19xx/29xx-C[1] Power Meter: Continuous Data Collection via USB Using the Ring Buffer Command

There are times when it is more advantageous to continually feed data from a power meter directly to a computer, than to download the data buffer to a memory device for eventual upload to data analysis software. Valuable time and data can be lost during the interval required to download the power meter buffer, clear the buffer, and restart data collection. Continual data feed directly from the power meter to the computer would be a much better. At this time, however, the command set for the 19xx/29xx-C power meters does not allow for this option.

A possible alternative is to set the buffer of the power meter into ring mode. The default of the power meter is to automatically set the data collection buffer into fixed size mode. In this mode the buffer will continue to store data samples until the buffer is filled. The data can then be downloaded to a USB memory stick and transferred to a computer for future analysis. This system works fine for short runs or limited data gathering. However, if data acquisition requirements are for a continuous run of several hours or days, this data collection and transfer process can become inconvenient.

Setting the data collection buffer into ring mode allows the buffer to fill and then begin to overwrite previously gathered data, in the order of oldest to newest, on a continual basis. The existing data is in a state of continuous replacement in a circular or ring fashion. This means that it is possible, with use of the appropriate remote command, to continually transmit data from the power meter to a computer via a USB interface. It is, however, important to determine how long it takes the buffer to fill and how long it takes to download a set amount of data to the computer in order to be certain of not re-collecting previous data before it has been overwritten, or collecting data yet to be transferred before it is overwritten. This determination process may require some trial and error analysis.

The maximum capacity of the data buffer is 250,000 samples per channel.

An example of the power meter command set for operation in ring buffer mode follows. The definitions of the listed commands can be located in the manual for the power meter. The end user will need to provide a software routine, in his preferred programming language (C++, Visual Basic, Lab View, etc…), that will call the routine.

Power Meter Settings:

This set will be needed one time only, at the beginning of the routine and is used for set up of the power meter.

PM:MODE *x*	(set the power meter mode—see manual for *x* value definitions)
PM:DS:EN 0	(disable the buffer)
PM:DS:CLEAR	(clear the buffer)
PM:DS:INT 1	(data collection interval--the current definition for this command is described in the Note at the end of this paper.)
PM:DS:SIZE *xx*	(set the buffer size, 0-250000 samples)
PM:DS:BUF 1	(set buffer to ring mode—this means that once the buffer fills it will begin overwriting the data with new data in the same order that it originally filled.)

PM:DS:EN 1 (enable the buffer—start data storage)

Use the following command repeatedly, as needed, selecting a different series of data each time until you have run all the way through the buffer, at which time you would restart at the beginning of the buffer.

PM:DS:GET? *xx* (get data from the buffer in the order you call it)

(for example, you might have a list of commands, such as

PM:DS:GET? 0-100
PM:DS:GET? 101-200
PM:DS:GET? 201-300
.
.
.
.
PM:DS:GET? 249900-250000

Repeat over and over until all required data is gathered.)

When working in CW CONT mode with a 918D-series photodiode detector and gathering 250,000 samples, it will take the buffer 250s to fill. Fill rate of the buffer is dependant upon the type of detector being used. For photodiodes, it is 0.1ms. (See Note below.)

NOTE:: While all the above commands in the routine are described in the power meter manual, it is important to note that the description of the PM:DS:INT *x* command has changed. The manual may describe the x value as being the interval in milliseconds for storing one measurement in the data buffer. This is no longer true.

The x value now determines the interval of data points to be stored. Therefore if the value =1, all measurement values will be stored on the buffer. If the value = 2, every other measurement value will be stored. If the value = 3, every third measurement value would be stored. Etc…

How quickly data is gathered depends on the detector type being used.

For 918D-series photodiode detectors—

Set the power meter in CW CONT mode
The measurement rate will be 10kHz
So if DS:INT = 1, data measurements will be gathered every 0.1ms

For the 818P-series thermopile detectors

Set the power meter to CW CONT mode
The measurement rate will be 1kHz
So for DS:INT = 1, data measurements will be gathered every 1ms

For 818E-series energy detectors

Set the power meter to PULSE CONT mode
The measurement rate will be the repetition rate (rep rate) of the pulsed beam, up to a maximum of 10kHz
So for DS:INT = 1, data measurements will be gathered at 1/(rep rate)

It is important to note that when making these settings directly on the power meter, rather than remotely, DS:INT =1 will appear as Rate = 0.1ms regardless of which of the above situations you are working in. DS:INT=2 will appear as Rate = 0.2ms, etc… This is not intuitive and can cause confusion.

[1] excluding the 1930/2930-C and the 1916-C power meters.