

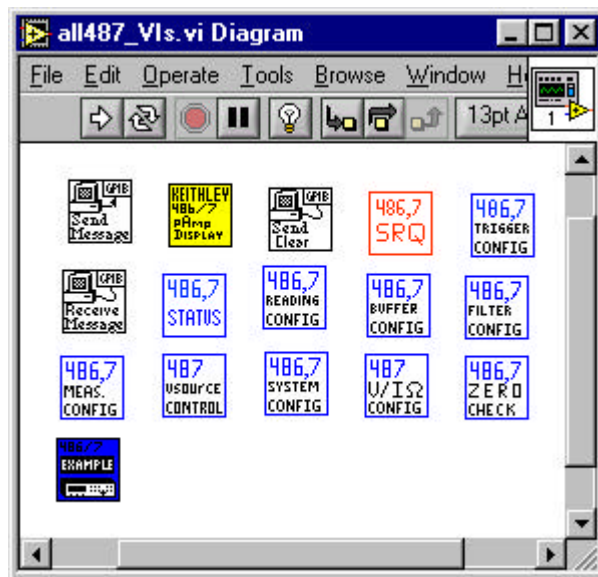
## LabVIEW VIs for Models 486 and 487 Picoammeters

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### Introduction

A library of VIs suitable for operation of the model 486 or 487 picoammeters is available on the Keithley web site ([www.keithley.com](http://www.keithley.com)). To use these VIs in LabVIEW, place this library file (kei486\_7.lib) into the instr.lib subdirectory of your LabVIEW installation. This location can vary, but is typically in \Program Files\National Instruments\LabVIEW6\instr.lib. Once this is done, these VIs will show up in the function palette under Instrument I/O. These VIs make use of the GPIB READ and WRITE VIs. These are not VISA based communication, but are IEEE-488 based. You will require a LabVIEW compatible GPIB card such as the KPCI-488.

The screen shot below is for the purpose of documentation only; it shows the 16 available VIs in the library placed onto a wiring diagram.



On the following pages are the context sensitive help screens for each of the 16 VIs of the library.

## LabVIEW VIs for Models 486 and 487 Picoammeters

### VIs for IEEE-488 Communication

At the heart of the VIs are the Send Message and Receive Message VIs. These VIs encapsulate the GPIB Write and Read VIs provided by National Instruments for IEEE-488 based instrument control. A 'Send Clear' vi is also provided.

The image displays three screenshots of the LabVIEW Context Help window, each showing the internal block diagram and description of a different VI.

**Top Screenshot: Keithley 486/7 Send Clear.vi**  
This window shows the block diagram for the 'Send Clear' VI. It features a 'GPIB Send Clear' block with three input terminals: 'address string', 'error in', and 'source'. It has two output terminals: 'status' and 'error out'. The description below the diagram reads: "Sends a Device Clear to selected Instrument".

