Perception V8 Acquisition Modes Quick Start Guide

Introduction

- From Perception V7 to V8, significant work was done on the acquisition modes:
  - The User Interface was improved: everything related to acquisition modes was brought together in a single interface element
  - New acquisition modes were added
  - Some new terminology was introduced
- This document explains the Acquisition Modes in Perception V8 and, where required, compares them with Perception V7

The basic ideas behind Acquisition Modes in Perception V7 and V8

The underlying ideas of acquisition modes in Perception V7 and V8 are very similar. To explain acquisition modes in either version of Perception, the following concepts need to be explained first.

Groups

A measurement setup may consist of several *recorders* or *acquisition cards* distributed over one or more mainframes. Perception recorders or acquisition cards can be collected in *groups*. The user can select which cards should be in which group. All the cards in a group have the same sample rate but different groups may have different sample rates. To assign a recorder to a group, go to the Settings sheet and click Recorder in the General area (Figure 1). Double-clicking an entry in the Groups column allows assigning this recorder to an existing group or by typing a new name, create a new group.
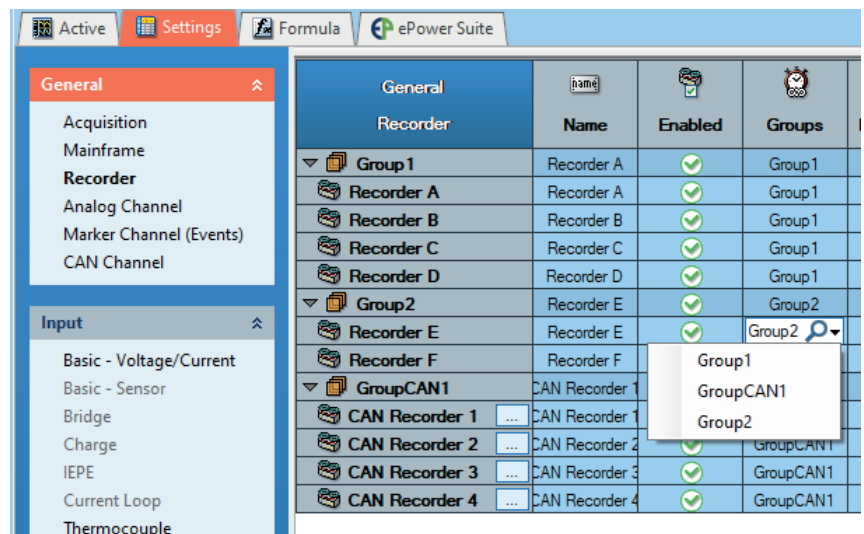

Figure 1: Example of assigning recorder E to a group

Sweeps

Perception has the powerful possibility to record certain parts of the recording at a *different sample rate*. Certain intervals of the recording (called *sweeps*) are recorded at a high sample rate whereas the continuous parts are recorded at a reduced sample rate. Sweeps allow to get detailed high-frequency and transient information about time-limited events while keeping the size of the recording and the data rate limited. Sweeps together with groups give significant flexibility on getting detailed information about physical quantities while not having to record all data at high a sample rate, keeping the acquisition feasible and the total recording size manageable. See Figure 2 for a sweep with user-defined pre-trigger and post-trigger times recorded at high sample rate. For illustration it is combined with a reduced rate continuous recording where, by user definition, some of the data is not stored.

