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Mode 60 – Discrete Filtered Inputs

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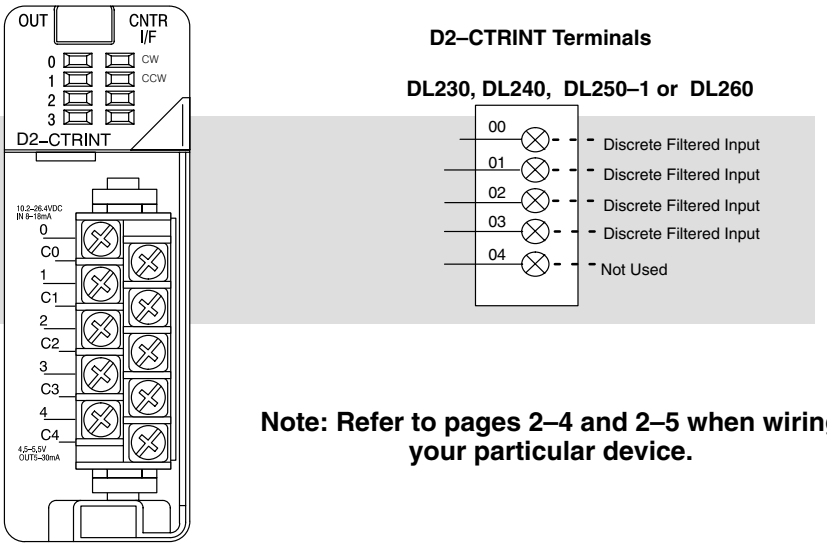
- — Wiring the Discrete Filtered Inputs
- — Configuring the Discrete Filtered Parameters
- — Writing the Control Program
- — Verification of Proper Operation
- — Troubleshooting

Using the Discrete Filtered Inputs, Mode 60

It is recommended that you read Chapter 1, Getting Started, which introduces the six different modes of operation of the D2–CTRINT module, before selecting a mode. Even though several features can be mixed from several modes, *you must select one of the modes as your primary mode.* Discrete Filtered Inputs, Mode 60 will be the only mode covered in this chapter.

It is also important to read Chapter 2, concerning the general guidelines for field wiring your device to the module. You may want to refer to Chapter 2 as you learn to make use of the D2-CTRINT's pulse catch inputs. A good place to begin is to learn what each channel of the module represents when it is being used for Discrete Filtered Inputs.

Default Settings for Discrete Filtered Inputs,-Mode 60



Note: Refer to pages 2–4 and 2–5 when wiring your particular device.

Shown in the above diagram and illustration are points 00 through 03 which default to discrete filtered inputs when the module is set for Mode 60.

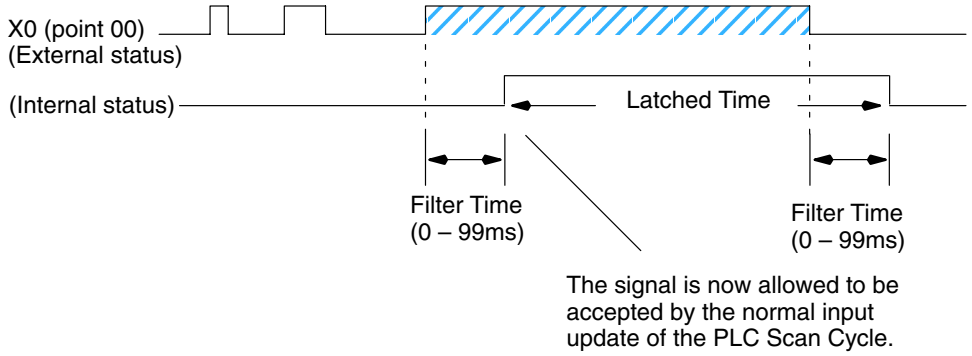
All of the I/O points do not have to be used as Discrete Filtered Inputs; there are other options which can be used.

Discrete Filtered Inputs

Some applications have inputs from field devices which have high noise levels. Adjustable input filtering will help eliminate these nuisance signals caused by switch bounce or other sources.

When an input signal is first detected at any one of the four channels, a programmable filter is activated which begins a timed countdown. The ON status of the signal is temporarily prevented from being read by the input update of the CPU. The ON signal must stay present long enough for the filter to “time out”.

