DirectFlash II

What you get:

- DirectFlash II controller board with DIN rail mountable enclosure.

What you will need:

- Secure Digital (SD) card. (32 GB Maximum Cards)
- PLC.
- PLC programming cable.
- Power Supply.

Recent Updates:

- Allow SD cards up to 32GB
- Data Log Connection to a Click! PLC

We recommend SanDisk and QMemory Cards.

32 GB Maximum Card Size

Before powering the unit, make sure a SD card is installed. Many of the sizes up to 32 GB cards made by SanDisk and QMemory have been successfully tested. Other brands may work but have not been fully tested for use with this unit. You may also use a microSD card as long as you also use the holder that converts the card to SD size.
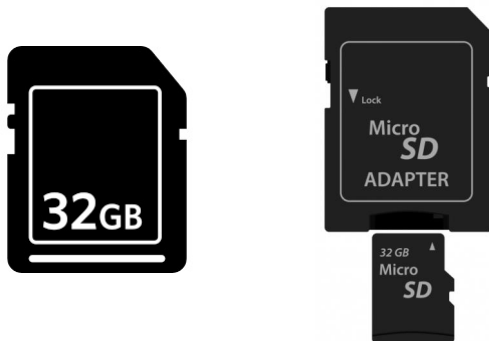
Power the DirectFlash II controller with a well regulated 9V to Max 24V DC power supply.

The DirectFlash II units have 5 led indicator lamps.
- POW
- SD
- WR
- TX
- RCV

The **POW** led will turn on once power is applied to the DirectFlash II.

The **SD** led will turn on solid after the SD card has been initialized and is working properly. The SD lamp will flash any timer the SD card is missing or has been removed.

The **WR** led will stay on solid when data is being written to the SD card. If this lamp flashes twice, there was an error trying to write the data to the SD card.

The **TX** led will flash when writing data to the PLC using DirectNet communication. It will flash slowly on / off if the data connection is lost to the PLC.

The **RCV** led will flash after the TX lamp indicating reception of data from the PLC. Valid communication with the PLC is indicated by TX (flash) then RCV (flash) and repeats.

To operate from a Modbus port, you will need the appropriate DirectSoft data cable. Consult your PLC manual to select the correct cable. The unit is programmed to be the Modbus Master. It can be programmed to communicate to any slave address (01 to 90). The unit will only communicate On Modbus at 9600 baud, Odd Parity, 8 data bits and 1 stop bit. If a Click is attached, the baud rate will be defaulted to 38400, Odd, 8, 1.

Connect the D2-DSCBL to the male Db9 connector on the DirectFlash II and to a Modbus enabled port on the plc. For DL 250 port 2, use cable D2-DSCBL-1.

DirectFlash II will work with any Modbus port on any AutomationDirect PLC.

Hot Swaps

"Hot swapping" or pulling out and replacing the flash card while the unit is powered, IS NOT RECOMMENDED. Although, in most situations, the unit will reset and restart the flash card, there is no guarantee that this will work every time. You could loose valuable data if the unit were in a write process when you pulled the card. Please power down the unit before removing or replacing the SD card.

Here is a table of possible ports that can be used by the DFII.

PLC	PORT 1	PORT 2	Communication
DL105	NO	NA	NA
DL05	YES	YES	MODBUS
DL06	YES	YES (with DF15TO6 adapter)	MODBUS
DL250	YES	YES (with DF15TO6 adapter)	MODBUS
DL250-1	YES	YES (with DF15TO6 adapter)	MODBUS
DL260	YES	YES (with DF15TO6 adapter)	MODBUS
Click	YES	YES	MODBUS

Before attempting to log using the DFII, read the next section to get the SD Card ready for logging.

# DFII Logging with DirectLogic Series PLC

To begin logging to an AutomationDirect PLC, the SD Card must have a SETUP.TXT file saved to the SD Card and either a DATLOG1.TXT file, DATLOG2.TXT file or both.

SETUP.TXT	This file is used to set operating parameters.
DATLOG1.TXT	This file is used to log by time interval.
DATLOG2.TXT	This file is used to log by an event that occurs in the PLC.

SETUP.TXT Example. This example will be used for the rest of this document. V03000 was used for the Base location. You may use any valid Vmemory address that is LESS THAN V10000 for your base location.

