

Quick Start

iDDS-2 Frequency Synthesizer

1.0 Operation

This Guide explains how to generate a constant output frequency (Single Tone Mode) and how to generate a repeating frequency ramp (Image Mode) using example data files and internally generated control signals.

The iDDS-2 is commonly used as the frequency source for AO based scanning systems. Both the single tone and frequency ramps modes will assist with the deflector alignment and Bragg angle adjustment. A frequency ramp will create a line scan for single axis AOD's and a flat field XY scan pattern for dual axis systems.

Final optimization of the scan efficiency may require fine tuning of the phase and amplitude values in the Calibration file. Please refer to the Full IDDS manual for guidance.

Caution

Please check that the iDDS-1/2(-U) and associated amplifiers supplied with the AO device have been pre-adjusted for the selected AO model and match your operating wavelength. This will be specified on the test data sheets. In this case ONLY, the power adjustment pots on the iDDS-2 (and amplifier, if fitted) will have been set to the appropriate level.

If in doubt, please take care. DO NOT exceed the maximum RF drive levels for the AO device. Refer to the respective AO manual.

USB versions

The iDDS-x-U utilizes the FTDI245R USB-parallel chip.

This version offers true USB interface and maintains the original RS232 interface for backwards compatibility. Note both interfaces should not be used at the same time.

An interface cable is supplied. This is **NOT** an RS232 to USB inline converter but a simple type adaptor to route the USB signals into the iDDS using unused pins on the existing 9-way connector.J3.

The FTDI DLL and VCP driver files are included on the CDROM supplied with the iDDS. They can also be downloaded from: www.ftdichip.com/drivers/d2xx.htm

The iDDS USB port supports the following data rates depending on the transfer method:

VCP : 300Kbytes/sec

DLL : up to 12Mbits/sec

The Isomet GUI software uses VCP (Virtual Comm Port) for simple commands and DLL routine for large file downloads.

After the drivers are installed onto the host PC, power up and plug in the iDDS-x-1.

Answer the prompts as follows:

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PC prompt

- > Found New Hardware Connect to the Internet
- > Install from List or Specific Location.
(Browse to the folder location for the drivers)

Repeat as necessary.

User response

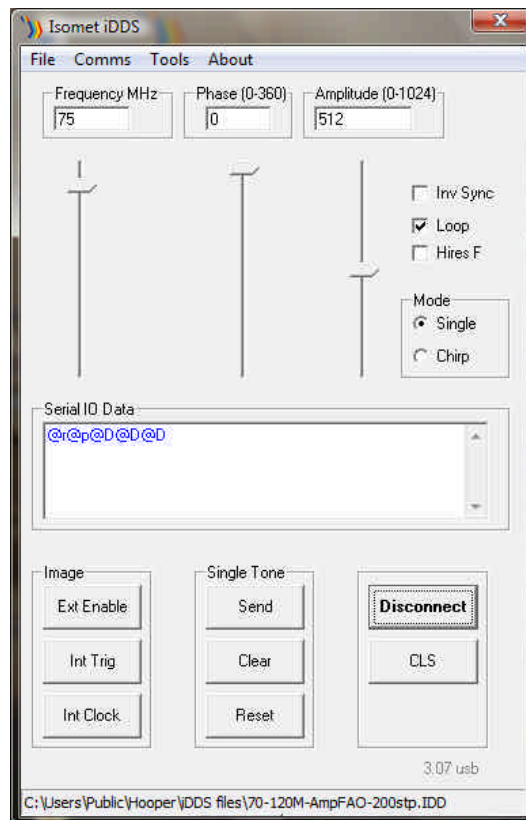
- NO
- Select this option
- OK
- Next

For all versions

Install the Isomet iDDS Software on a PC with a free Serial / USB port running Win XP or Vista. See the Readme file on the installation CD for guidance.

Connect the Comms and DC power (see Basic Connection Section below)

Run the software by clicking on the Isomet logo on the Desk top.
There are two main windows. The first is similar to below.