Once the signal has remained ON for the programmed time, it is latched and allowed to be accepted by the CPU during the normal input update of the PLC scan cycle. The signal is latched for the remaining duration of the ON signal plus an amount of time equal to the filter time. The filter time can be programmed from 0 to 99ms in 1ms increments.

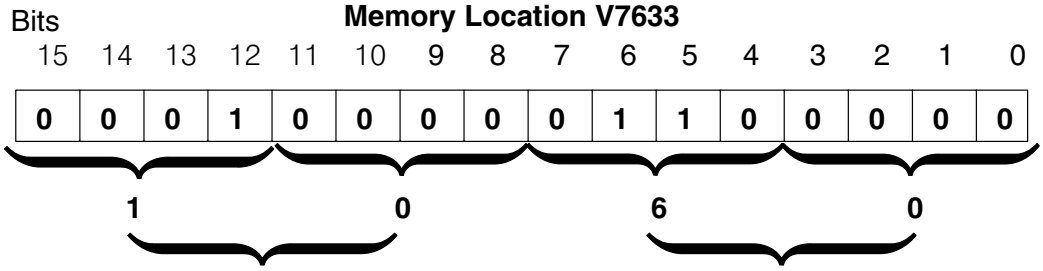


Note: If a zero (0) is stored to V–memory as the filter time, the CPU will treat the configuration as having no filter. The filter time range is 0 – 99ms.

Understanding V-Memory Setup Locations

The Discrete Filtered Input, Mode 60, associated with the D2-CTRINT requires V-memory configuration in order to be used.

V-memory location V7633 is the most important of all the reserved memory areas because it stores the value which lets the CPU know which mode has been selected. The following diagram shows the 16–bit word and the various information it stores, including the values used for the Counter Interface Module. The example shown here is for the Discrete Filtered Input, Mode 60. The lower bits are set to 60 and the upper bits are set to 10 so the backup battery is enabled. Together they form the hexadecimal number 1060.



Miscellaneous Setup
Binary Coded Decimal:

00 = Not Used (default)
10 = Battery Enabled (DL230/240/250–1/260)
20 = Power Up in Run (DL230 only)
30 = Selects both Battery Enable and Power Up in Run (DL230 only)
40 = Mode Change Enable in K–sequence (DL240 only)
50 = Battery Enable and Mode Change Enable in K–sequence (DL240 only)

D2-CTRINT Mode Setup
Binary Coded Decimal:

00 = Not Used
10 = UP Counting Mode
20 = UP/DOWN Counting Mode
30 = Pulse Output Train
40 = High Speed Interrupts
50 = Pulse Catching
60 = Discrete Filtered Inputs

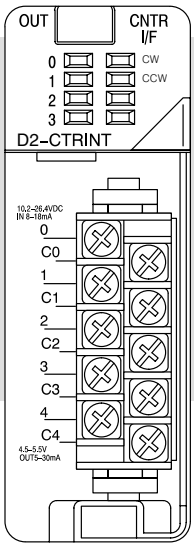
NOTE: It is important to look at the entire 16 bits in V7633. If the RLL program only sets the bits in the lower byte when entering the mode value, the upper bits will be overwritten with zeros (0's). Always enter a 4-digit BCD value in the V-memory. This way, the proper value will be written into the upper bits.

There are also other V-memory locations which contain Counter Interface setup information for each I/O point. The CPU will automatically configure them with default values for each Counter Interface mode selected.

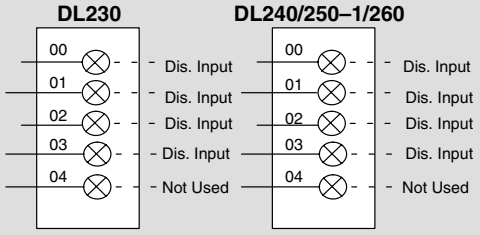
Default Settings When xx60 is written to V7633, the CPU places the following default codes in V-memory:

Configuration	Point 00/V7634	Point 01/V7635	Point 02/V7636	Point 03/V7637	Point 04
DL230 Hexadecimal Value	Discrete Input 1006	Discrete Input 1006	Discrete Input 1006	Discrete Input 1006	Not Used
DL240/250–1/260 Hexadecimal Value	Discrete Input 1006	Discrete Input 1006	Discrete Input 1006	Discrete Input 1006	Not Used

Default Settings for Interrupt Input Mode 60



D2–CTRINT Terminals



Note: Refer to pages 2–4 and 2–5 when wiring your particular device.

