

# RS485-Communication based on UART-Communication

Physical Layer	Drive controller family
RS485	K17e



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**Version 1.01**

## 1 Revision History

Date	Version	Change Details	Firmware Min
16.03.2022	1.00	First Release, M.Zimmermann	V2.8-000 K17e
06.04.2022	1.01	Small changes	

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## 2 Introduction

This document shall describe special RS485 Topics which **are not already handled** by KannMotion UART Communication protocol document **100570**.

Link to Base Document: see [KannMotion.com](http://KannMotion.com) Webpage

## 3 KannMotion RS485 Command Set (Basics)

For detailed command and protocol settings, please refer to your device specific manual !

### UART Standard Settings

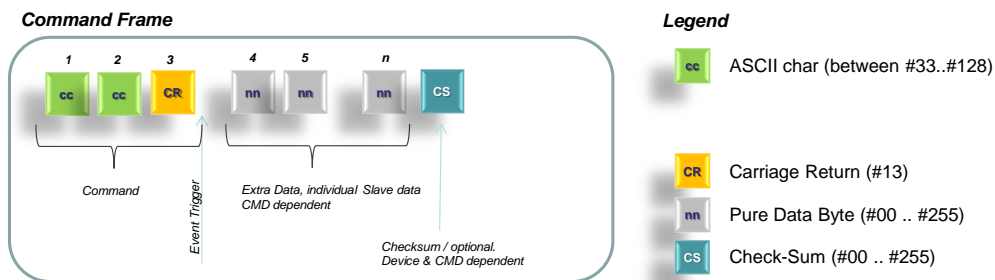
38400 Baud, 8 Data, 1 Stop, Parity=none ( Standard ), *might be different refer to device manual*

### Protocol Basics

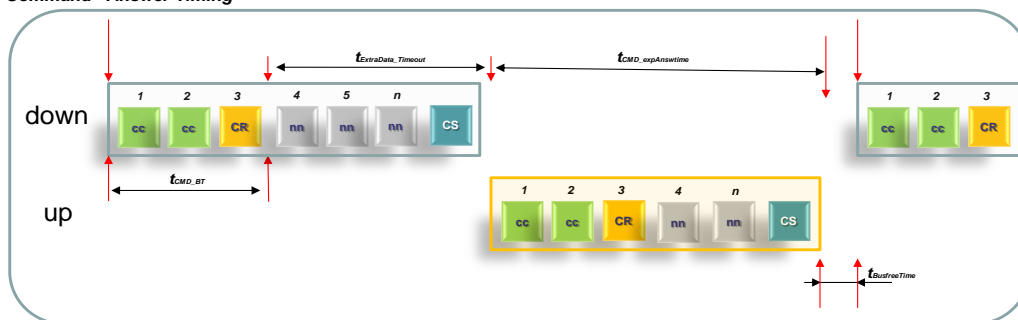
In principle every command consists on a 2-Byte-Instruction followed by a Trigger Byte (CR).

The Command Bytes has to be inside a certain number range, for protocol consistency (clear distance between Trigger Byte and Command)

After trigger byte is detected, interpretation of 2-command bytes (word) will be done, and if command is known, the command is sent back to the transmitter and the receiver prepares it's buffer for additional data if needed ...



### Command - Answer Timing



Short	Description	min	typ	max	Unit
t <sub>BusfreeTime</sub>	Bus free Time	100			us
t <sub>CMD_BT</sub>	Command Time Consumption	781 <sup>1)</sup>			us
t <sub>ExtraData_Timeout</sub>	extra data timeout	625us + 312.5us x Bytecount <sup>2)</sup>			us
t <sub>CMD_expAnswtime</sub>	expected Command Answertime	781us + 261us x Bytecount <sup>2)</sup>			us

1) Standard Baud rate of 38000 Baud

2) ExtradataTimeout is: Time= (expected Bytecount+2) \* BitTime \* 1.2



Remember RS485 is Half-Duplex, so means, the up-Stream can not been started before downstream has finished! As master you have to wait 'expected answer time' + 'BusfreeTime', before writing a new query frame on to the bus.