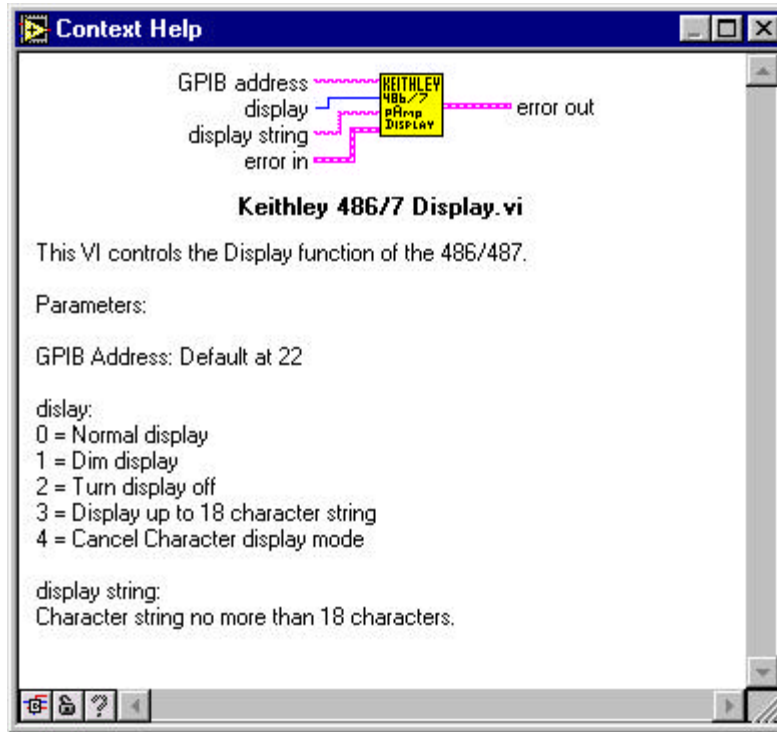
**Middle Screenshot: Send Message.vi**  
This window shows the block diagram for the 'Send Message' VI. It features a 'GPIB Send Message' block with six input terminals: 'timeout ms', 'address string', 'write buffer', 'write mode (set END:0)', 'error in', and 'source'. It has four output terminals: 'address out', 'byte count', 'status', and 'error out'. The description below the diagram reads: "Sends a string to a the selected GPIB Address."

**Bottom Screenshot: Receive Message.vi**  
This window shows the block diagram for the 'Receive Message' VI. It features a 'GPIB Receive Message' block with six input terminals: 'timeout ms', 'address string', 'byte count', 'read mode', 'error in', and 'source'. It has two output terminals: 'read buffer' and 'error out'. The description below the diagram reads: "Reads a string from an instrument. You must supply the address string of the instrument. A byte count value is required in order to tell the VI how many bytes can be returned by the VI. Select the appropriate read mode to terminate the receive function correctly."

## LabVIEW VIs for Models 486 and 487 Picoammeters

### *Display Control*

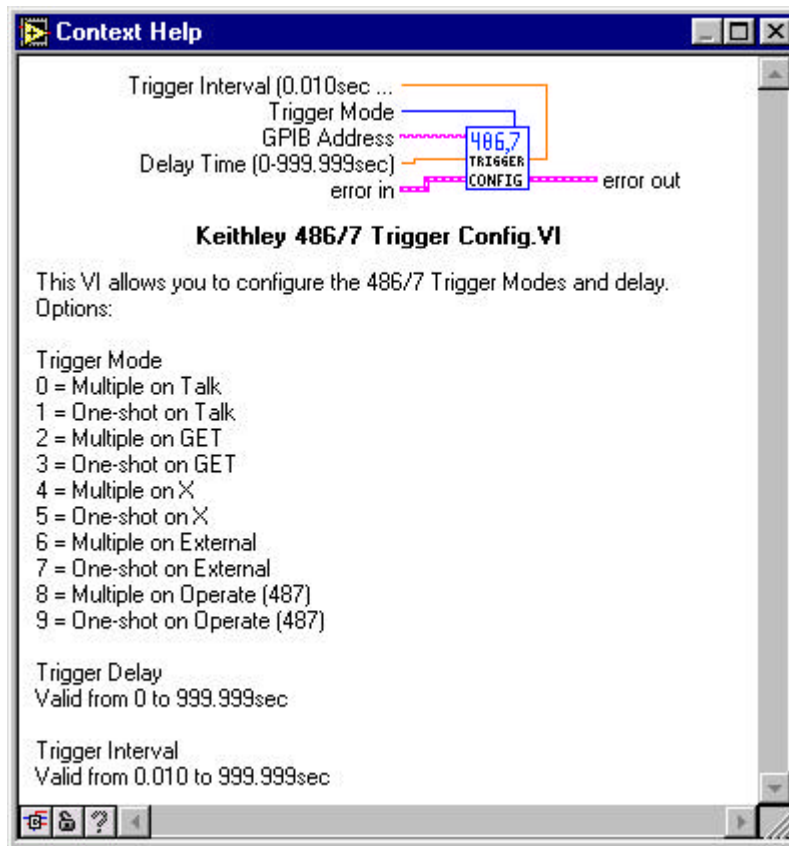
The front panel display can be controlled with this VI. You can dim the intensity, turn it off or display your own custom message up to 18 characters long.



