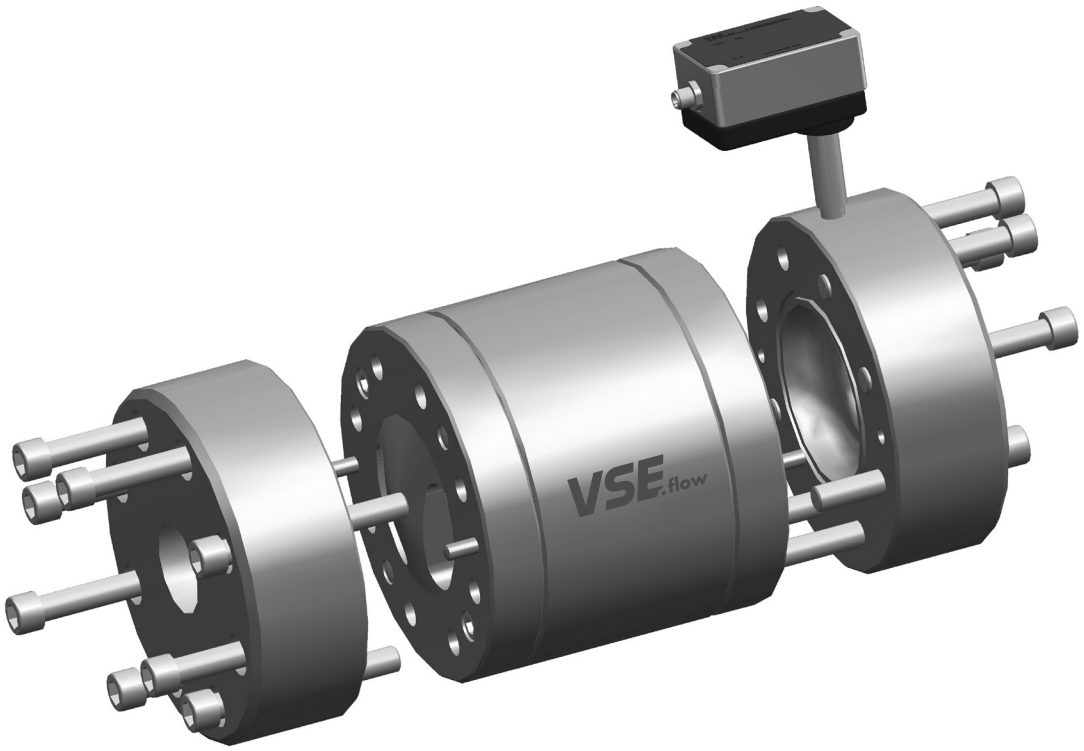
VSE flow measurement

OPERATING INSTRUCTIONS
IPF switching function of the RS Series



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Contents

Important basic information

Dear customer, dear user,

These installation and operating instructions should provide you with the information you need to properly install and commission the flow meter. Installation, commissioning and testing are to be performed by trained and qualified personnel only. These operating instructions must be read and applied carefully to ensure proper, trouble-free and safe operation of the flow meter. VSE is not liable for any damage incurred resulting from not complying with the instructions in this operating instruction. It is not permitted in any case to open the device.

These operating instructions for flow meters of the series "RS" from VSE must be stored, so that they can be read by the group of authorized personnel at any time. Chapters may not be taken of these instructions at any time. A missing operating instructions manual or missing pages must be replaced immediately. VSE can supply you with new instructions or you can download the operating instructions from the internet (www.vse-flow.com). The operating instructions must be given to each subsequent user of this product.

Legal information

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If the device has been opened, modified or incorrectly connected to the electrical circuits, the guarantee of VSE Volumentechnik GmbH for safe operation is void. VSE Volumentechnik GmbH is not liable in any way for personal injuries or damage to goods resulting from improper installation or improper operating of the flow meter.

Stand: November 2012

• Description of the IPF switching function

In hydraulics, process engineering and in the test bay the user often has high demands on the bandwidth of the flow ranges, which are required for the individual processes.

