ADVANCED ROTAVALVE COMMUNICATION PROTOCOL

RotaValve Distribution

RotaValve Recirculation

This document provides the information needed to communicate with the Advanced Rotavalve module through direct UART communication.

UART Communication Protocol for Advanced Rotavalve / Version: 01.01.00 / Date: August 2024

Introduction

The Advanced RotaValve can be controlled directly via an adapter (intermediary between the module and the computer) or it can be controlled via an Advanced Control Center. Two options are available for the rotary valve module, either the RotaValve Distribution or the RotaValve Recirculation. If you are using the RotaValve with the Advanced Control Center, refer to the Control Center communication protocol documentation for additional information.

The **RotaValve Distribution** is a 12/1 rotary selector bidirectional valve that allows one to control a fluid input and direct it toward one of the 12 outputs or have 12 fluid inputs and choose which one goes toward the output. To do so, you choose the valve head position. This position controls the path the fluid can go through. This module is perfect to perform sequential injection.

The **RotaValve Recirculation** is a 6 ports / 2 positions valve. It has 6 inputs and 2 interchangeable configurations. Each input is connected to a neighbor output, either on the right or the left depending on the configuration. This module is perfect to recirculate a fluid in a closed loop for dynamic cell culture experiments.

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Serial connection settings

Baud rate: 230400

Data bits: 8

Stop bit: 1

Parity: none

Termination character: '\n'

Syntax

Command syntax

char 0: '<' to start the query

char 1 to 5: command name

char 6: '?' to read, '!' to write

then ':' to start a value. Can iterate over many arguments

Error handling

In the answer to any command, the first information displayed after the read / write character is the error code '|xx|'. It is two characters that indicate the error code associated with the request. '00' means no error. Refer to the following table to check the possible error codes related to the RotaValve module:

Error code	Meaning
00	No error
C0	Channel error: wrong channel requested
L0	Locking error: you do not have writing access to this parameter
I0	Impossible command: this query can not be processed
P0	Pause error: this command can not be processed while pause is set to 1
B0	Argument value out of bound

List of commands

- W means 'write', ie set value, available for this command if ticked
- R means 'read', ie get value, available for this command if ticked
- 'Mandatory arguments' corresponds to mandatory arguments to attach to command in R mode
- 'Arguments' corresponds to additional mandatory arguments to attach to command in W mode after the 'Mandatory arguments'
- 'Arguments' also corresponds to additional values in the answer resulting from the sent command (in W or R mode), after the 'Mandatory arguments'

Other auxiliary tables after this one.

Parameter	Mandatory arguments	Arguments	W	R	Number of characters returned	Example query	Typical answer	Note
IDN		**str:** device name		X	22	<_IDN_?	>_IDN_?|00|ROTAVALVE_	
DEVSN		**str:** SN		X	18	<DEVSN?	>DEVSN?|00|R00005	
FIRMV		**str:** firmware version		X	21	<FIRMV?	>FIRMV?|00|v01.03.01	

RESET						<RESET		**reset firmware, i.e. soft reset of the device, i.e. simulates a power off-power on which resets all volatile variable (not saved in hard memory)**
PINGA		**int:** position **int:** valve status		X	19	<PINGA?	>PINGA?|00|004:000	**valve status = 0 means no error** **(see 'valve status handling' table below)**
POSTN		**int/char:** position **int:** how to	X	X	17	<POSTN? <POSTN!:5:1 OR <POSTN!:b:0 (in recirculation mode)	Distribution mode: >POSTN?|00|11:00 OR Recirculation mode: >POSTN?|00|Xa:02 >POSTN!|00|05:01 OR >POSTN!|00|Xb:00 (in recirculation mode)	Distribution mode : position is **int** Recirculation mode : position can be **'a' or 'b'** how to **value controls the rotation to go to a position :** **0 = shortest** **1 = clockwise** **2 = counterclockwise**

SPEED		int : speed mode	X	X	14	<SPEED!:1	>SPEED!|00|01	mode 0 : slow mode mode 1 : fast mode

Valve status handling

When controlling the position of the RotaValve module (see PINGA command), a hexadecimal value representing the valve's status is accessible. '00' means that the command has been applied successfully and that the module is ready for the next instruction. The different statuses available for the valve are as follow:

Status code	Name	Description
255	**Busy**	Valve currently executing an instruction
0	**Done**	Valve available for next instruction
144	**Not homed**	You forgot the homing! Otherwise, check that you have the right port configuration and try again
224	**Blocked**	Something prevented the valve to move
225	**Sensor error**	Unable to read position sensor. This probably means that the cable is disconnected
226	**Missing reference**	Unable to find the valve's main reference magnet during homing. This can mean that a reference magnet of the valve is bad/missing or that the motor is blocked during homing. Please also check motor cables and crimp
227	**Missing reference**	Unable to find a valve's reference magnet during homing. Please check that you have the correct valve number configuration. If not, change it according to the valve you are working with. This can also mean that a reference magnet of the valve is bad/missing or that the motor is blocked during homing
228	**Bad reference polarity**	One of the magnets of the reference valve has a bad polarity. Please check that you have the correct valve number configuration. If not, change it according to the valve you are working with. This can also mean that a reference magnet has been assembled in the wrong orientation in the valve