

Keithley

# Development of Wide Range Current Signal Data Acquisition System for Reactivity Meter using Keithley Electrometers

150

CIC

DOS

## Abstract

The reactivity worth of control rods is measured to ensure safety every refueling phase in HANARO, the research reactor in KAERI. Two compensated ion chambers are installed around the outer core to measure the reactor power. The signals from CICs enter the reactivity computer system. The reactivity computer system operated on MS-DOS was developed during the commissioning phase. But it is not so user-friendly, is so outdated and difficult to acquire spare parts. Hence we decided to upgrade the system to utilize MS-Windows™ operating system and object oriented visual program language. This paper describes the data acquisition system developed for the new reactivity computer system operated on MS-Windows™ operating system. This data acquisition system uses electrometers for converting low current signal to voltage and measures the current signal accurately even though the electrometer change the range of the output automatically. We verified that the system was stable and acquired the input signals accurately.

1.

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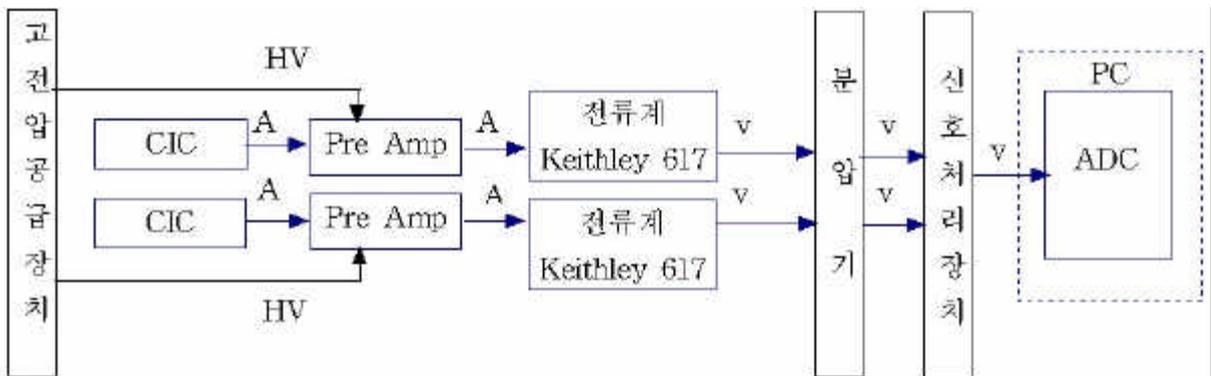
FFT

BF3

1.1

- (Compensated Ion Chamber, CIC) : ( )
- (Pre-amplifier) : CIC , ( + )
- (High voltage supplier) : CIC
- ( , ) :
- NIMBIN : , NIM
- 19 : NIMBIN 19
- : CIC ,
- :
- :
- : PCI - ,
- 가
- :

1



1

1.2

1.2.1 CIC, ,

가

CIC

$3 \times 10E-10[A]$

$3 \times 10E-4[A]$

1.2.2

CIC



1.2.5

PCI

- : NI PCI-6052E Multi-function board
- Sampling rate : 333 kHz
- Resolution : 16 bit
- AI Channels : 16 ( 8 difference)
- Programmable gain : 0.05 - 10 V
- Programmable sampling rate
- AO channels : 2
- Counters : 2 up/down 24 bit resolution
- Digital I/O : 8

2.

2.1

. CIC ADC

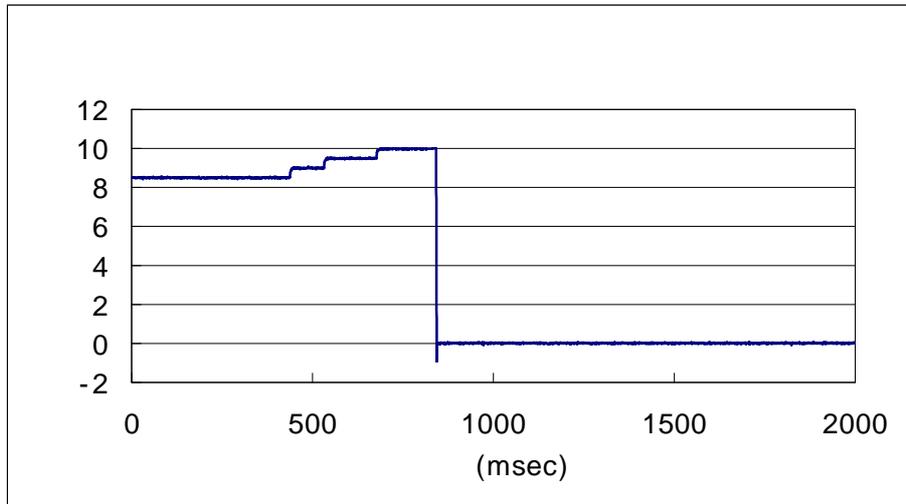
[3].

