

15th International Symposium on Fireworks



Bordeaux, France
September 21-25, 2015

PROGRAM

Message from the ISF Society Chairman: Ettore Contestabile

Welcome to the 15th Edition of the International Symposium on Fireworks (ISF). As with other ISF locations, it took several attempts to finalize a plan to host the ISF in France. The location of choice was proposed by the France Host Committee (FHC) as Bordeaux, a city of historical significance and of course in an area of great wines.

There has always been a large presence of French pyrotechnicians, researchers and regulators. They played a major role at the first ISF in Montreal in 1992. Besides attending and contributing to the first international Fireworks Harmonization Workshop which was part of the 1st ISF there were presentations such as, "Un outil industriel de sécurité (An industrial Safety Tool) by Jean-Paul Lucotte of Ruggieri" and "L'ensemble de lancement de feux d'artifice, ELFE D'ART (Fireworks Launching Equipment, ELFE D'ART) by Robert Maurel of Maurel Pyrotechnie. (The French delegations also travelled to Ottawa to attend the IGUS meeting which followed the 1st ISF.)

Following the 1st ISF, other presenters from France included, Jean-Marc Mouligné, Dominique Lajeunesse, Raphaël Trousselle (Davey Bickford), Annik Keyser (Ministere de l'Economie, des Finances et de l'Industrie), Alain Jaillard-Rakowski (Arts France), Isabelle Dufresne and Jean-Eric Ougier (Comite Departemental du Tourisme de L'Oise), Ruddy Branka (INERIS), Christian Michot (INERIS), Frederic Manzi and Dominique Vignolo (Vishay Sfernice), Pierre Thébault (Etienne LACROIX Tous Artifices), and others.

The FHC, whose members are exceptional professionals in the field of fireworks have sourced a large number of interesting papers for presentations at this ISF, have arranged several outings, and have organized numerous fireworks displays. The outings are designed to reflect the varied personality of Bordeaux with its many flavours which will be accentuated by fireworks displays by some of the best companies in the world.

This 15th Edition of the International Symposium will be overseen by the Honorary Chairman, Pierre Thebault, a true pyrotechnician and academic with broad knowledge of the evolution of the art and science of pyrotechnics. He has so impressed us that



he has agreed to serve as both the Honorary Chair and the Co-Chair of this ISF. This is the first time in the history of the ISF, that the same persona has held both titles. Congratulations and thank you, Pierre!

When the first ISF was being planned for Montréal in 1992, it was imperative to have a logos and nomenclature in both official languages of Canada, French and English. The so called, "Ticket", shown here, and used for the 1st ISF in Montréal, had the French on top and English on the bottom with the "Star" between them. A very appropriate logo, once again for this 15th ISF.

When it came to have an ISF slogan that would impart the same meaning in English and French, the official federal government translators were at odds. And so, there would be no bilingual slogan! A way for me was the use of letters most often used in mathematical equations and that no one ever questioned. It would mean, using a third language, one that would find acceptance due to its deep roots of many words that seed many languages of the world. And so, I went back to the old Greek letters from which the term that bonds us, "pyro", is the source, and our quest in the ISF slogan, discovering the fire, ΕΞΕΥΡΙΣΚΕΤΕ ΤΟ ΠΥΡ, continues.

Ettore Contestabile
ISFS Chairman



and knowledge, presenting offers of new products and equipment, debating common problems and finding common solutions, establishing cooperation links or bases of fair and respectful competition, with a common will of making fireworks ever more attractive, ever more amazing, ever more innovative.

