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# Pyrodigital® FM-A Operating Instructions

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Innovative Pyrotechnik GmbH  
Steinwerkstr. 2  
71139 Ehningen  
Germany



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## Safety and warning information

1. Ensure compliance with all relevant national and international laws and regulations, such as explosives laws, fire protection provisions and valid safety clearances.
2. Before connecting the device to electric matches, ensure that the IO switch of the Pyrodigital® FM-A firing module is set to "O" and that the Pyrodigital® Phase III network is not in operation.
3. The Pyrodigital® FM-A firing modules may only be operated by professional and authorized pyrotechnicians with sufficient knowledge of the Pyrodigital® Phase III network and the Pyrodigital® Field Controller to control the Pyrodigital® Phase III network.
4. Before set-up, ensure that the surrounding area is cleared by qualified personnel and cannot be accessed by unauthorized persons.
5. Protect the devices against fallout and the weather.
6. The device is intended exclusively for firing suitable electric matches. The user is responsible for the safe handling and use of the electric matches. Exclude the risk of unwanted firing caused by electrical, magnetic and electromagnetic sources and other safety hazards.
7. Only use the Pyrodigital® FM-A firing module with Pyrodigital® field controllers and Phase III network cables recommended by Pyrodigital® (Innovative Pyrotechnik GmbH). Please contact Pyrodigital® (Innovative Pyrotechnik GmbH) for an up-to-date overview of the recommended Pyrodigital® Phase III network components.

## Device view





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## Operation

### Use

The Pyrodigital® FM-A firing module is designed for firing suitable electric matches for the performance of fireworks displays and special effects. It is powered and controlled via a Pyrodigital® Phase III network. Pyrodigital® FM-A firing modules are not stand-alone devices, and cannot be operated without a Pyrodigital® Field Controller via a Pyrodigital® Phase III network.

### Connecting the electric matches

The **electric match terminals** are hexadecimally numbered from "0 to 9" and "A to F", and can be checked and triggered via the Pyrodigital® Phase III network. Before connecting the electric matches, ensure that the **IO switch** is set to "O" and the Pyrodigital® Phase III network is not powered up.

### Protection with fireproof cover

The sides of the Pyrodigital® FM-A firing module are fitted with **Velcro®** in order to attach the **flame-retardant cover**. This cover protects the device against fallout.

### Safety cable notch

The Pyrodigital® FM-A provides two **safety cable notches** to secure it from falling using a safety cable.

### Setting the network address

Using the two address selection switches on the **address unit**, it is possible to select a two-digit, hexadecimal address from "00" to "7F" to address the device within the Pyrodigital® Phase III network.

### Connection to the network

The Pyrodigital® FM-A firing module is connected to the Pyrodigital® Phase III network via the **Phase III network input** (three-pin XLR socket, male). It is also possible to loop through and split the Phase III network to successive Pyrodigital® firing modules via the three **Phase III network outputs** (three-pin XLR sockets, female). Only use the Pyrodigital® field controllers and Phase III network cables recommended by Pyrodigital® for operating the Pyrodigital® FM-A firing modules. Please contact Pyrodigital® for an up-to-date overview of the recommended Phase III network components.

### Arming and disarming the firing module

The Pyrodigital® FM-A firing module can be armed ("I" position) and disarmed ("O" position) using the **IO switch**. The **IO switch** mechanically connects ("I" position) and disconnects ("O" position) the power line from the firing circuitry of all **electric match terminals**. "I" corresponds to "power line connected" and "O" corresponds to "power line disconnected" to/from the firing circuitry of the **electric match terminals**. Simply think of the **IO switch** as a SAFETY. The "O" position of the **IO switch** is the SAFETY position for connecting the electric matches to the **electric match terminals**.



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### “O” Position of the IO Switch:

When the **IO switch** is in the "O" position, the firing circuits of the individual **electric match terminals** are mechanically disconnected from the power line supplied by the Phase III network. Thus, in the "O" position of the **IO switch** there is no current available to fire electric matches connected to the **electric match terminals**, even though the Pyrodigital® Phase III Network would be powered up. Further, in the "O" position, the Pyrodigital® FM-A firing module ignores all received firing commands and does not execute continuity tests on the **electric match terminals** when receiving check status commands. While the **IO switch** is in “O” position, the Pyrodigital® FM-A firing module always replies by default with “all **electric match terminals** open” to a check status command, as it is commonly known from all previous Pyrodigital® firing module types. Thus with the IO Switch in the “O” position, the entire Phase III system network can be checked for correct operation, proper addressing of the FM-A firing modules, and proper communications to the Pyrodigital® field controller in a “safe”, not capable of firing, condition.