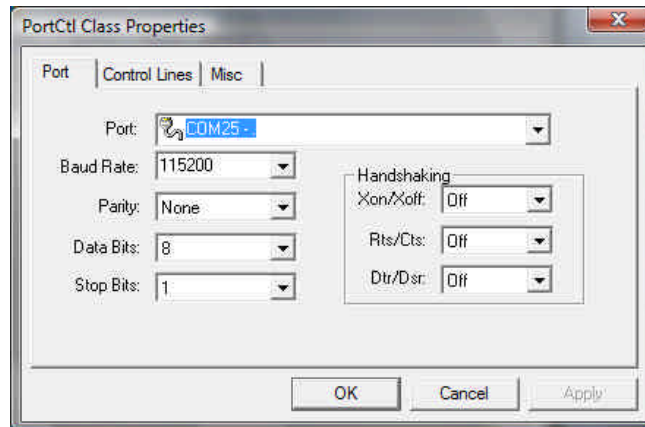
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Communication

Select the **CommPort** pull down menu. Check the Port Number suits the serial port assigned/connected to the iDDS. Check other parameters are as shown.



Normal settings:

Serial Port versions

RS232 : e.g. Com1

The iDDS is configured for RS232. The Baud rate is fixed at 115200.

USB Port versions

USB : The Isomet GUI software uses VCP for simple commands and DLL routine for large file downloads.

Select the appropriate COM port assigned by the Host PC for VCP. (Typically Com5 or higher).

Click the **Connect** button. (Changes to **Disconnect**)

The iDDS should respond and send @r@p@D characters to the Serial I/O Data window.

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2.0 MAIN Menu:

The **Clear** button places the DDS into a known state and should be applied between mode changes. It does not reset the internal micro-controller (uC).

The **Reset** is equivalent to applying a hardware Reset. This will reset the uC.

2.1 Single Tone

Single Mode Button Checked

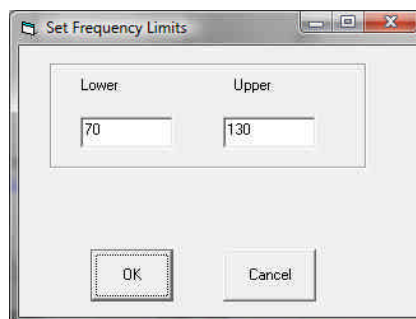
From the MAIN menu, the iDDS can be commanded to output a fixed frequency at given Amplitude and Phase. Phase only applies to the iDDS-2, where a phase difference is applied between the two RF outputs J7 and J8.

Numbers can be entered directly into the boxes, or by means of the slider controls using the mouse or Up/Down arrow keys.

Click the **Send** button to initiate the change in output value.

2.2 Frequency Slider Limits

The Frequency slider control limits can be customized
Select the **Tools** pull down menu and click on **F Limits**



Enter the desired end points and click OK

2.3 Single Mode Application

Each time a value is set or changed, click the **Send** button to update the iDDS-x

Use the Single Tone mode to apply a constant Frequency, Phase and Amplitude to the AO device.

This is useful to set the initial Bragg angle at the AOD centre frequency, using a phase value of Zero and amplitude in the range of 400 – 500.

To stop the output, click the **Clear** button

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3 Image mode (Overview)

The iDDS-x follows a user defined sequence of Frequency, Amplitude and Phase data values clocked from internal memory. (Phase control applies to Beam steered AO deflectors). The maximum data rate in this mode is 1MHz (i.e. 1usec per new frequency point)

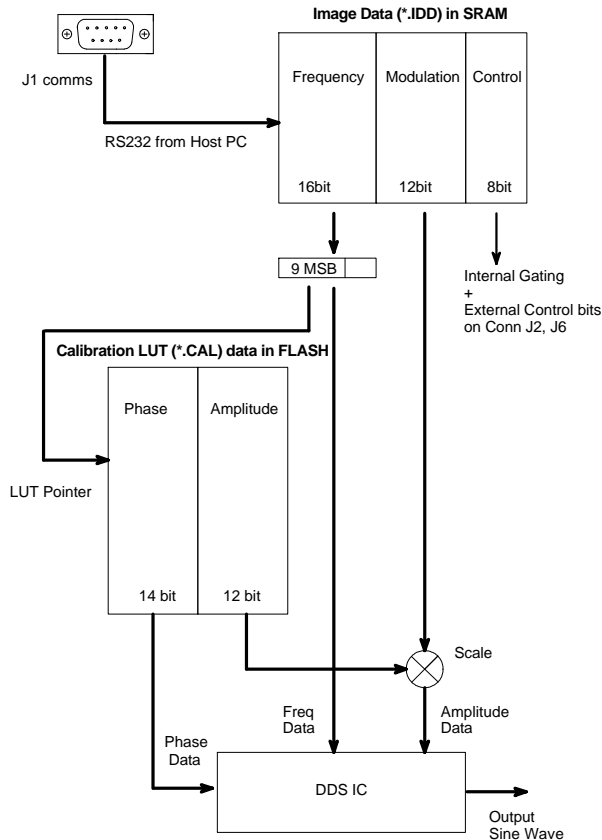
Two files are required:

- The *.IDD "Image file" that contains the sequence of Frequency, Amplitude and Control data
- The *.CAL "Calibration file" that contains the calibration Phase and Amplitude data for each frequency point.

The LUT calibration data (*.CAL) resides in non-volatile FLASH memory and will not be lost during power down or reset.

The Image data (*.IDD) is stored in SRAM and will require reloading after a power down or after a hard or soft Reset.

Data Flow.



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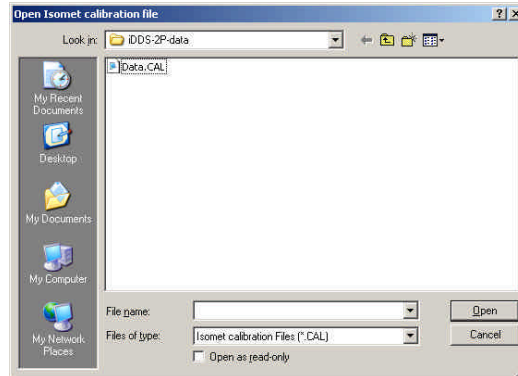
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3.2 Loading Data and Calibration Files

The Calibration file **MUST** be loaded into the iDDS memory **BEFORE** the desired image data files

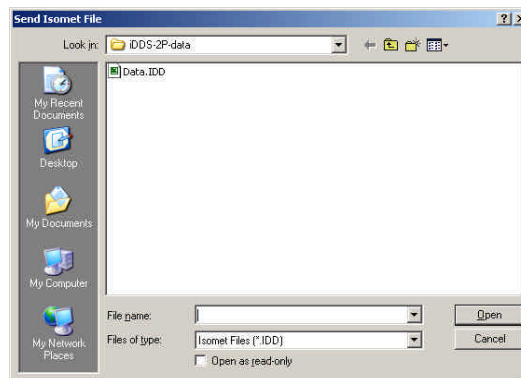
- a: Load the Calibration file,
Select **Send LUT** in the **Calibrate** pull down menu from the Main Window.



Select the desired CAL file and **OPEN**
(see listing in Appendix A)

During a successful download, the iDDS will respond and send 256 x @c character pairs. Completion is indicated with @F in the Serial I/O Data window.

- b: Load the Image Data file
Select **Send Isomet File** in the **File** pull down menu.



Select the desired IDD file and **OPEN**
(see listing in Appendix A)

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During a successful download, the iDDS will respond and send a series of @c character pairs (one per Location). Completion is indicated with @L in the Serial I/O Data window. (@L may not be seen with USB download)

3.3 Clock / Trigger Source

Trigger and clock signals are required to output the frequency pattern from the iDDS. These can be internally generated or externally applied (via connector J2) For the Quick start guide, the Internal signals are assumed.

The trigger input initiates the output sequence. Following a trigger, each rising clock edge will increment the iDDS memory pointer and the output(s) value to change according to image data.

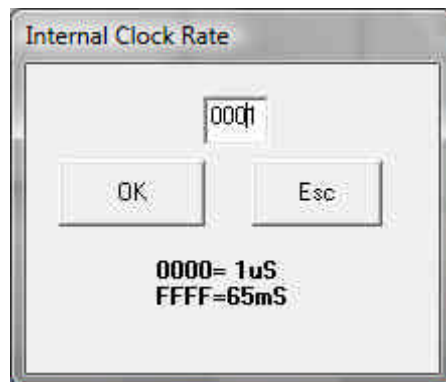
The last entry of the image data file must include the end-of-image ("interrupt") bit. This is the end-of-file flag for valid data. When the interrupt bit is reached then:

- With the **LOOP** radio button unchecked (Main Menu), the iDDS will stop, return to the start position and wait for the next trigger.
- IF the **LOOP** radio button is checked, the iDDS will continually loop around the stored data, provided the clock is active.

