**FroboMind: Row Cleaner Actuator (RowCA) :Protocol**

**RowCA protocol**

The protocol is based on NMEA 0183 [[1]](http://en.wikipedia.org/wiki/NMEA_0183%7CNMEA0183) over a serial port.

Serial communication  
Baudrate: 57600  
Frame length: 11 bits (N81)  
Max bytes per second: 57600/11 = 5236   
Max NMEA strings per second: 57600/11/50 = 104 (assuming a total length of 50 chars)

**RowCA Status (PFRHI) transmitted by the RowCA firmware**

$PFRHI,hw\_version, firmware\_version\_Major\_Version, firmware\_version\_Minor\_Version,reset\_cause\*CS<cr><lf>

hw\_version: The Frobit hardware version

1. RoboCard 2. FroboMind Controller

firmware\_version\_Major\_Version: The Row Cleaner major firmware version

1. RowCA  
2. N/A

firmware\_version\_Minor\_Version: The Row Cleaner minor firmware version

1. 2014-08-28

reset\_cause: The reason why the RowCA hardware was reset:

0. Power on reset 1. Reset 2. Brown-out reset 4. Watchdog reset (15ms timeout) 5. JTAG reset

This message is transmitted only once after boot.

**RowCA Control (PFRAC) accepted by RowCA FW**

For CS check

$PFRCT,dist\*CS<cr><lf>

If you don’t care for CS

$PFRCT,dist<cr><lf>

Dist: reference to tell the RowCA the desired actuator length in percentage [0-100].

**Frobit Status (PFRST) transmitted by RowCA FW**

$PFBST,state,act\_state,dist,binary\_dist,measured\_dist,voltage\*CS<cr><lf>

state: Normal states

* STATE\_OK (1)

Warning states

* STATE\_NMEA\_WARN(2) At least one nmea packet disregarded due to invalid format/CS since last PFBST message.

Error states

* STATE\_WATCHDOG (3) No valid nmea packet received for the past 0.2s. (auto reset)
* STATE\_LOW\_BAT (5) Battery voltage critically low (auto reset).
* STATE\_ACTUATOR\_FAULT (6) Determent by TR-MM215

act\_state: State of the actuator:

* 1: actuator moving out.
* 2: actuator moving in.
* 3: actuator in place.
* 4: actuator fault.
* 5: actuator in reset state

dist: the distance in percentage set by user.

binary\_dist: the distance in binary set by user. (10 bit)

measured\_dist1: measured actual distance (10 bit ADC value from port PF1)

measured\_dist2: measured actual distance (10 bit ADC value from port PF2)

voltage: Battery voltage (10 bit ADC out from voltage divider to allow external calibration)

**Frobit RowCA Parameters (PFRSP) accepted by RowCA FW**

$PFRSP,voltage\_min\*CS<cr><lf>

voltage\_min: Battery minimum voltage threshold (10 bit value corresponding to ADC out from voltage divider)

**Frobit Communication Parameters (PFRCP) accepted by RowCA FW**

$PFBCP,pfbst\_interval, pfbct\_wd\_timeout\*CS<cr><lf>

pfbst\_interval: Rate of the Frobit Status (PFBST) 1-1000 \* [ms] (default 100)

pfbct\_wd\_timeout: NMEA watchdog timeout (monitoring PFBCT)

0: disable

1-1000 \* [ms]

**Frobit RowAC RESET command (PFRAR) accepted by RowCA FW**

$PFRAR,RESET\*CS<cr><lf>

Reset the TR-MM215 MultiMoC actuator control unit.

Be aware that this will course actuator to be fully extended.