



QRC1... for frontal illumination



QRC1... for lateral illumination

## 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 small-capacity burners 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 so that it optimally covers the range of UV radiation of blue-burning oil or gas flames.

Since the QRC1... also detects UV fractions of the radiation spectrum of other luminous sources (e.g. from boiler house illumination or sunlight), the standard regulations for extraneous light still apply.

The QRC1... must not detect UV radiation from ignition sparks, as otherwise lockout occurs during the prepurge time, due to extraneous light.

## Warning notes

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

### **Do not open, interfere with or modify the flame detector!**

- Before performing any wiring changes, completely isolate the burner control from the mains supply (all-polar disconnection)
- Ensure protection against electric shock hazard by providing adequate protection for the connection terminals
- Check to ensure that wiring is in an orderly state
- Fall or shock can adversely affect the safety functions. Such flame detectors may not be put into operation, even if they do not exhibit any damage

## Mounting notes

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- Ensure that the relevant national safety regulations are complied with
- Mounting work must be carried out by qualified staff
- Locate the ignition electrode such that the QRC1... cannot detect ignition sparks, as otherwise lockout occurs due to extraneous light
- Fit the flame detector with the help of a plug 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
- Locate the QRC1... 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 (refer to «Dimensions»)

## Installation notes

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- Installation work must be carried out by qualified staff
- Observe the permissible length of the detector cable (refer to «Technical data»)
- It is important to achieve practically disturbance- and loss-free signal transmission:
  - Line capacitance reduces the magnitude of the flame signal
  - Use a separate cable
- Always run the detector cables separately while observing the greatest possible distances from other cables and units

## Commissioning notes

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- Commissioning work must be carried out by qualified staff
- Prior to commissioning, check to ensure that wiring is in an orderly state

## Norms and certificates

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Conformity to EEC directives  
- Electromagnetic compatibility EMC (immunity)  
- Directive for gas appliances  
- Low-voltage directive

89 / 336 EEC  
90 / 396 EEC  
73 / 23 EEC



ISO 9001: 2000  
Cert. 00739



ISO 14001: 1996  
Cert. 38233

Only in connection with  
the burner control



## Service notes

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- Maintenance work must be carried out by qualified staff
- Each time a flame detector has been replaced, check to ensure that wiring is in an orderly state
- When cleaning the detector, always use a clean cloth
- Do not use any burner cleansing sprays

## Disposal notes

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The flame detector contains electrical and electronic components and may not be disposed of together with household waste.  
Local and currently valid legislation must be observed.

## Mechanical design

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The detector's housing is made of black plastic and has a displaceable plug with stops. The 3-core connecting cable is firmly connected to the QRC1... and features strain 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**

7716102e/1 299

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
QRC1A3.103 C27	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»)
	Detector cable	3 x 0.5 mm <sup>2</sup> ; 5.45 mm dia.
	Degree of protection	IP40
	Safety class	II
	Vibrations to IEC 68-2-6	max. 1 g, 10...500 Hz
	Weight incl. 350 mm cable	approx. 0.029 kg
	Mounting position	optional
	Environmental conditions	<b>Transport</b>
Climatic conditions		class 2K2
Mechanical conditions		class 2M2
Temperature range		-25...+80 °C
Humidity		< 95 % r.h.
<b>Operation</b>		DIN EN 60 721-3-3
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

## Function

The QRC1... has a special UV-sensitive diode with a quartz-glass lens which concentrates the flame's radiation on the active part of the diode.

A filter ensures that fractions of radiation of longer wave lengths will be eliminated.

A preamplifier is used to amplify the signal of the diode to the level required for the flame signal amplifier of the respective burner control.

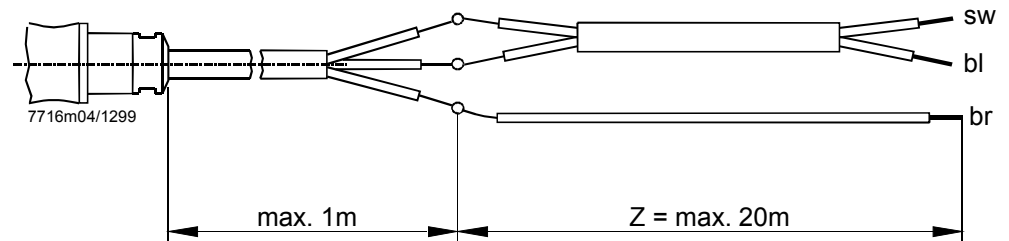
Flame signal interruptions of short duration are tolerated (refer to «Technical data» under «Tolerated flame signal interruptions»), thus ensuring more stable detector currents and more stable operation of the burner in the event of strongly flickering flames.

