

UPGRADE OF QUENCH RECORDING SYSTEM FOR MULTIPOLE SUPERCONDUCTING WIGGLERS AT BINP

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Magnetic poles of superconducting wigglers (SCWs) are passed through "training" phase during fabrication of SCWs at Budker INP. In "training" procedure magnetic field is increased until superconducting coils enter the resistive state. Quench Recording System (QRS) is used for registration of waveforms in the each coil to determine fault initiator coil. Outdated QRS is based on modules in CAMAC standard and requires modernization.

OUTDARE QRS (CAMAC based)

Outdated QRS is based on three pairs of modules in CAMAC standard: ADC-333 and MUX16->1x4. ADC-333 is a four-channel multiplexed digitizer with 12-bit resolution and 3MSPS sampling rate. MUX16->1x4 is a carrier board with four embedded MUX-cards, on each of which analog multiplexer 16 to 1 and 16-channel preamp are installed.

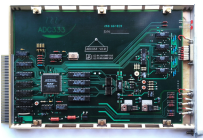
REASONS FOR THE UPGRADE:

CAMAC platform is becoming obsolete

support of outdated modules, repair of faulty ones or fabrication of new batch, seems impossible due to production discontinuation of a significant part of electronic components.

QRS expanding and increase measuring channels is present

ADC-333



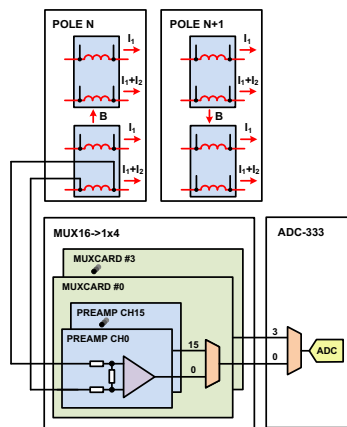
MUX16->1x4



MUX-CARD



CAMAC BASED QRS STRUCTURE

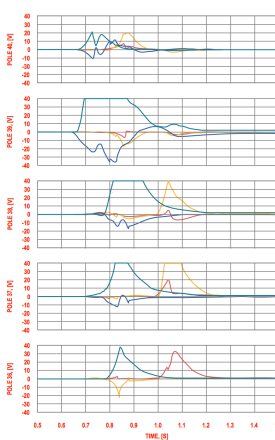


UPDATED QRS (VME64 BINP based)

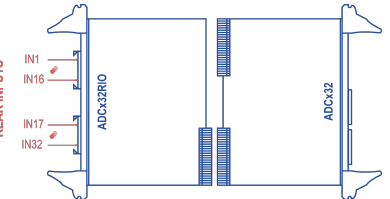
New system for quench recording is based on VME64-BINP standard and ADCx32 digitizer. ADCx32 is 32-channel digitizer with sample rate 125 kHz per channel and 12 bit resolution, which consists of four 8-channel multiplexed ADC chips. VME64-BINP crate contains 21 positions for 6U modules. The first position is designated for VME-controller, remaining general-purpose positions can be used for ADCx32 modules, thus the total number of monitored coils in QRS based on VME-64 BINP can reach 640 channels.

Wiggler coils are connected in series, which creates very high common-mode voltage up to $\pm 250V$. To provide the safe signal receiving in high-voltage common-mode environment a RIO-module with the protecting preamplifiers for each channel was developed.

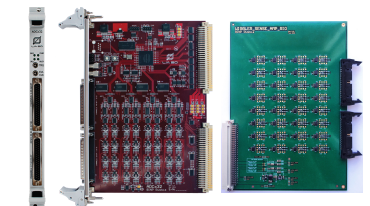
COILS WAVEFORMS



RARE INPUTS



ADCx32 AND RIO-MODULE



	Outdate QRS (CAMAC-based)
ADC	ADC-333
Channels	192
Common voltage range	$\pm 200V$
Input protection	$\pm 500V$
MAX sample rate	4.5 KSPS per channel
Resolution	12 bit
Accuracy	$\pm 5 \cdot 10^{-4}$ FS
Built-in calibration	-
Recorder mode	+
Software support	-

	Updated QRS (VME64BINP-based)
ADC	ADCx32
Channels	640
Common voltage range	$\pm 275V$
Input protection	$\pm 500V$
MAX sample rate	125 KSPS per channel
Resolution	12 bit
Accuracy	$\pm 3 \cdot 10^{-4}$ FS
Built-in calibration	+
Recorder mode	+
Software support	SDK TANGO Device Server Firmware update function