Pierre Thebault
Honorary Chairman
15th International Symposium on Fireworks,
Bordeaux

As usual, these five days of September 2015 will give the opportunity to every participant of exchanging ideas





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SYMPOSIUM WEEK AT A GLANCE

September 20-25, 2015

Time	Sunday 20	Monday 21	Tuesday 22	Wednesday 23	Thursday 24	Friday 25
		Registration Trade Show Until 17:00	Trade Show Until 17:00	Trade Show Until 12:00	Trade Show Until 17:00	
8:30/9:00		OPENING Presentations	Presentations	Presentations	Presentations	Presentations
10:00		Break	Break	Break	Break	Break
10:30		Presentations	Presentations	Moderated Sessions	Presentations	Presentations
12:00		LUNCH	LUNCH	CLOSE	LUNCH	CLOSE
13:00	Registration					
13:30		Presentations	Presentations		Presentations	
15:00		Break	Break		Break	
15:30		Presentations	Workshop: Picking Areas	Event 1 @4:00pm	Presentations	
17:00	CLOSE	CLOSE	CLOSE		CLOSE	
18:00		Event 1	Event 2			ISF Gala Dinner
19:00	Welcome Reception					
Evening		Fireworks	Fireworks	Fireworks		Fireworks

Registration

Registration to the 15th International Symposium on Fireworks includes entry to receptions, meals and refreshment breaks, all Technical Sessions, Workshops, the Trade Show, site visits, evening fireworks displays, and demonstrations.



Registrants will receive a printed copy of the 15th ISF Proceedings which is a compilation of the scientific and technical papers presented and any other promotional material supplied by sponsors.

Trade Show

Exhibits will open each day at 9:00 Monday to Friday, and will close at the same time as the technical sessions. Attendees are strongly encouraged to visit our exhibitors and discuss their merchandise and services. The exhibitors' participation is a welcome and a necessary part of the Symposium.

Technical Program

The 15th International Symposium on Fireworks WOULD NOT BE A SYMPOSIUM without the presentations provided by our speakers and moderators during the technical sessions. A great deal of time and effort is required to write papers and prepare the presentations. Your attendance at the technical sessions demonstrates firm support of our presenters and lets them know their efforts are greatly appreciated.



INTERNATIONAL SYMPOSIUM ON FIREWORKS

PROGRAM SCHEDULE

September 20-25, 2015

SUNDAY: September 20

13:00 to 17:00 **Registration**

19:00 **Welcome Reception**

MONDAY: September 21

8:30 **Official Opening**
Ettore Contestabile, ISF chairman
Pierre Thebault, Honorary Chairman
Roger L. Schneider, Technical Program Co-Chairperson

Guest Speaker
Hervé Graindorge, Chairman of AF3P

9:00 **From The Kings' Prestige to Bastille Day Celebrations: History of a National Passion** *Pierre Thebault*, Pyroconsultant Sarl, France

9:30 **Peering at the Display-Window of a Fireworks Shop before World-War-Two** *Jean-Louis Dumont*, Expert in Pyrotechnics, Retired from CNRS (Centre National de la Recherche Scientifique), France

10:00 **BREAK**

Session 1

Session Chairperson:
Ben Schwegler,
The Walt Disney Company, USA



10:30 **Characterization and Classification of Spent Tubes from Pyrotechnic Devices and Items Soiled with Pyrotechnic Residue** *Stephan A. Coman*, RES Specialty Pyrotechnics, Inc., *Troy A. Gardner* and *Kirt N. Sasser*, Safety Management Services, Inc., USA



11:00 **We're Only Human: The Application of Human Factors Engineering to the Reduction of Errors in Fireworks Related Operational Systems** *Robert Foti*, Pyromanager Co Ltd, Hong Kong



11:30 **Study on Thermal Decomposition Characteristics of High-Nitrogen Fuel** *Xinggao Zhang*, *Wenlian Peng*, *Gengran Liu*, *Pai Wu*, *Hongxin Shi*, State Key Laboratory of NBC Protection for Civilian, Beijing, P. R. China

12:00 **LUNCH**



Session 2

Session Chairperson: *Jean-Michel Dambielle*,
General Operational Director of Lacroix-Ruggieri,
Etienne-Lacroix Tous Artifices S.A., France



- 13:30** **French Main Requirements for Fireworks Implementation in Pyroshows** *Jean-Frédéric Dartigue Peyrou and Henri Miermont*, Syndicat des Fabricants d'Explosifs, de Pyrotechnie et d'Artifices (SFEPA), France
- 14:00** **Fireworks Shooting Technology in China** *Shixing Ouyang*, Ouyang Musical Pyro Ltd., China
- 14:30** **Showing Compliance of Firework Noises with the European Directive on Environmental Noise** *Daniel Casenave, Matthieu Labeille and Pierre Thebault*, Etienne LACROIX Tous Artifices S.A., France
- 15:00** **BREAK**