## Maximum detector cable length

If the maximum 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 segregated from the detector signal line.**

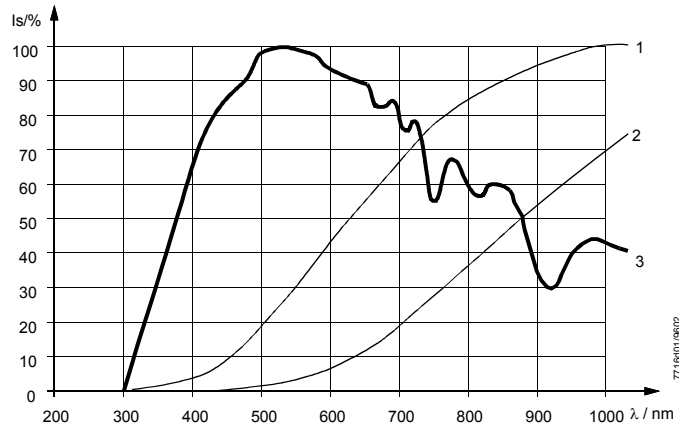


### Legend

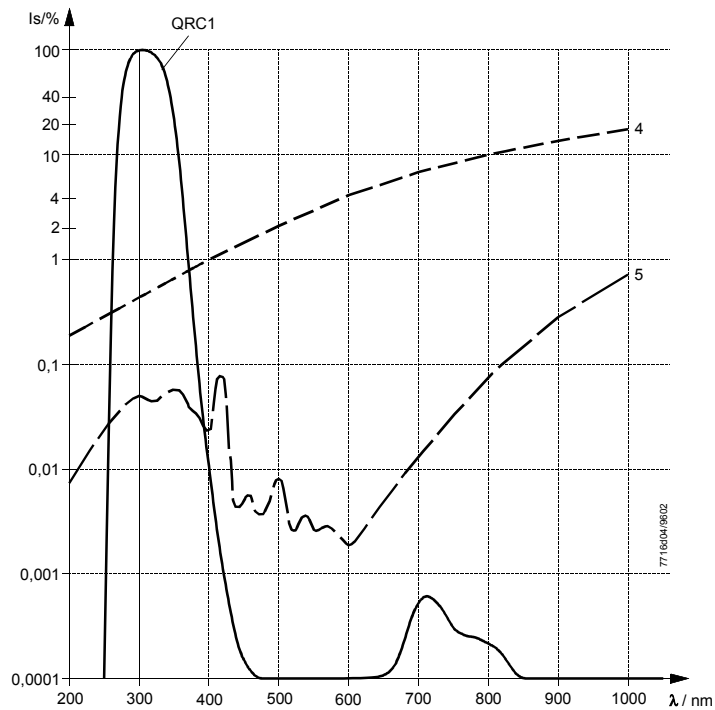
- Z Auxiliary cable
- bl Blue core = neutral conductor «N»
- br Brown core = live «L»
- sw Black core = signal line

## Spectral curves

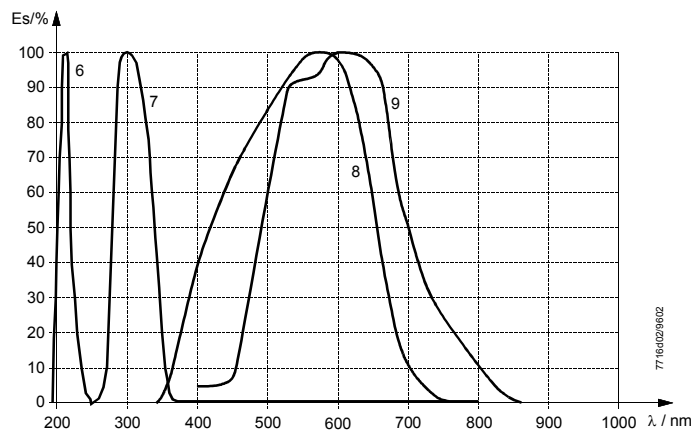
### Extraneous light



### Flames



### Sensitivity of light detector



### Legend

	$I_s$ / %	Relative intensity of radiation in %	$\lambda$ / nm	Wave length in nm
	$E_s$ / %	2856 K-radiation	QRC1...	Spectral sensitivity of QRC1...
1		2856 K-radiation	2	2000 K-radiation
4		Yellow-burning oil flame	5	Blue-burning oil flame
7		QRC1... photo diode	8	Selenium cell
			9	QRB... photo resistance

