



4-Channel Multi-Range  
Precision Digital  
Quench Detection System



**QDS**

Your **DIGITAL**  
**POWER ELECTRONICS**  
Partner.

- The QDS (“Quench Detection System”) is a 4-channel multi-range precision digital quench detection system for superconducting magnets
- 4-channel simultaneous sampling with a 24-bit Analog-to-Digital conversion. Quench detection windows from 1 ms to 1 s
- Integrated interlock and status signals as well as 12-V and 24-V power for persistent switch control

## FEATURES

- 4-channel simultaneous sampling
- Integration time configurable from 1 ms to 1 s
- 11 full-scale ranges for each channel, ranging from  $\pm 20$  V to  $\pm 20$  mV
- 24-bit ADC internal conversion
- Absolute and differential quench thresholds
- 10/100/1000 Ethernet Connectivity
- 12-V and 24-V persistent switch drivers
- Interlocks and output status signals
- Firmware Remote Update
- Auto-ranging functionality
- On-board FPGA and soft-processor computations
- Compact mechanical dimensions
- Oscilloscope software available

## APPLICATIONS

- Quench detection
- Superconducting Magnets
- Precision floating voltage sensing

**QDS.** The QDS (“Quench Detection System”) is the new solution for any type of quench detection on superconducting magnets. It is composed by 4 independent channels, each one floating up to 100V, that can be connected to voltage taps. The quench detection can be performed both in an absolute or differential way and the detection window can be configured from 1 ms to 1 s.

Each channel has eleven (11) different full-scale ranges, the largest one up to  $\pm 20$  V (2.4  $\mu$ V resolution) and the smallest one up to  $\pm 20$  mV (2.5 nV resolution). The range of each channel can be set independently.

Each channel can float up to 100 V from ground and it is fed to a signal conditioning network that

converts it with a 24-bit resolution and a 100-kHz sampling rate. Interlock signals as well as output status signals are available for different uses - e.g. interfacing to a power supply for the superconducting magnet.





Two power outputs, one rated at 12 V and the other one at 24 V, can be used to drive a persistent switch.

A 10/100/1000 Mbit Ethernet connection allows for very fast data transmission and easy instrument control with several operating systems and programming languages.

The internal firmware can be remotely updated, please check our website [www.caenels.com](http://www.caenels.com) in order to have the last available version installed on your QDS device.

### About Us

CAEN ELS is a leading company in the design of power supplies and state-of-the-art complete electronic systems for the Physics research world, having its main focus on dedicated solutions for the particle accelerator community and high-end industrial applications.

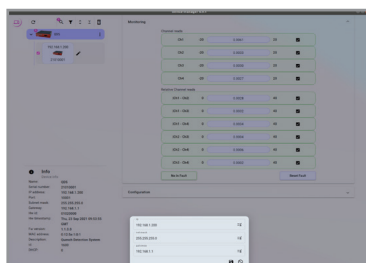
-  Power Supply Systems
-  Precision Current Measurements
-  Beamline Electronics Instrumentation
-  FMC and MicroTCA

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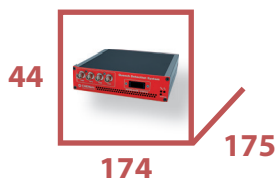
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Configuration/Monitoring Software



QDS - Rear View



### Technical Specifications

### QDS

<b>Input Channels</b>	4	
<b>Input Polarity</b>	Bipolar	
<b>Input Channel Type</b>	Floating - up to 100 V	
<b>Voltage Measuring Range</b>	RNG0	±20 V
	RNG1	±10 V
	RNG2	±5 V
	RNG3	±2.5 V
	RNG4	±1.25 V
	RNG5	±625 mV
	RNG6	±312.5 mV
	RNG7	±156.25 mV
	RNG8	±78.125 mV
	RNG9	±39.0625 mV
	RNG10	±19.53125 mV
<b>Voltage Resolution (LSB)</b>	RNG0	2.4 µV
	...	...
	RNG10	2.5 nV
<b>Internal Sampling Frequency</b>	100 kHz	
<b>Sampling Resolution</b>	24 bit	
<b>Integration Time (T)</b>	from 1 ms to 1 s	
<b>Equivalent Input Bandwidth</b>	T = 10 ms	45 Hz
	T = 50 ms	9 Hz
	T = 100 ms	5 Hz
	T = 500 ms	1 Hz
	T = 1 s	0.55 Hz
<b>Temperature Coefficient</b>	0.0025 %/FS/K	
<b>Communication Interface</b>	Ethernet 10/100/1000 TCP-IP or UDP	
<b>Internal Processing Unit</b>	FPGA and soft-processor	
<b>External Signals</b>	2 x External Interlocks 12-V and 24-V persistent switch power Magnetic Relay	
<b>Input Connectors</b>	Twin ("Twinax") BNC	
<b>Interlock/Status Connector</b>	Weidmüller 1290260000 (mating: Weidmüller 1277900000)	
<b>Additional Features</b>	Auto-Ranging Firmware Remote Upgrade Configurable Integration Time Configurable absolute and differential quench thresholds	
<b>Cooling</b>	Blower Fan	
<b>Dimensions</b>	174 x 175 x 44 mm	
<b>Weight</b>	< 850 g	
<b>Supply Voltage</b>	+12 V	
<b>Status Indicators</b>	5 LEDs	

Ordering Code	Acronym	Description
QDS4CHXAAAAA	QDS	4-channel Quench Detection System with Persistent Switch Heater - ± 20 V (max), ± 20 mV (min) - BW=1 kHz