2.2.1

가 가 . 0.1V-10V  
 3 decade 가  
 ADC . 12 bit  
 ADC 10V 2.44 mV .

2.1.2

가  
 ( )가 10V 0.1V 가



3

2.2

2.2.1

ADC

2가

1)

2)

3

1

2

2

3

3

1

1(0-10V)

), 2

10(0-1V)

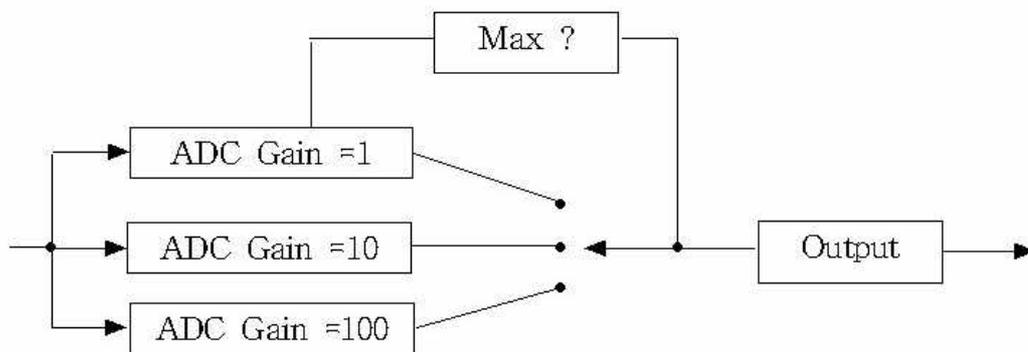
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100(0-0.1V)

)

