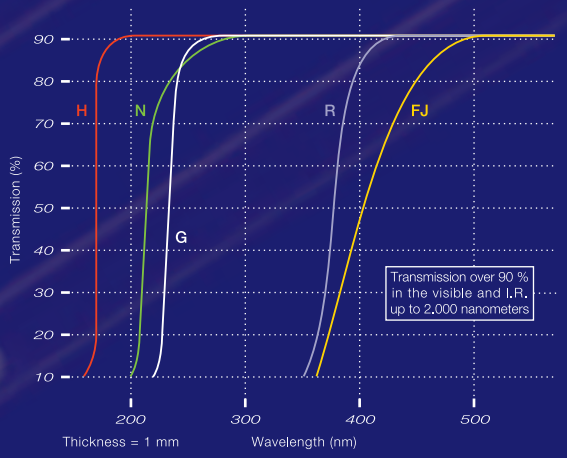
Standard Linear Flashlamps

JA SERIES

EXAMPLE : ORDERING INFORMATION

Flashtube	VQ
Xenon	X
Quartz envelope	R
Ref N°	8P4
(JA Serie)	JA
Pressure in Kg/cm2	1
Tube end	E4R

DIFFERENT TYPES OF SILICA TUBING



TYPICAL XENON OUTPUT SPECTRUM

Pulsed Flashlamp

R : Cerium doped silica. Even after extensive use there is pratically no violet coloured absorption center near 540 nanometers.
This silica filters pratically all the UV, no deterioration of doped glass rods or reflectors, no ozone formation, and has no damaging effect on the eyes.
Considerable conversion of UV into fluorescence centered at 435 nanometers : particularly recommended for pumping Yag crystals.

N : Natural fused silica with little fluorescence (selection of quartz crystals). After long use, coloured centers appear near 540 nanometers. Robust material.

H : Pure synthetic non-fluorescent silica. No appearance of absorption at 540 nanometers. This silica is mainly used for optical pumping of rubies and for distant UV flash sources.

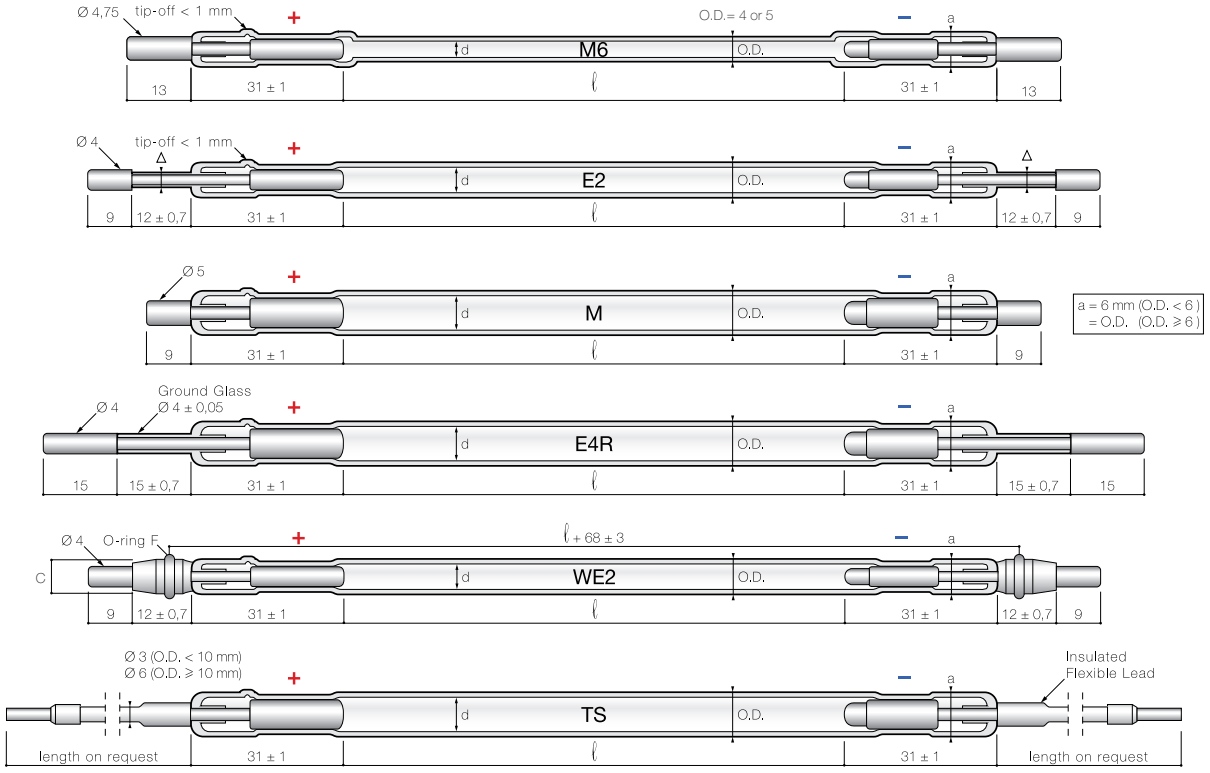
G : Titanium doped silica (germicidal) absorbing UVC. No ozone formation. Very rapid appearance of coloured absorbtion centers around 540 nanometers.