Corresponding DDC Commands: A0 – A2, Dxxx

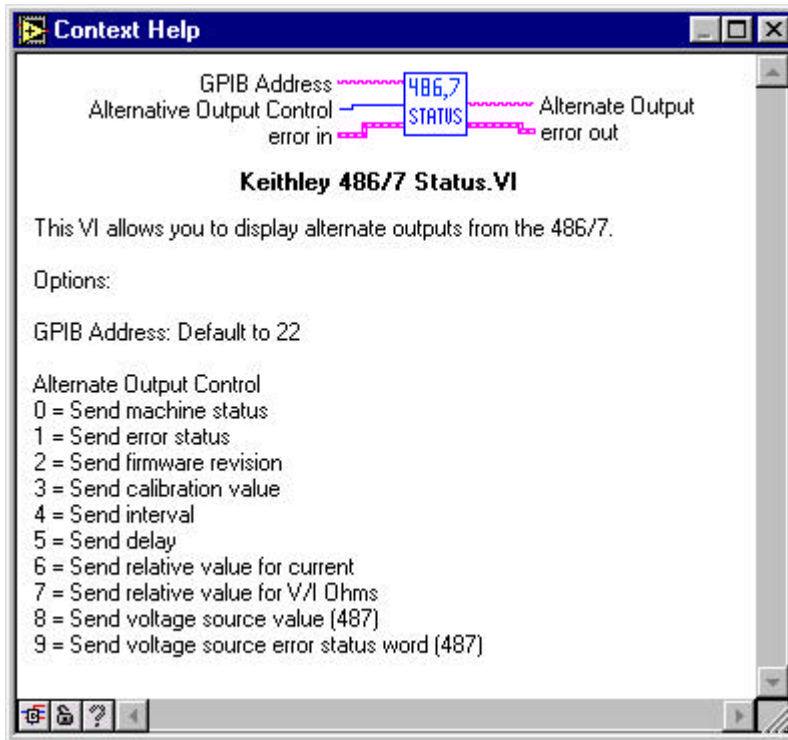
## LabVIEW VIs for Models 486 and 487 Picoammeters

### Triggering mode



Corresponding DDC Commands: T0 – T9; Wxxx ; Q0-Q1

**Alternate Output Types (not readings)**



Corresponding DDC Commands: U0 – U9

## Configure Reading Source and Format

**Context Help**

User Relative Value  
Reading Source  
GPIB Address  
Reading Format  
Reading Relative Control  
error in

486,7  
READING  
CONFIG

error out

**Keithley 486/7 Reading Config.VI**

This VI allows you to configure the 486/7 Reading source, format, and reading relative.

Options:

GPIB Address: Default to 22

Reading Source  
0 = Latest Reading from A/D converter  
1 = One reading from buffer  
2 = All readings in buffer  
3 = Maximum value in buffer  
4 = Minimum value in buffer

Reading Format  
0 = ASCII readings with prefix  
1 = ASCII readings without prefix  
2 = ASCII readings and buffer locations with prefix  
3 = ASCII readings and buffer locations without prefix  
4 = Binary rdgs: IEEE Std. 754 single-precision bytes, bytes reversed for Intel CPUs  
5 = Binary rdgs: IEEE Std. 754 single-precision bytes, bytes normal for Motorola CPUs  
6 = Binary rdgs: Counts and exponents, bytes reversed for Intel CPUs  
7 = Binary rdgs: Counts and exponents, bytes normal for Motorola CPUs

