SIEMENS

7716

ISO 9001

Blue-flame Detectors QRC1...

Blue-flame detectors for the supervision of blue- or yellow-burning oil or gas flames.
Blue-flame detectors are used primarily in connection with burner controls for burners of small capacity in intermittent operation.

The QRC1... and this data sheet are intended for use by OEMs which integrate the flame detectors in their products!

Use

The QRC1... is a compact UV-sensitive blue-flame detector with an integrated pre-amplifier.
It is designed for frontal and lateral (90°) illumination.
This type of flame detector is suited for use with burner controls LOA2... (except LOA25...), LOA3..., LOA44..., LMOx4..., LGB3..., LAL1... and LAL4... and, in terms of plug-in facility, is compatible with the photoresistive detectors QRB1....

The spectral sensitivity of the QRC1... is a maximum of approximately 300 nm, which means that it optimally covers the range of UV radiation of blue-burning oil or gas flames.
Since the QRC1... is also capable of detecting UV fractions of the radiation spectrum of other luminous sources (e.g. boiler house illumination or sunlight), the usual regulations for extraneous light still apply.

The QRC1... may not detect UV radiation of ignition sparks, as otherwise lockout will already occur during the pre-purge time, due to extraneous light.

Warning notes

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

It is not permitted to open, interfere with or modify the flame detector!

- Before performing any wiring changes in the connection area of the QRC1…, the burner control must be completely isolated from the mains supply
- Ensure protection against electric shock hazard through appropriate mounting
- Check wiring and all safety functions prior to commissioning

Mounting notes

- The relevant national safety regulations must be complied with
- Locate the ignition electrode such that the QRC1... cannot detect ignition sparks
- Fit the flame detector with the help of a plug already inserted in a hole on the burner.
  For hole on the burner, refer to «Dimensions».
  The securing and sealing lips of the plug give the QRC1... a firm hold in the hole, even in the case of vibrations, also allowing the detector to be removed for maintenance work
- The QRC1... must be located such that it can detect the most radiation-active zone of the flame
- For the precise adjustment of the distance between the most radiation-active range of the flame and the converging lens of the UV-sensitive diode, the QRC1... can be displaced in its plug by about 10 mm in both longitudinal directions «S» (refer to «Dimensions»)

Installation notes

- Installation and commissioning work may only be carried out by qualified staff
- Observe the permissible length of the detector cable (refer to «Technical data»)
- Always run detector cables separate while observing the greatest possible distances from other cables and units

Service notes

- When cleaning the flame detector, always use a clean cloth
- Do not use any burner cleansing sprays

Mechanical design

The detector's housing is made of black plastic and has a displaceable plug with stops. The three-core connecting cable is firmly connected to the QRC1... and features tension relief.
The front of the detector has a protective glass to ensure protection against accidental contact and dust.

QRC1... with mirror fixture

In the case of burner designs that do not allow the QRC1... to be illuminated from the front, the detector is also available with a mirror attachment for lateral illumination.

Type summary

Type code

Q R C 1 A 1 . 1 0 1 C 2 7

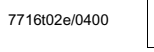
Voltage / mains frequency:
27: AC 230 V / 50...60 Hz
17: AC 110 V / 50...60 Hz (on request)

Series

Available cable length **L** (refer to "Dimensions"):
00: 200 mm (on request)
01: 350 mm
02: 420 mm (on request)
03: 500 mm
04: 700 mm
05: 1000 mm (on request)

Plug:
1: with plug

Level of sensitivity:
1: normal
2: medium
3: high



Direction of illumination:
A: front
C: lateral

Standard types

Type reference	Frontal illumination	Lateral illumination	Level of sensitivity
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 «Type summary».

Technical data

General detector data

Mains voltage	AC 230 V –15 / +10 %
Mains frequency	50...60 Hz ±6 %
Power consumption	0.35 VA
Tolerated flame signal interruptions	approx. 300 ms
Length of connecting cable	max. 1 m
Length of auxiliary detector cable	max. 20 m (only in case of separate cable runs, refer to «Max. detector cable length»)
Degree of protection	IP 40
Safety class	II
Vibrations to IEC 68-2-6	max. 1 g, 10...500 Hz
Weight incl. cable 350 mm	approx. 0.029 kg
Mounting orientation	optional

Norms and standards

Environmental conditions	
Transport	IEC 721-3-2
Climatic conditions	class 2K2
Temperature range	-25...+80 °C
Humidity	< 95 % r.h.
Operation	IEC 721-3-3
Climatic conditions	class 3K5
Mechanical conditions	class 3M1
Temperature range	-20...+60 °C short-time (max. 1 min) up to 75 °C
Humidity	< 95 % r.h.

⚠ **Condensation, formation of ice and ingress of water are not permitted!**

Detector current at AC 230 V

Type of burner control	Min. detector current required During operation (typically)	Max. permissible detector current Without flame (dark current)
LMO...	70 µA	5.5 µA
LOA2..., LOA3...	70 µA	5.5 µA
LOA44...	58 µA	5.5 µA
LGB3...	50 µA	5.5 µA
LAL1..., LAL4...	80 µA	12 µA

In the case of maximum illumination, the QRC1... of the C-series deliver a lower maximum saturation current than the QRC1... of the B-series.
This has no impact on the sensitivity or function of the QRC1...
Decisive is the minimum detector current required and specified for the type of burner control used (refer to the table above).