Session 3

Session Chairperson:
Izaskun Astondoa,
Piroteknia Astondoa
S.A., Spain



- 15:30** **A Survey of the Sources of Pyrotechnic Chemicals in China** *Andrew Tang*, Tian Cheng Pyrotechnics Laboratory, China and *Roger L. Schneider*, Rho Sigma Associates, Inc., USA



- 16:00** **Evaluation of Aging Pyrotechnic Compositions Obeying the Arrhenius Law by Differential Thermal and Gravimetric Analysis** *D. Medus, M. Petrantoni, C. Sandre, C. Dupuy, P. Thebault*, Etienne LACROIX, France

- 16:30** **The Research of the Extinction Theory of Graphite** *Gengran Liu*, State Key Laboratory of NBC Protection for Civilian, Beijing, P. R. China

CLOSE

TUESDAY: September 22

Session 4

Session Chairperson:
Martyne Gagnon,
Entertainment Manager
and Director of
L'International des Feux
Loto-Québec presented
by TELUS, Canada



- 8:30** **Water and Gravity Efficient Action Relationship in Reaction to Fire**
Joaquim Melo Rodrigues, Luso Pirotecnica Group, Portugal
- 9:00** **Phenolic Resin/Hexamine Binding of Pyrotechnic Compositions**
James C. Widmann, Connecticut Pyrotechnic Manufacturing LLC, USA
- 9:30** **Progress with the Development of an Alternative Approach to the Analysis of Data from the CHAF Research on Waterfall Fireworks and the Ramifications for UN Series 6(A) and 6(B) Testing of Fireworks** *S.G. Myatt* Health and Safety Laboratory, and *E. Bale*, Health and Safety Executive, Great Britain



10:00 BREAK

Session 5

Session Chairperson: *Dominique Medus*, Scientific Director, Etienne-Lacroix Tous Artifices S.A., France

10:30 **Are Shells' "Safety" Distances "Safe"?**
Tom Smith, CarnDu Ltd, UK, *Christian Lohrer*, Federal Institute for Materials Research and Testing (BAM), Germany



11:00 **Determination of Safety Distances: The French Approach** *Jean-Pierre Costes and Pierre Thebault*, Etienne Lacroix Tous Artifices S.A., France

11:30 **Method of Measuring the Effect Range of Aquatic Display Fireworks** *Y. S. Chua*, International Quality Assurance B.V., China

12:00 LUNCH

Session 6

Session Chairperson: *Emmanuel Baudet*, General Director, ARDI S.A., France

13:30 **Methods for Projecting Pyrotechnic Patterns in the Air: Software, Hardware, and Products** *Alberto Navarro*, Infinity Visions Inc., USA



14:00 **The Language of Pyrotechnic Effect Names Part 3: VDL 1.0 Specification**
Will Harvey and Dustin Leary, Finale Fireworks, USA



14:30 **Parallelism and Hybrid Communication: A Perfect Combination to Maintain High Speed and Performance for Data Exchange in Firing Systems** *Luigi Leone Paolo Monetti*, PyroLEDA® Firing System Monetti Srl, Italy

15:00 BREAK

Session 7

Session Chairperson and Workshop Moderator: *Ettore Contestabile*, Chairman, ISFS

15:30 **Workshop: Fireworks Picking Areas**
Presentation by representatives from various countries, followed by a Question and Answer Period

CLOSE

WEDNESDAY: September 23

Session 8

Session Chairperson:

9:00 TBA

9:30 **Study on Thermal Decomposition Characteristics of Triaminoguanidinium Azotetrazolate** *Yinglin Mu, Bing Yao, Gengran Liu, Xinggao Zhang, Wenlian Peng, and Hongxin Shi*, State Key Laboratory of NBC Protection for Civilian, China

10:00 BREAK

Session 9

Session Chairperson: *Jorge M. Márquez M.*, Lux Pirotecnia, S.A. de C.V., Mexico



Moderated Sessions

10:30 to 12:00

Each of the moderated session topics listed below will be assigned to a designated table. The number of participants at each table will be limited. Symposium attendees wishing to take part in the discussion of a particular topic will be required to register with the respective moderator. This should be done prior to 9:00 on Wednesday.