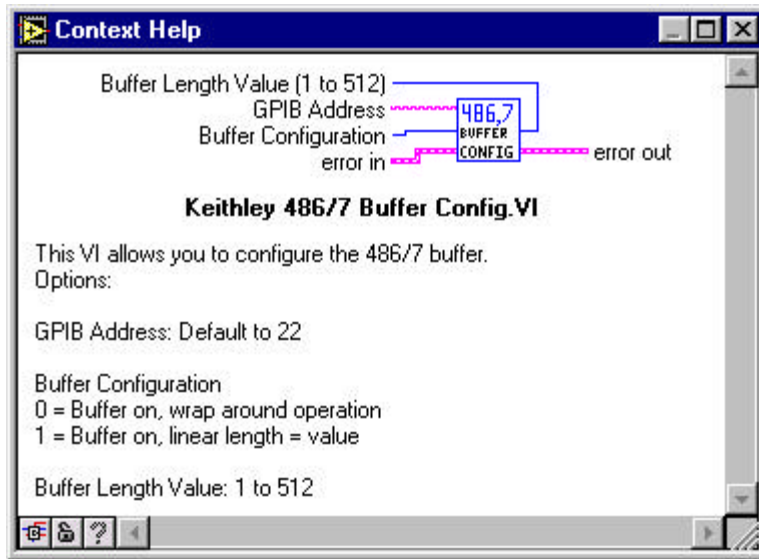
Reading Relative  
0 = Disable reading relative  
1 = Enable reading relative using present reading as baseline  
2 = Enable reading relative using value  
3 = Enable reading relative, using the baseline previously defined

Reading relative value range => -2E-3 to +2E-3 amps for current  
0 to 50.5E16 for V/I ohms (487)

Corresponding DDC Commands: B0- B4 ; G0 – G7; Z0 – Z3

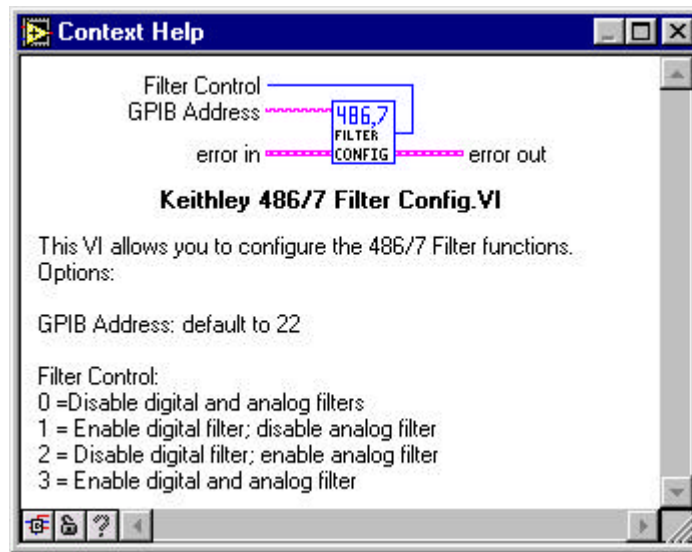
## LabVIEW VIs for Models 486 and 487 Picoammeters

