

Instruction manual for installation and commissioning

Flame Monitoring System F 150



Prototype proofed

Registered numbers

DIN EN 230 for Oil operation

DIN EN 298 for Gas operation

72 – hours - TRD 604 operation

Prod.-Ident-No.:

CE-0085AR0290

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The F 150 Flame monitoring device in combination with the FFS 05... or FFS 06 ... Flame sensor is a safety device and complies with the DIN EN 230 and DIN EN 298 standards.

The flame safeguard is chiefly used in furnaces, where there are no complicated selection functions required. Safe functioning of the flame safeguard mainly depends on proper positioning of the flame sensor and the application-related setting of the flame monitoring device. Take into account both the instructions on the installation of the flame safeguard and the instructions given by the burner manufacturer.

For technical data on the flame safeguard that are not contained in this instruction manual for installation and commissioning refer to the technical description of the flame safeguard.

1 Technical data

1.1 Parameters - Flame sensor

Required input values from the flame radiation to deliver the message „Flame in“

- spectral radiation range = 260 ... 400 nm (FFS 05 UV-1, FFS 05 UV-1 Ex, FFS 05 UV-1 Ex II, FFS 06 UV-1)
- spectral radiation range = 210 ... 380 nm (FFS 05 UV-2, FFS 05 UV-2 Ex, FFS 05 UV-2 Ex II, FFS 06 UV-2)
- spectral radiation range = 850 ... 1200 nm (FFS 05-1, FFS 05-1 Ex, FFS 05-1 Ex II)
- spectral radiation range = 1200 ... 2800 nm (FFS 05, FFS 05 Ex, FFS 05 Ex II, FFS 06)
- Pulsation frequency ok. 10...90 Hz

1.2 Parameters - Flame monitoring device

Auxiliary energy

Mains voltage	230 V AC +10% - 15%
Mains frequency	50 Hz
Power consumption	10 VA

Output values

Output contact	Switching-over contact (connections A10, A12, A14)
Admissible switching voltage	250 V AC; 30 V DC max. 6 V AC/DC min.
Admissible switching current	0.5 A max. 1 mA min.
Switching capacity DC	15 W max.
Switching capacity AC	250 VA max. with $\cos \varphi = 0.4$
Safety time „service“	$t \leq 1$ sec, other safety periods only on demand, possible up to 3 sec max., factory-setting

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2 Installation

2.1 General instructions

The processes occurring during combustion generate a pulsating portion of the flame radiation (flickering of the flame), which oscillation sequence (flame frequency) is relatively rapid at the root of the flame (i.e. near the burner nozzle), and becomes slower towards the flame tip.

This phenomenon is used for the observation of individual burner flames in furnaces. This is required to direct the flame sensor to a certain flame range. To this end, we recommend the use of our adjustable holding devices, if required, in combination with a scanning tube.

The flame sensor must detect

- the flame root area (area of high flame frequency) in the „Flame in“ state

and shall only detect

- the residual radiation (e.g. glowing lining) in the „Flame out“ state.

The flame monitoring device connected in series with the flame sensor is able to distinguish between the „Flame in“ and „Flame out“ states of the flame to be monitored after the appropriate settings have been made.

2.2 Flame sensor installation

Install the flame sensor on a support of the scanning opening, through which the burner flame must be clearly visible throughout the operating range of the furnace. If the sensor is installed on the FS 20-10, FS 41 or FS 36 for sensor FFS 05 ... or FS 60 for FFS 06 ... adjustable holding device, a later alignment to a certain flame section is possible.

For the installation of the sensor make sure that the maximum application temperature of +60°C is not exceeded.

There are the following measures for lowering a high application temperature:

- Use of the FS 19-10 or FS 20-10 for FFS 05 ... adjustable holding devices with heat insulation part, protective glass and scavenging air connection
- Use of the FS 36 or FS 41 for FFS 05 ... adjustable holding devices for direct cooling of the flame sensor.

The use of cooling and scavenging air with the appropriate particle cleanliness (oil, water, dust) provides for an efficient prevention of any possible dirt accumulation of the flame sensor scanning opening.