Location	Definition
BASE+0	File I/O function plc writes data here
BASE+1	I/O function results SD logger writes here
BASE+2	File write low memory location plc writes here
BASE+3	File write high memory location plc writes here

RESERVE 4 VMEMORY LOCATIONS FROM V03000 TO V0303. DOUBLE CHECK NONE OF THESE LOCATION ARE IN USE IN THE LADDER LOGIC. THE SD LOGGER WRITES DATA TO SOME OF THESE LOCATIONS!

setup.txt - Notepad

```
01
V03000
```

Ln 1, Col 1
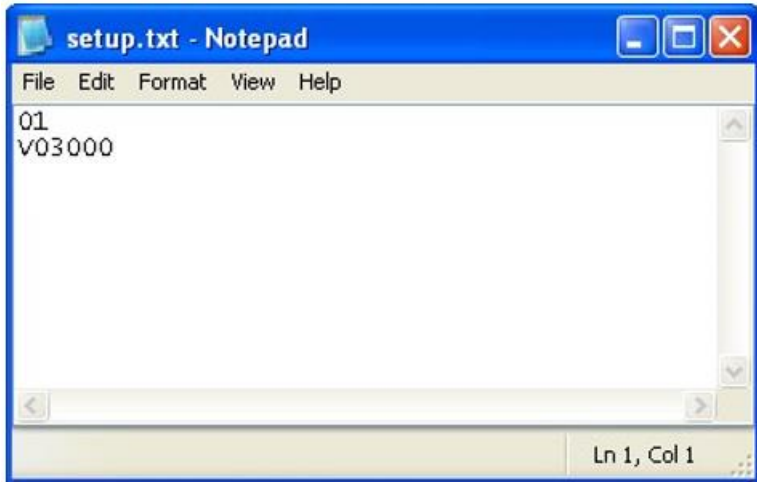
Use Notepad in Windows to create the file shown above.
Save as SETUP.TXT to the SD Card. Make sure a carriage
return is on each line, even the last line.

Line	Example	Definition	Value Ranges
Top Line	01	PLC Address	01 to 99
Second Line	V03000	Base Vmem Address	02000 to 05000

Baud rate options are:
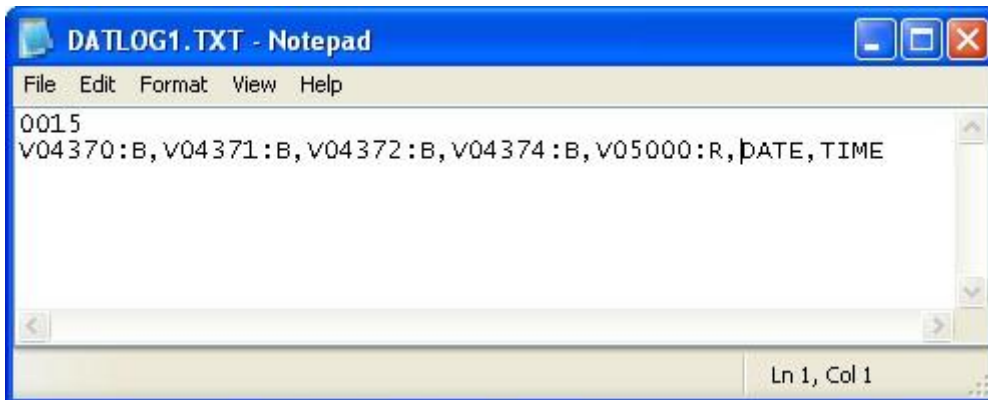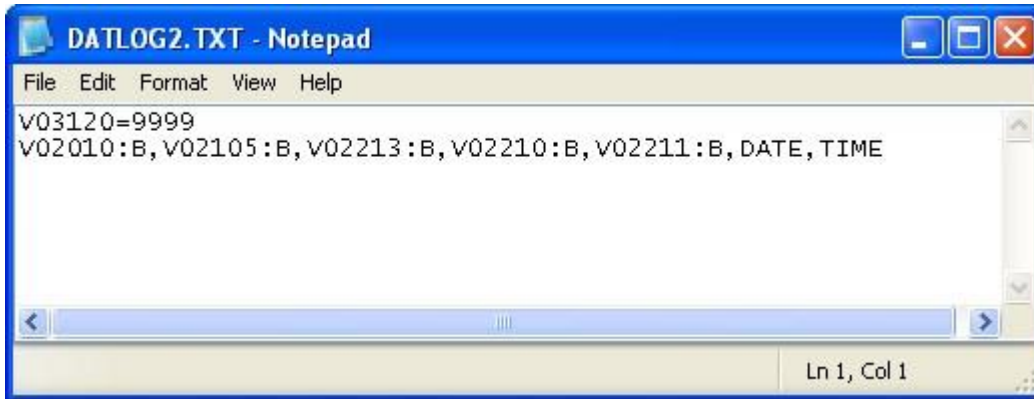9600 for Direct Logic and
38400 for Click!
Parity is fixed at Odd.
Only 8 date bits and 1 stop bit is supported.