It is usually the case that several flow rate sensors are required for these processes because not all measurement ranges can be covered by one single volume sensor. The larger sizes supply too little information in the low flow ranges whereas the smaller sizes are unsuitable for higher flow ranges due to their mechanics.

A volume sensor with interpolation, such as from the VSI series, can also lead to problems in the subsequent evaluation process. The necessary pulse count may be ideal for the low ranges but the evaluation unit connected is often not designed for the high number of pulses in the higher flow ranges. The frequencies generated by the flow rate system lie above the input frequencies the evaluation can process, which means that any further results are flawed and, correspondingly, the measurement becomes unusable.

In each of the cases described above there is a problem with the required number of pulses and with the resolution for the respective flow range.

This problem can be solved using the IPF switching function of the RS series. This function allows the user to specify explicitly an appropriate interpolation factor (IPF) for two flow ranges. The interpolation factor switching point is saved once during the first operation by means of a so-called teaching function. Switching is then performed automatically during subsequent normal operation. The status of the IPF activation is signalled via the third signal line (Channel 3). The potential on this channel changes equivalently with the switching of the interpolation factor.

Using this feature, a high interpolation factor for the low flow range and a low interpolation factor for the higher flow range can now be used. The switching over takes place at the point of the „taught" flow value and is signalled by the level of the third channel. Using this signal the evaluation receives, for example, via a digital or an analogue input, the information as to which pulse value and which interpolation factor is currently active. The evaluation is then to be adjusted and programmed accordingly.