Function

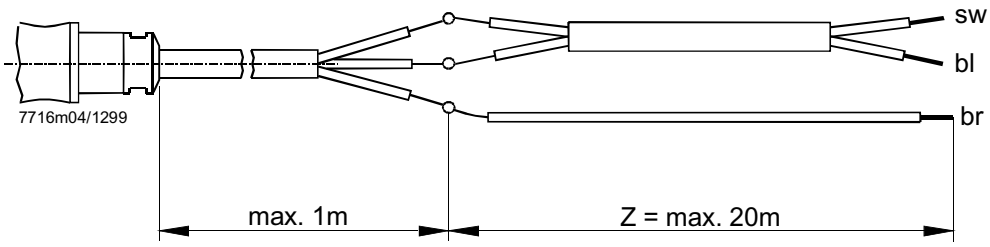
The QRC1… consists of a special UV-sensitive diode with a quartz glass lens which concentrates the flame's radiation on the active part of the diode.
Using a filter, fractions of radiation of longer wave length are eliminated.
A pre-amplifier is used to amplify the signal of the diode to the level required for the flame signal amplifier of the respective burner control.

Flame signal interruptions of short duration are tolerated (refer to «Technical data» under «Tolerated flame signal interruptions»), thus ensuring more stable detector currents and more stable operation of the burner in the event of strongly flickering flames.

Maximum detector cable length

If the maximum connecting cable length of 1 m is not sufficient, the burner manufacturer can extend the cable by a maximum of 20 m.

In that case, the following rule must be observed when laying the cable:
To minimize the coupling capacitances of the detector signal lines to the live conductor, live conductor «L» (brown core) must be laid separately or separately from the detector signal line.

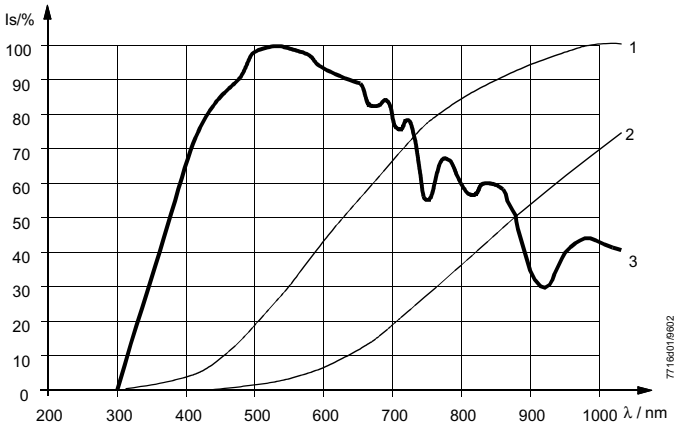


Legend

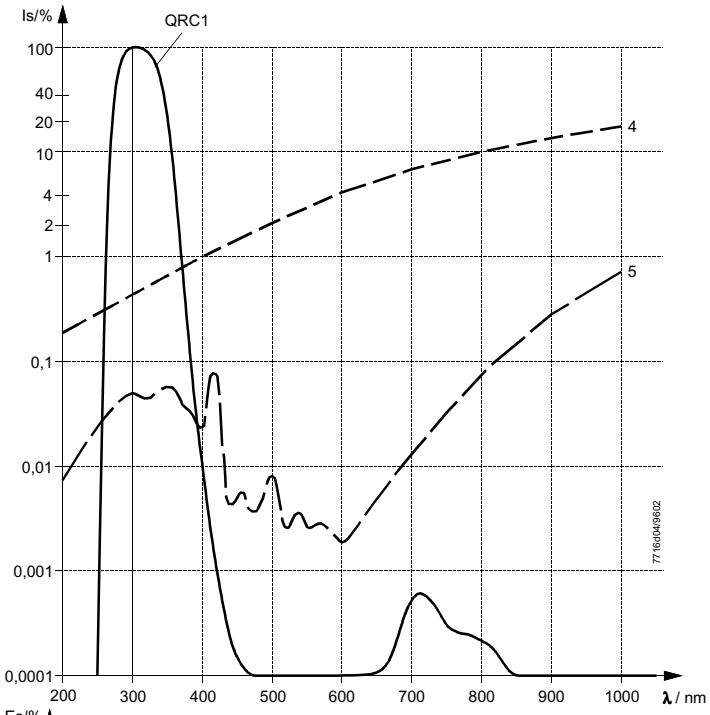
Z	Auxiliary cable
bl	Blue core = neutral «N»
br	Brown core = live «L»
sw	Black core = signal line