## RS485 extra Command Set (additional to 100570 )

CMD	Description	Additional data	Answer	time
<b>Bq</b> <CR>	Bus participant query	Group-ID + CK	up to 8 addresses	special
<b>Ba</b> <CR>	Bus activate 'Tunnel' to participant	Adr8 + CK	-	norm
<b>Bw</b> <CR>	Bus write participant address	Adr8 + CK	ACK/NAK + CK	norm

### Keywords

CK	:byte	0..255	Checksum of full Command or Answer Frame ( Sum, followed by complement of 2)
ACK	:byte	0x06	
NAK	:byte	0x15	

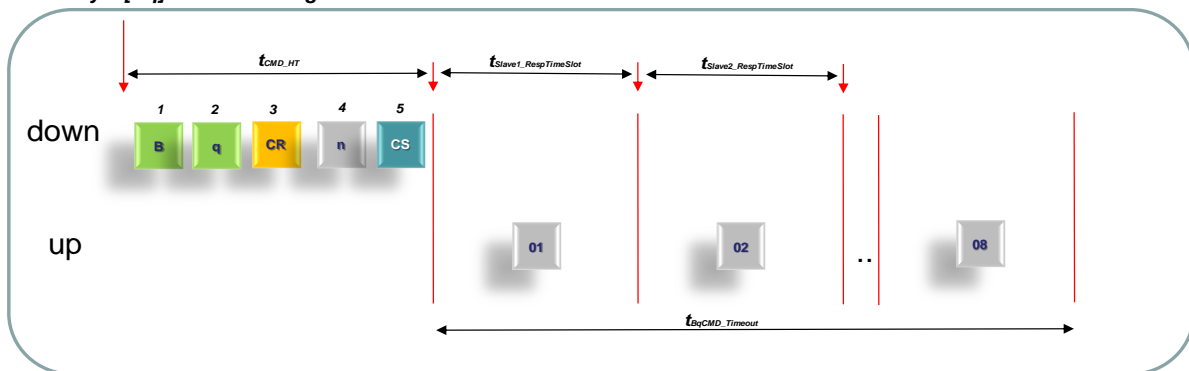
### <Bq> Bus participant query command

This command enables you to get bus participant addresses back, write <Ba> <Broadcast> command before!

**Send:**        **Bq**<CR> <gg> <CK>  
**Answer:**     <nn> <nn> ... <nn>

<gg>        : Address group ident data byte        e.g. 0x00  
 <nn>       : address data byte [0..255]         e.g. 0x01  
 <CK>       : Checksum of HEAD

### BusQuery – [Bq] Answer Timing



Group-ID <gg>	Meaning	Description
0	Group 0 [01..08]	drives, participants with address from [01..08] shall answer within their timing slot
1	Group 1 [09..16]	drives, participants with address from [09..16] shall answer within their timing slot
2	Group 2 [17..24]	drives, participants with address from [17..24] shall answer within their timing slot
3	Group 3 [25..32]	drives, participants with address from [25..32] shall answer within their timing slot
4..254	Not allowed	Command not known
255	all not addressed are selected	Not addressed devices will answer

### Timing table

Short	Description	min	typ	max	Unit
t <sub>slave1_ResponseTimeSlot</sub>	Slave1-WriteAdresse Timeslot	50		950	us
t <sub>slave2_ResponseTimeSlot</sub>	Slave2-WriteAdresse Timeslot	1050		1950	us
t <sub>slave8_ResponseTimeSlot</sub>	Slave8-WriteAdresse Timeslot	7050		7950	us
t <sub>CMD_HT</sub>	Commando Header-Time Consumption	1298	1302	1341	us
t <sub>Ba_CMD_Timeout</sub>	Bus-Query Timeout	8		9	ms



Special: this command has no fixed answer size. This is within our communication protocol an absolute exception! Master needs for that a little special handling. It needs to take data after reaching timeout of 9ms! There might be 0..8 data-Bytes inside buffer, containing connected addresses.

## <Ba> Bus activate 'Tunnel' to participant

This command establish a communication 'Tunnel' to adressed participant. After this command we are able to talk with selected device as usual (Standard 1:1 communication as 100570 describes)  
 This command enables talking to adressed device.

**Send:** Ba<CR> <adr8> <CK>  
**Answer:** -

Adress <adr8>	Meaning	Description
0	Not adressed devices	Not adressed devices are allowed to talk <i>Attention: this might lead to collisions on Bus if more than 1 device is not adressed!</i>
1..32	Device adress	Device- participant adress where the tunnel shall go to
33..254	Not allowed	No change
255	Broadcast	All devices are allowed to listen/answer <i>Attention: this might lead to collisions on Bus !</i>



Special: this command has no Echo and no answer !

