

SYSTEM 3000 / 4000

UV-RADIATION PYROMETER SPM U16W

OPERATING INSTRUCTIONS

EDITION: TB U16W-SZ1

UV-Radiation Pyrometer SPM U16W

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1. Application

To allow an efficient and automatic process control, complete information concerning the precise position of the main burning zone on the grate is essential. Only this would guarantee a direct distribution of primary and secondary air and a consideration of grate velocity and heating value of the input material. The aim is a reduction of CO and NOx and an even distribution of emission to operate the gas cleaning devices to an optimum. An optimal detection of the main burning zone should therefore consist of individual systems, placed at optimal locations. The resp. grate can be separated into individual zones observed by a single scanner, furnishing a special intensity of signal.

The sum of all scanners create a 3-dimensional picture of the main burning zone on the grate. The results achieved depend on the number of scanners used. Such a solution is given by the UV-radiation pyrometer SPM in combination with the flame amplifier ORFEUS 3001 MS or ORFEUS 3001 DMS. This system realizes a complete fire diagnosis for the support of a fire control system. The main application field is for grate and fluidized bed incineration.

2. Function

The SPM utilizes the integrating UV radiation analysis. An optical lens collects the flame radiation and leads it to an UV-sensor with special filters to pass chosen wavelengths only. The radiation within the range 350-550 nm is converted to an electrical signal. Because the radiation of the flame is rising with an exponent of 2 to 4 of the temperature, the SPM processes the signal with a logarithmic characteristic field. This guarantees a very wide dynamic scanner range. For this reason, the SPM can be used in each zone and each intensity of the incineration process.

The SPM does not correct the emissions of the flame or linearize the temperature sensitivity. The SPM uses the flame radiation not as a temperature- but as an intensity signal.

The user may adjust offset and gain locally by himself. This shows why the SPM is suited for many solutions. The time for signal conditioning can be adjusted too. This gives a correct adjusting to the process control unit.

The SPM gives a digital coded output signal to the flame amplifier which transfers this signal to a 4 to 20 mA signal. If the 3001 DMS has been chosen the adjustment is supported by an additional digital display. The flame amplifier checks the signal and informs about disturbance/failure. For external diagnosis two potential free outputs are available.

For further information refer the instruction manual of the flame amplifier.

3.Mounting

The SPM is mounted to a viewing tube with sufficient diameter. The diameter of the viewing tube depends on the length of the tube and the viewing angle of the SPM used. The viewing angle of the SPM U16W is 16 degrees. The following diagram indicates the diameter of the viewing tube. The SPM is supplied with a fast coupling device with a 1" connection according to DIN ISO 228. The SPM can be mounted directly to the viewing tube

To support the adjusting of the viewing direction the use of a ball flange is recommended. If the maximum operating temperature of 60 C will be exceeded, a heating insulator is recommended. For cooling and cleaning of the lens the SPM has 1/2" coupling for purging air. The volume of the purging air should be 10-15Nm³/h.

Diameter in inch/mm	length in cm
1/25,4	15
1,5/38,1	20
2/50,8	25
3/76,2	30
4/101,6	40

Attention: In the event that penetration of hot or poisoned gas may be possible due to a removal of the SPM from the fast coupling device, the 1/2" coupling has to be closed and a valve should be integrated into the viewing

pipe. A 3-way valve is recommended to continue the maintenance of the purging air and to ensure the cooling of the whole device.

The mentioned devices can be supplied by BFI Automation.

4.Installation

The SPM is equipped with a sturdy standard industrial plug-in connector. To prevent external influence to the signal transmission between SPM and flame amplifier the use of the special cable type KW5 is recommended. It has a double high frequency shield with 6 single strands, two of which are specially shielded data-cables. Nevertheless, the following important instructions should - by all means - be adhered to when the cable is installed:

The cable should be separated from high voltage ignition- and main lines and should not be installed in parallel to such cables for long distances.

The high frequency shield should be low-impedance connected to the SPM via the housing of the plug-in connection.

The cable should not be cut-off at the terminal block.

The cable should be mounted according to the connecting plan and in conformity with the VDE-terms and regulations.

