

**Sipper System**  
**for**  
**Spectrophotometer**  
**Type: P/N OD-SIPPER-02**  
**Software Communication**  
**Manual**

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## CONTROL BOARD OVERVIEW

### **General.**

Microprocessor based unit controlling a 1-channel peristaltic pump. The pump unit automatically activates a spectrophotometer (e.g. Cary 50) and is equipped with a full duplex RS-232 communication interface for remote control from a PC or equivalent.

### ***RS-232 interface specification.***

Simple ASCII strings is used for communication between the PC and the control board. All data characters transmitted and received are 7-bit ASCII code. Only upper case characters are recognized.

CR (0D Hex) is string terminator. This terminator starts command execution. Any LF (0A Hex) is skipped.

The PC is the master and the control board is only reacting when asked to do so. The received strings are used to setup and control the unit. The master **must not** send a new command before the command in progress is accepted and finished (this version doesn't use a multiple command input buffer).

The communication is as close as possible to earlier Magnatek controllers. To select which logical unit is transmitting/receiving, a "device" identifier is introduced. The first character in each command line always is the device identifier:

- C Communication unit
- M Motor unit
- P Port unit
- S Status unit
- T Timer unit

Commands and responses may be mixed. The control board sorts commands at the input.

### **RS232 Transmission parameters.**

Type : Serial RS232  
Baud rate : 9600  
Data bits : 7  
Parity : Tx: Space Rx: Ignored  
Stop bits : 1  
Handshake : Tx: None Rx: None

### **RS-232 Cable connections.**

See hardware description manual.

## ASCII STRING DESCRIPTIONS

### COMMUNICATION UNIT

#### General.

The communication logical unit controls the RS-232 communication parameters, e.g. use of checksum etc.

#### C.....Command control.

- Enable/Disable receive checksum control. Checksum is always sent from the control board.
- Enable/Disable RS232 character echo (for service purposes only).

DEFAULT: No receive checksum check, and No echo.

#### No. Code Description

1	'C'	Device identifier, Communication unit.
2	'C'	Command identifier
3	x	Checksum control. '0' = Disable checksum. '1' = Enable checksum.
4	x	RS422 echo control. 'E' = Set Echo on. 'N' = Set No echo.
5	xx	2 digit hex checksum (1 byte)
7	CR	End of command.

### MOTOR UNIT

#### General

The motor unit controls motor start, stop (and reverse).

If Start or Flush key on top of the pump is activated, or a motor run command is issued, while motor is on, the pump is stopped immediately. This condition may be read using Get Mode Status command.

#### F.....Forward.

Activate pump Aspiration or Flush (forward).

#### No. Code Description

1	'M'	Device identifier, Motor unit.
2	'F'	Command identifier F = Forward
3	A or W	Command identifier A = Aspiration W = Flush time
4	xx	2 digit hex checksum (1 byte)
6	CR	End of command.

## H.....Halt.

Stop the pump immediately.

No.	Code	Description
1	'M'	Device identifier, Motor unit.
2	'H'	Command identifier H = Halt
3	xx	2 digit hex checksum (1 byte)
5	CR	End of command.

## **PORT UNIT**

### **General.**

The port logical unit controls the input/output ports.

## I/E.....Internal/External key control.

Set Internal/External inputs active or inactive (buttons on top/external input connector).

**Emergency stop:** If Internal keys (on top of the pump) is activated while the pump is running, the motor is always stopped even if Internal keys are set inactive.

No.	Code	Description
1	'P'	Device identifier, port unit.
2	'I' or 'E'	Command identifier, Internal/External keys.
3	'1' or '0'	Enable/Disable
4	xx	2 digit hex checksum (1 byte)
6	CR	End of command.

## G.....Get Internal/External key status.

No.	Code	Description
1	P	Device identifier, port unit
2	G	Command identifier
3	'I' or 'E'	Internal/External keys
4	xx	Checksum
6	CR	End of command.

## Get key status response TRANSMITTED:

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'P'	Device identifier, x-ray unit.
2	'G'	Command identifier
3	'I' or 'E'	Internal/External keys
4	x	Key mode '0' = Key inputs inactive '1' = Key inputs active
5	xx	Checksum
6	CR	End of status.

## **STATUS UNIT**

### **General**

The status logical unit reports status information.

### *E.....Error Status request (System Errors)*

Read microprocessor system error message and clear all system error flags.