### “I” Position of the IO Switch:

The firing circuits of the **electric match terminals** are only connected to the power line when the **IO switch** is in the "I" position. The Pyrodigital® FM-A firing module is then permitted to trigger the electric matches on the **electric match terminals** after receiving a valid fire command via the Pyrodigital® Phase III network. The **IO switch** can be switched to "I" once all necessary electric matches are connected to the **electric match terminals**, the Pyrodigital® FM-A firing module is connected to the Pyrodigital® Phase III network, and the Pyrodigital® Phase III network is not in operation. Also, ensure that the surrounding area is cleared by qualified personnel and cannot be accessed by unauthorized persons before you power up the Pyrodigital® Phase III network. The **IO switch** needs to be in the "I" position to perform a continuity test on the **electric match terminals** with a check status command sent via the Pyrodigital® field controller.

### Protective Circuitry

Bleeding resistors and Transient Voltage Suppressor (TVS) diodes prevent the poles of all **electric match terminals** from being electrostatically charged with respect to each other. A bleeding resistor between the electronics and the housing prevents electrostatic charge in respect to the housing and, at the same time, prevents dangerous currents via potential ground loops or by other fault current sources. The circuitry topology on each of the **electric match terminals** helps suppress induced currents by RF (radio frequency energy), e.g. originating from noncompliant devices or radio transmitters.

### Testing and Firing

The Pyrodigital® field controller allows you to perform a continuity test on each individual **electrical match terminal** of the Pyrodigital® FM-A Firing Module (a so called “check status”). The Pyrodigital® field controller also allows you to control the firing of each electric match connected to the **electrical match terminals**. To perform the continuity test and firing, please read the operating instructions of the corresponding Pyrodigital® field controller.



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## Technical data

Dimensions:	30.0 cm x 14.5 cm x 7.5 cm (11.8 inches x 5.70 inches x 2.95 inches)
Weight:	1.5 kg (3.3 lbs)
Rated voltage:	24 VDC
Rated power consumption:	< 0.5 W
Standby current:	3.3 mA
Continuity test current:	0.5 mA (applied for approx. 200 $\mu$ s per test)





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## Disclaimer

The Pyrodigital® FM-A firing modules are devices only for use in professional pyrotechnics, used to fire suitable electric matches as part of fireworks displays or special effects. The Pyrodigital® FM-A firing modules are intended and designed exclusively for the purpose of firing pyrotechnic special effects and fireworks, and may only be used for this purpose. The Pyrodigital® FM-A firing module is a slave module for the Pyrodigital® Phase III network, and may only be used together with a Pyrodigital® field controller via a Pyrodigital® Phase III network recommended by Pyrodigital® (Innovative Pyrotechnik GmbH) and interconnected using Phase III network cables recommended by Pyrodigital® (Innovative Pyrotechnik GmbH). The user must have specialist knowledge of the Pyrodigital® Phase III network and the Pyrodigital® field controller used. This is required to set up Phase III networks and to operate the Pyrodigital® FM-A firing modules. The Pyrodigital® FM-A firing module is designed and intended solely for professional use by trained and authorized pyrotechnicians, and may only be operated by such personnel. The Pyrodigital® FM-A firing modules may only be used by professional and authorized pyrotechnicians in conditions and environments that are approved by the authorities having jurisdiction. The designers, engineers, authors, manufacturer and sales partners of the Pyrodigital® FM-A firing module assume no liability for critical and unforeseeable factors outside their control related to the handling of the Pyrodigital® FM-A firing modules and the resulting risks. These risks include but are not limited to severe personal injury or death due to unintentional or incorrect firing of electric matches, operating errors and incorrect execution due to system errors during a fireworks display or performance. Such risks exist even though the Pyrodigital® FM-A firing modules are suitable within reason for all applications indicated in advertising material, brochures and documentation. This is also the case even when all instructions and guidelines for use, including those for the Pyrodigital® field controller, are observed. ENSURING SAFETY IS YOUR RESPONSIBILITY, and is outside of the control of Innovative Pyrotechnik GmbH (Pyrodigital®). By purchasing and/or using the Pyrodigital® FM-A firing modules, both the buyer and user assume full responsibility for all risks and liabilities resulting from the use of the Pyrodigital® FM-A firing modules. Furthermore, they also agree to indemnify Innovative Pyrotechnik GmbH (Pyrodigital®) and its sales partners against any claims resulting from injuries, loss and any damages caused directly or indirectly through the use of Pyrodigital® FM-A firing modules, as well as damages caused by failure. Innovative Pyrotechnik GmbH (Pyrodigital®) assumes no guarantee or liability for repairs or modifications to the device that are not performed or authorized by Innovative Pyrotechnik GmbH (Pyrodigital®), as well as for the resulting risks. Each sales partner is also bound to the conditions described here for the purposes of sales.