



## MF 28

Electrical firing unit on pyrotechnical elements

The electrical firing unit MF 28 is a highly accurate current generator, programmable in amplitude and duration, specifically developed for use on pyrotechnical elements where user safety is at stake.

The MF 28 accurately controls non-fire current as well as time and energy of activation. It can be used for instrumented, performance and product line tests (with process automation) on pyrotechnical elements.

## Description

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Several protections are integrated into the instrument in order to guarantee a safe use in any critical environment and more particularly for pyrotechnical systems:

External safety input (door closing, barrier closing, etc.)

Safety key extractible in "SAFETY" position

Protected "MANUAL" triggering button

Safety pyrotechnical ohmmeter at measurement current of  $< 10$  mA, allowing continuity tests to be performed (to limit and control current, even in case of failure)

DC output line to prevent build-up of electrical charges

Further key elements in MF 28 design guarantee the accurate control of the ignition:

Absence of any overshoot

Rising time  $< 10$   $\mu$ s at 1 A

Any potential residual discharges, inopportune firing causes, are automatically removed by automatic short-circuiting of shot-firing cables.

## Technical features:

- Programmable current from 1 to 10 A
- Programmable timing
- Embedded line pyrotechnical ohmmeter
- Isolated floating shot firing cable
- 5 protection elements
- Load breakdown detection

- Manual or automated triggers
- 3 synchronisation outputs (zero time, crenel current, current image)
- Optional remote control of the cycle SAFE AUTHORIZATION OF FIRE

Yearly calibration is highly recommended in order to control the safety functions of your firing unit.

## Technical support:

- Our technical staff can support you:
- Commissioning of your MF 28
- Management of units evolution (number and functional needs)
- On site breakdown servicing
- Unit integration on test bench
- On site investigation of any measurement issues

# Specifications

## Programmable current

|          |                            |
|----------|----------------------------|
| Range    | 1 to 10 A in steps of 1 mA |
| Accuracy | 1% of the scale            |

## Programmable timing

|          |  |
|----------|--|
| Range    | 0.1 ms to 999 s in steps of:<br>10 $\mu$ s from 0.01 ms up to 9.99 ms<br>100 $\mu$ s from 10.0 ms to 99.9 ms<br>10 ms from 1.00 s to 9.99 s<br>100 ms from 10.0 s to 99.9 s<br>1 s from 100 s to 999 s |
| Accuracy | $\pm 25 \mu$ s for all ranges  |

## Output voltage

|                |   |
|----------------|---|
| Output voltage | 70 V in standard<br>15 to 120 V in option |
|----------------|---|

## Line ohmmeter

|                   |   |
|-------------------|---|
| Range             | 0 – 10 $\Omega$ in standard<br>0 – 20 $\Omega$ in option                                |
| Accuracy          | $\pm 0.05 \Omega$ (4 wire measurement)<br>$\pm 0.1 \Omega$ after line offset correction |
| Measuring current | 3.3 mA  |

## Current copy output

|           |                                  |
|-----------|----------------------------------|
| Range     | 0 – 10 V for each internal range |
| Accuracy  | $\pm 5\%$                        |
| Rise time | 100 $\mu$ s                      |

## Further features

|                          |  |
|--------------------------|--|
| Load breakdown detection | Activated: The line current is inhibited as soon as the igniter detects the first break<br>None: No current inhibition |
| Synchronisations         | Synchro 1: Fire pulse (0 – 5 V)<br>Synchro 2: TTL presence copy line current (0 – 5 V)                                 |

|                         |  |
|-------------------------|--|
|                         | Synchro 3: Key position copy (closed contact)  |
| Fault detection         | <ul style="list-style-type: none"> <li>- Line short-circuited: <math>R_{line} &lt; 0.5 \Omega</math></li> <li>- Line open: <math>R_{line} \geq 10,0 \Omega</math></li> <li>- Power supply fault: <math>R_{line} * I &gt; \text{Power supply (120 V)}</math></li> <li>- Transistor fault: Output transistor continuously conducting</li> <li>- Delay setpoint fault: The delay set point is not in the same range as the time setpoint</li> <li>- Ohmmeter measurement current fault</li> <li>- Power relay fault: 'Power relay has not switched to the firing position' or 'Power relay has already switched to the idle position'</li> <li>- Start already present before firing</li> </ul> |
| External triggering BNC | <p>F+ Internal matching on <math>50 \Omega</math> (<math>1/2 \Omega</math>)<br/> <math>U_{max} = 20 \text{ V}</math></p> <p>F- Internal matching on <math>50 \Omega</math> (<math>1/2 \Omega</math>)<br/> <math>U_{max} = 5 \text{ V}</math></p> <p>Fc Return at +12 V on 1 K<math>\Omega</math> <math>U_{max} = 20 \text{ V}</math></p> <p>Oc Return at +12 V on 1 K<math>\Omega</math> <math>U_{max} = 20 \text{ V}</math></p>   |
| Trigger types           | <ul style="list-style-type: none"> <li>- By protected manual internal pushbutton Ma</li> <li>- By external "Triggering" connector</li> <li>- On Leading Edge F+</li> <li>- On Trailing Edge F-</li> <li>- On Closed Contact Fc</li> <li>- On Open contact Oc</li> </ul>  |

## General specifications

|                     |   |
|---------------------|---|
| Size                | Rack 19" - 3U<br>1 / 2 channels: 360 mm depth<br>4 channels: 460 mm depth |
| Supply              | 220 VAC - 50 / 60 Hz - 450 W  |
| Communication ports | RS 232 in option  |

## Safety specifications

|             |                             |
|-------------|-----------------------------|
| Protections | Mains fuse x 2: 3.15 A del. |
|-------------|-----------------------------|

## Models and accessories

### Instrument:

|                     |   |
|---------------------|---|
| MF28 1V 5A 2W       | MF 28 - 1 channel - 5 A - 2 wires         |
| MF28 1V 5A 4W       | MF 28 - 1 channel - 5 A - 4 wires         |
| MF28 1V 10A 2W      | MF 28 - 1 channel - 10 A - 2 wires        |
| MF28-1V-10A-4W      | MF 28 - 1 channel - 10 A - 4 wires        |
| MF28-2V-5A-2W       | MF 28 - 2 channels - 5 A - 2 wires        |
| MF28-2V-5A-4W       | MF 28 - 2 channels - 5 A - 4 wires        |
| MF28-2V-10A-2W      | MF 28 - 2 channels - 10 A - 2 wires       |
| MF28-2V-10A-4W      | MF 28 - 2 channels - 10 A - 4 wires       |
| MF28-4V-10A-2W      | MF 28 - 4 channels - 10 A - 2 wires       |
| MF28light-1V-10A-2W | MF 28 light - 1 channel - 10 A - 2 wires  |
| MF28light-2V-10A-2W | MF 28 light - 2 channels - 10 A - 2 wires |

Further configurations on request: 4 channels, specific firing current...