Spectral curves

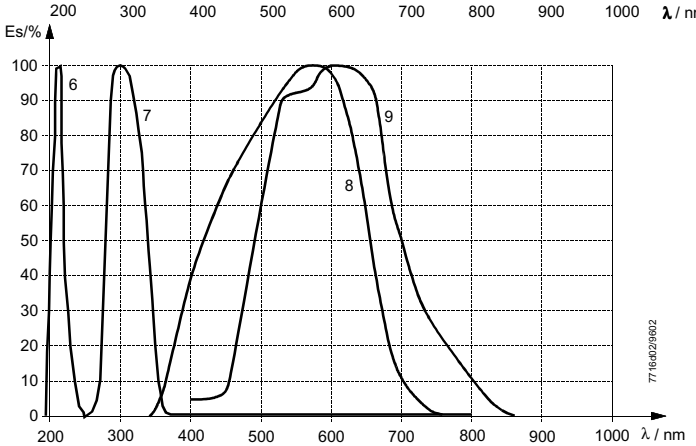
Extraneous light



Flames



Sensitivity of light detector



Legend

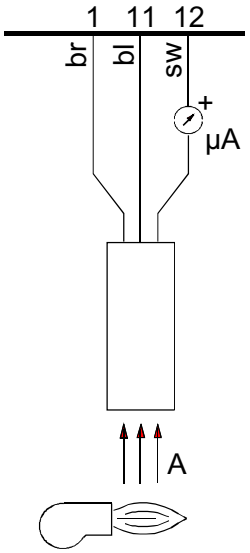
Is / %	Relative intensity of radiation in %		λ / nm	Wave length in nm	
ES / %	Spectral sensitivity in %		QRC1...	Spectral sensitivity of QRC1...	
1	2856 K-radiation	2	2000 K-radiation	3	Solar radiation
4	Yellow-burning oil flame	5	Blue-burning oil flame	6	UV photocell
7	QRC1... photo diode	8	Selenium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

Measurement circuit / connection examples

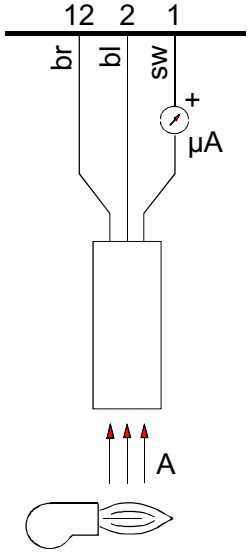
Measurement of detector current

For the detector currents required, refer to «Technical data» under «Detector current».

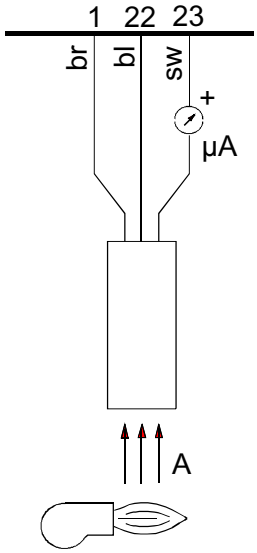
LMOx4...
LOA2...* , LOA3...,
LOA44...



LGB3...



LAL1... / LAL4...



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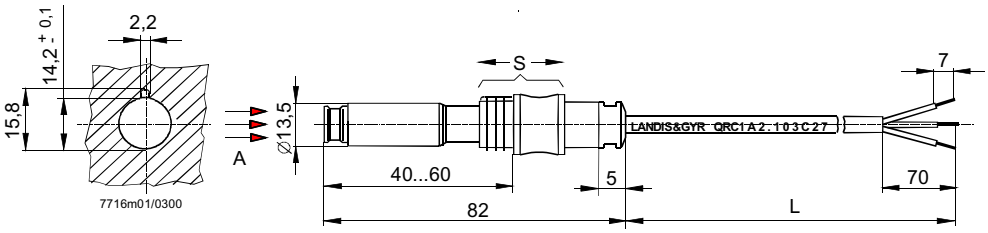
Connection examples

For normal operation, remove the measuring unit from the detector current measurement circuit.

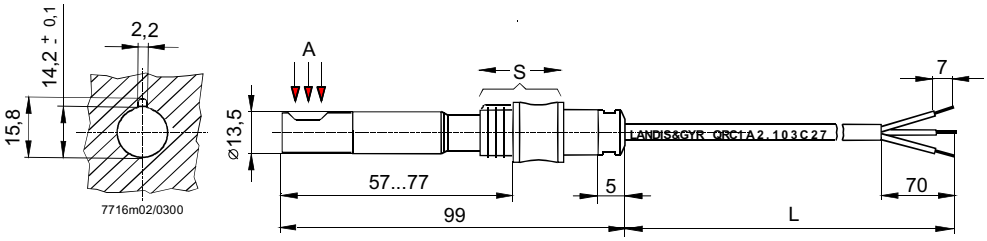
Dimensions

Dimensions in mm

Frontal illumination



Lateral illumination



Legend

*	Except LOA25...		bl	Blue
µA	DC microammeter (internal resistance		br	Brown
	Ri = max. 5 kΩ)		sw	Black
A	Incidence of illumination		L	Available cable length (refer to «Type summary»)

S Range of displacement of plug produces a change in the dimensions ...

...40...60 mm (front)	50 mm ex works
...57...77 mm (side)	67 mm ex works