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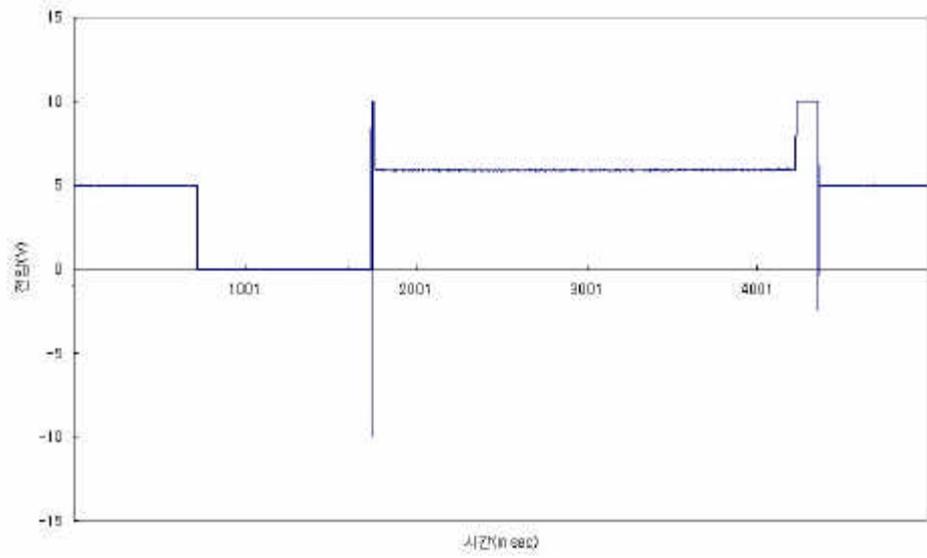
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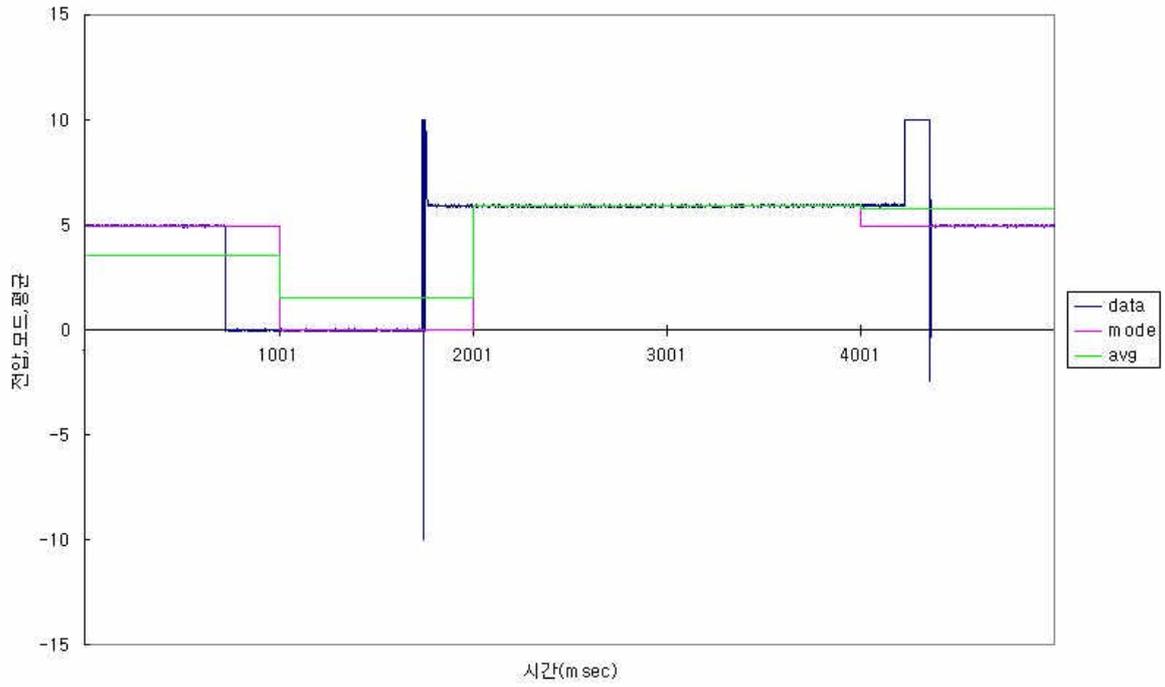
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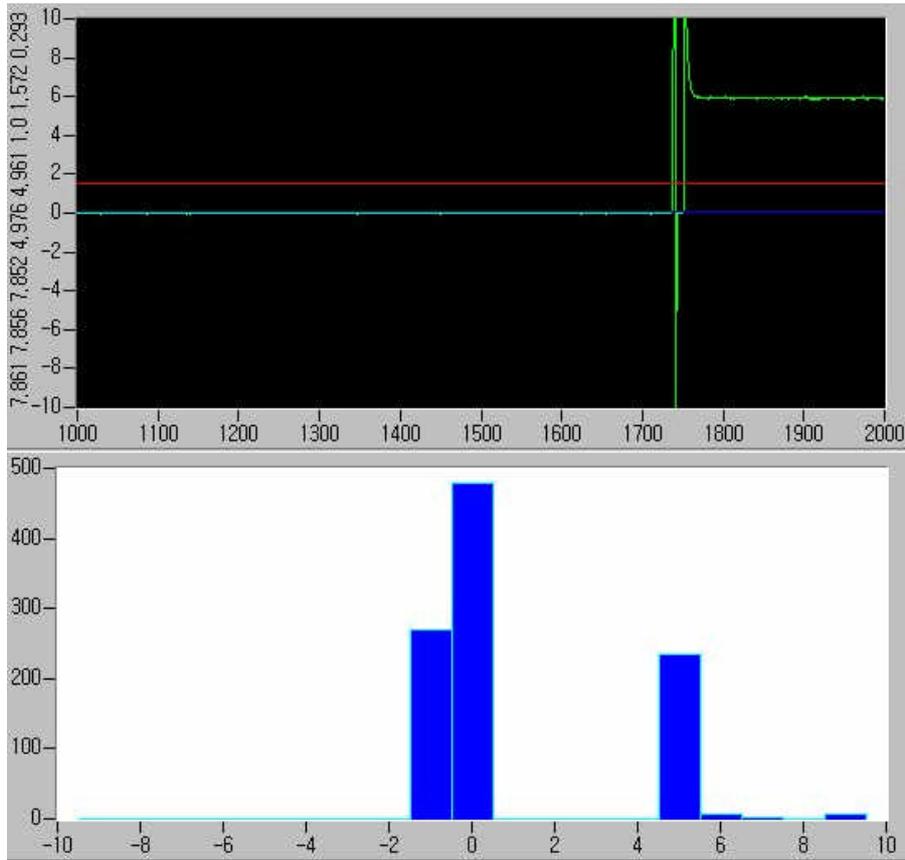
가  
 9 가  
 가 (5 -5)  
 가 (1) 가  
 10 CIC 가