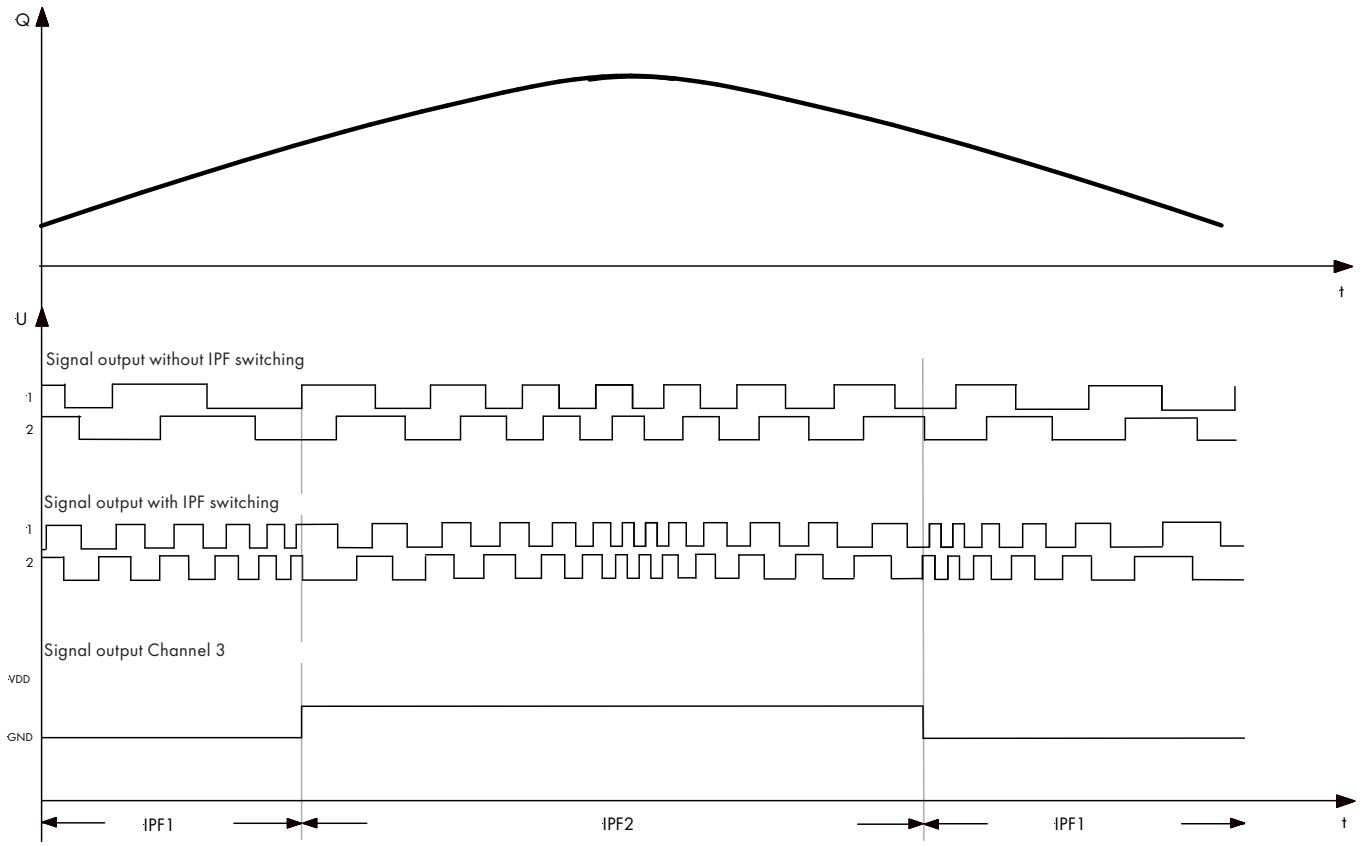


Figure 1: Switching of the interpolation factor in IPF switching mode.

• Teaching function

With the measurement during the teaching function, however, the flow oscillations in the system are also taken into account and a switching hysteresis is calculated.

This switching hysteresis contains two switching points instead of only one fixed switching point.

The first switching point, analogous to the level of oscillation, lies above the fixed switching point, and the second below it.

The first switching point activates the second interpolation factor (IPF2) for the higher flow range. If the flow falls short of the second switching point, which lies below the fixed switching point, then the interpolation factor changes again to the first interpolation factor (IPF1). With this an undesirable change between the two interpolation factors within the range of the switching flow is avoided.

• Analogue processing using the evaluation unit "A341"

The conversion of the pulse frequency into an analogue measured value happens more accurately and quickly due to the high number of pulses.

VSE, with the evaluation equipment "A341", offers an appropriate solution with which an analogue output for both measurement ranges can be made available with the appropriate interpolation factors.

Using the signal of the third channel the analogue output range is updated and matched to the input frequency.

Although the switching points are visible on the analogue output, the reaction time and the quality of the analogue conversion are, however, exactly as with the digital evaluation, increased considerably by the high resolution of the IPF switching.

The measurement of the application is thus more flexible as any other means of measurement for a large flow bandwidth become unnecessary, and, due to the high resolution, the measurement is more accurate and quicker.