The SPM is ready for operation immediately. A pre-heating phase is not necessary. The adjustment of the measuring range and the operating point takes place in the SPM. The fine tuning is done with the aid of the flame amplifier.

The housing of the SPM is potential free.

The SPM is a solid state electronic device. No wearing parts are used. The device is maintenance-free.

By using the special cable KW 5, the distance between the SPM and flame amplifier can be up to 1000 m. A measuring adapter can be mounted into the signal connection. Due to this the measuring of the impulse-rates with the amplifier ORFEUS 3103 will be supported thus achieving an indication of the radiation intensity. This on-line measuring does not effect the function of the equipment and supports a fine tuning.

5. Basic Adjustment

After correct installation and electric connection, the radiation pyrometer is ready for operation immediately.

For the adaption to the resp. task, three parameters can be adjusted at the device independently from each other.

- the Gain
- the Offset
- the Integration Time

The functioning of the gain and offset can be taken from the output characteristics.

Each offset chosen for the fade out of the background signal, results into 10 fan-out curves for the gain. In case of strong amplification (gain = 9) the radiation energy is already achieved through a slight change to the maximum output signal of the SPM.

In case of considerable differences in the radiation energy resulting from the chosen lay-out of the SPM, it is recommended to chose a slight amplification only, thus achieving a slighter increase. The radiation energy can then be displayed over more than 6 decades (120 dB = 100.000)

By using the time information of the SPM output signal the adaption to the available control system and the dynamic potentiometer is easily achieved. In case that immediate SPM reaction to a speedy change of radiation should become necessary, a shorter adjustment time should be chosen. For potentiometers with a longer time delay it would be advisable to use a slow-changing output signal achieved by a longer SPM integration time

The available time factors can be taken from the stated below diagram:

DIP-Switch				Time [s]	Time [s]
1	2	3	4	0 - 90 %	0 - 99 %
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	110	220
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10	20
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4,9	9,8
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,1	2,1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0,54	1,1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0,33	0,65

The radiation pyrometer is manufacturer adjusted to an average gain of

(2) and an offset of min (9).

The max. time factor has been pre-setted (DIP-switch 1-4 On) Should this basic adjustment not be sufficient a resp. parameterizing of the SPM should be made.

The pre-set time should not be changed first-off since the large

manufacturer's time factor makes it more easy to read the output signal.

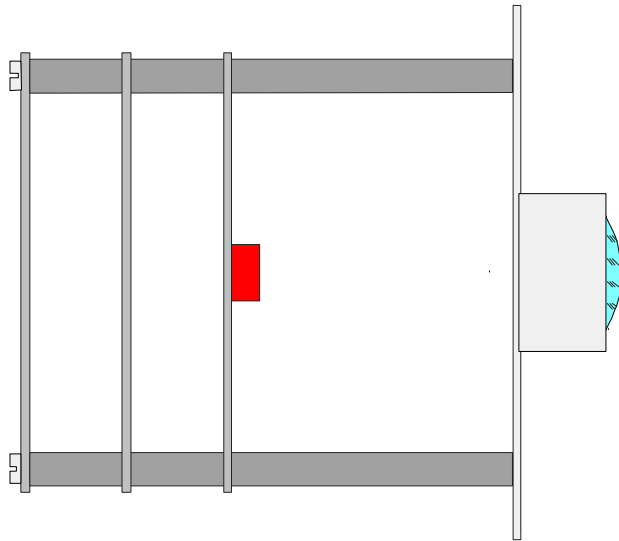
The offset should be adapted to the undesired background signal. A 10 step switch is available for this. As soon as the required setting is achieved by means of the output characteristics, the gain setting is selected the same way. Finally it is possible to reduce the preset-time in order to adapt to available control circuits. (refer to the a.m. diagram)

The unit must be opened to reach the described adjuster. Disconnect the SPM from the cable connector and remove from the purging air flange. Place the radiation pyrometer on an even base and loosen the 4 screws from the lens holder. The complete chassis can simply be removed from the housing now. It consists of a multi-layer construction, whereas the adjuster is situated at the rear printed circuit.