DATLOG1.TXT Example:

DATLOG1.TXT - Notepad

```
0015
V04370:B,V04371:B,V04372:B,V04374:B,V05000:R,DATE,TIME
```

Ln 1, Col 1

When the DFII powers up and finds this file, it will be set to log the 5 vmemory locations listed plus DATE and TIME every 15 seconds.

DATLOG2.TXT Example:

When the DFII powers up and finds this file, it will be set to log the 5 vmemory location listed plus DATE and TIME when V03120 is equal to 9999. The DFII will then write a 0 to V03120 and log the values.

Both DATLOG1.TXT and DATLOG2.TXT can exist on the card at the same time. Both files will be used for logging.

The DFII logs directly to the files created above. No extra files are created. DATLOG1.TXT and DATLOG2.TXT are APPENDED each time a write occurs. The files will grow continously unless a backup is made. See the BACKING UP LOG FILES section below.

The DFII uses 4 V memory locations to indicate file status and other information to the PLC. 13 of the locations should be viewed as BCD WORD. V03007 and V03014 should be viewed as Decimal, DWORD.

Data Types Supported:

When creating a DATLOG1.TXT or DATLOG2.TXT use the following table to indicate the data type to use when reading the PLC and saving the values to the SD Card.

Abbreviation	Data Type Recorded
:B	Records 4 digit BCD value
:b	Records 8 digit BCD value
:R	Records the Real (floating point) Value.
:D	records the Unsigned Decimal Value.
:d	Records the Signed Decimal Value.

Ex:

V04370:B will record values between 0000 and 9999 and will also record hex characters as well (00FF, A00A, etc…)

V04544:b will record values between 0 and 99999999 and will record Hex chars as well

V04440:d will record values between -32767 and +32767

V04555:D will record values between 0 and 655535

From a DataView in DirectSoft 4 or 5:

DF-3-USB Logging DirectNet to AutomationDirect PLC

Element	Status	Edits	
V3000	0		File IO functions written from PLC to this location defined in SETUP.TXT
V3001	1011		status values written from logger to here.
V3002	600		Start location of Vmemory in Hex when writing data files.
V3003	620		End location of Vmemory in Hex when writing data files.

V03000: This is the base memory area defined in SETUP.TXT . You may use any value between V2000 and V5000 for your base location. RESERVE 17 VMEMORY LOCATIONS FROM VXXXX TO VXXXX + 16. DOUBLE CHECK NONE OF THESE LOCATION ARE IN USE
IN THE LADDER LOGIC. THE SD LOGGER WRITES DATA TO MOST OF THESE
LOCATIONS! The PLC write values to this register to cause the DFII to execute certain tasks defined below.

V03001 The DFII writes status indication values back to this location to show progress and current SD status.
- 0x1010 is written if no SD drive is present.
- 0x1011 is written when a new line it written to DATLOG1.TXT.
- 0x1012 is written when a new line it written to DATLOG2.TXT.
- 0x1000 is written when when the SD drive is present at power up or insertion only.

V03002 to V03003 should be treated as read only by the PLC. Only the DFII should write values to these locations. The plc should not try to write to these memory areas.
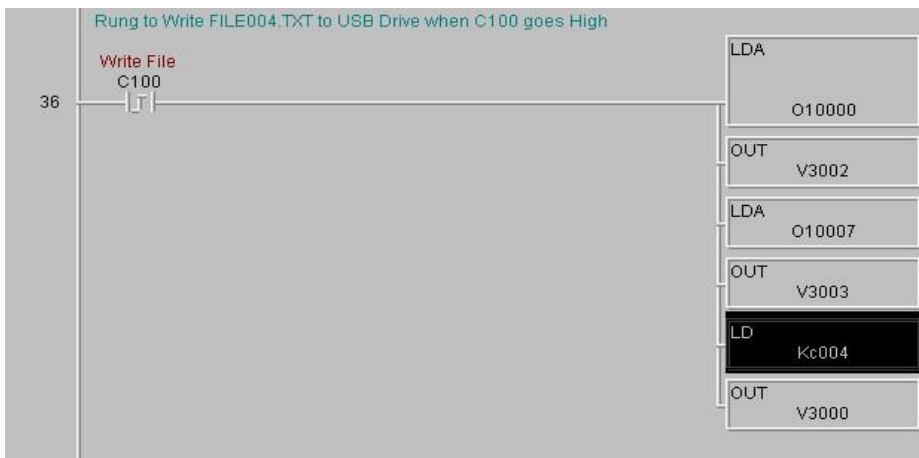
Using the File I/O routines