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The flame sensor is supplied with a connection cable. An extension of up to 500 m of the feed cable between flame sensor and flame monitoring device is admissible. For an extension line, we recommend to use a separate, shielded five-core cable LiY (C) Y 5x1x0,5.

Moreover, a flame sensor connection that can be disconnected by a plug is possible when using the FG 21 junction box with coupling.

If required, the extension cable should be routed in a protecting tube to avoid any kind of damage.

WARNING

The sensor cable must be routed separately from mains, control and high-energy power cables or power equipment (e.g. ignition lines, ignition transformers, electrical motors, contactors). A cable routing parallel to mains cables in the same cable ducts is not allowed.

2.3 Installation of the flame monitoring device

Install the flame monitoring device at a vibration-free location. The installation site must be easily accessible to enable the carrying out of test measures during operation of the furnace and proper observation of the device displays.

Make sure that the maximum permissible application temperature for the installation site does not exceed 60°C, and that installation is not carried out in the close neighbourhood of high-energy interference sources.

Moreover, the related VDE regulations are to be complied with, this concerns in particular the DIN VDE 0116.

2.4 Installation of the flame sensor

Connect the mains cables, signal lines und the sensor line to the terminal strip of the flame monitoring device in accordance with the configuration drawing (section 6). Make sure that the terminals are properly tightened.

The flame safeguard ready for operation delivers the „Flame in“ and/or „Flame out“ state message to the floating output contact (connections A10, A12, A14). Further signal processing must be effected by the control unit adapted to the corresponding furnace.

The connection cable between flame safeguard and the remote contact component can be up to 500 m long.

In order to ensure a good operating safety, make sure, when connecting the output contacts, that the circuitry of the radio interference suppression to be provided for by the user is designed in such a way that shorting out of the contacts by defective component parts of the suppressor unit is impossible.

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3 Commissioning

3.1 General instructions

Check the flame sensor for proper positioning. Before switching on the mains voltage to the flame safeguards, check the feed voltage, signal cable and sensor cable connections (on the basis of colour marking) for proper execution and tight fit.

3.2 Preparatory measures

For explanation of the checking and operational control refer to section 5.
Set the intensity switch of the F 150 to position 1.

3.3 „Flame out“ state

- After powering on the mains voltage the flame safeguard is ready for operation.

The following display should appear:

- „Flame out“ message: LED (red) lights
- Intensity display: LED row (green) doesn't light

3.4 „Flame in“ state

When the flame burns naturally, the display should change as follows:

- „Flame out“ message: LED (red) goes out
- „Flame in“ message: LED (green) lights, the LED changing its intensity in the rhythm of the clock pulse
- Intensity display: two-stage green LED row lights

In order to enable the best possible detection and covering of the flame, increase, if required, the intensity of the flame sensor by means of the four-stage intensity switch of the F 150 in such a way that the intensity display does not show considerable variations.

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3.5 Flame failure switch-off check

Simulate a burning away of the flame from the nozzle or the extinguishing of the flame. For example, this can be effected by obscuring for a short period of time the light incidence opening at the flame sensor or by cutting off fuel supply. Check if the signal for closing the safety cut-off valve is released within a period of time $T < 1$ sec after the flame has „extinguished“ [the green LED goes out, and the red one lights]. Also check that the flame safeguard does not respond to the radiation reflected from the combustion chamber lining. If this should be the case after all, increase the lower limit frequency of the F 150 (from 10 to 30 Hz), change the sensitivity setting of the flame sensor, or restrict its scanning range.