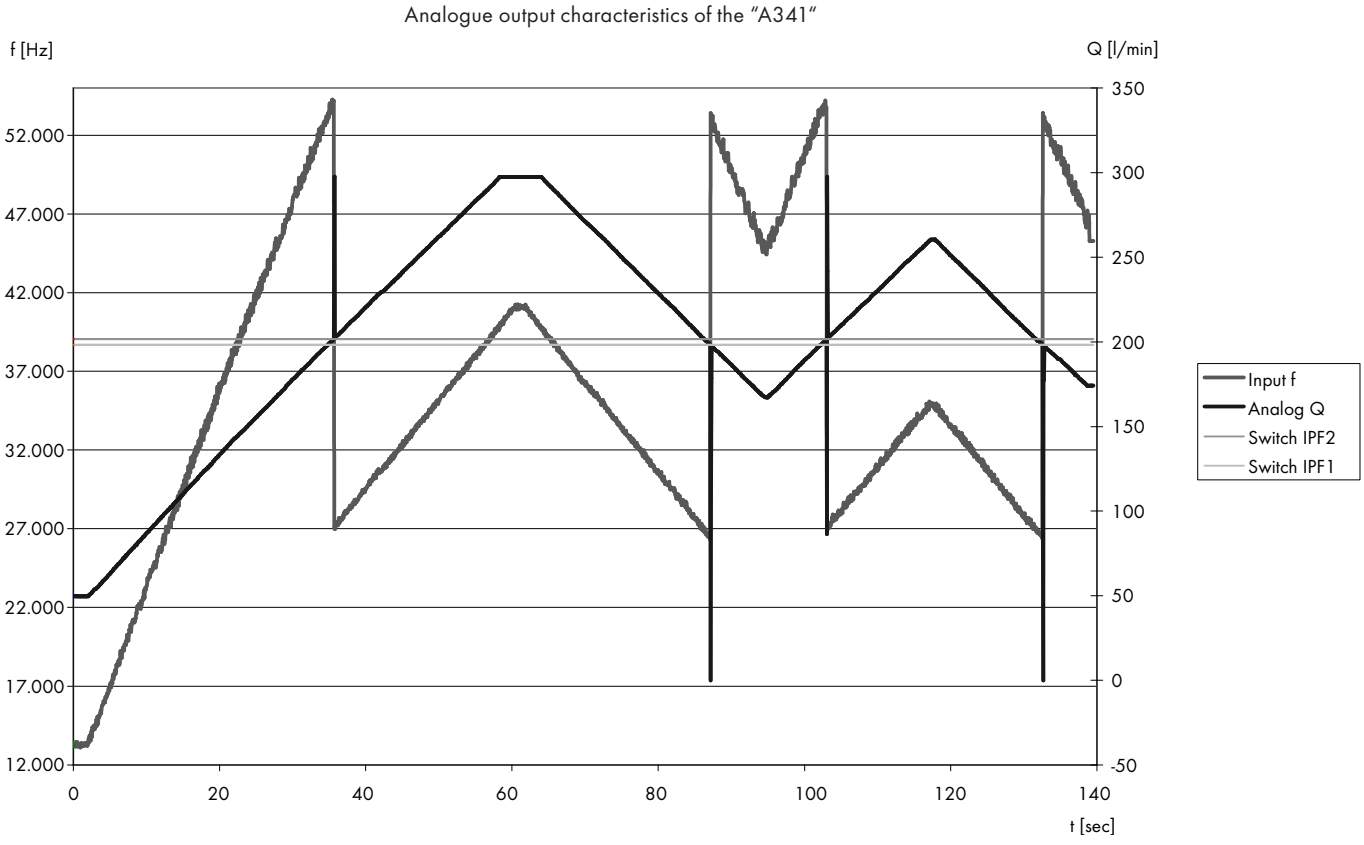


Figure 2: Analogue processing using the "A341"

