



# INTRINSIC SAFETY WITHOUT THE POWER LIMITS

## DART

DYNAMIC ARC RECOGNITION AND TERMINATION

# THE NEW DIMENSION OF INTRINSIC SAFETY

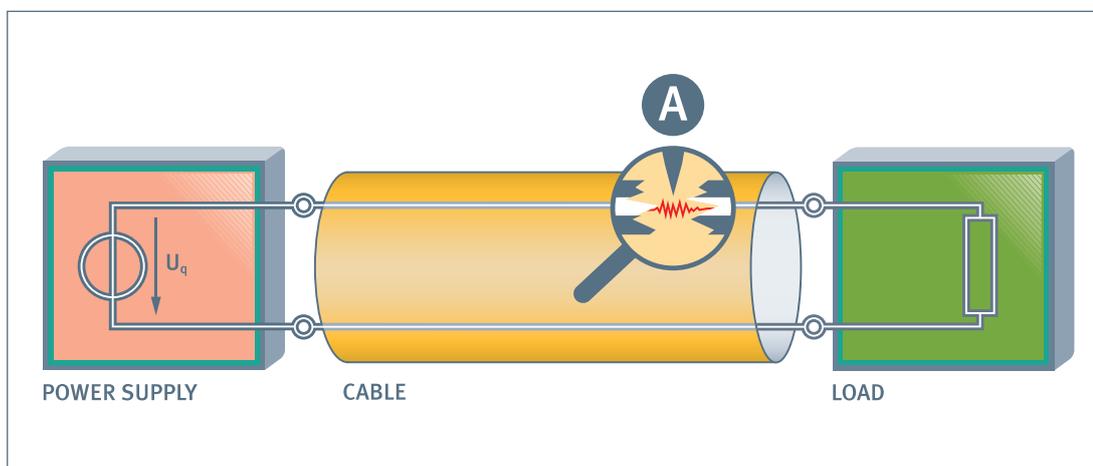
DART dramatically increases available power in explosion hazardous areas while maintaining intrinsically safe energy levels.

## BASIC PRINCIPLES OF DART

DART introduces design principles of a well-known technology – dynamically acting power supplies – to explosion protection.

[www.technology-dart.com](http://www.technology-dart.com)

Intrinsic safety of an electric circuit with dramatically increased available power during normal operation is enabled by DART. In the case of an unwanted, potentially threatening condition such as opening or closing of the electric circuit, DART puts the circuit into a safe state before critical levels are reached. This redefines intrinsic safety where energy limitation is traditionally achieved through power limitation.



*Simple DART circuit with fault on the cable. The power supply recognizes the fault condition and turns off.*

Pepperl+Fuchs in conjunction with PTB, the Physikalisch Technische Bundesanstalt in Germany is involved in introducing changes to international standard IEC 60079-11. The next issue of this standard for intrinsic safety will introduce the option for test and approval of dynamically acting power supplies.