decade



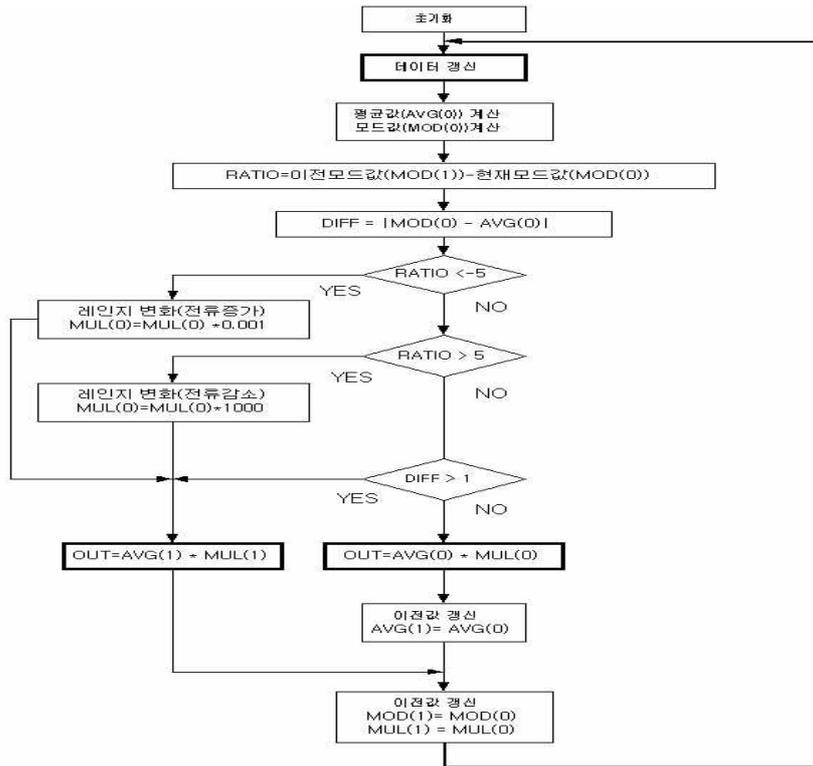


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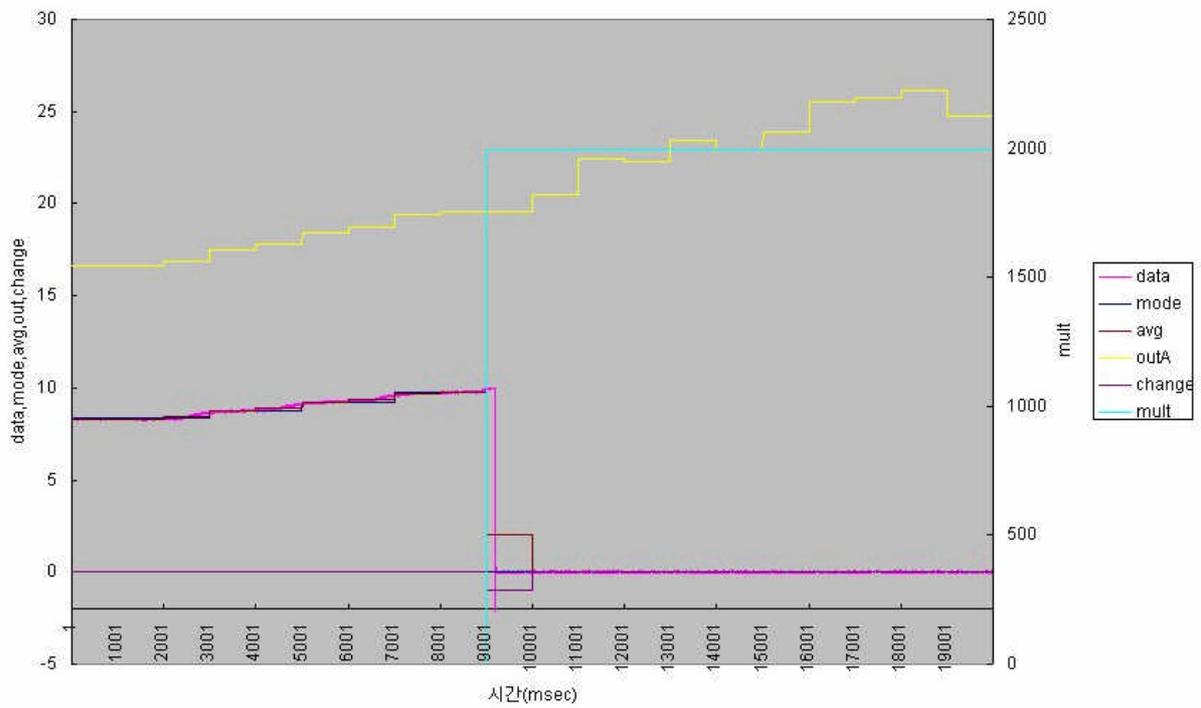


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3.

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4.

[1] ED , Digital Reactivity Computer System ,1994

[2] Combustion Engineering, User Manual for RHODA, A PC Based Reactivity Monitoring Computer, 1993

[3] , , HAN-RO-CR-97-37,1997