## <Bw> Bus write adress to device

This command enables you to allocate a dedicated adress to a drive/participant. Valid data ist stored automatically to non volatile memory. Device must be activated before by <Ba> CMD

**Send:** Bw<CR> <adr8> <CK>  
**Answer:** Bw<CR> <ACK/NAK> <CK>

Adress <adr8>	Meaning	Description
0	No adress	Device is not adressed <i>talking is not done until activated over Ba-0-CMD!</i>
1..32	Device adress	Device- participant adress <i>talking is not done until activated over Ba-n-CMD</i>
33..254	Not allowed	No change
255	Factory Setting	Sets the Bus-Adress to factory Setting (not adressed, direct talk) <i>this is only for 1:1 communication to enable 100% backward compatibility to toolset/master</i>



Do not connect more than 1 unadressed devices on bus. You might add 1 device, then apply a free adress to it, before you apply the next unadressed device. Repeat this until you have all devices connected and allocated to the bus.



**Factory Setting of Adress is = 0 (unadressed)**

## Adlos Win32-APPS

adlos offers for it's customers some Helping and Design-In Tools.

### 3.1 ComWatch Communication Tool ( 190077 )



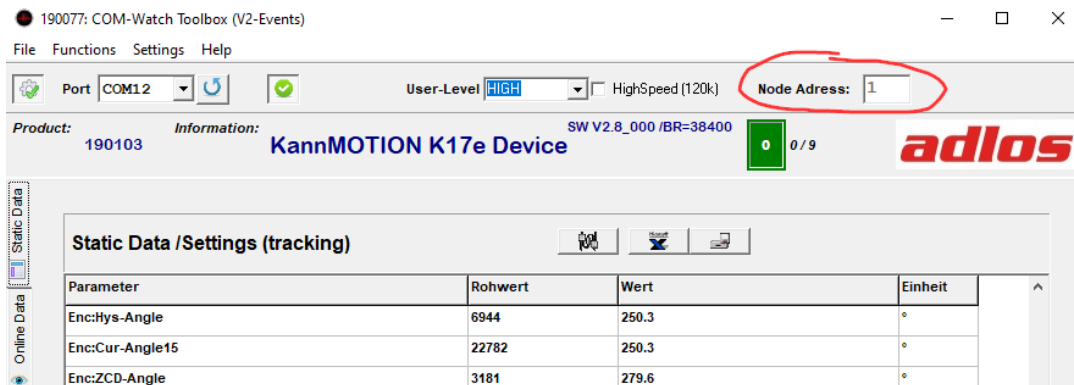
ComWatch is a helping tool for engineers and technicians to explore device specific parameters, read out tracking data and settings and doing firmware updates.

The software is as it is, and in principle for free for adlos customers, the software is not made for a broad range of standard users, it's made in principle for technical engineers which are used in working w. windows based software and have some understanding of technical things.

<http://kannmotion.adlos.com/download/comwatchtool/ComWatchSetup.zip>



You need at least ComWatch Version V2.1.0.0, press *Menu->Functions->Search Updates*  
You need at least Bootloader App Version V1.4.0.1



## 4 Best practice

### Do / example process



- Connect a new device the first time direct in a 1 to 1 connection (not directly on a bus w. more than 1 participant)
- Check firmware Version of connected device, do an update of Firmware up to at least V2.8-000
- Set an unused address [1..32] to this device, an mark your drive with it
- Now connect it to the real bus where more than 1 drive might be connected
- Check bus participants by using Bq-CMD

### Do not / avoid



- Do not connect drives with Firmware < V2.8-000 on a multiple drive bus, this drive needs first to be updated ( otherwise it will generate Bus collisions, due to not having Ba-CMD included)
- Do not connect more than 1 unaddressed device on bus. You might add 1 device, then apply a free adress to it, before you apply (connect) the next unaddressed device. Repeat this if needed until you have all devices connected and allocated to the bus
- A bus collision might lead to a internal RESET (Soft-Reset by overcurrent inside drive)
- After a reset or a Newstart command, Ba-CMD has to be repeated to get the communication channel agein