It is very easy to create text-based files that contain the current values of contiguous vmemory locations. Only the BCD value is written. Decimal and Real are not supported in the File IO routines.

To create the following file:
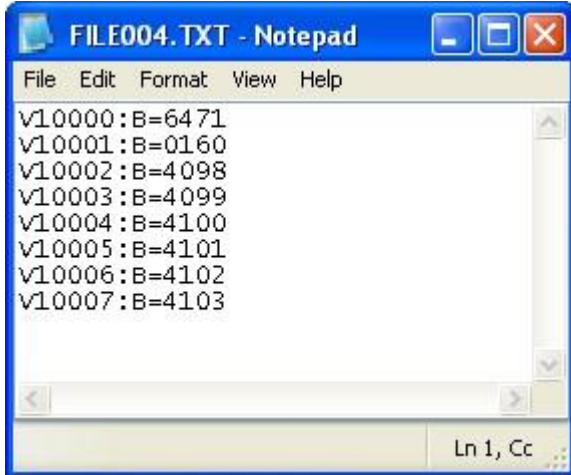
Will require the following sequence:

That is it. The DFII will take care of the saving the data to the SD Card
Reading a FILEXXX.TXT file into Vmemory

Element	Status	Edits
V7500	1	
V7501	2	
V7502	3	
V7503	4	
V7504	1234	
V7505	999	

FILE005.TXT - Notepad

File Edit Format View Help

```
V07500:B=0001
V07501:B=0002
V07502:B=0003
V07503:B=0004
V07504:B=1234
V07505:B=0999
```

Ln 7, Co

To read a file named FILE005.TXT and write those vmemory values to the PLC requires the following:

```
Rung to Read FILE005.TXT from USB to V memory

Read File
  C101                                                    LD
   |↑|                                                         Kf005

                                                         OUT
                                                              V3000
```

That is it. The DFII will take care of the reading the data from the SD Card and saving the values to the memory indicated.

The following is a list of values your PLC program can write to V03000 for File I/O routines.

V03000=	SD Function
Fxxx	Upload (F)ile if it exists from SD to PLC.
Exxx	Check to see if the file (E)xists on the SD Drive.
Dxxx	(D)elete File from the SD drive if it exists.
Cxxx	(C)reate File on the SD and overwrite any file with same name.
Bxxx	(B)ackup Datlog1.txt or Datlog2.txt.
Axxx	(A)ppend to existing SD file. If it does not exist, the file is created anyway.

XXX Can equal any value from 000 to 999 and include hex characters such as FFF or 9A9 or 00F etc…

The DFII will write back a status value to V03001. V03001 Values:

If V03000 = Fxxx
- 1000 is written to V03001 while checking for file
- 1001 if file uploaded from flash ok.
- 1002 if file did not exist
- 1003 if busy uploading the file then will change to 1 if successful

If V03000 = Exxx
- 1000 is written to V03001 while checking for file
- 1006 if file does exist
- 1007 if file does not exist

If V03000 = Dxxx 0000 while busy checking for file
- 1008 is written to V03001 if file was delete successfully
- 1009 if file did not exist

If V03000 = Cxxx
- 1000 is written to V03001 while checking for file
- 1003 if busy creating the file then will change to
- 1002 if there was an error
- 1001 if successful

If V03000 = Bxxx
- 1000 is written to V03001 while checking for file
- 1003 if error creating backup
- 1002 if backup failed because all 26 names used
- 1001 if successful
- V03016 or V03017 will increment
- V03007 or V03014 will change to new file size (smaller)

If V03000 = Axxx
- 1000 is written to V03001 while checking for file
- 1004 if busy appending to the file then will change to
- 1002 if there was an error
- 1001 if successful

V03002 Values: Written by PLC
> The hex start address for the Data you want to save or append

V03003 Values: Written by PLC
> The hex end address for the Data you want to save or append

To get the Hex address use the LDA command from DirectSoft. This will load the Vmemory hex address equivalent. Ex: [LDA O3000] will load the accumulator with the value 600 hex. Then [OUT V03002] to save 600 Hex to V03002. Do the same for V03003. Be sure to load V03002 and V03003 values before you write Cxxx or Axxx to V03000. Do Not write any values to V03001.

