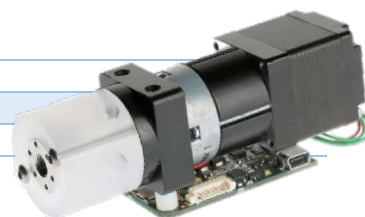


RVM – Ultra-low internal volume rotary valve DATASHEET



Environmental conditions

Operating temperature	5-40°C (41-104°F)
Humidity	20-80%, non-condensing
Max pressure	5 bars (72 psi)



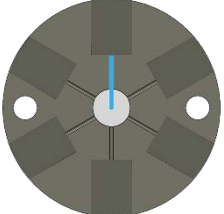
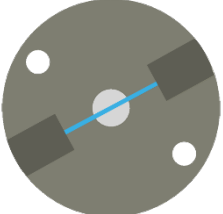
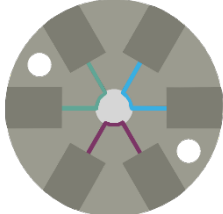
Fluidic characteristics

Tube port fittings	Standard ¼-28 UNF, flat-bottom
Wetted materials	PTFE, PCTFE
Channel diameter	0.5 mm (0.020 in) / 0.4-1 mm (0.015-0.039 in) available upon request

Mechanical characteristics

VALVE MODELS

Default model: VD1-6

Ref. #	VD1-6	V01-2	VS1-6
Name	7-PORT/6-POSITION	ON/OFF	6-PORT/2-POSITION
Liquid path			
Internal volume	2.84 µL	2.75 µL (0.5mm channels) 3.98 µL (0.75mm channels)	2.32 µL
Carryover volume	1.07 µL	0.98 µL (0.5mm channels) 2.21 µL (0.75mm channels)	0.55 µL
Dead volume	None		

For other known aliases, please refer to the corresponding website page.

Glossary reminder

Internal volume: Volume inside the system, from entrance to exit

Dead volume: Volume that is “stuck” in the system (dead end), which is not cleanly swept and relies on diffusion to clear out.

Carryover volume: volume of liquid that will be mixed with the next liquid. It is not stuck, but will be swept next time a liquid passes.

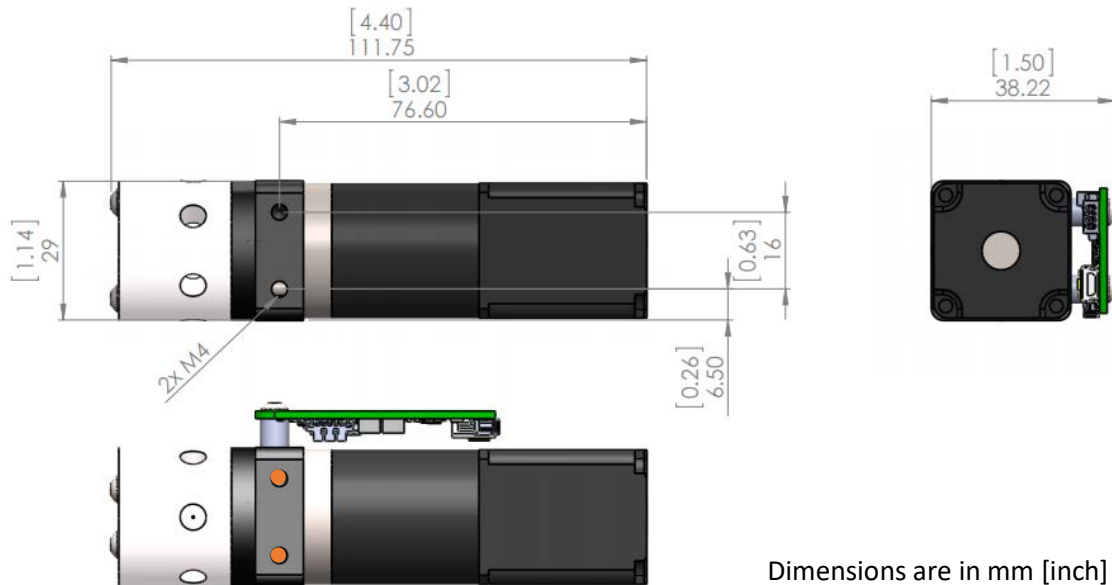
RVM – Ultra-low internal volume rotary valve

