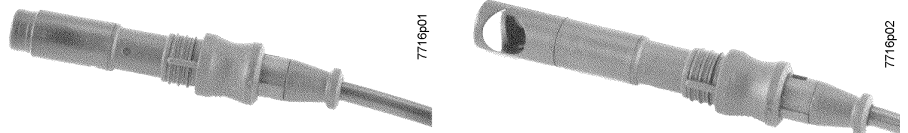




Blue-flame Detectors

QRC1...



Flame detector for the supervision of blue or yellow burning oil and gas flames. The flame detector is used especially in connection with burner controls supervising small burners in intermittent operating mode.

Use

QRC1... is a UV-sensitive flame detector of small size with integrated pre-amplifier. It is designed for frontal and lateral (90°) illumination. QRC1... is appropriate for the use with burner controls of the types LOA2... (except of LOA25...), LOA3..., LOA44..., LGB3..., LAL1... and LAL2.... In term of plug-in facility it is compatible with the photo-resistive detector QRB1 with fastening plug.

The maximum spectral sensitivity of the detector amounts to approx. 300 nm, thus optimally covering the range of maximum UV radiation of blue burning oil and gas flames. As the detector is also able to detect UV-fractions of the radiation spectrum of other luminous sources (boiler house illumination, sunlight, etc.) the usual regulations on extraneous light safety are still valid.

Attention has to be drawn to the fact that the detector must not detect the UV-radiation of the ignition spark, as otherwise lockout occurs due to "extraneous light" already during the prepurge time.

Technical Features

QRC1... consists of a special diode sensitive to UV-radiation with a quartz glass lens which concentrates the flame radiation onto the active part of the diode. Radiation fractions of longer wave length are eliminated by means of a filter to the necessary degree. A pre-amplifier intensifies the signal of the diode to the value necessary for the flame signal amplifier of the corresponding burner control.

The detectors of **series C** replace the existing **series B**.

QRC1... of series **C** - in contrast of those of series **B** - do not react to flame signal interruptions of short duration. Due to this the detector current is stabilized and the burner's behavior during operation in case of a strongly flickering flame becomes more stable, too.

Mechanical Design

QRC1... has a black plastic housing with a displaceable and locking fastening plug. The three-core connecting cable is firmly connected to QRC1... and is secured through a tension relief. At the front a protective glass ensures protection against accidental contact and dust.

QRC1**C**... with mirror fixture

In case of burner constructions which do not allow frontal illumination of the detector, QRC1... is also available with a mirror attachment for lateral illumination.

Summary of Types

Type code

QRC1	A	1	.	1	01	C	27
							Voltage/Mains frequency: 27: AC 230 V / 50...60 Hz 17: AC 110 V / 50...60 Hz on demand
							Series
							Available cable length L (see dimension drawings): 00: 200 mm on demand 01: 350 mm 02: 420 mm on demand 03: 500 mm 04: 700 mm 05: 1000 mm on demand
							Plugs 1: with plug
							Degree of sensitivity: 1: Normal (corresponds to normal sensitivity of series B) 2: Medium (corresponds to high sensitivity of series B) 3: High
							Direction of illumination: A: Frontal illumination C: Lateral illumination

Standard types

Type	Frontal illumination	Lateral illumination	Degree of sensitivity (see above)
QRC1A1.101C27	x		1
QRC1A1.103C27	x		1
QRC1A2.101C27	x		2
QRC1A2.103C27	x		2
QRC1A2.104C27	x		2
QRC1A3.101C27	x		3
QRC1C2.103C27		x	2

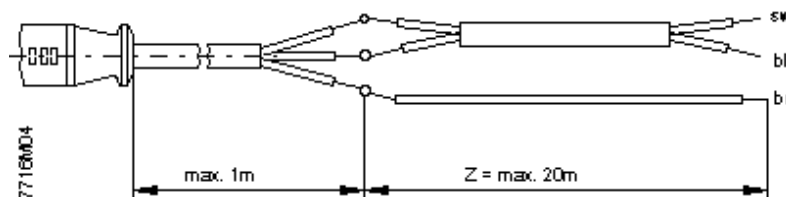
Ordering

When ordering, please give type reference according to "Standard types" or "Summary of Types".

Maximum Detector Cable Length

In case the maximum connecting cable length of 1 m is not sufficient, the burner manufacturer may extend the cable by 20 m. In such a case the following has to be observed as far as the cable layout is concerned:

In order to reduce the coupling capacities of the detector signal line to the phase conductor to a minimum, the phase conductor L (brown core) has to be laid separately resp. separately from the detector signal line.