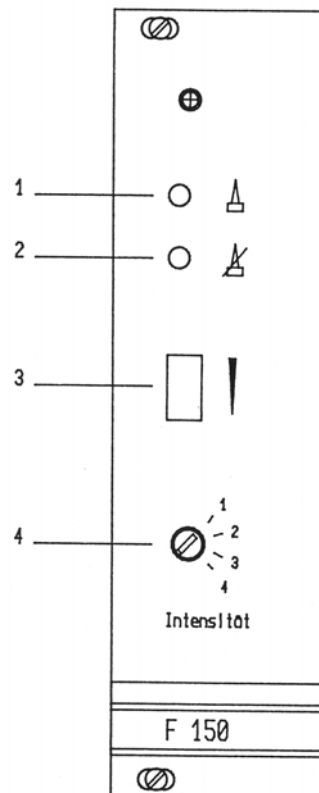
4 Maintenance

- Clean at regular intervals the light incidence opening of the flame sensor and the related scanning opening of the furnace, the intervals depending on the actual operating conditions of the plant.
- Should the intensity display vary heavily and often decrease dramatically, the reason for this could be an unnaturally burning flame (e.g. flame is detached from the burner nozzle).
- In order to prevent a burner failure switch-off, check the burner setting and, if required, correct it accordingly.
- The flame safeguard is maintenance-free.
- The maintenance cycle of the plant should include a verification of the flame failure switch-off check.
- It is also possible to check the proper functioning of the flame safeguard even without any flame, using the FFP 01 test light, which is also supplied by LAMTEC Leipzig GmbH & Co KG.

WARNING

The flame safeguard is a safety device. Any repair work or other changes to the device shall only be effected by the manufacturer's specialist staff or by some other person appointed by the manufacturer. Any other person is not allowed to operate on parts inside the device.

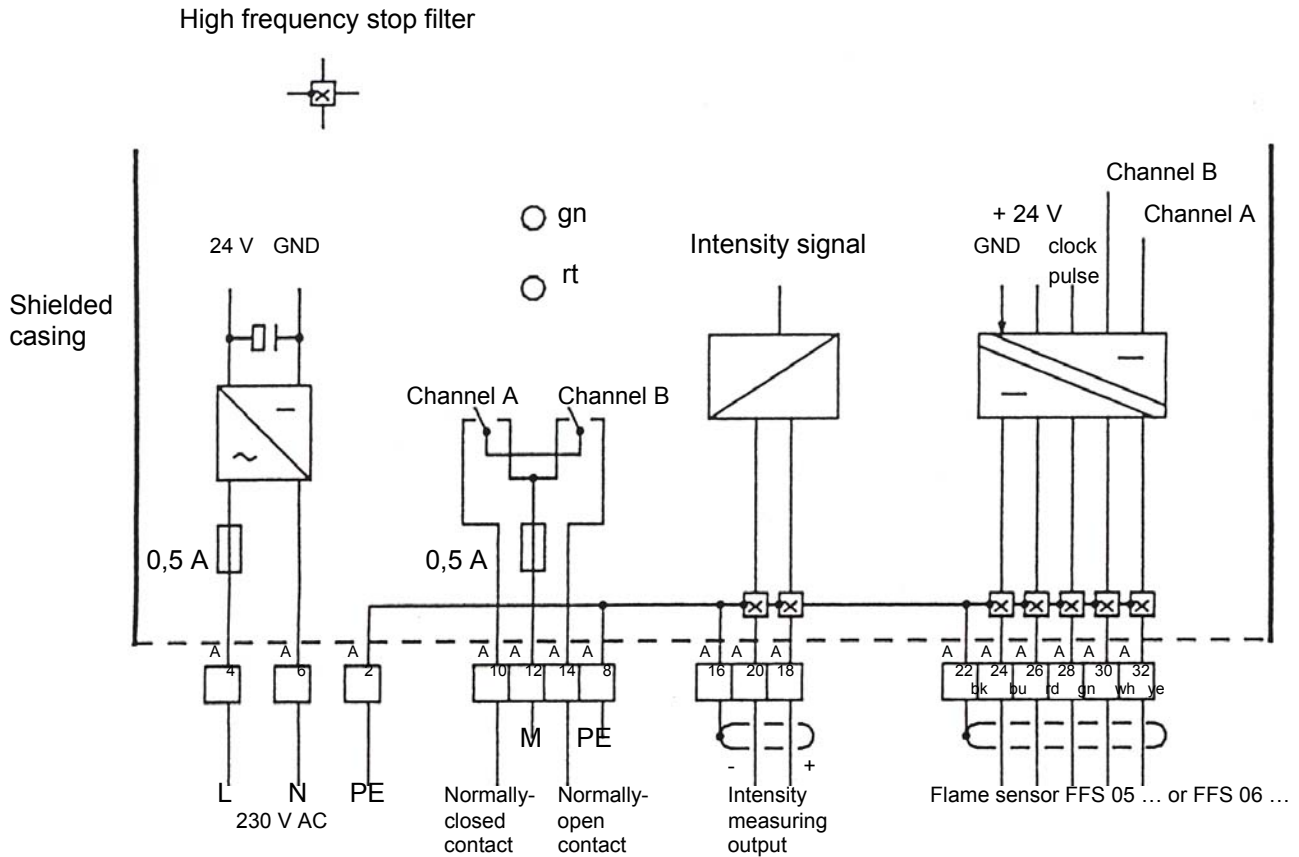
5 Representation of the checking and operational controls