FJ : Yellow filters stopping all UV, correcting filter for colour photography. Withstands more than 600°C in permanent use, in air. Coated on R silica. No immersion.

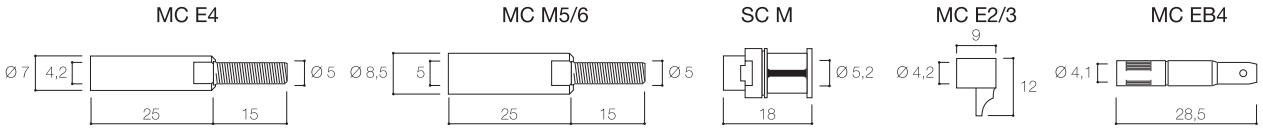
The spectral profile of xenon (and for rare gases in general) is composed of continuum of radiation - visible part from 350 nm up to 750 nm - and line radiation (atomic radiative transitions between energy levels) - IR part from 750 nm. (see figure beside)
Evolution of the radiation for 2 different current densities : 3200 A/cm^2 and 5400 A/cm^2.

Standard Linear Tube ends

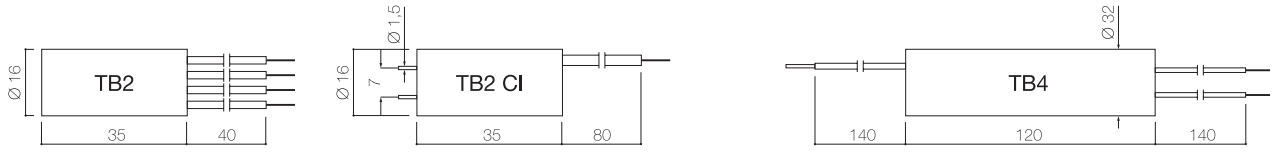
JA SERIES



Standard Plugs



Typical Trigger Coils



TB2 or TB2 CI

Primary Voltage : Max. 600 V
Secondary Voltage : Max. 22 kV
Discharge Capacitor : Typ. 0,47 µF
TB2 CI : output pins for soft soldering on elec. cards.

TB4

Primary Voltage : Max. 700 V (Typ. 600 V)
Secondary Voltage : Typ. 40 kV (Max. 50 kV)
Discharge Capacitor : Typ. 0,22 µF
Typ. useful frequency : 2 kHz

For more details about trigger transformers, please see section : "TRIGGER TRANSFORMERS FOR EXTERNAL AND SERIES TRIGGERING".

Specifications are subject to change without notice.