Power Up Files

There are 2 files that can exist on the card and are read into the plc at powerup. They are called POWUP.TXT and POWUPD.TXT. They are written exacly like the example above (FILE005.TXT) but they are only looked at during the power up cycle.

If POWUP.TXT exists on the drive at power up, the contents of the file are written to the v memory EACH time the logger is powered.

If POWUPD.TXT exists on the drive at power up, the contents of the file are written to the v memory and the file is then deleted from the SD card to prevent the write from happening again.

# DFII and LOGGING with Click Series PLC

The procedure for logging the Click plc is very similar to the DirectLogic series. The main difference is how the SETUP.TXT , DATLOG1.TXT, DATLOG2.TXT and other power up and insertion files are written.

Communication with the Click must be set to Modbus. The default baud rate for Port 1 is 38400,8,O,1 and cannot be changed. Port2 can be changed but will default to 38400,8,O,1. The click plc will supply 5V dc to the DFII through the cable provided.

ONLY THE DS AND DF AREAS OF MEMORY IN THE CLICK PLC CAN BE ACCESSED BY THE DFII.

SETUP.TXT
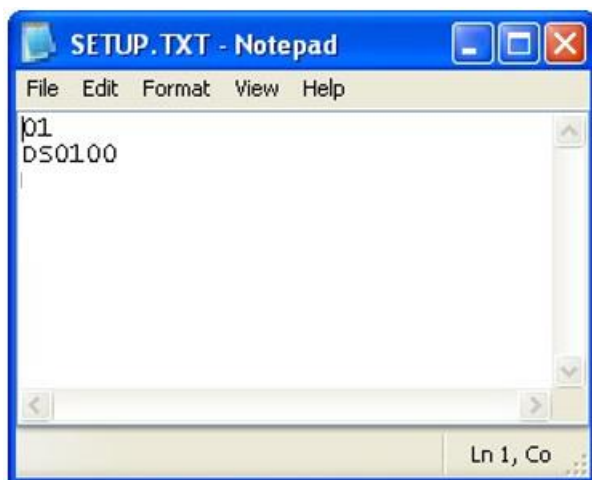
DS0100 is the BASE address for I/O functions. You may use DS0000 to DS4483. The BASE location must be in the DS area of memory.

RESERVE 3 DS LOCATIONS FROM DS0100 TO DS0103. DOUBLE CHECK NONE OF THESE LOCATION ARE IN USE IN THE LADDER LOGIC. THE SD LOGGER WRITES DATA TO ALL BUT 2 OF THESE 4 LOCATIONS!