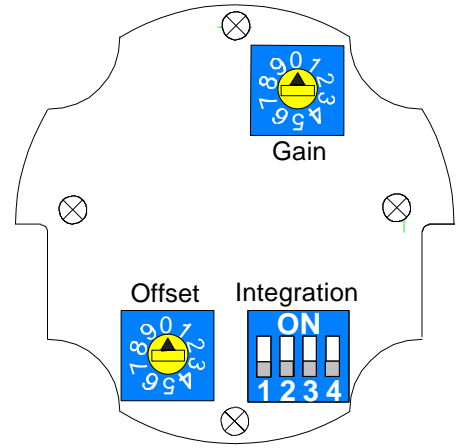
(as illustrated below) By means of the switch an adjustment to the required position is to be made (ref. to the output characteristics by switching the SPM sensivity to pos. 1)

The chassis can then be replaced again whereas the correct fitting should be ensured. By securing the electronics to the lens holder by means of the screws, the radiation pyrometer is ready to be mounted and connected.

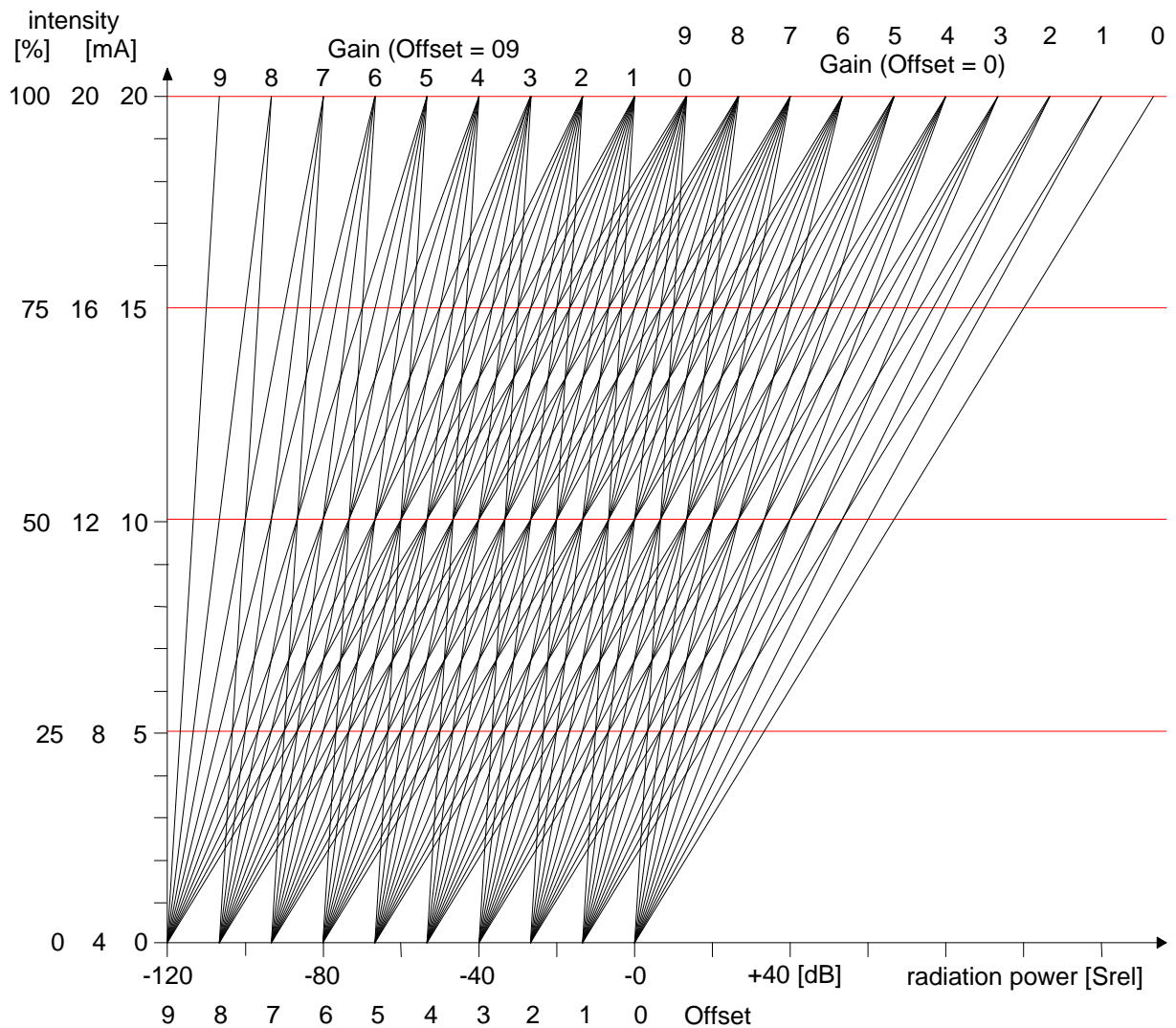
6. SPM-Chassis



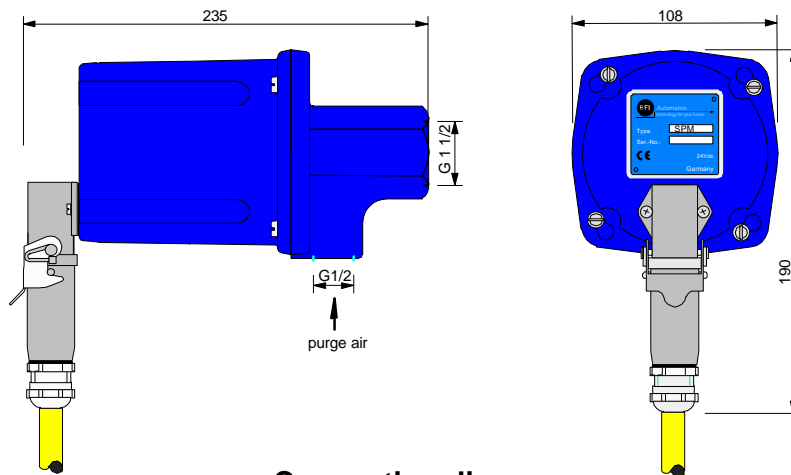
Adjuster board



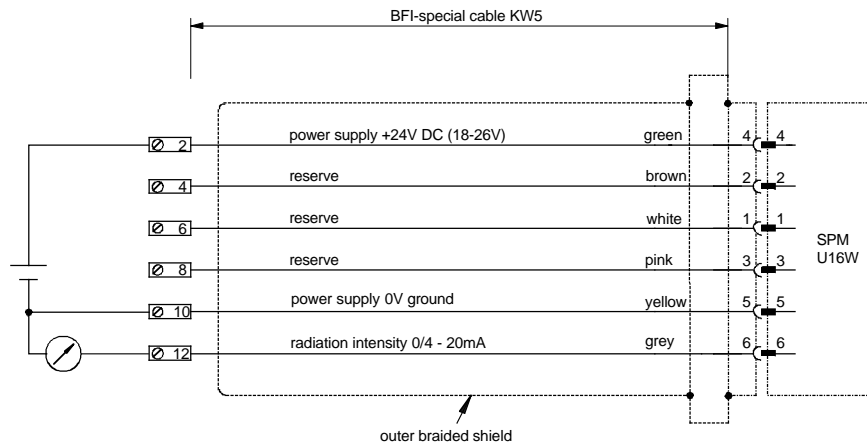
7. Characteristic field



8. Dimensions



Connection diagram



9. Technical data

Spectral Sensivity	350 to 550 nm
Object of detection	CO ₂ , C ₂ , CH, OH
Viewing angle	16 °
Operating voltage	24 Vdc (18-26 V)
Current consumption	max. 100mA
Ambient temperature	-20 to +60 °C
Electric connection	dust-proof plug connector
Protection	IP 65
Length of cable	max. 1000m (KW 5)
Sight tube connection	1" internal thread ISO 228
Purging air connection	1/2" internal thread ISO 228
Purging air quantity	10 Nm ³ /h
or	
Purging air pressure	0,02 bar over combustion chamber inner pressure
Weight	1kg
Part-No.	S 305.4
Output current	0 / 4 - 20 mA
CE	DIN VDE 0110
Optional:	EEx- Protection EEx d IIC T6 oder EEx de IIC T6 Heating elements

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