## Measuring circuit / connection examples

Measurement of detector current

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

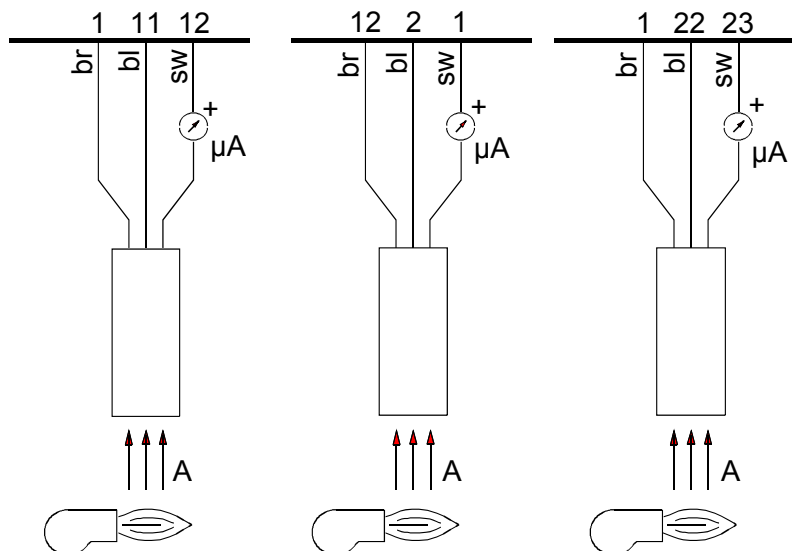
LMOx4...

LOA2...\*, LOA3...,

LOA44...

LGB3...

LAL1... / LAL4...



7716s04/0300

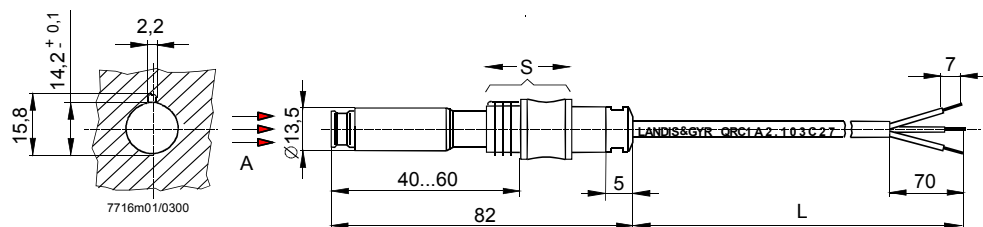
Connection examples

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

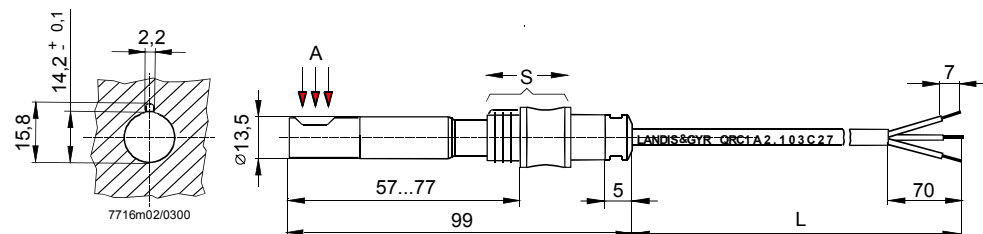
## Dimensions

Dimensions in mm

Frontal illumination



Lateral illumination



Legend

*	Except LOA25...	bl	Blue
μA	DC microammeter (internal resistance $R_i = \max. 5 \text{ k}\Omega$ )	br	Brown
A	Incidence of illumination	sw	Black
S	Range of displacement of plug produces a change in the dimensions ...	L	Available cable length (refer to «Type summary»)
		...40...60 mm (front)	50 mm as supplied
		...57...77 mm (side)	67 mm as supplied

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Subject to change!