DATLOG1.TXT Example:
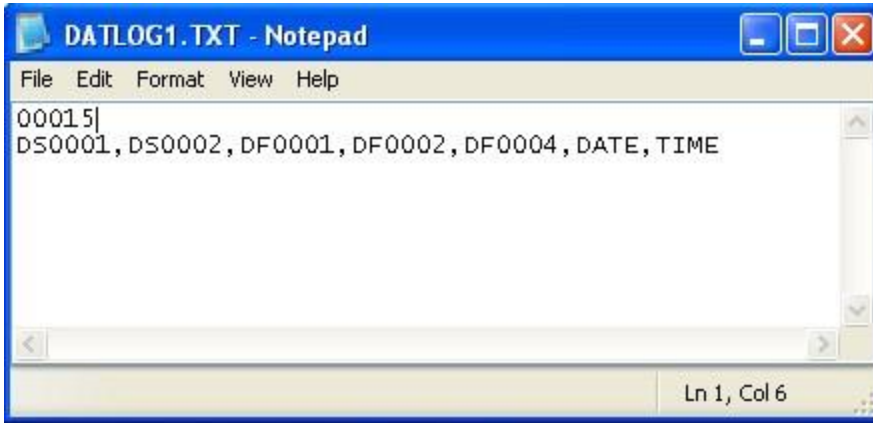
This DATLOG1.TXT file will log DS0001, DS0002 as Signed Decimal and DF0001,DF0002 and DF0004 as Floating point.
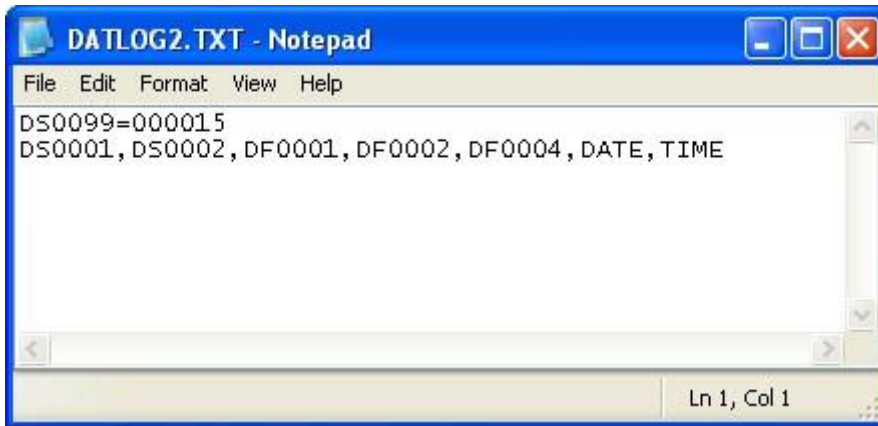
This DATLOG2.TXT file will log DS0001, DS0002 as Signed Decimal and DF0001,DF0002 and DF0004 as Floating point. It will log when DS0099 = 15.

Leading ZEROS are NOT required. DS2 is just as Valid as DS0002.

Here is a screen with some logs attached.

```
DATLOG1E.TXT - Notepad

File  Edit  Format  View  Help

0015
DS0001,DS0002,DF0001,DF0002,DF0004,DATE,TIME

402,-227,0.32,15074.95,0.00,12/30/11,09:33:19
417,-212,0.55,15076.44,0.00,12/30/11,09:33:33
432,-197,0.75,15077.93,0.00,12/30/11,09:33:48
447,-182,0.06,15079.43,0.00,12/30/11,09:34:03
462,-167,0.30,15080.92,0.00,12/30/11,09:34:18
477,-152,0.54,15082.42,0.00,12/30/11,09:34:33
492,-137,0.75,15083.91,0.00,12/30/11,09:34:49
507,-122,0.06,15085.40,0.00,12/30/11,09:35:04
522,-107,0.32,15086.90,0.00,12/30/11,09:35:19
537,-92,0.55,15088.39,0.00,12/30/11,09:35:34
552,-77,0.75,15089.89,0.00,12/30/11,09:35:49
567,-62,0.06,15091.38,0.00,12/30/11,09:36:04
582,-47,0.32,15092.88,0.00,12/30/11,09:36:19
597,-32,0.55,15094.37,0.00,12/30/11,09:36:34

                                           Ln 1, Col 1
```


Data View -[DataView1]

[ ] View Override

No.	Address	Nickname	Current Value	New Value	Write	Viewing Format
001	DS100		0			Integer
002	DS101		1011			Integer
003	DS102		100			Integer
004	DS103		119			Integer

DS0100: This is the base memory area defined in SETUP.TXT . You may use any value between DS0000 and DS4483 for your base location. The PLC writes values to this register to cause the DFII to execute certain tasks defined below.

DS0101 (BASE + 1) The DFII writes status indication values back to this location to show progress and current SD status.
   • 1010 is written if no SD Card in present.
   • 1011 is written when a new line it written to DATLOG1.TXT.   • 1012 is written when a new line it written to DATLOG2.TXT.
   • 1000 is written when when the SD Card is present at power up or insertion only.