Legend:

Z	Auxiliary wire
sw	black core = signal conductor
bl	blue core = neutral N
br	brown core = phase L

Technical Data

Operating voltage	AC 230 V, -15% +10%
Frequency	50 ... 60 Hz
Consumption	0.35 VA
Tolerated flame signal interruptions	approx. 300 ms
Length of detector connecting cable	1 m max.
Length of auxiliary detector wire (only in case of separately laid cables, see "Max. Detector Cable Length")	20 m max.
Degree of protection	IP 40
Protection standard	II
Humidity tests according to IEC 68-2-30	40°C / 95% rel. humidity
Permissible ambient temperature	
- Operation	-20°C ... +60°C, for 1 min. max. up to +75°C
- Transport and storage	-25°C ... +85°C
Vibrations according to IEC 68-2-6	1 g max., 10 ... 500 Hz
Weight with cable of 350 mm	0.029 kg
Mounting position	optional

Detector current with 230 V

Burner control	Min. required during operation	Max. permissible without flame (dark current)
LOA2..., LOA3...	65 µA	5 µA
LOA44...	70 µA	5 µA
LGB3...	50 µA	5 µA
LAL1...	80 µA	12 µA
LAL2...	3,9 µA	0,8 µA

In case of maximum illumination the QRC1... of series C delivers a lower maximum saturation current than the QRC1... of series B. This has neither an effect on the sensitivity nor on the function of the flame detector. Decisive is here the minimum required detector current given for the used burner control (see table above).

Assembly

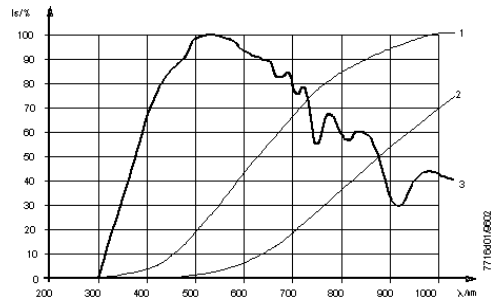
The flame detector is mounted by fixing the fastening plug already mounted at time of supply into a hole which has to be made into the burner (hole dimensions identical with detector QRB1... with fastening plug, see "Dimension Drawings"). The securing and sealing lips of the fastening plug hold the detector firmly and vibration-safely in the hole, allowing, however, to take the detector out during maintenance work.

In case the flame detector QRC1A... is used for light from the front, it is essential that the detector is placed such that the hole for the fastening plug is aligned to the radiation-active zone of the flame. In applications where this is only possible to a certain extent the type for lateral light QRC1C... may be used.

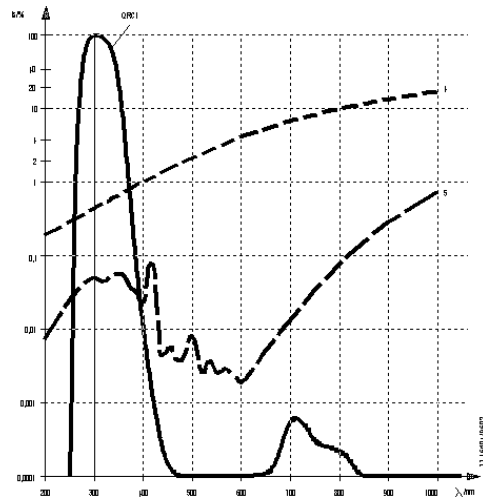
For the fine adjustment of the distance between the radiation-active range of the flame and the convergent lens of the UV-sensitive diode, the flame detector can in both cases (light from the front and lateral light) be shifted in its fastening plug by 10 mm each in both longitudinal senses (locking) "S" (see "Dimension Drawings").