• Implementation of the teaching function

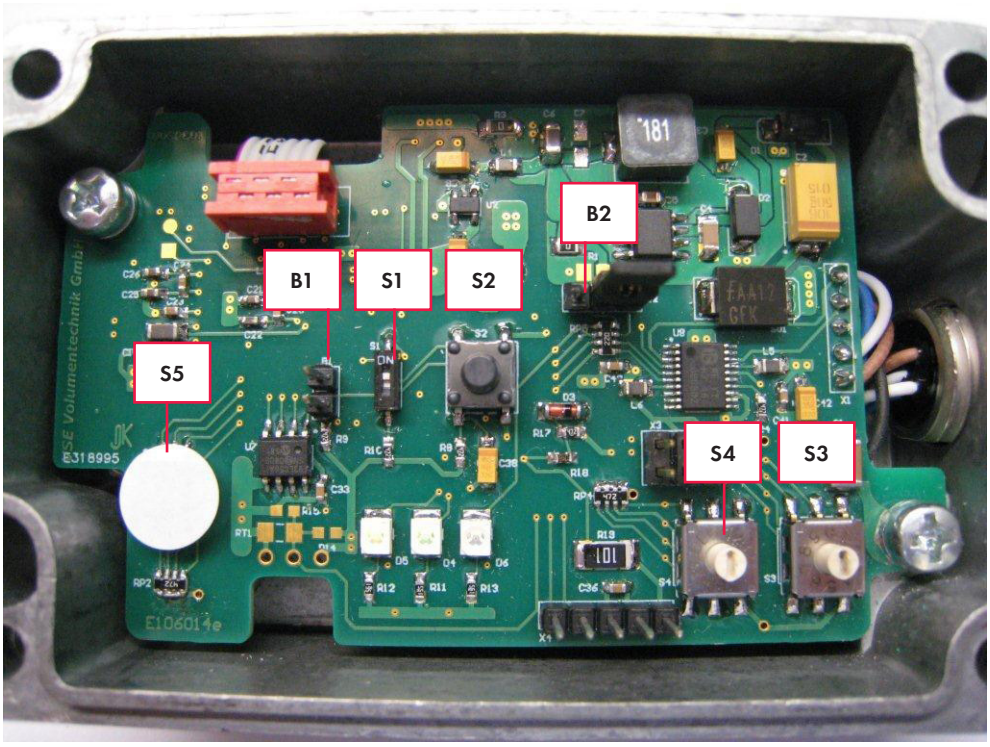


Figure 3: Electronics of the RS series

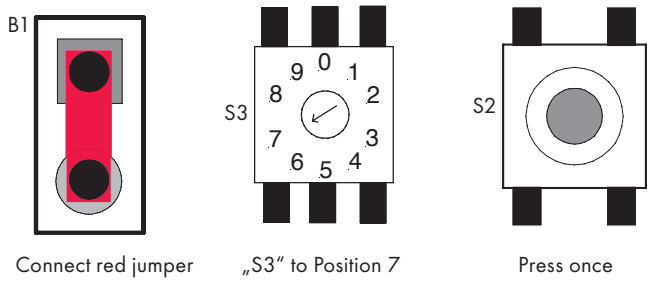
Adjustment of the switching frequency and of the switching flow

1. For the implementation of the IPF function and its settings, the red jumper lead is first plugged into bridge circuit „B1". This jumper must remain affixed even for the further operation in IPF switching mode.

In addition, the code switch „S3" must be set to Position 7.

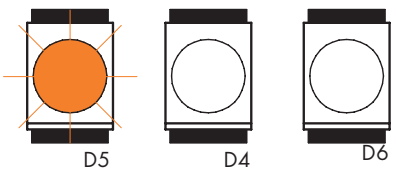
If these settings are carried out, the IPF setting mode is activated by a single press of the key „S2".

The yellow LED blinks while the other two remain switched off.



IPF setting mode activated

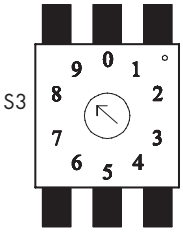
The yellow LED blinks



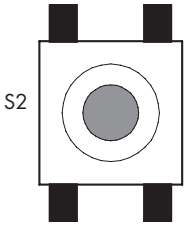
IPF1 is to be set

2. Now the first IPF factor can be programmed for the lower flow range. For this the code switch „S3“ is to be set to the desired position of the respective IPF factor and the key „S2“ is to be pressed once.

After the key has been pressed, the green LED lights up and the electronics read in the first IPF value (IPF1).



S3 to the desired position of the IPF1

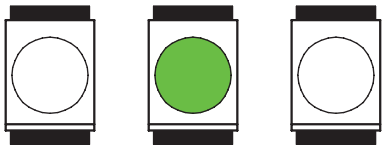


Press S2 once

Switch setting „S3“	Interpolation factor „IPF“
0	1
1	2
2	5
3	10
4	25
5	32
6	50
7	64
8	100
9	128

First IPF1 set

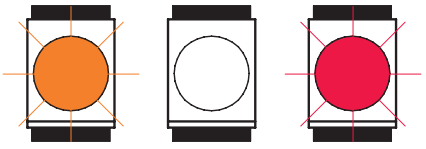
Green LED lights up once.



IPF1 is read in

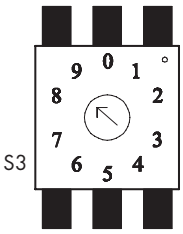
3. Following the programming of IPF1 the LEDs signal that the setting of the second interpolation factor IPF2 for the higher flow range can now take place. The yellow LED and the red LED blink.

Yellow and red LED blink.

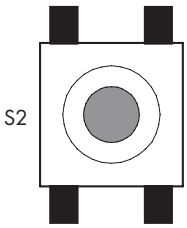


IPF2 is to be set

4. The programming of IPF2 takes place in the same way as the programming of IPF1. First, set the switch S3 to the position of the desired IPF2 and acknowledge this with the S2 key. Again, the green LED lights up once.