DS0102 to DS103 (BASE + 2 to BASE + 3) should be treated as read only by the PLC. Only the DFII should write values to these locations. The plc should not try to write to these memory areas.
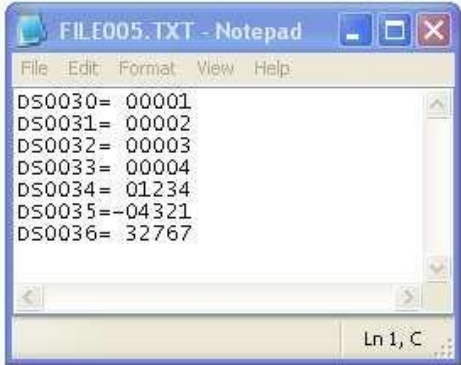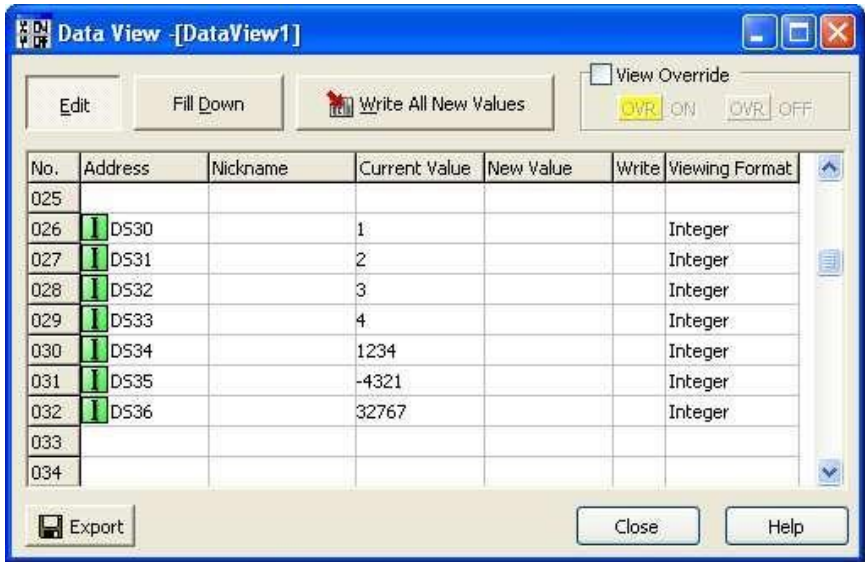
To create a file called FILE005.TXT and save DS0030 to DS0036, use the following logic:
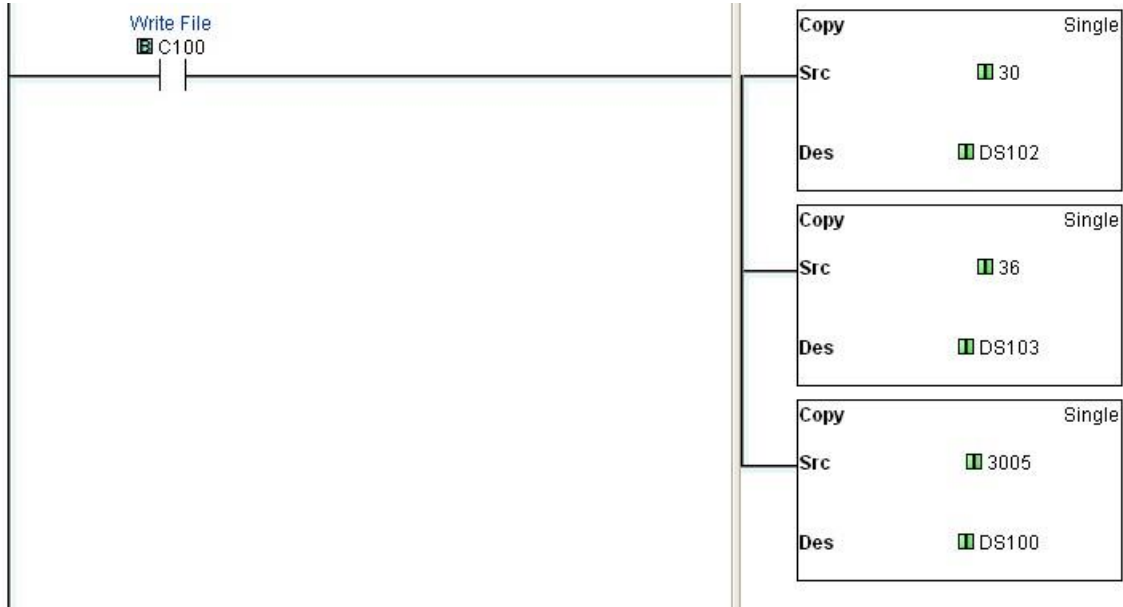
Make sure C100 is a ONE SHOT. 3005 is the same as C005 (Create a File) with the Click. See section below for more explanation.

The functions that are written to DS0100 are different than for the Direct Logic plc. Since the DS values cannot have Hex characters, the thousands digit is used to specify the File I/O function:

DS0100=	SD Function
6xxx	Upload File if it exists from SD to PLC.
5xxx	Check to see if the file Exists on the SD Card.
4xxx	Delete File from the SD Card if it exists.
3xxx	Create File on the SD and overwrite any file with same name.
200x	Backup Datlog1.txt or Datlog2.txt. (2001 or 2002 only allowed)
1xxx	Append to existing SD file. If it does not exist, the file is created anyway.

