Spetec

Laminar Flow Systems

Datasheet for the
External control unit interface
V 1.5

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1 Introduction

This datasheet describes how the Spetec laminar flow systems are controlled via an external control unit (e.g. a PLC). This allows for things such as turning the system on automatically on a schedule at the beginning of production, or automatically running a flow profile without input from the operator.
The interface features potential isolation so that different ground states between the system and the external control unit have no effect.

2 Control

2.1 Functions

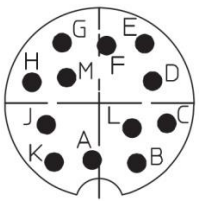
The following functions of the laminar flow systems can be controlled via the interface

- Power on/off
- Lights on/off
- Increase/decrease flow by one level

The following states can be read

- Power is on/off
- Lights are on/off
- Filter replacement is necessary
- A fault has occurred (fans are not turning)

2.2 Connector



Pinout diagram of the plug (from the solder side)

The connector is implemented as a round plug, Lumberg type WSV120.

2.3 Interface

Details of the interface connections

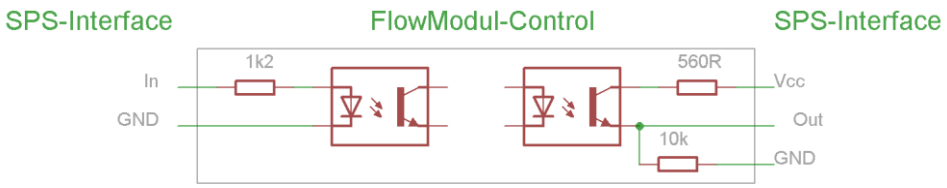
Pin	Signal	In/Out	Level	Description	Cable colour
A	ON/OFF	In	high impulse	Turns the system on or off through a change in the state	purple
B	LIGHT_ON/OFF	In	high impulse	Turns the system lights on or off through a change in the state	green
C	FLOW+	In	high impulse	Increments the flow level by 1	yellow
D	FLOW-	In	high impulse	Decrements the flow level by 1	black
E	ERROR	Out	high	Fans are not turning (1)	orange
			low	Fans OK	
F	FILTER	Out	high	Filter replacement is necessary (2)	brown
			low	Filter OK	
G	LIGHT	Out	high	The lights are turned on.	white
			low	The lights are turned off	
H	POWER	Out	high	The system is turned on.	gray
			low	The system is turned off	
J	VCC		12-24V	Operating voltage, 12...24V	red
K	GND		Ground	Interface ground potential	blue

Please note:

(1) ERROR is activated for 3-5 seconds (high) when the system is turned on. This doesn't indicate a fault as long as ERROR is deactivated after this period.

(2) Intermittent activation indicates that the main filter is getting clogged. Multiple or permanent activation indicates that the main filter must be replaced.

2.4 Connection of In- and Outputs



Please note:

- Common Ground Reference is GND (Pin K)
- Maximal voltages and levels must not exceed the electrical spezification

3 Specification

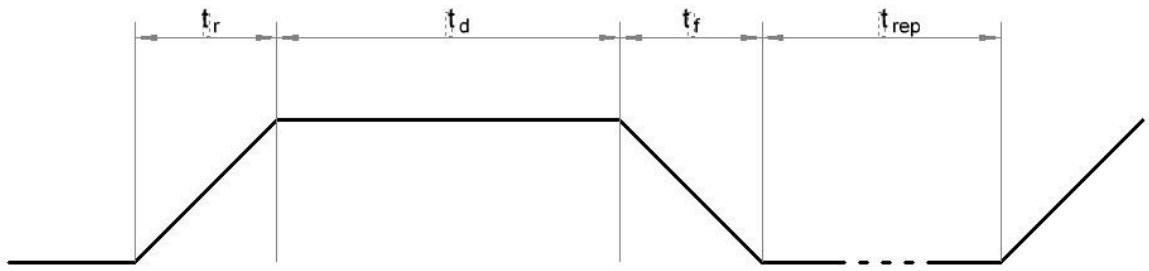
3.1 Electrical Data

	Conditions	min	type	max	Unit
General					
Operating voltage V_{cc}		11	12 or 24	25	VDC
Total current draw (1)	V_{cc}=12V			14	mA
	V_{cc}=24V			24	
Inputs					
$I_{in, high}$		8		20	mA
$I_{in, low}$				0.5	mA
$U_{in, high}$		10		25	V
$U_{in, low}$				1	V
Outputs					
$I_{out,max}$				-20	mA
$U_{out, high}$	I_{out}=-1mA	V_{cc}-2.3		V_{cc}-2.0	V
	I_{out}=-10mA	V_{cc}-5.4		V_{cc}-4.9	V
$U_{out, low}$	$I_{out, max}$=-100uA		0,1	0,2	V

All voltages levels are relative to the connector GND

1) Only one input activated at a time, approx. 10ma per input

3.2 Timing



		min	type	max	Unit
Rise time	t_r			500	µs
Duration (1)	t_d	20		100	ms
Fall time	t_f			500	µs
Repetition Time (2)	t_{rep}	20			ms

(1) The maximum duration t_d time must not be exceeded!

(2) The repetition time t_{rep} also applies to sequential control of different inputs

4 Programming

During programming, please note that

- The maximum duration time t_d must not be exceeded!
- Simultaneous switching of more than one of the inputs is prohibited, since this would prevent clear detection of the system signals. All signals must be switched sequentially.
- Despite the external control unit, operation of the system via the control panel buttons and manual modification of the flow level is still possible. Therefore, a definitive flow level must be set first if the control unit is used to set a defined flow level. This is achieved by switching the FLOW+ or FLOW- input at least seven times. Then the level to be set can be selected from this state.
- When the system is turned off, all output signals are automatically set to high.

4.1 Programming examples

Note: CHECK(...) stands for reading the respective output

Example 1:
Turning the system on and selecting flow level 1

```
If(CHECK(POWER) == low)
{
        ON/OFF
        7x FLOW-
}
```

Example 2:
Changing the flow level to 5, turning the lights on

```
If(CHECK(POWER) == high)
{
        7x FLOW+
        3x FLOW-
        If(CHECK(LIGHT) = low)
        {
                LIGHT_ON/OFF
        }
}
```

Example 3:
Turning the system on, selecting flow level 5, turning the lights off

```
If(CHECK(POWER) == low)
{
        ON/OFF
        7x FLOW+
        3x FLOW-
        If(CHECK(LIGHT) = high)
        {
                LIGHT_ON/OFF
        }
}
```

Example 4:
Turning the lights and system off

```
If(CHECK(POWER) == high)
{
        If(CHECK(LIGHT) = high)
        {
                LIGHT_ON/OFF
        }
        ON/OFF
}
```

5 Version overview

Ver.	Date	Name, description
1.00	12.11.2012	BachlC
1.10	09.07.2013	Brandl, translated, 1.Freigabe
1.20	20.11.2014	BachlC, some minor changes in 2.3 und 3.2
1.30	12.05.2015	Kölbl, cable color expanded in 2.3
1.40	25.02.2016	BachlC, connection of In/Outputs inserted
1.5	09.07.2020	Brandl, Programming examples adapted