S3 to the desired position of the IPF1

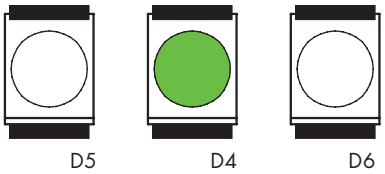


Press S2 once

Switch setting „S3“	Interpolation factor „IPF“
0	1
1	2
2	5
3	10
4	25
5	32
6	50
7	64
8	100
9	128

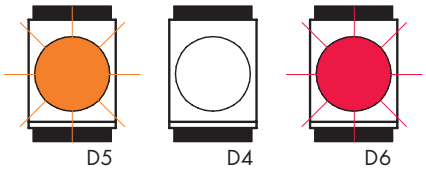
Second IPF2 set

Green LED lights up once.



5. After this, the LEDs signal that now the appropriate flow at which the interpolation factor is to switch over automatically, is to be set.

The yellow LED blinks and the red LED lights up constantly.



The flow for the switching point is to be set.

6. The flow must lie within the permitted range.

	Flow range
RS100	6,5 ... 100 l/min
RS400	35 ... 400 l/min
RS800	110 ... 800 l/min
RS2500	420 ... 2500 l/min

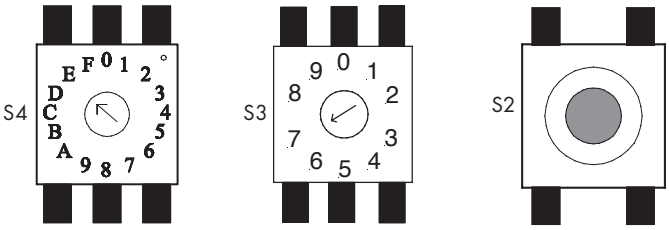
7. Once the system is set to the appropriate flow, the code switch S3 must then again be set to Position 7. This is important in order that the parameters are saved and the interpolation switching mode is active in further operation.

In addition, at this point the level of the pulse filter should be determined at code switch S4. The pulse filtering is set by volume, i.e. this is independent of the interpolation factor IPF.

When the two code switches are set, pressing the S2 key starts a measurement of the flow. During this measurement the yellow and the green LED light up.

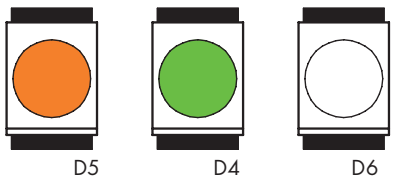
If the measurement takes place correctly and if the S3 is on 7, the electronics goes directly over to switching interpolation mode.

The yellow LED and the red LED (IPF2 active) now remain constantly lit. Should errors occur, the red LED alone lights up briefly and the electronics switch back again to Point 1, i.e. the yellow LED blinks and the IPF1 is to be set.



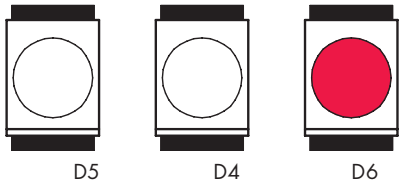
S4 set to filter level | S3 to Position 7 | Press once

Measurement of the switching point and saving of the parameters.



LED status during the flow measurement

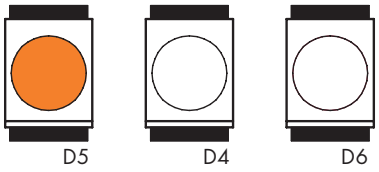
Flow measurement in progress



Error during the flow measurement or switch position at S3 not on 7

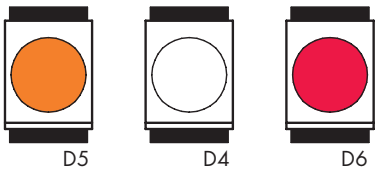
Error in the flow measurement or switch setting S3 is incorrect

8. When in operation, the red LED or the signal on channel 3 signals the appropriate active IPF. If the LED is off or the output signal is on „low", IPF1 is active. If the interpolation factor switches from IPF1 to IPF2 then the red LED lights up and there is a high signal on the third channel.