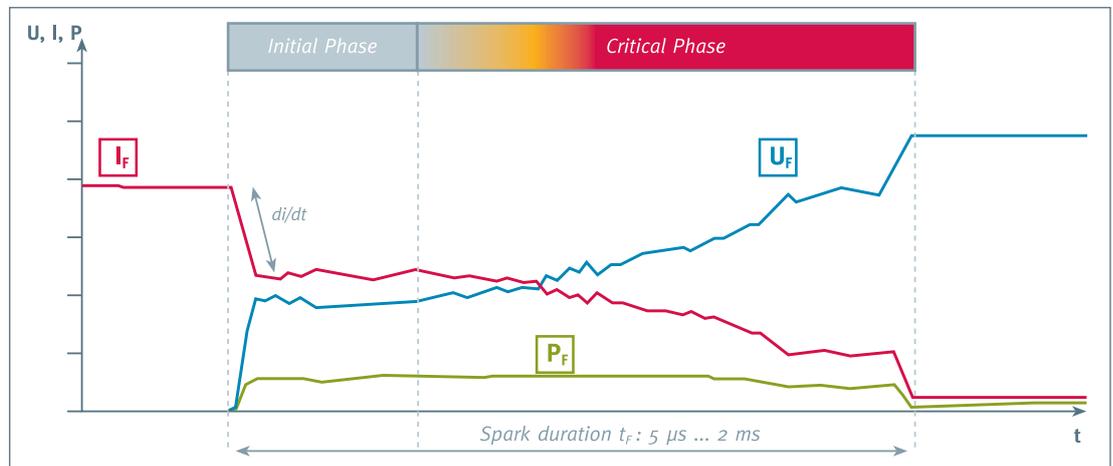
## THE TECHNOLOGY

A spark caused by opening or closing an electric circuit has a very characteristic and easily detectable change of current and voltage. This change is detected by DART and the circuit switched off in only a few microseconds ( $\mu\text{s}$ ). Thus, even at higher power levels sparks never become incandescent. The response of the DART power supply is about  $1.4 \mu\text{s}$ .

In dynamic systems such as DART, the length of the cable has to be taken into consideration. The information about a current change ( $di/dt$ ) and the corresponding “turn off” from the power supply travels as a guided wave along the cable from the fault location to the power supply and back at approx.  $160.000 \text{ km/sec}$ . This is why the length of the cable is an important aspect of safety considerations.

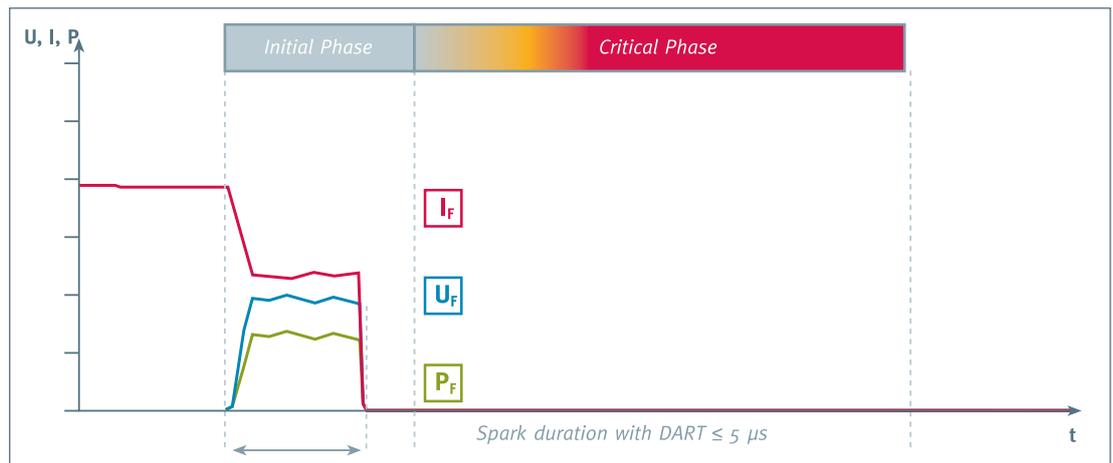
Current, voltage and power of a break spark.

A characteristic current and voltage change is detectable at the beginning of an interruption.



Current, voltage and power of a spark interrupted by DART.

Coolness of a spark is ensured.