Custom Configuration

Up to this point, only Mode 60 default settings have been discussed. The default settings will be suitable for many applications and will not require a custom configuration. However, for those applications needing the defaults changed so the D2–CTRINT will work for the applications, use the following table which contains the options available.

Mode 60 Options

Point Number	V-Memory Location	Possibility (One per point)	Hex Value
point 00	V7634	Discrete Filtered Input	xx06 (xx=filter time) (default)
		High Speed Interrupt (Internal)	0004
		High Speed Interrupt (timed)	ttt4 (ttt=1 to 999ms timer setting)
		Pulse Catcher	0005
point 01	V7635	Discrete Filtered Input	xx06 (xx=filter time) (default)
		High Speed Interrupt (DL240/250–1/260)	0004
		Pulse Catcher (DL240/250–1/260)	0005 (DL240/250–1/260)
point 02	V7636	Discrete Filtered Input	xx06 (xx=filter time) (default)
		High Speed Interrupt (DL240/250–1/260)	0004
		Pulse Catcher (DL240/250–1/260)	0005 (DL240/250–1/260)
point 03	V7637	Discrete Filtered Input	xx06 (xx=filter time) (default)
		High Speed Interrupt (DL240/250–1/260 only)	0004
		Pulse Catcher (DL240/250–1/260)	0005 (DL240/250–1/260)
point 04	--------	Not available in Mode 60	----------

Setting Up the CPU for Discrete Filtered Inputs

Configuring the V–Memory

The CPU checks the V-memory to see if there is a High Speed Counter Interface Module present. There will be the number 10, 20, 30, 40, 50, or 60 in V7633 if a module has been properly configured. If the CPU finds that a Counter Interface module is present, it checks other V-memory locations to see how they have been configured for each channel of the module.

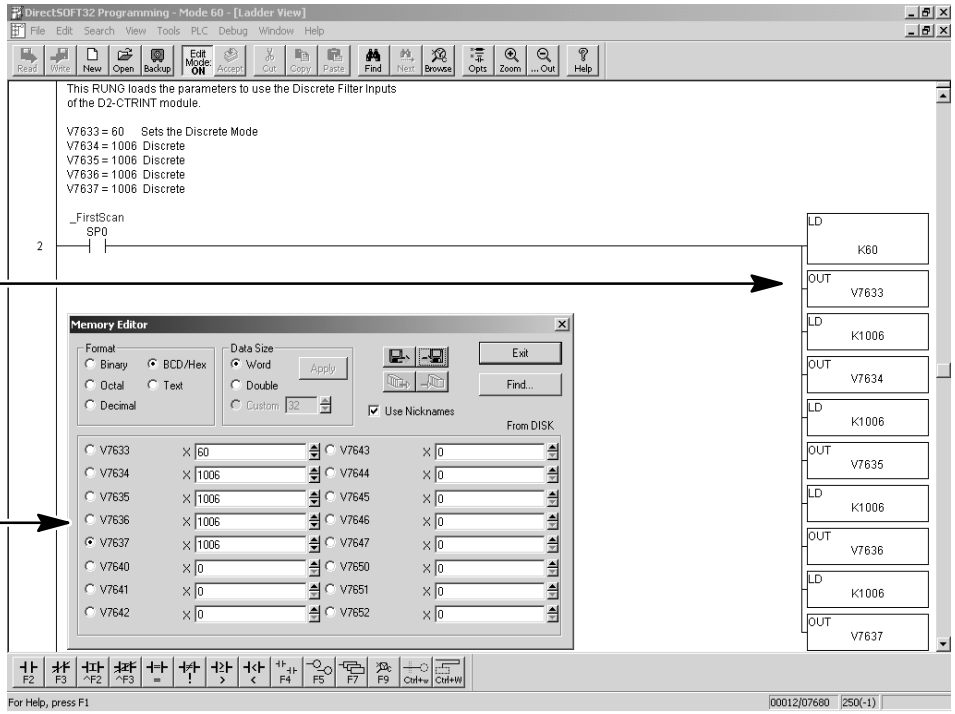
The values can be entered into memory by using either a handheld programmer or by editing them into a control program using ***Direct***SOFT32. The following examples will show how to use ***Direct***SOFT32 to configure the Filtered/Discrete Inputs.