30, Route d'Aulnay - 93140 Bondy - FRANCE
Tel + 33 (0)1 48 49 74 21 - Fax + 33 (0)1 48 48 44 22
e-mail : flashlps@club-internet.fr

FLASHLAMPS Verre & Quartz

30, Route d'Aulnay
93140 Bondy - FRANCE
Tel + 33 (0)1 48 49 74 21 - Fax + 33 (0)1 48 48 44 22
e-mail : flashlps@club-internet.fr

FLASHLAMPS
Verre & Quartz

JA SERIES ORDERING CODE VQX R . . . JA1 E2 Note 1	4P1.5	4P2	4P2.5	5P2	5P2.5	5P3	5P4	6P2	6P2.5	6P3	6P4	6P5
d (I.D. ± 0,2 mm) (O.D. = d+2 mm)	2			3				4				
ℓ Arc length (mm)	38,1	50,8	63,5	50,8	63,5	76,2	101,6	50,8	63,5	76,2	101,6	127
Δ (± 0,1) (mm)	3	3	3	3	3	3	3	3	3	3	3	3
F (mm) Note 2	8	8	8	8	8	8	8	8	8	8	8	8
C (± 0,1) (mm)	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7	7,7
Ø of hole in flashtube supporting plate	8	8	8	8	8	8	8	8	8	8	8	8
Max. Power (W) Note 3 — Forced Air	90	120	150	180	230	270	360	240	300	360	480	600
Max. Power (W) Note 3 — Water Note 4	480	640	800	960	1200	1440	1920	1280	1600	1900	2560	3200
Operating Voltage (V) — Min.	540	600	660	600	660	720	840	600	660	720	840	960
Operating Voltage (V) — Max.	1400	1600	1700	1600	1700	1900	2200	1600	1700	1900	2200	2500
Max. Peak Current (A) Flash Duration 500 µsec.	500	500	500	500	500	500	500	500	500	500	500	800
Trigger Voltage (kV)	15-22	15-22	15-22	15-22	15-22	15-22	16-22	15-22	15-22	15-22	16-22	17-22
Typical Transformer	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2

JA SERIES ORDERING CODE VQX R . . . JA1 E2 Note 1	7P2	7P3	7P4	7P5	8P2	8P3	8P4	8P5	9P3	9P4	9P6	9P8
d (I.D. ± 0,2 mm) (O.D. = d+2 mm)	5				6				7			
ℓ Arc length (mm)	50,8	76,2	101,6	127	50,8	76,2	101,6	127	76,2	101,6	152,4	203,2
Δ (± 0,1) (mm)	3	3	3	3	3	3	3	3	3,5	3,5	3,5	3,5
F (mm) Note 2	9	9	9	9	9	9	9	9	11	11	11	11
C (± 0,1) (mm)	7,7	7,7	7,7	7,7	8,7	8,7	8,7	8,7	10,2	10,2	10,2	10,2
Ø of hole in flashtube supporting plate	8	8	8	8	9	9	9	9	11	11	11	11
Max. Power (W) Note 3 — Forced Air	300	450	600	750	360	540	720	900	630	840	1260	1680
Max. Power (W) Note 3 — Water Note 4	1600	2400	3200	4000	1920	2880	3840	4800	3360	4480	6720	8960
Operating Voltage (V) — Min.	600	720	840	960	600	720	840	960	720	840	1080	1320
Operating Voltage (V) — Max.	1600	1900	2200	2500	1600	1900	2200	2500	1900	2200	2900	3500
Max. Peak Current (A) Flash Duration 500 µsec.	800	800	800	800	1100	1100	1100	1100	1400	1400	1400	1400
Trigger Voltage (kV)	16-22	16-22	17-22	18-22	16-22	16-22	17-22	18-22	17-22	17-22	19-22	19-22
Typical Transformer	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2	TB2

Specifications are subject to change without notice - Standard features given in the table : other specifications on request.

Note 1

XENON FLASHTUBE (VQX…JA 1)

Standard silica : R (N, H and G available on request, as well as FJ coating).
The last figure in our reference indicates cold filling pressure in kg/cm² for JA tube series.
Standard pressure fill : 1 kg/cm² (1 to 4 kg/cm² on request).

Typical operating energy (critical damping discharge).