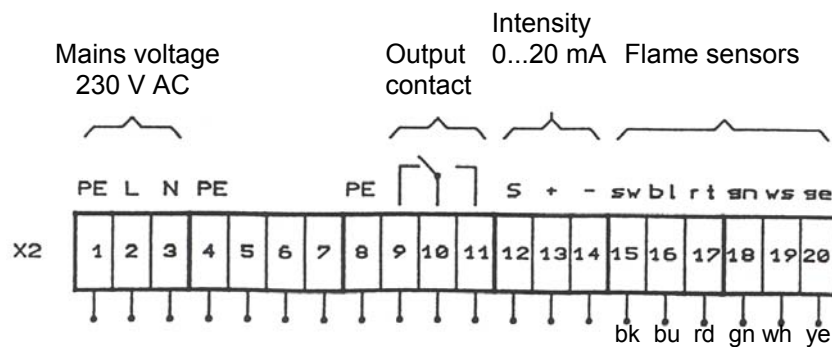
- 1 - LED (green) „Flame in“
- 2 - LED (red) „Flame out“
- 3 - Intensity display
- 4 - Intensity switch

6 Pin configuration of the F 150 Flame monitoring device

6.1 SKT 16 Plug-in cards carrier

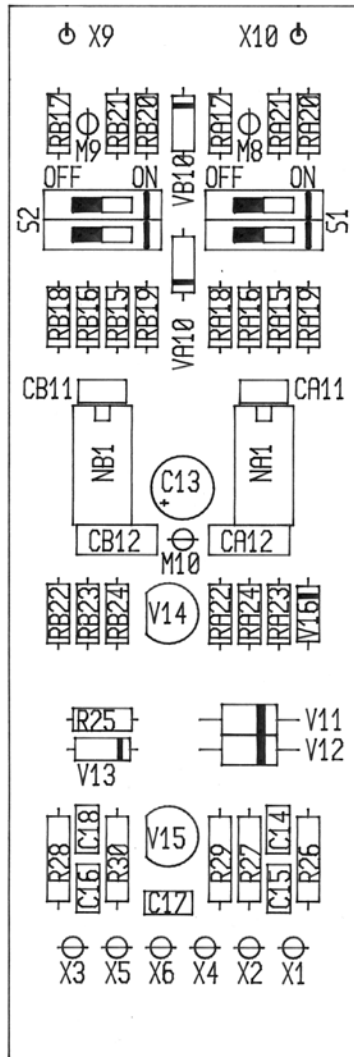


6.2 Panel casing (12 TE) and wall-mounted casing (12 TE)



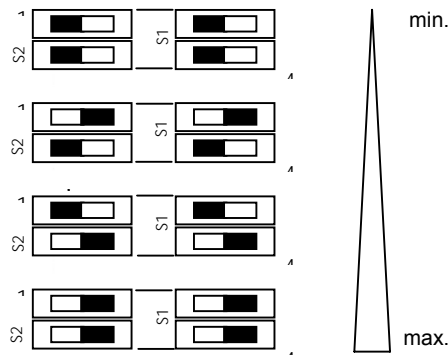
Sensitivity setting on the FFS 05 ... and FFS 06 ... Flame sensors

FFS 05 ...