Step 1: Enter the Mode

If Mode 60, Discrete Filtered Inputs, has been chosen as the primary function, then the value 60 must be placed in V7633. The following ***Direct***SOFT32 diagram shows the setup procedures for communicating with a DL230, DL240, DL250–1 or DL260 CPU. Refer to the ***Direct***SOFT32 **Programmers User Manual** for more details.

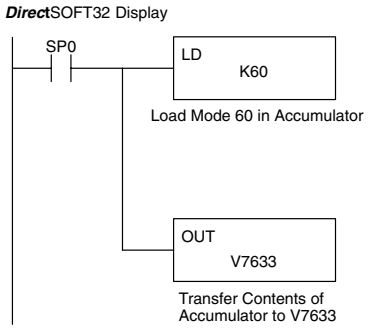
Setting the V-Memory using RLL

Setting the V-Memory using the Memory Editor



Editing the D2–CTRINT setup at the beginning of the user program is the most efficient method for setting up the counter mode. Should there be a need to change any of the counter setup values after the PLC has been put in the RUN Mode, use the Memory Editor to change the values. These values will only be temporary. They should be put into the program if they are to be used permanently.

The following RLL example shows how to set V–memory location V7633 to Mode 60, Discrete Filtered Input,. This is the location for all mode values for this module. Only one mode (6 possible) can be entered, i.e. 10,20,30,40,50 or 60.



Two commands are needed to put the values into V-memory. The value must first be loaded into the accumulator of the CPU, then the CPU must transfer the value to the memory location. In this case, 60 is to be placed in V7633. This value is loaded into the accumulator, LD K60. The CPU then writes this data to the memory location, V7633, once it reads the OUT instruction, OUT V7633. Notice that an SP0 contact is used in this rung. This relay is on for the first scan only. This will load the values into memory initially, thereby keeping the scan time to a minimum.

Step 2: How many Channels

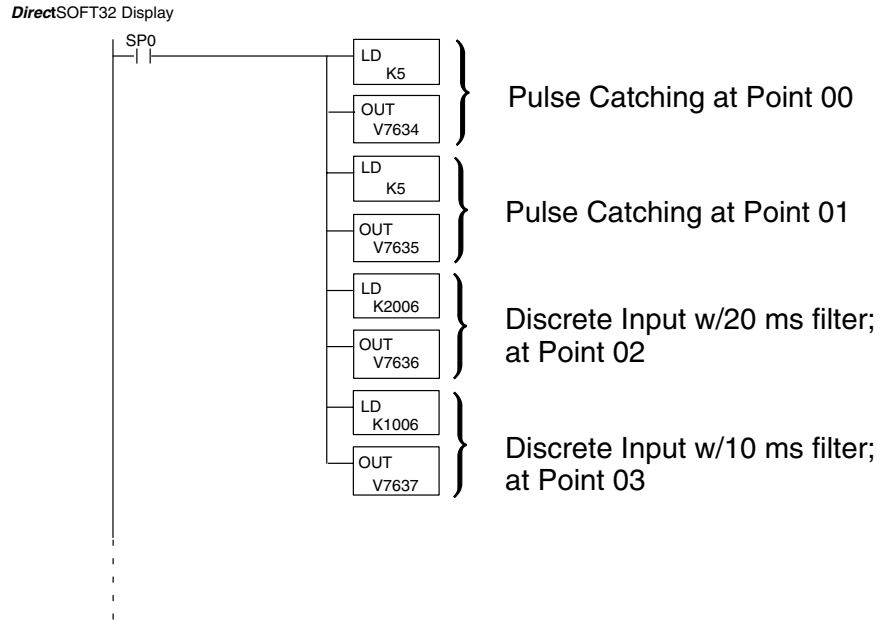
Up to four (4) Discrete Filtered Inputs can be used with the DL230/240/250–1/260 CPUs. The following steps will discuss the programming for each channel.

