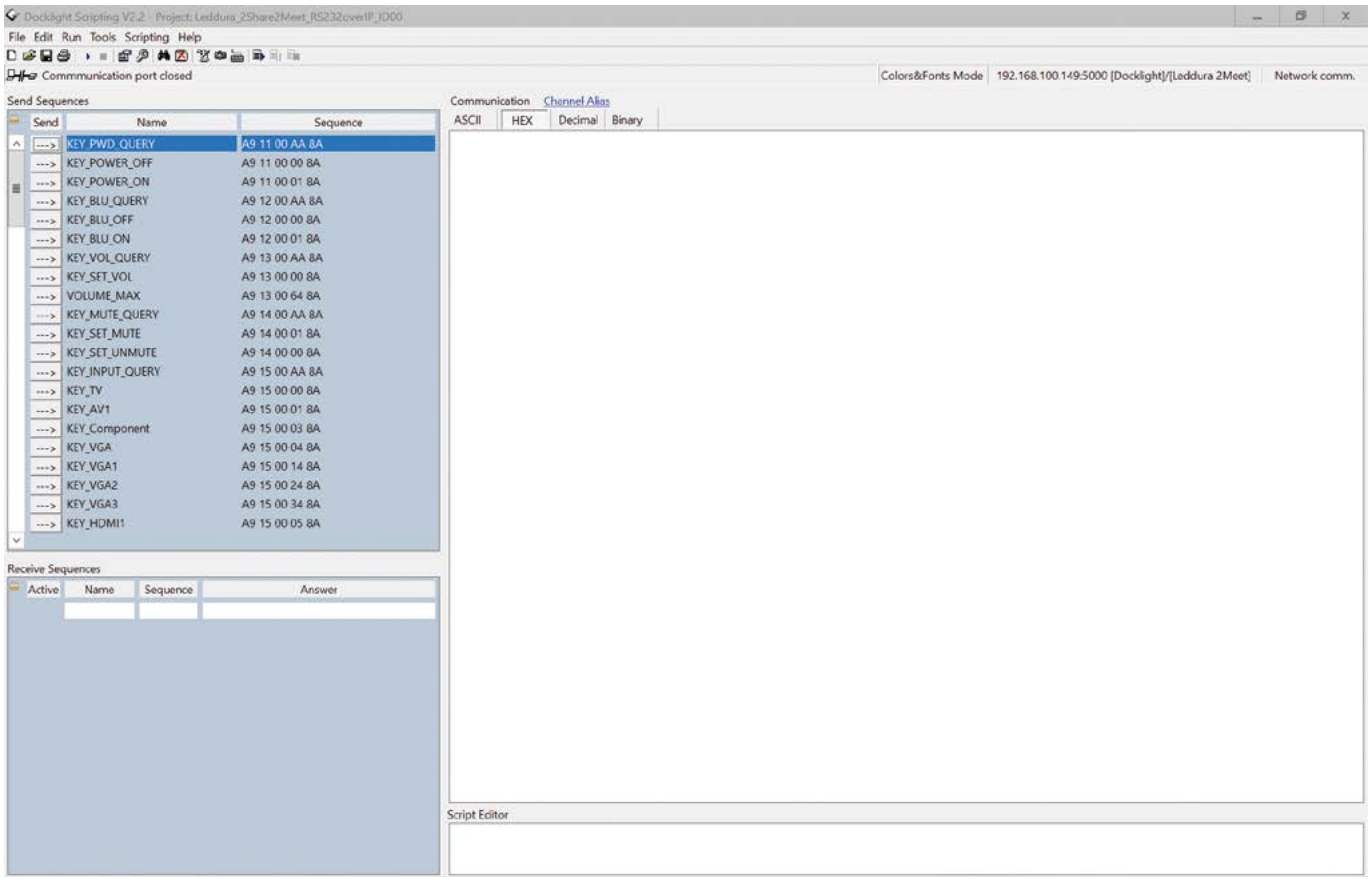
To be able to test your configuration, you can use all kind of tools. The one we recommend is Docklight (Scripting) since we made a pre-configured file that you can use with it.
Docklight can be downloaded via https://docklight.de/ and can be used without a license (free version). Only if you would like to edit and store configurations, you will need a full version. Our pre-configured files for RS232 over IP contain the default IP address 192.168.123.1 using port 5000. The IP addres of the display can be found in the Display Menu, under the topic Settings. If you log into this menu, the IP addres is visible at the top of the menu. The port you need to use is port 5000. Please be aware that when you want to purchase Docklight, keep the following in mind:

- Docklight: RS232 via Serial
- Docklight Scripting: RS232 via Serial as well as RS232 over IP

4.1 Docklight
In Project Settings you can adapt the IP address as well as the port being used (free version cannot store changes).



When the connection is setup, you can use the different example commands (just press the Arrow in front of the command you want to send).
Communication window will show the sent commands as well as the received commands (in below example empty).



ANNEX A

NO.	COMMAND	DATA	END
1	Power Control	0x11	
2	BLU Power Control	0x12	0x0 ~ 0x1
3	Volume Control	0x13	0x0 ~ 0x64
4	Mute Control	0x14	0x0 ~ 0x1
5	Input Source Control	0x15	Input source
6	Infrared Control	0x16	Infrared control value
7	CTOUCH button Control	0x17	0x00~0x01
8	Picture Mode Control	0x18	0x00~0x06
9	Sound Mode Control	0x19	0x00~0x04
10	Baud Rate Control	0x1A	0x00~0x07
11	Freeze Control	0x1B	0x00~0x01
12	Source Info visible Control	0x1C	0x00~0x01

ANNEX B

KEY NAME	KEY CODE	DESCRIPTION
RC_POWER	0xD7	Power
RC_INPUT	0xC0	Input Source Menu
RC_CURSOR_UP	0x92	Cursor Up
RC_CURSOR_LEFT	0x97	Cursor Left
RC_ENTER	0x9B	Enter
RC_CURSOR_RIGHT	0x9F	Cursor Right
RC_CURSOR_DOWN	0xD8	Cursor Down
RC_MENU	0x84	Menu
RC_HOME	0xBC	Discrete HOME
RC_EXIT	0xD4	Back/Exit
RC_STILL	0xB8	Picture Freeze
RC_MUTE	0xDF	Audio Mute
RC_BACKLIGHT_MUTE	0xB2	Backlight Mute
RC_VOL_DN	0x86	Volume Down
RC_VOL_UP	0x83	Volume Up
RC_SCREENSHOT	0x62	Take Screenshot

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