Each topic will be presented for discussion in two separate, 45 minute sessions, with a break between. This will provide participants the opportunity to attend two different topics, if they wish. Note that translation services will not be available for the moderated sessions; however, some moderators can converse in more than one language.

Topics and Moderators

1. *Wrong Theory; the Power of Imperfection in Pyrotechnic Display Design* – Alberto Navarro
2. *Environmental Impacts, Assessments and Mitigation Strategies* – Ben Schwegler and Joost van Lingen
3. *Safety distances for display fireworks with focus on EU regulations* – Christian Lohrer, Pierre Thebault, and Jean-Pierre Costes
4. *The susceptibility of the e-match to ESD, lightning, magnetic fields and electromagnetic waves* – David Weston
5. *International Symposium on Fireworks; Open Forum for Opinions and Suggestions* – ISF Directors
6. *Phenolic Resin/Hexamine Binding of Pyrotechnic Compositions* – James C. Widmann
7. *The Montreal International Fireworks Competition, thirty-one years of Pyromusical Innovation* – Martyne Gagnon and Paul Csukassy
8. *America's National Fireworks Association (NFA)* – Nancy Blogin
9. *Issues Concerning CE Marking* – Rev. Ron Lancaster
10. *Firing Systems* – Vitor Machado
11. *Technics in Computer Choreography* – Will Harvey

12:00

CLOSE—Free Afternoon

On this occasion of the 15th ISF, MagicFire and Rho Sigma Associates have sponsored a flash drive that every ISF registrant will receive. The flash drives are loaded with the Program and the Proceedings of the 15th ISF and the Proceedings of the previous fourteen symposia.

THURSDAY: September 24

Session 10

Session Chairperson: *Martin Hildeberg*, Göteborgs FyrverkeriFabrik, Sweden



8:30

Comparative Analysis of Fireworks Transport Dangerous Classification Test Results and Default List

Zhang Guanghui, Xiao Jiayong, Tan Aixi, Jiang Zicheng, Qiu Lina, Tan Jingru, Fireworks & Firecracker Inspection Centre of Hunan Entry-Exit Inspection and Quarantine Bureau, China, and *Y. S. Chua*, International Quality Assurance B.V., China

9:00

Fireworks Accidents in Japan during 2011-2014 *Yuji Wada, Takako Itou, Nobuo Nakajima, Kunio Matsukura, and Masahide Wakakura*, Research Institute of Science for Safety and Sustainability (RISS), National Institute of Advanced Industrial Science and Technology (AIST), Japan



9:30

Lessons that can be Learnt from Accidents Involving Fireworks

Pauline Arama, Bureau d'Analyse des Risques et Pollutions Industriels (BARPI), French Ministry of Ecology, Sustainable Development and Energy, France

10:00 **BREAK**



Session 11

Session Chairperson: *Lionel Aufauvre*, INERIS, France

10:30 15 Years after Enschede: An Overview of Actions and Status *Piet Timmers and Soedesh Mahesh*, RIVM, National Institute for Public Health and the Environment, Centre for Environmental Safety and Security, The Netherlands

11:00 Safety Related Behavior of Cylindrical Shells *Marianne Douet, Christian Lohrer, Lutz Kurth, Olaf Mücke*, Federal Institute for Materials Research and Testing (BAM), Germany



11:30 Injury Potential from Rockets with Net Explosive Content Less Than 75 g *Shulin Nie and Mikael Ekeberg*, MSB, Swedish Civil Contingencies Agency, Sweden