## ENSURING ACCURATE ELECTRIC BEHAVIOR

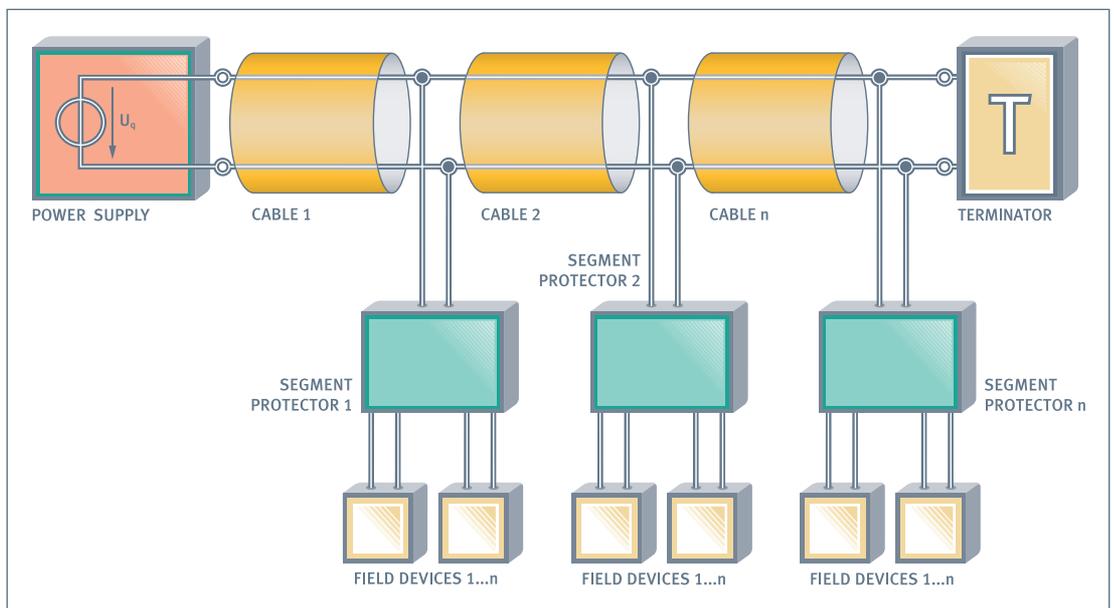
A decoupling module integrated in the load ensures a well-defined electrical behavior for both: function and safety. It permits operation of practically any load with DART and is integrated into the explosion-proof housing of the load. The decoupling module essentially fulfills the following tasks:

- “Soft” start-up of the load with limited current rise  $di/dt$  in milliseconds
- Well-defined electrical behavior of the load
- Optional  $di/dt$  detection for disconnection during a fault, which allows for longer cable distances

## APPLICATIONS

With DART intrinsic safety could be used in many other applications relevant to the process industry. Pepperl+Fuchs is currently developing two different versions of DART:

- DART Power is designed for point-to-point connections which will enable maximum energy of 50 W on 100 m cable
- DART Fieldbus is optimized for maximum cable length while maintaining the ability to connect up to twenty fieldbus instruments to a segment



	DART Fieldbus	DART Power
<b>High-Power Field Instrumentation</b>		
Valve control	■	■
Magnetic flow meter	■	■
Coriolis flow meter	■	■
Fire and gas detector		■
Analytic equipment	■	■
<b>Other Equipment</b>		
Horn/siren/beacon		■
Emergency lighting		■
Scales		■
PCs and HMI-terminals		■

Looking forward to a professional "DART-Dialog" with you!

[www.technology-dart.com](http://www.technology-dart.com)

**WITH THIS TECHNOLOGY ANYTHING IS POSSIBLE.**

Are we missing your favorite application? What would you do with DART?

DYNAMIC ARC RECOGNITION AND TERMINATION

# DART

→ 160,000 kilometers per second → 400% power → 0 ignitions

→ up to 50 watts of active power → up to 1,000 metre cable length

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# PROCESS AUTOMATION – PROTECTING YOUR PROCESS



For over a half century, Pepperl+Fuchs has been continually providing new concepts for the world of process automation. Our company sets standards in quality and innovative technology. We develop, produce and distribute electronic interface modules, Human-Machine Interfaces and hazardous location protection equipment on a global scale, meeting the most demanding needs of industry. Resulting from our world-wide presence and our high flexibility in production and customer service, we are able to individually offer complete solutions – wherever and whenever you need us. We are the recognized experts in our technologies – Pepperl+Fuchs has earned a strong reputation by supplying the world's largest process industry companies with the broadest line of proven components for a diverse range of applications.

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