The Loop button has a toggle function.

Internal Clock Rate

The data output Clock can be internally generated and its rate is set via the **Tools** pull down menu and clicking on **Int Clock Rate**



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3.4 Image Mode Application

Click the **Int Clk** button on the MAIN menu to enable the internal clock.
Then click the **Int Trig (or 1 Shot)** button to initiate the frequency sequence.
The iDDS-x will output the previously loaded frequency pattern.

The image mode can be used to generate line scans or “random” beam positioning.
The Amplitude and Phase for each frequency will follow the data determined by the Calibration file. This an essential feature of the iDDS-2 and its use with Beam steered AO deflectors,

To stop the output and/or return to Single Tone mode, click the **Clear** button

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Appendix A

Example files :

<u>Calibration File Name</u>	<u>Description</u>	
<i>MaxAmp_ZeroPHASE_allFREQ_LUT.cal</i>	Default for iDDS-1 variants with single output.	
<i>532nm-FC102-0D76-P3-Amp700-2-92PP.CAL</i>	For us with LS110 at 532nm	
<i>1064nm-FC52-P3-AmpPP700-D13.CAL</i>	For us with LS110 at 1064nm	
<u>Image File Name</u>	<u>Description</u>	<u>Use with:</u>
<i>65-115M-AmpFAO-200stp.IDD</i>	50MHz line scan for LS110 Fc=90MHz , 200 steps	LS110A – 532
<i>70-125M-AmpFAO-17x1ramp.IDD</i>	50MHz line scan for LS110 Fc=95MHz, 17 steps	LS110 X axis- 532
<i>70-125M-AmpFAO-17x10step.IDD</i>	50MHz line scan for LS110 Fc=95MHz, 17x10 steps	LS110 Y axis- 532
<i>75-125M-AmpFAO-200stp.IDD</i>	50MHz line scan for LS110 Fc=100MHz , 200 steps	LS110A – 532
<i>37-63M-AmpFAO-255stp.IDD</i>	25MHz line scan for LS110 Fc=90MHz , 200 steps	LS110A - 1064
<i>37-63M-AmpFAO-17x17ramp.IDD</i>	25MHz line scan for LS110 Fc=95MHz, 17 steps	LS110 X axis- 1064
<i>37-63M-AmpFAO-17x17step.IDD</i>	25MHz line scan for LS110 Fc=95MHz, 17x10 steps	LS110 Y axis- 1064

For wideband devices such as the LS110, the optimum centre point for the scan bandwidth may be +/- 10% from the centre frequency.

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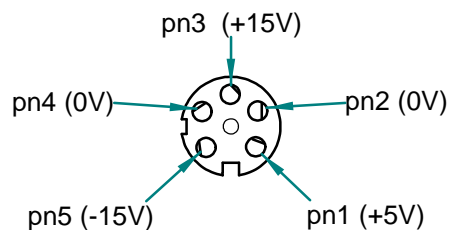
BASIC CONNECTIONS

- Connect DC voltages to J10

Voltage	Current	Conn	Pin
+12V (+15V max)	< 0.2A	J10	3
0V	RTN	J10	4
-12V (-15V max)	< 0.1A	J10	5
+5V (+5.2V max)	< 4.5A	J10	1
0V	RTN	J10	2

iDDS power cable socket

Internal view of **SOLDER** terminations



(= same view looking **into** bulkhead plug mounted in iDDS)

- Connect RF output(s) J7 and/or J8 to desired load.
Pots set the maximum output level (0 – 2.5 mW).
Default 1.0mW
- Depending on the Model Connect the Host PC.

PC USB to iDDS 'J1 Comms' via supplied USB cable

or

Connect RS232 serial port to 'J1 Comms'

Baud rate is fixed at 115Kbaud. No cross over required:

9way_D	PC Comms	iDDS J1
pin	2	2
pin	3	3
pin	5	5

or

RS485, 115Kbaud serial port to 'J1 Comms'