Step 3: Configure the V-Memory.

The table below gives a description for each of the V–memory locations which must be configured for each I/O point which are selected to be filtered inputs.

V–Memory	Description
V7633	Primary Mode (Discrete Filter=60)
V7634	Point 00
V7635	Point 01
V7636	Point 02
V7637	Point 03

In the below example, Channels 1 and 2 are configured as Pulse Catch Inputs, Channel 3 is to be a Discrete Filtered Input, and Channel 4 to be an Interrupt Input. Channel 3 is set to be a 20ms filter and Channel 4 is set to be a 10ms filter.



The hex number 5 stored in points 00 and 01 is the value for the Pulse Catching feature. Notice that the upper two digits of each hex value stored in V-memory for points 02 and 03 are the timing constants for filtering. The last two digits, 06, is the value for Discrete Filtered Inputs.

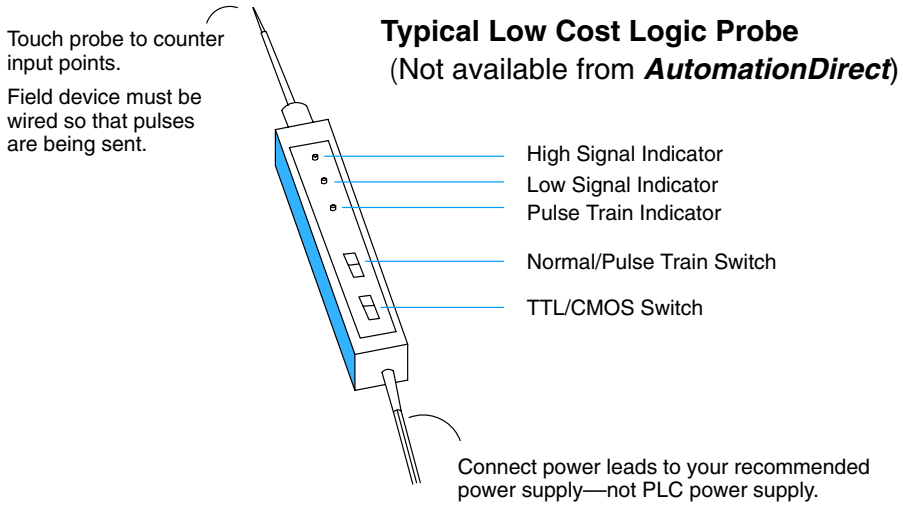
Troubleshooting

The following information may provide some assistance in dealing with problems which may be encountered when setting up the D2–CTRINT module, should they occur. ***Experience has shown that most problems occur because of improper configuration. Always re-check configuration before anything else.***

For verifying types of inputs (or outputs) which do not relate to external High Speed Interrupts, see the Chapters in this manual covering the specific function. Listed below are some things that could possibly go wrong with the high speed interrupt inputs:

1. No filtering appears to be taking place.
2. The status indicator LED is not lighting for the input point where the Discrete Filtered Input are connected.

Defective Field Device - If a field device is suspected to be faulty, verify its proper operation first. Examine the characteristics of the pulses being received with an oscilloscope, test equipment type digital counter or an inexpensive logic probe.



Check the specifications for the field device. Make certain that the output signal matches the specifications of the D2–CTRINT module.

Pulse Width – The pulse width may be too narrow. The positive transition must remain HIGH for at least 0.1 ms in order for the module to detect its presence. Select another field device which has a pulse longer than 0.1ms.

Wiring - Simple as this might seem, quite often poor wiring is the cause of many problems. Be sure there is a complete electrical loop between the device and the input module. Along with visual inspection, use a voltmeter to check the wiring.

Input Voltage - If the input device is sending a signal which is less than 12 volts, most likely the counter will not function or function improperly. Replace the field device with one which has the proper output level if necessary.

Improper Configuration - Verify that proper values have been used in the configuration. The value for a filtered input follows the format xx06, where xx is the filtering time in milliseconds.

Status Indicators – Make sure the PWR or BAT LEDs are not lit on the CPU. Be sure that the status indicators are lit as the pulse signals are received at the proper input point on the D2–CTRINT module. If an LED is not functioning, check the point with a voltmeter to be sure that the I/O point is being energized.