12:00 LUNCH

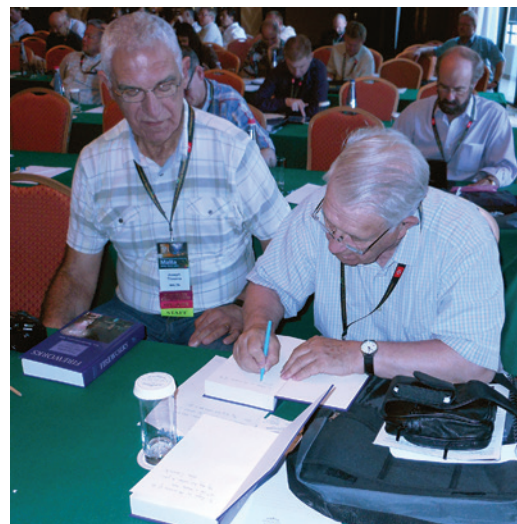
Session 12

Session Chairperson: *Maria Grazia Gerbaudo*, Panzera s.a.s Industria Pirotecnica, Italy



13:30

Issues Concerning CE Marking: Notes Written April 2015 *Rev. Ronald Lancaster*
MBE, Kimbolton Fireworks Limited, UK



14:00 Ideas of Improving Colored Flame Compositions *Dominykas Juknelevicius, Arunas Ramanavicius* Department of Physical Chemistry, Vilnius University, Lithuania, *Magdalena Rusan, Thomas M. Klapötke*, Department of Chemistry, Ludwig Maximilian University, Germany, *Rytis Kubilius*, Pyrotechnics R&D Department, Blikas Ltd., Lithuania

14:30 Hazard Evaluation of the Strobe Compositions with Water *Mieko Kumasaki*, Yokohama National University, Japan

15:00 BREAK

Session 13

Session Chairperson: *Dominique Brezac*, Brezac Artifices, France

15:30 America's National Fireworks Association (NFA)—It's Founding, Accomplishments and Future Goals *Nancy Blogin*, National Fireworks Association, *Joseph R. Bartolotta*, Bartolotta and Associates, LLC, *Roger L. Schneider*, Rho Sigma Associates, Inc., USA



16:00 **What did Pyrotechny Mean Five Centuries Ago? Vannoccio Biringuccio and the Arts of Fire** *Pierre Thebault, Pyroconsultant Sarl, France*

16:30 **The Danger of Human Body Electrostatic Discharge to Fireworks Shells with a Composition Containing Metal Particles** *David Weston, EMC Consulting Inc., Canada*



16:45 **Exposure of Fireworks Shells with Conductive Metal Particles to the High E and H Fields under High Voltage Transmission Lines** *David Weston, EMC Consulting Inc., Canada*

CLOSE

FRIDAY: September 25

Session 14

Session Chairperson: *Yuji Wada*, Research Institute of Science for Safety and Sustainability (RISS), National Institute of Advanced Industrial Science and Technology (AIST), Japan

9:00 **Scale Effect on DDT Properties of Fireworks Compositions** *Mitsuru Arai and Kotaro Ouchida, The University of Tokyo, Japan*



9:30 **The Omagari Fireworks Competition** *Shigeji Sasaki, Chairman of the Omagari Chamber of Commerce and Industry, Japan*

10:00 **BREAK**

Session 15

Session Chairperson: *Mitsuru Arai, The University of Tokyo, Japan*

10:30 **Comparison of Modified DDT Test and HSL Flash Composition Tests for Various Fireworks Compositions** *Shu Usuba, Ken Okada, Miyako Akiyoshi, Takehiro Matsunaga, National Institute of Advanced Industrial Science and Technology (AIST), Japan, and Shuji Hatanaka, Japan Pyrotechnics Association, Japan*



11:00 **Firework Mortar Suppressor: Acoustic Dampening of the Launch Phase of Shells for the Professional Fireworks Industry** *David Willsher, Fantastic Fireworks, England*

11:30 **Resisting the Impact of an Exploding 6" (150 mm) Dud Aerial Display Shell: Design and Testing of a Protective Roof Canopy** *Roger L. Schneider, Rho Sigma Associates, Inc., USA, John E. Bouman, Walt Disney Company, USA, Ken Agee, Wheeler & Gray Consulting Engineers, USA, and Ettore Contestabile, Rho Sigma Associates, Inc., Canada*



12:00 **CLOSE**
Closing Remarks
—Pierre Thebault and Ettore Contestabile



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FireOne—Sunday evening Welcome Reception

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Pyro Spectaculars—Symposium Bag

*Sirius Pyrotechnics—Wednesday's Moderated
Session Coffee Break*

*Christoph Maier, Pyrophotos.com—
Select photos*



FRANCE ISF HOST COMMITTEE EVENTS

September 21 – 25, 2015

Note that with the exception of the Welcome Reception (Sunday evening) and the Gala Dinner (Friday evening) all other events during the week of September 21 to September 25 are organized by the France Host Committee.