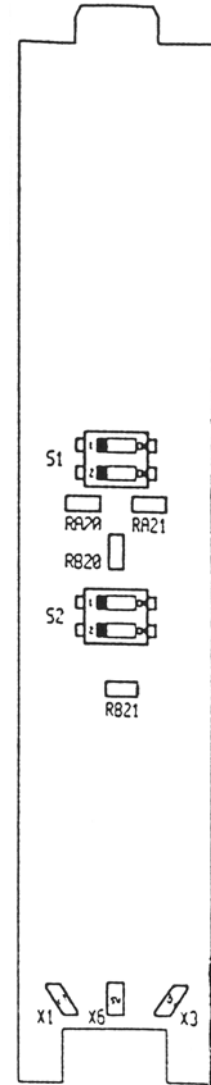


Setting is made using the S1 and S2 switches, which become accessible after opening the sensor housing.

Sensitivity



FFS 06



L-Seite

Attention:

The FFS 06 UV-Flame Sensors do not have these threshold switches for sensitivity adjustment. To achieve here the optimum and optimum angle of incidence for monitoring the flame, the sensor signal voltage can be measured for its maximum.

Measuring of the signal voltage on Flame scanner FFS 06 ...

The connecting cable has an additional measurement wire (pink) which can be used for a standard isolated analog or digital hand held multimeter (acc. to EN 61010 , input impedance >5 MΩ) to measure the signal voltage. The voltage is measured against the ground potential (blue wire) of the connecting cable to adjust the direction for an optimum of flame detection.

The min. threshold value for IR-Flame Sensors are 15 mV AC and for UV-Flame Sensors 25 mV AC.

The measurable signals should have at least **2 to 3 times the switching threshold value** to allow a **reliable recognition**.

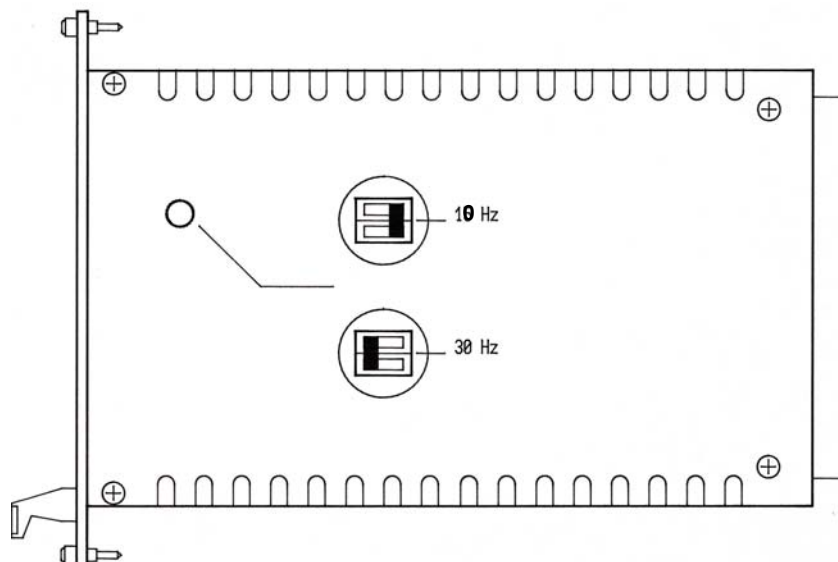
Measuring of the signal voltage on Flame scanner FFS 05 ...

The signal voltage can be measured in terms of the flame scanner FFS 05 after opening the rear cover of the scanner casing at 2 test points which can be used for a standard isolated analog or digital hand held multimeter (acc. to EN 61010 , input impedance >5 MΩ) to measure the signal voltage.

The min. threshold value for IR-Flame Sensors are 15 mV AC and for UV-Flame Sensors 10 mV AC.

The measurable signals should have at least **2 to 3 times the switching threshold value** to allow a **reliable recognition**.

Frequency range switch-over on the F 150 Flame monitoring device



Note: This document is meant for service technicians only for the commissioning of flame monitoring devices. Any intervention into the devices effected by unauthorized staff is not allowed.