COMMUNICATION SETTINGS
Asynchronous communication, 9600 baud, 8bit, 1 start bit, 1 stop bit, no parity
Voltage level: 2,85V DC (Max 3,3V DC)

SERIAL PROTOCOL

Communication package:
\(<SNHi><SNMi><SNLo><NetID><ADRHi><ADRLo><R/W-AMOUNT><DATA1><DATAx><CHKSM>\)

Pump serial number:  \(<SNHi><SNMi><SNLo>\)
Pump serial number, if you wish to address a pump in a system with more than one pump these values can be set from 1 – 16777215. However, the general call is 0 which will be default.

Pump netId:  \(<NetID>\)
Can also be used to address single pumps with a value from 1-255. 0 will be used as general call and that is also the default value.

Memory address (EEPROM and RAM):  \(<ADRHi><ADRLo>\)
ADRHi uppermost 2 bits is setting for which memory type to access. Lower 6 bits of ADRHi and ADRLo byte forms the memory address.
ADRHi=00XXXXXX=RAM
ADRHi=01XXXXXX=EEPROM
Memory address pointer=(ADRHi AND 00111111)*256+ADRLo

Amount of data:  \(<R/W-AMOUNT>\)
Number of bytes to read or write to either the RAM or the EEPROM
\(<R/W-AMOUNT> = 00XXXXXX = \text{Read from memory}\)
\(<R/W-AMOUNT> = 10XXXXXX = \text{Write to memory}\)
Number of bytes to read/write is the lower 6bits + 1. So if you want to read 1byte the lower 6 bits should be 0 (0+1=1), if they are set to 63 (bin XX111111) you will read 64bytes (63+1=64).

Data bytes:  \(<DATAx>\)
Number of databytes defined in \(<R/W-AMOUNT>\).

Package checksum:  \(<CHKSM>\)
Add every byte in the package (without carry/overflow) to calculate checksum.
Response from pump:
If a read command is sent to the pump a 3 byte response will be sent. The pump will at least send an integer value and a checksum. Number of bytes is defined by the chosen amount data.

\(<\text{DATA1}\><\text{DATA2}\><\text{CHKSUM}\>

If a write command is executed the pump will answer \(<165>\) if the command was successful executed and \(<90>\) if it failed.

**SERIAL COMMANDS**

Flow control (pump frequency adjustment):
The pump frequency, and thus the flow, can be changed independently of the applied voltage. This is an important feature that enables flow control independently of supply voltage and thus a lower flow can be achieved without reducing maximum vacuum/pressure. This also reduces current consumption and the need of flow restrictors. It is both cost effective and power efficient.

Command package:
\(<0>\><0>\><0>\><0>\><1>\><126>\><129>\><\text{Lo Byte}\><\text{Hi Byte}\><\text{CHKSM}\>

The frequency is defined as a 16-bit number and is actually a delay time between each new pump stroke.

- Highest frequency/highest flow: 16-bit number = 0 (Default calibrated flow)
- Lowest frequency/lowest flow: 16-bit number = 65 535

**Example:**
\(<0>\><0>\><0>\><0>\><1>\><126>\><129>\><232>\><3>\><235>
16-bit value = 1000

Response of command was successfully written: \(<165>\)

Read firmware: \(<0>\><0>\><0>\><0>\><192>\><0>\><1>\><0>\><0>\><193>
Get the firmware version of the pump. 1 byte with the checksum of entire flash will be sent from the pump.

Stop pump:
First: \(<0>\><0>\><0>\><0>\><0>\><122>\><129>\><0>\><0>\><251>
wait for \(<165>\)
Then: \(<0>\><0>\><0>\><0>\><0>\><37>\><129>\><0>\><0>\><166>
wait for \(<165>\)

Reset pump: \(<0>\><0>\><0>\><0>\><0>\><128>\><0>\><1>\><0>\><0>\><129>
Pump start with initial start up process.