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'S'	Device identifier, Status unit.
2	'E'	Command identifier
3	xx	2 digit hex checksum (1 byte)
5	CR	End of command.

## Error Status response TRANSMITTED:

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'S'	Device identifier, Status unit.
2	'E'	Command identifier
3	xx	2 digit hex System Error code. All bits 0 = = OK. bit 7 = Stack error. bit 6 = Undefined. bit 5 = EEPROM error bit 4 = Undefined bit 3 = Soft watch reset (time-out) bit 2 = PC status request watchdog timeout. bit 1 = CPU internal watchdog reset (undefined). bit 0 = CPU Reset or Power fail.
5	xx	2 digit hex checksum (1 byte)
7	CR	End of command.

## M.....Get Mode status

Read Sipper Pump run mode and clear error bits.

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'S'	Device identifier, Status unit.
2	'M'	Command identifier
3	xx	2 digit hex checksum (1 byte)
5	CR	End of command.



## Mode Status response TRANSMITTED:

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'S'	Device identifier, Status unit.
2	'M'	Command identifier
3	xx	2 digit hex mode status. <u>Bit 7,6,5,4 indicates an error (bit coded).</u> <u>All bits 0 == OK.</u> bit 7 = Mode Error. bit 6 = Start/Flush command while motor on. Motor stopped. bit 5 = Undefined bit 4 = Undefined  <u>Bit 3,2,1,0 indicates mode (number).</u> 00 = Standby 01 = Pump running, aspiration 02 = Delay active 03 = Pump running, flush
5	xx	2 digit hex checksum (1 byte)
7	CR	End of command.

## V.....Version Report

Get software version and date stamp. An ASCII string is returned.

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'S'	Device identifier, Status unit.
2	'V'	Command identifier
3	xx	2 digit hex checksum (1 byte)
5	CR	End of command.

## Version request response TRANSMITTED:

<u>No.</u>	<u>Code</u>	<u>Description</u>
1..9	FP_19990415	Version dated 15-04-1999 (FP_yyyymmdd)
10	CR	End of command.

## **TIMER UNIT**

### **General**

The timer unit controls the timer values.

Timer, set value

#### A/D/W.....Timer, set value.

Set Aspiration, Delay or Flush timer value.

Parameters: Timer value 0.1 to 300.0 seconds accepted.

#### No. Code Description

1	'T'	Device identifier, Timer unit.
2	A, D or W	Command identifier A = Aspiration D = Delay time W = Flush time
3	xxxx	4 digit hex Timer value, sec. x 10, i.e. 10.0 sec. = 0064 hex.
7	xx	2 digit hex checksum (1 byte)
9	CR	End of command.

#### A/D/W.....Timer, get value.

Read Aspiration, Delay or Flush timer value.

#### No. Code Description

1	'T'	Device identifier, Timer unit.
2	'G'	Command identifier
3	A, D or W	Command identifier A = Aspiration D = Delay time W = Flush time
4	xx	2 digit hex checksum (1 byte)
6	CR	End of command.

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## Timer get value response TRANSMITTED:

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	'T'	Device identifier, Timer unit.
2	'G'	Command identifier
3	A, D or W	Command identifier    A = Aspiration D = Delay time W = Flush time
4	xxxx	4 digit hex Timer value, sec. x 10.
8	xx	2 digit hex checksum (1 byte)
10	CR	End of command.

## General software specification.

### **General reply on commands, ALL logical units.**

Message from control board to PC telling that it has understood/not understood the message from the PC. This message is **always** send to PC as a receipt (in get status commands sent before the status string is returned).

<u>No.</u>	<u>Code</u>	<u>Description</u>
1	x	Device identifier, C, P, S, T etc.
2	x	Message: '\$' = Command OK '?' = Command not OK
3	CR	End of message.

### **Checksum**

Checksum is the 8-bit sum of the ASCII values transmitted.  
The 2 checksum and the CR characters are not used in the calculation.

```
Checksum:= 0;  
for I:= 1 to (Length(ASCIIString) - 3) do  
    Checksum:= CheckSum + ASCIIString[I];  
ChecksumByte:= byte(CheckSum);
```

### **Default values**

The timer values are preset from factory. To reset the unit to these values follow the procedure below:

- Switch off the Sipper Pump.
- Press and hold Start and Flush buttons activated while switching mains power on.
- The Sipper Pump transmits: "INIT SETUP EEPROM, DONE !"
- Depress Start and Flush buttons.