DATE AND DEPARTURE TIME	SOCIAL EVENTS	PYROSHOWS
Event 1: Monday, 21st Direct Public Transport from Cité Mondiale (15 minutes)	WELCOME RECEPTION AT TOWNHALL at 6.30 pm	Palais Rohan/Place Pey Berland Place des Quinconces at 9.30 pm: JCO PANZERA-APE PARENTE GALAXIS-FFP VULCAN-ARDI
Event 2: Tuesday, 22nd Buses departure from Cité Mondiale at 6.00 pm	CASUAL PARTY AT CHATEAU GISCOURS MEDOC Winery visit Medoc Wines testing Dinner and food testing	On site at 10.00 pm: JINSHEN- BREZAC PARENTE PYRAGRIC- RICASA
Event 3: Wednesday, 23rd Busses departure at 4.00 pm	SAINT EMILION VISIT Winery visit Old city guided visit Dinner at Cloître des Cordeliers	On site at 10.00 pm: NEWYEARFIREWORKS - BREZAC
ISF Gala Dinner* Friday, 25th 10-minute walk from Cité Mondiale	GALA DINNER* on BORDEAUX Garonne bank Welcome appetizer on terrace Seated high quality dinner Wines from several Bordeaux vineyards Champagne	On Garonne river and Chaban- Delmas bridge visible from the terrace: RUGGIERI- ZARAGOSANA

*Gala Dinner is an ISF event

**REGISTRATION CONDITIONS AND FEES ON ISF WEBSITE/DEADLINE FOR REGISTRATION:
SEPTEMBER 10th/ PAYMENT IN EUROS ON SITE ONLY by CASH or CREDIT CARD**



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The "Jiangxi Wanzai Golden Peak Fireworks Corporation" was established.

1989

Received Chinese Government Fireworks Export & Import Permit.

2002

1994

Completed successful takeover bid of the original township enterprise of the "Huang Mao Export Shell Factory".

Awarded Top 10 enterprises in the Chinese Fireworks Industry.

2006

2004

Established the Tongyi Firecracker Factory in Wanzai.

2000

Registration of Golden Peak's first registered logo, the "Jin" brand.

2005

Registered the King Bird trademark logo in the United States and Asia.

2007

Successful takeover bid to acquire the Liuyang Ruida Fireworks Factory to develop the Chinese domestic market.

The subsidiary corporation Peak Performance Fireworks of Frankfort, Indiana was founded and began business operations in the United States in order to develop and serve the wholesale and retail consumer fireworks market in the United States.

2013

2012

Awarded Top 100 advanced enterprises among over 600 member enterprises of the Chinese Fireworks and Firecracker Standardization Organization.

2009

Awarded Most Influential Top 10 Management Companies in the Global Fireworks Industry. King Bird awarded Most Influential Top 10 Brands in the Global Fireworks Industry. King Bird awarded Most Famous Brand in Jiangxi province.

2015



certification



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15th International Symposium on Fireworks

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The image shows several boxes of Ardi 'Les Portables' fireworks, specifically the 'Champs-Élysées' series. The boxes are labeled with durations: 1m30, 3mn, 4mn, and 5mn. They feature the Ardi logo and the text 'FEU D'ARTIFICE MUSICAL PORTABLE PRESTIGE'. A film strip at the bottom displays a sequence of colorful fireworks exploding in the night sky. A gold oval logo on the right reads 'ARDI CREATEUR DU CONCEPT PORTABLES DEPUIS 1999'. Below it, text states 'Inventor of the "Portables®" concept since 1999'. At the bottom center, the text 'Qualité Grand Spectacle' is displayed.