### Configure Buffer



Corresponding DDC Commands: N0 or Nxxx

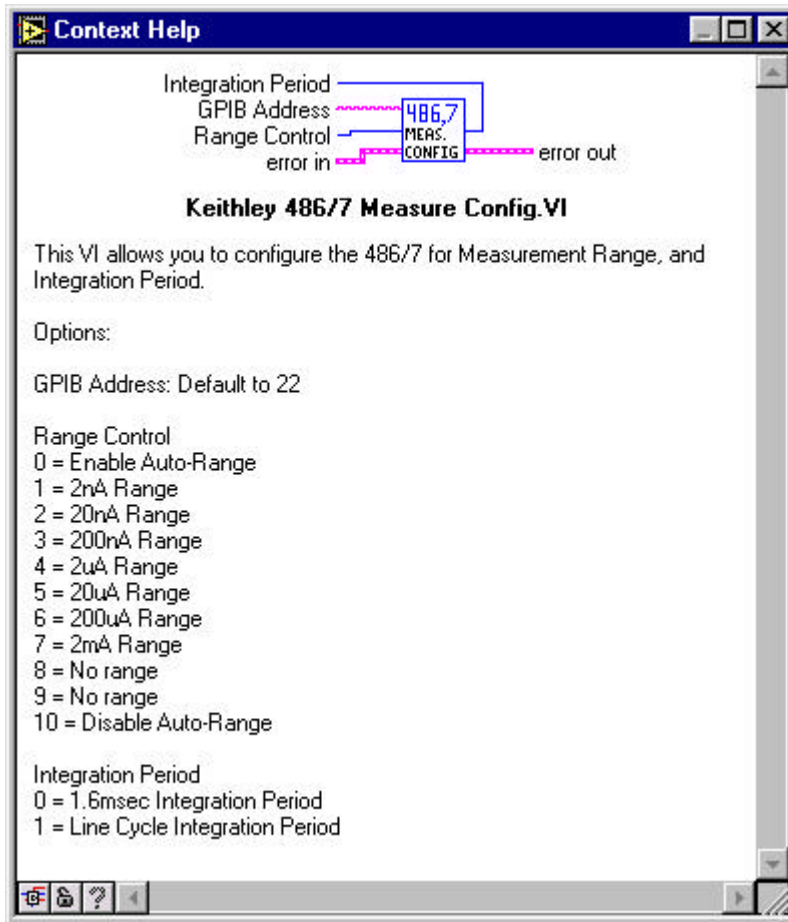
## Configure Analog and Digital Filter



Corresponding DDC Commands: P0 – P3



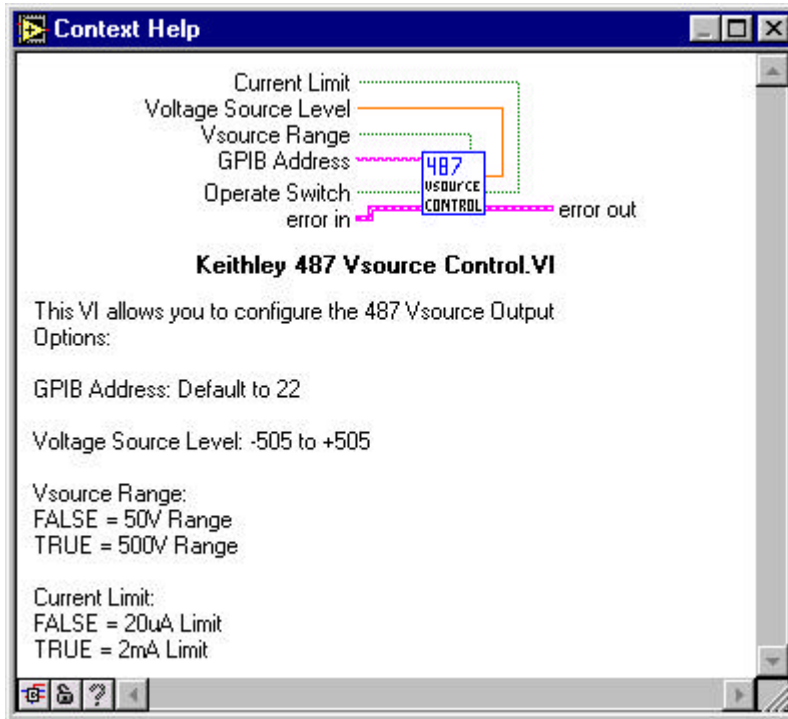
## Measurement Range and Line Cycle Integration