XXX Can equal any value from 000 to 999.

The above example wrote 3005 to DS100 to write FILE005.TXT

The DFII will write back a status value to DS101.
DS0101 Values:

If DS0100 = 6xxx (Upload File)
- 1000 is written to DS0001 while checking for file
- 1001 if file uploaded from flash ok.
- 1002 if file did not exist
- 1003 if busy uploading the file then will change to 1 if successful

If DS0100 = 5xxx (Check file Exists)
- 1000 is written to DS0001 while checking for file
- 1006 if file does exist
- 1007 if file does not exist

If DS0100 = 4xxx (Delete File)
- 0000 while busy checking for file
- 1008 is written to DS0001 if file was delete successfully
- 1009 if file did not exist

If DS0100 = 3xxx (Create File)
- 1000 is written to DS0001 while checking for file
- 1003 if busy creating the file then will change to
- 1002 if there was an error
- 1001 if successful

If DS0100 = 200x (Backup Datlog1 or Datlog2)
- 1000 is written to DS0001 while checking for file

- 1003 if error creating backup
- 1002 if backup failed because all 26 names used
- 1001 if successful
- DS0016 or DS0017 will increment
- DS0007 or DS0014 will change to new file size (smaller)
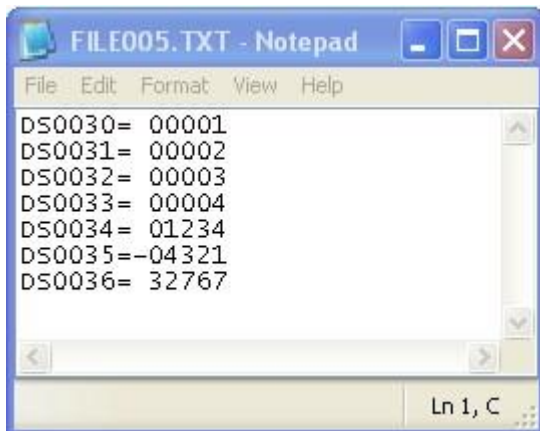
If DS0100 = 1xxx (Append to File)
- 1000 is written to DS0001 while checking for file
- 1004 if busy appending to the file then will change to
- 1002 if there was an error
- 1001 if successful

DS0002 Values: Written by PLC
> The start address for the Data you want to save or append

DS0003 Values: Written by PLC
> The end address for the Data you want to save or append

If you are creating FILEXXX.TXT with another application or manually typing in the data to be uploaded to the plc, make sure each line is 13 characters wide and each line has a CARRIAGE RETURN/LINE FEED at the end. After the "=" sign, either a space, " ", "-", or "0" must be entered. The number must be between -32,767 and 32,767

Using the DFII for serial PRINT logging

The DFII can accept serial data for logging and file creation. In this mode, any file name can be saved to the SD Card. The file must follow the 8.3 convention for file naming:

ABCDEF.TXT
12345678.CSV

The SD Card that is inserted into the DFII should not contain the SETUP.TXT file or DATLOG1.TXT or DATLOG2.TXT. When these file are missing, the DFII automatically sets itself to accept serial print data. The baud rate is also set to 9600,8,N,1. Notice it is reset to NO PARITY.

The following is a ladder rung example of how to open a file and write data to the file:

Breaking this PRINT statement up:
 W or w means Write to File.
 $RFILE1.TXT$R Will write to FILE1.TXT
 (text will be written to file like the following. $N inserted a CR/LF)
 HERE IS THE GUTS OF THE FILE

BYTES WRITTEN 0053

$R.$R (This must be written to close the file and wait for next string)
$R.$R will close the file and add a CR/LF to the end of the file
$R:$R will close the file only. The next write will append directly behind the last write.

The PRINT rule is only 128 characters can be sent in one print statement.
The DFII will respond with a 16 character ASCII string that indicates if the thumb drive is attached and how many bytes were written and the current file size:

Ex:

SDC>000000000000 (SDC> means SD card is inserted no data written) SDC!000000000000 (SDC! means SD Card was removed)
SDC>003400000455 (SDC> means SD Card is inserted, 34 bytes were written and the file size is 455 bytes)