Spectral Curves

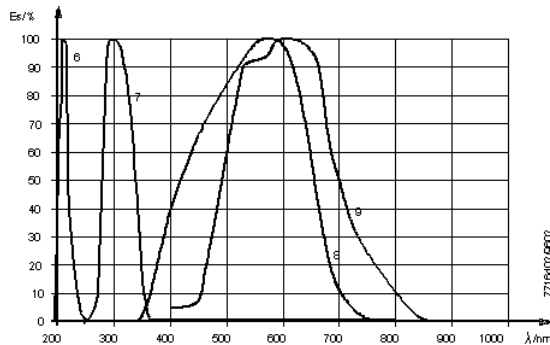
Extraneous light



Flames



Sensitivity of light detector



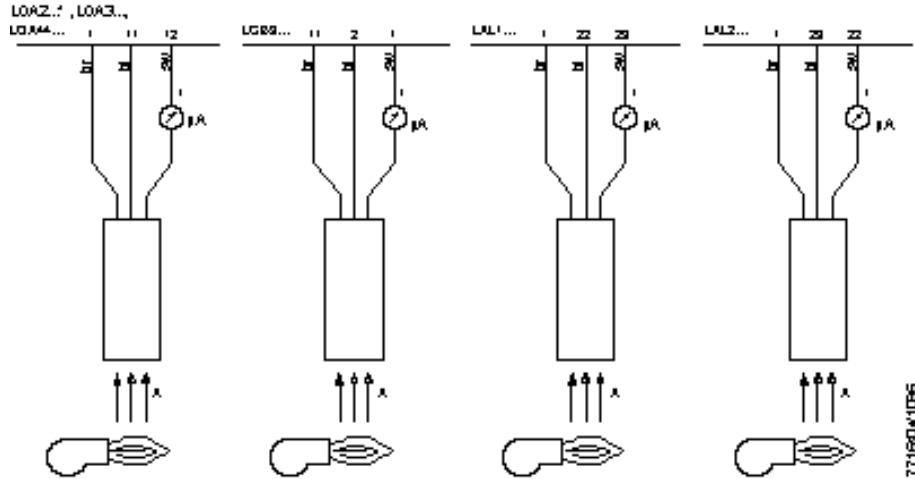
Legend

- Is/% Relative radiation intensity in %
- λ/nm Wave length in nm
- 1 2856 K-radiation
- 2 2000 K-radiation
- 3 Sunlight-radiation
- QRC1 Spectral sensitivity QRC1...
- 4 Yellow oil flame
- 5 Blue oil flame
- Es/% Spectral sensitivity in %
- 6 UV-photocell
- 7 QRC photo diode
- 8 Selenium cell
- 9 QRB...-photo resistance

Measuring circuit/Connection examples

Detector current measurement

Required detector currents: see "Technical Data": Detector current



Legend

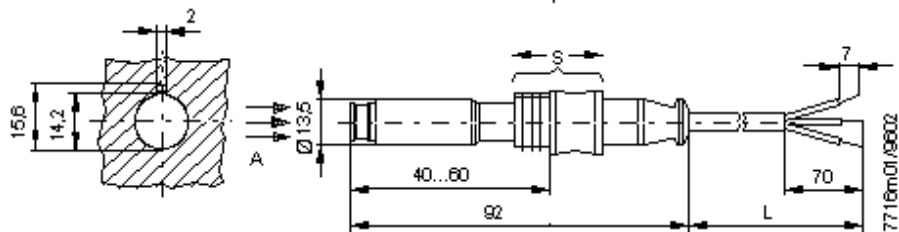
- LOA2...* except LOA25...
- br brown
- bl blue
- sw black
- µA dc microamperemeter with internal resistance $R_i = 5k\Omega$ max.
- A direction of illumination

Connection examples

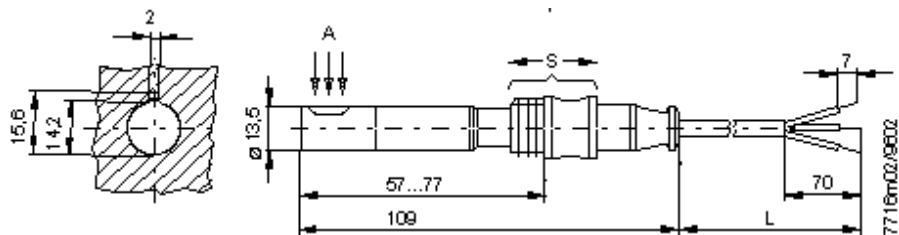
For normal operation the measuring unit has to be removed from the detector current measuring circuit.

Dimension Drawings Frontal illumination

Dimensions in mm



Lateral illumination



Legend

- A Direction of illumination
- S Range of displacement of the fastening plug, initiates dimensional change for :
 - 40...60 (front) Dimension of delivery: 50 mm
 - 75...77 (side) Dimension of delivery: 67 mm
- L Available cable length see "Summary of Types"