$J = \sqrt{T} \times \ell \times d \times 0{,}029$ T in µs, ℓ and d in mm.
This formula is given for recommended typical operation where discharge energy is equal to 20% of the energy at which the lamp explodes at the first shot in air at 20°C (explosion due to over high pressure and to stresses brought to bear by the temperature gradient upon the tube in natural fused silica (N) under the best mechanical mounting conditions with typical input energy (B = 1)). With typical energy, lifetime varies from 10^5 to 10^6 shots or more according to the way in which the tube is used, irrespective of type of end or type of silica chosen. Lifetime is defined as the number of pulses after which light intensity drops to 50% due to silica and electrode erosion.

Calculation of maximum critical damping operation energy for linear flashtubes as a function of their structure and environment.
(Mounting with "FLASHLAMP - Verre & Quartz" W type tube ends, ceramic with silicone 0 ring on supporting plate, or equivalent, at ambient temperature of 20°C to 80°C, for flash durations between 40 µs and 4 ms).

Maximum energy in joules = $\dfrac{\sqrt{T} \times \ell \times d \times A \times B}{P}$

Where : T = total duration (1/3 peak) in µs ; ℓ (arc length) and d are in mm.
P = pressure of Xenon or Krypton in kg/cm² (last figure in the tube reference, max. 4 kg/cm²).

Coefficient A (strength of tube depending on envelope material used).
silica thickness = 1 mm
A = 0,085 for N silica
A = 0,084 for G and H silica
A = 0,078 for R silica

silica thickness = 0,5 mm
A = 0,051 for N silica
A = 0,05 for G and H silica
A = 0,047 for R silica

Coefficient B (strength of tube end, environment) tube ends : E2, M, M6, E4R, WE2, TS…
B = 1 in air with reflector (in neutral atmosphere or for flash durations above 300 µs).
B = 0,45 in water in a laser cavity with very tight coupling.
B = 0,8 in water where there is an ample room for water to dilate during shots without causing extra mechanical stress on flashtubes.

Calculation of parameters for obtaining flash duration with critical damping at standard filling pressure.
(rise time = decay time)

$$C = 10^2 \sqrt[3]{\frac{2E\alpha^4 t^2}{Ko^4}} \qquad L = \frac{t^2}{C}$$

$$Ko = 1{,}33\frac{\ell}{d} \qquad V = 10^3\sqrt{\frac{2E}{C}} \qquad T = 3t\ (\alpha = 0{,}8)$$

T = total duration (1/3 peak) in µs.
E in joules. V in volt. C in µF. L in µH.
ℓ (arc length). d in mm and Ko in $\Omega\ A^{1/2}$.

KRYPTON FLASHTUBE (VQK…JA 1)

Pressure on request from 1 to 8 kg/cm².
Maximum power in watts the same as for Xenon (see table).
Maximum energy in joules as recommended above for Xenon.
Electrical ignition characteristics (trigger) are about 20% above those given in the table for 1kg/cm² of Xenon, for the same filling pressure.
Discharge characteristics : formulae given above for Xenon lamps give a good approximation for discharge parameters as a function of the energy and flash duration desired.

Standard tube ends : E2 (M, M6, E4R, WE2, available on request. See drawing).
High voltage insulation flexible leads with specific lengths available : TS…
- Ø 3 mm ext : temperatures -70°C +250°C, insulation 22 kV.
- Ø 6 mm ext : temperatures -70°C +250°C, insulation 37 kV.

Note 2

F is Ø of hole in plate supporting flashtubes fitted with WE2 ends.
Maximum operating temperature for continuous use in oxiding atmosphere (dry air) for lamps fitted with WE2 ends : 200°C.

Note 3

Maximum operating frequency is 30 Hz in air, 100 Hz in water, for tubes with pressure fill of 1kg/cm². For higher frequencies please consult us, see section : "Stroboscopic Xenon Flashtubes".

Note 4

Use only demineralized or preferably distilled water in a closed circuit. We recommend a deionizer in series, with an average flow of 8 liters per minute, and exchanger made of non-metallic material. If that is impossible, use only one metal, preferably stainless (no copper or derivatives). Temperature around the lamp should not exceed 40°C.
For silica thickness = 0,5mm, the max. power in water can be increased :
P x 1,6 (in Watt) for N, G and H silicas
P x 1,4 (in Watt) for R silica