Corresponding DDC Commands: R0 – R10 ; S0 – S1

## Configure Voltage Source Value

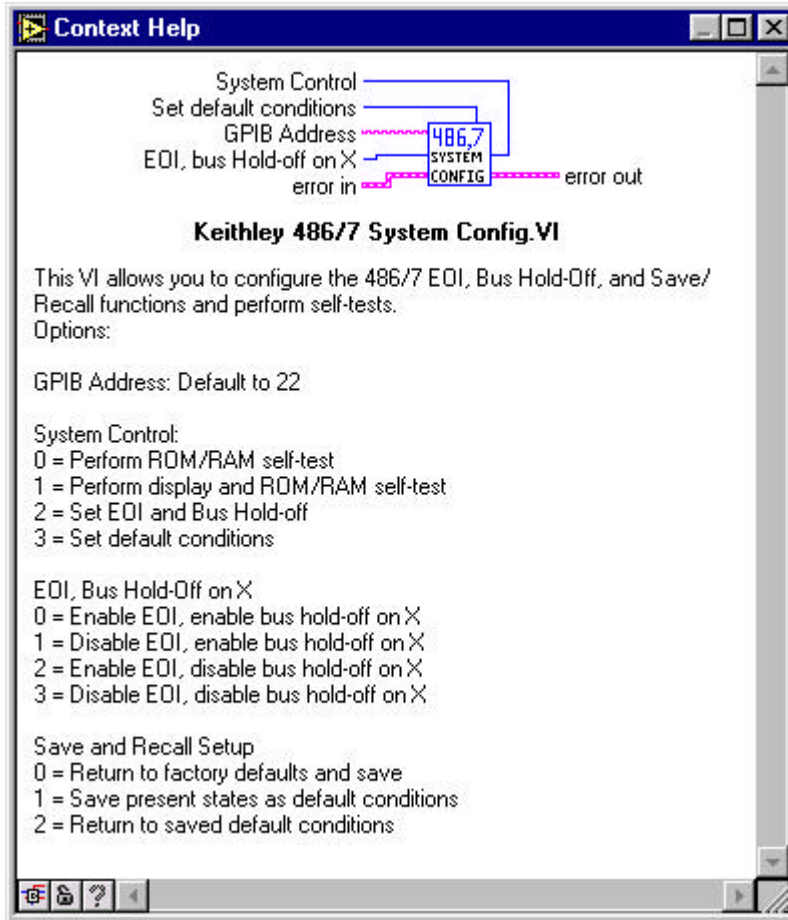
The voltage source value, source range and Current Compliance is controlled here. Applies to 487 only.



Corresponding DDC Commands: V value, range, current limit

O0 or O1 to turn Vsource off/on

**System default state bus communication and Self-tests**

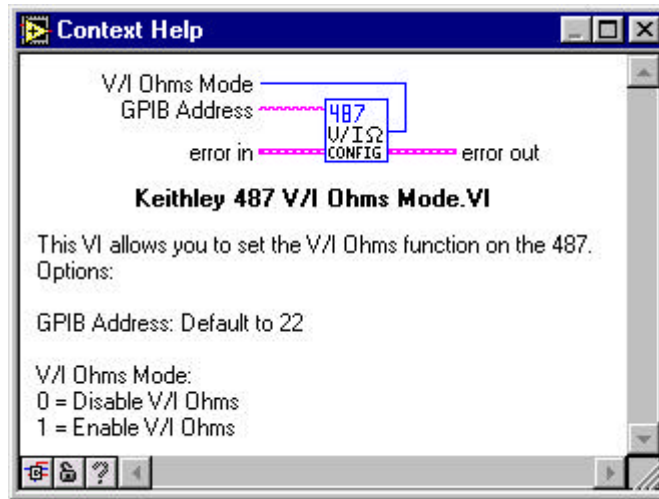


Corresponding DDC Commands: J0 – J1 ; K0 – K3 ; L0 – L2

## LabVIEW VIs for Models 486 and 487 Picoammeters

### ***Enable Ohms mode***

Measures ohms by applying a voltage and measuring current. Applies to 487 only.