Au 15^{ème} Symposium international des feux d'artifices,
retrouvez-nous **lundi 21 Septembre**, Place des Quin-
quonnes, à Bordeaux, pour un spectacle à couper le
souffle avec notre partenaire Vulcan®.

Et du **mardi 22 au mercredi 23 Septembre**, venez nous
rencontrer sur le Trade Show du Symposium. (Stand
SFEPA)

Present on the 15th International Symposium of Fire-
works, meet up with us on Monday, **September 21st**,
Place des Quinquonnes in Bordeaux, for an absolutely
breathtaking pyro-melodic show with our partner Vul-
can®. You can also meet up with us at the Symposium
Trade Show (Stand SFEPA), from **Tuesday, September
22nd to Wednesday, September 23rd**.

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bi-directional



G-Flame

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- externer Taster bzw. pot. freier Kontakt
- 12-24V Spannungseingang
- DMX512

Control Inputs:

- Wireless (PFC Advanced)
- external key or any potential free contact
- 12-24V voltage input
- DMX512



Vorteile des Flammenprojektors G-Flame

- Sehr flexibel durch verschiedene Steuereingänge
- Keine Netzspannung erforderlich
- Kann auch bei starkem Regen im Freien betrieben werden
- Betrieb mit Aerosoldosen, Gasdosen oder Gasflaschen
- Brennstoffdosen sind vollständig im Gehäuse untergebracht und dadurch gut geschützt
- Dosenadapter mit Rückschlagventilen
- Alle Komponenten sind mit Schnellkupplungen ausgestattet für einen extrem schnellen Aufbau
- Vollkommen autarker Betrieb beim Einsatz des optionalen Advanced-Funkmoduls oder von drahtlosen DMX-Empfängern
- Feinfilter integriert, um undichten Magnetventilen vorzubeugen
- Ausgestattet mit zwei hintereinander geschalteten Magnetventilen für doppelte Sicherheit
- Elektronische Flammenüberwachung mittels Ionisationsmessung
- Mit Neigungssensor ausgestattet
- Bidirektionale Kommunikation mit dem Controller PFC Advanced und USB-Funkmodem PFM Advanced für Fernprogrammierung und Fernabfrage
- Vorbereitet für die schnelle Montage auf Hochständen und Truss-Elementen
- Beleuchtetes Textdisplay mit bequemer Menüführung
- Optische Warnanzeige wenn scharf
- Atompilzeffekt programmierbar
- Schnelle Stepsequenzen möglich, weil die Flamme auch bei Dosenbetrieb innerhalb kurzer Zeit nach dem Schließen der Magnetventile erlischt

Bitte besuchen Sie unsere Homepage, um weitere Informationen zu diesem innovativen Produkt zu erhalten oder fordern Sie das vollständige Prospekt mit allen Eigenschaften und Spezifikationen der G-Flame an.



Advantages of the Flame Projector G-Flame

- Versatile usage due to various control inputs
- No mains supply required
- Can be used outdoors also in heavy rainfall
- Either aerosol or gas cartridges or gas bottles can be used as fuel supply
- The gas cartridges are fully integrated in the housing and are well protected
- Cartridge holder comes with non-return valves
- All components are equipped with quick couplers for an extremely fast setup
- Completely autarkic operation if the optional Advanced Wireless Module or wireless DMX receivers are used
- Equipped with a microfilter to prevent leakages in the electromagnetic valves
- Contains two electromagnetic valves connected in series for additional safety
- Electronic flame monitoring system utilizing ionization measurement
- Tilt sensor installed
- Bi-directional communication with the controller PFC Advanced or the wireless USB modem PFM Advanced for remote programming and remote checks
- Prepared for the fast installation on light or speaker stands and truss elements
- Backlit character display and convenient menu-driven operation
- Optical warning signal if the device is armed
- Atomic effect programmable
- Flame extinguishes rapidly after closing the electromagnetic valves, also if cartridges are being used, enabling fast step sequences

Please visit our website to obtain further information about this innovative product or contact us in order to receive the complete G-Flame brochure with all its features and specifications.

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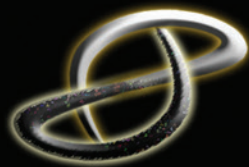
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