DATASHEET



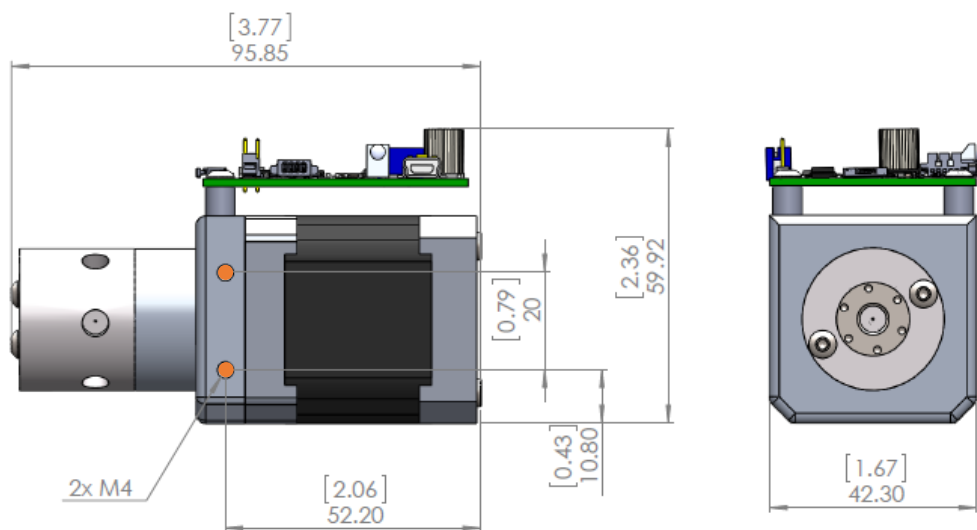
LOW POWER MODULE (Ref. P200-O)

Weight	300 g
Dimensions	29 x 38.3 x 111.8 mm
External fixation system	2x M4 screws, position shown in orange
Rotation time for 180°	1.5 s



FAST MODULE (Ref. P201-0)

Weight	650 g
Dimensions	42.3 x 60 x 95.9 mm
External fixation system	2x M4 screws, position shown in orange
Rotation time for 180°	200 ms



RVM – Ultra-low internal volume rotary valve

DATASHEET



Electrical characteristics

LOW POWER MODEL

Power	5-10 VDC, 0.5 A peak
Required cables for operation	USB mini B male to USB A male or custom cable with PicoBlade™ 6 pos. male

FAST MODEL

Power	18-24 VDC, 1.15 A peak
Required cables for operation	USB mini B male to USB A male or custom cable with PicoBlade™ 4 pos. male, and custom power cord

Communication interface

Interface	USB mini B, PicoBlade 4 pos. (other upon request)
Communication type	Serial communication on USB mini I ² C on PicoBlade™

The valve controller is seen as a virtual serial port. There is an on-board FTDI USB to serial chip, so the drivers are automatically installed on recent Windows 7 and above.

SERIAL COMMUNICATION PARAMETERS

Baud rate	115200
Data Bit	8
Parity	None
Stop Bit	1
Handshake	None
End line	<CR>

COMMANDS

A command is in the following format: `/1 + command + R + <CR>`

For example, the pump is initialised with the command Z, so the instruction to send to the pump would be `/1ZR<CR>`

A new command can only be sent once the first one is done, or if an error appears. A *status message* is always sent from the pump, so it is possible to debug the system in case of error. You will find a list of most used commands below. Please refer to the operating manual for an extensive list of commands and error codes.

Pump configuration commands

Command	Operand n range	Default value	Operand description	Command description
Z	-	-	Homing	The valve detects the number of ports + goes to a known position
O<n>	1..6	-	Counter-clockwise plug movement (valve seen from above)	Move to valve port
I<n>	1..6	-	Clockwise plug movement (valve seen from above)	Move to valve port.

Report commands

Command	Command description
Q	Current status
?6	Report valve position
?10 or F	Report command buffer status
?20 or #	Report firmware checksum
?23 or &	Report firmware version
?29 Same as Q	Same as Q (query, status and error bytes)
*	Report supply voltage (x0.1 V)
?9000	Unique ID
?9200	Detailed status of the valve

Error codes

The RVM immediately sends a response every time an instruction is sent to it. Only errors 2 and 3 can be found through this immediate response. The user must send the command Q to get the status in case of further errors.

Error byte							
Bit	7	6	5	4	3	2	1 0
Value	0	1	Status bit	0	Error code		

Status bit value	Description
X = 0	The RVM will only accept report commands
X = 1	The RVM is ready to accept new instruction

Error byte 7 6 5 4 3 2 1 0	ASCII symbol		Error	
	If X = 0	If X = 1	Code	Description
0 1 X 0 0 0 0 0	@	'	0	No error
0 1 X 0 0 0 0 1	A	a	1	Initialisation
0 1 X 0 0 0 1 0	B	b	2	Invalid command
0 1 X 0 0 0 1 1	C	c	3	Invalid operand
0 1 X 0 0 1 1 1	G	g	7	Device not initialised
0 1 X 0 1 0 0 0	H	h	8	Internal failure
0 1 X 0 1 0 1 0	J	j	10	Valve overload
0 1 X 0 1 1 0 0	L	l	12	Internal failure
0 1 X 0 1 1 1 0	N	n	14	A/D converter failure
0 1 X 0 1 1 1 1	O	o	15	Command overflow

Detailed status of the valve (see command ?9200)

Status code	Name	Description
E0	Blocked	Something prevented the valve to move.
E1	Sensor error	Unable to read position sensor. This probably means that the cable is disconnected.
E2	Missing main 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.
E3	Missing reference	Unable to find a valve's 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.
E4	Bad reference polarity	One of the magnet of the reference valve has a bad polarity. This can mean that a reference magnet has been assembled in the wrong orientation in the valve.