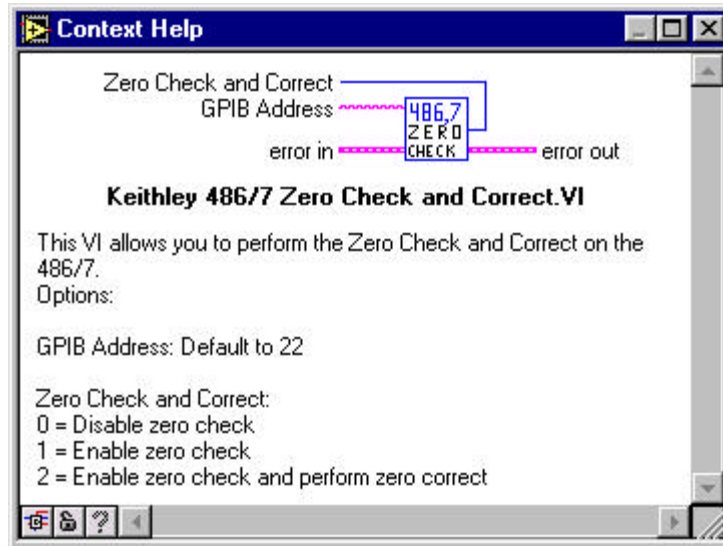


Corresponding DDC Commands: F0 – F1

## LabVIEW VIs for Models 486 and 487 Picoammeters

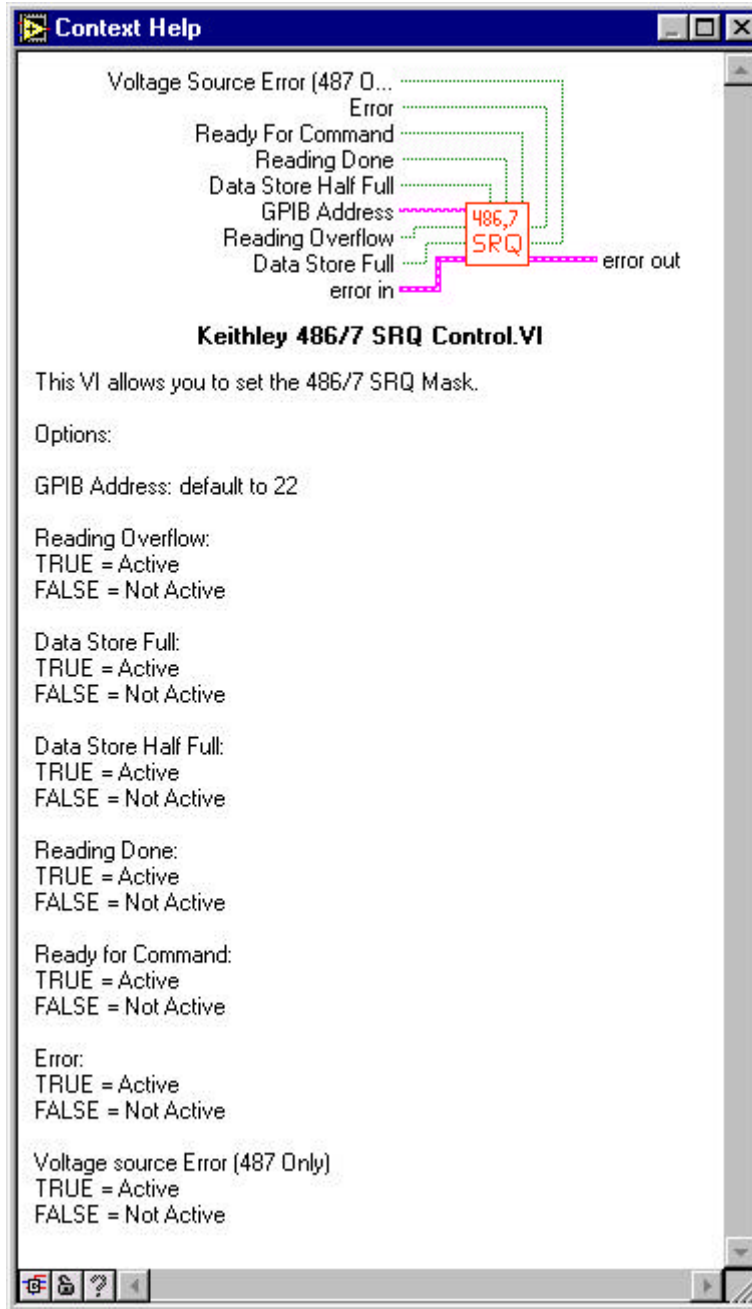
### ***Zero Check and Zero Correct***

The Instrument will power up with zero check enabled. Zero check must be disabled in order to make measurements.



Corresponding DDC Commands: C0 – C2

## SRQ Control



The 486/487 can assert SRQ under a number of conditions. This VI brings out Boolean terminals for enabling/disabling each condition.

Corresponding DDC commands: M0 – M128

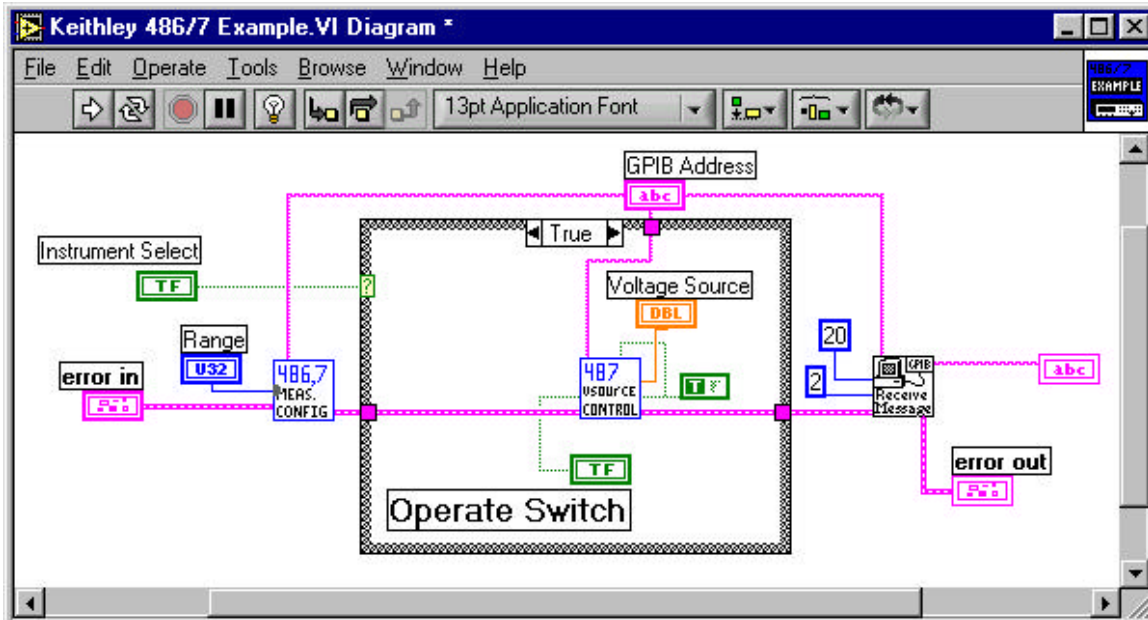
## LabVIEW VIs for Models 486 and 487 Picoammeters

### Example Program

One example program has been built based upon some of the above VIs and is included in the library file.



The wiring diagram of this example looks like below:



This example programs the range of the instrument using the Measurement Config VI. If the Instrument Select switch on the front is set to "487", then the true condition of the case statement will be entered as shown. This allows the voltage source of the 487 to be programmed for a value and turned on via the Operate Switch. The Receive Message VI is used to read back the measurement from the 486 or 487.