Interpolation factor of the lower flow range active (IPF1).
Channel 3 is at „low" potential.

Signalling of the lower flow range using IPF1

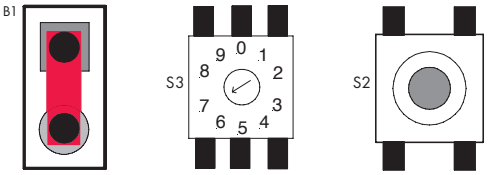


Interpolation factor of the upper flow range active (IPF2).
Channel 3 is at „low" potential.

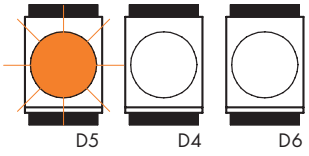
Signalling of the upper flow range using IPF2

• Summary

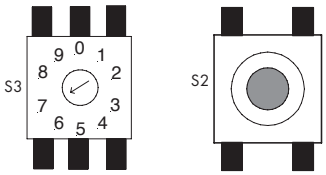
- Set jumper B1
- Set S3 to Position 7
- Press key S2 once



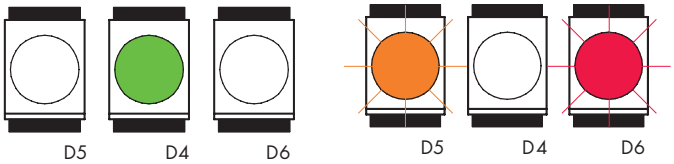
- The yellow LED blinks
- IPF1 is to be set



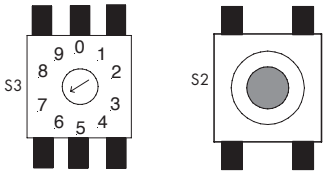
- Set IPF1 via switch S3
- Press key S2 once



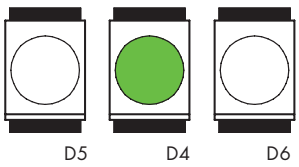
- IPF1 is read in (green LED lights up);
- Yellow and red LEDs blink and IPF2 is to be set

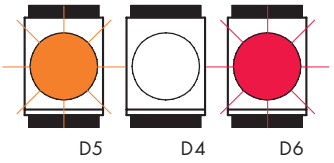


- Set IPF2 via switch S3;
- Acknowledge once using key S2

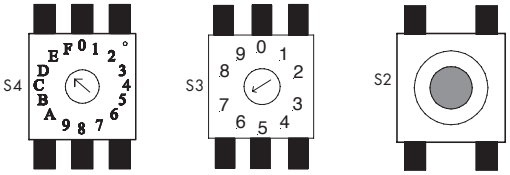


- IPF2 is imported (green LED illuminates);
- The yellow LED blinks and the red LED lights up.

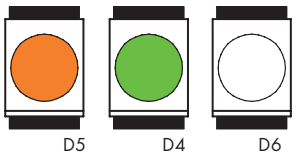




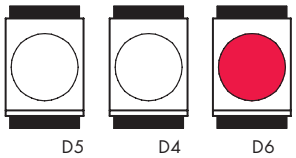
The system is now to be operated using the switching flow in order to implement the teaching function.
In order to do so:
- Set filter level via S4;
- Set S3 again to Position *7*;
- Press key S2 once



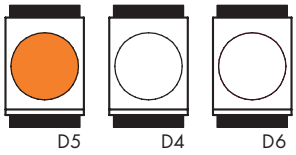
- Teaching function is implemented;
- Frequency of the switching flow is read in



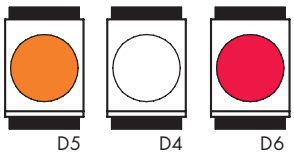
Signalling of an error
- S3 not at Position *7*
- Flow range is not permitted



Signalling of the active IPF2 for the upper flow range



Signalling of the active IPF1 for the lower flow range



- **Notes**

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