Figure 2: A sweep combined with a continuous recording

Triggers

The *moment in time* where a sweep interval occurs is determined by *triggers*, and the *length* of a sweep by user specification and possibly by triggers as well. Triggers are caused by user-defined *events* such as the level crossing of a signal, result of a calculation crossing a level, a rising edge of an external signal, etc. Examples of different types of sweeps (see also Figure 3):

a)   A sweep based on a single trigger, the sweep length is defined by the user-defined pre- and post-trigger times

b)   A sweep based on multiple triggers, the sweep length is defined by the user-defined pre- and post-trigger times and when the last trigger occurs (every trigger (re)starts the post-trigger time)

c)   A sweep based on a trigger and a stop-trigger, the sweep length is defined by the user-defined pre- and post-trigger times and when the stop-trigger occurs (starts the post-trigger time)
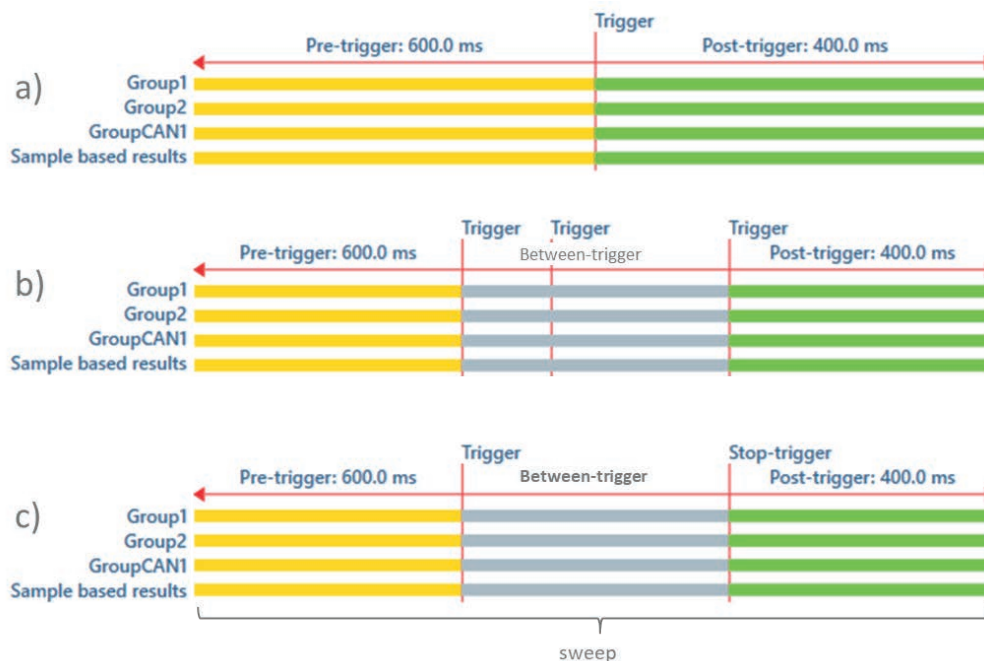

Figure 3: Three different kind of sweeps

Terminology

Perception has very fast drive access so in many cases, the digital recorded data can immediately be stored on the drive. In some cases (e.g., many channels at a very high sample rate) even the fastest drives cannot keep up. In

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those cases, the user can choose to store sweep data first to very fast dedicated trigger memory The terminology is "*to trigger memory first*". In the end, all recorded data will be available in a single PNRF file.

Perception V8 Acquisition Modes New User Interface

Overview User interface

An overview of the Perception 8 Acquisition Modes User Interface is given in Figure 4. It consists of the following areas:

- Graphical ❶ indication of what is recorded and when
- An area ❷ where the type of acquisition mode can be chosen
- The fields ❸ where the pre- and post-trigger times can be specified (in case triggers are used)
- The area ❹ where the high sample rate and the reduced sample rate per group can be defined. In this area it should also be indicated which data is to be stored.
- The area ❺ to define how a recording or sweep should be stopped
- The area ❻ to define how the total data acquisition process should be stopped
- Further detailed trigger settings ❼.
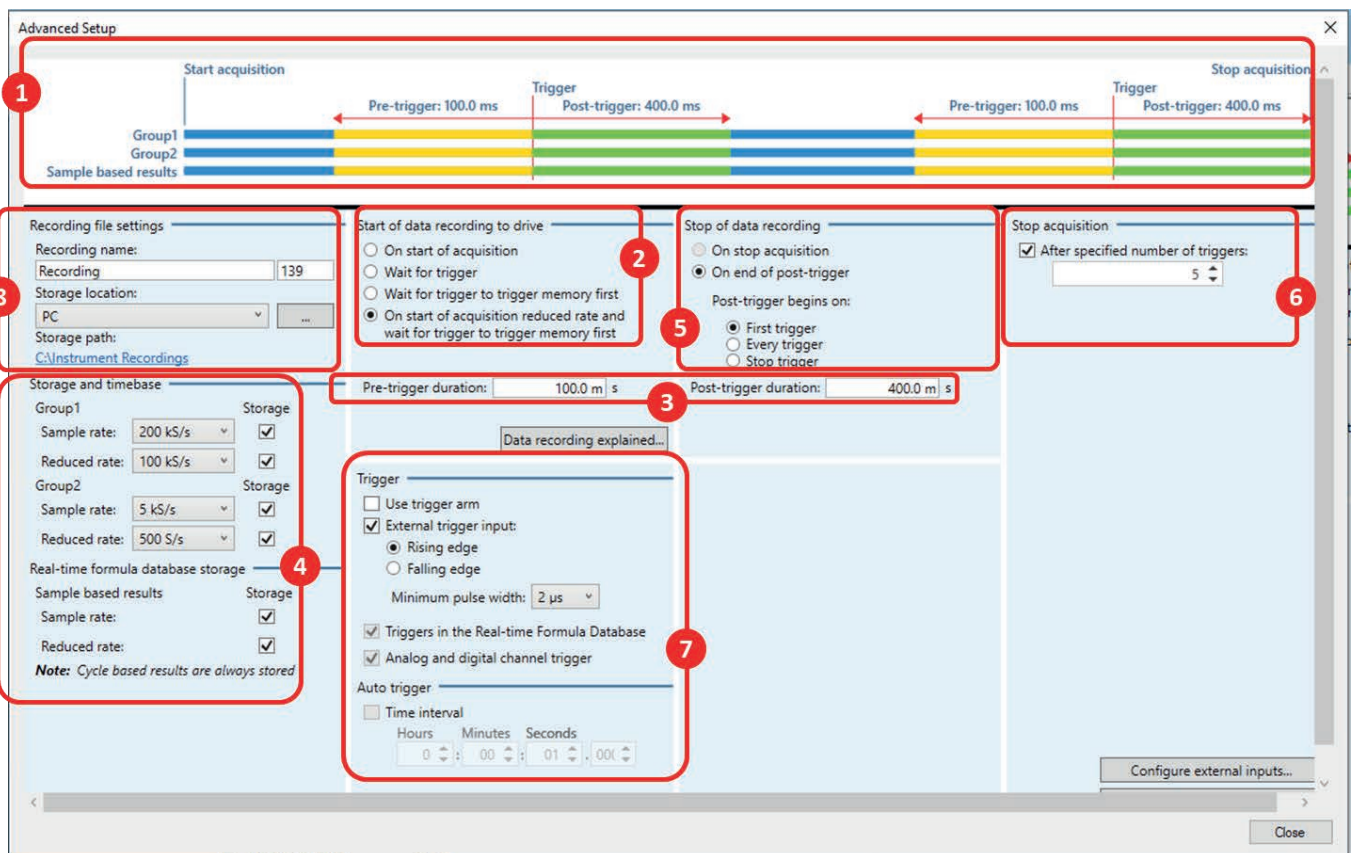- Name of the recording file and where it is stored ❽.

Figure 4: Overview of the Perception 8 Acquisition Modes User Interface

The different acquisition modes

- On start of acquisition (❶ in Figure 5)
    - A continuous recording directly to a drive, from the start to the end of the acquisition time ❷. No triggers required nor used.
    - Data for Group1 is recorded at 200kS/s and stored, for Group2 at 5kS/s and also stored ❸
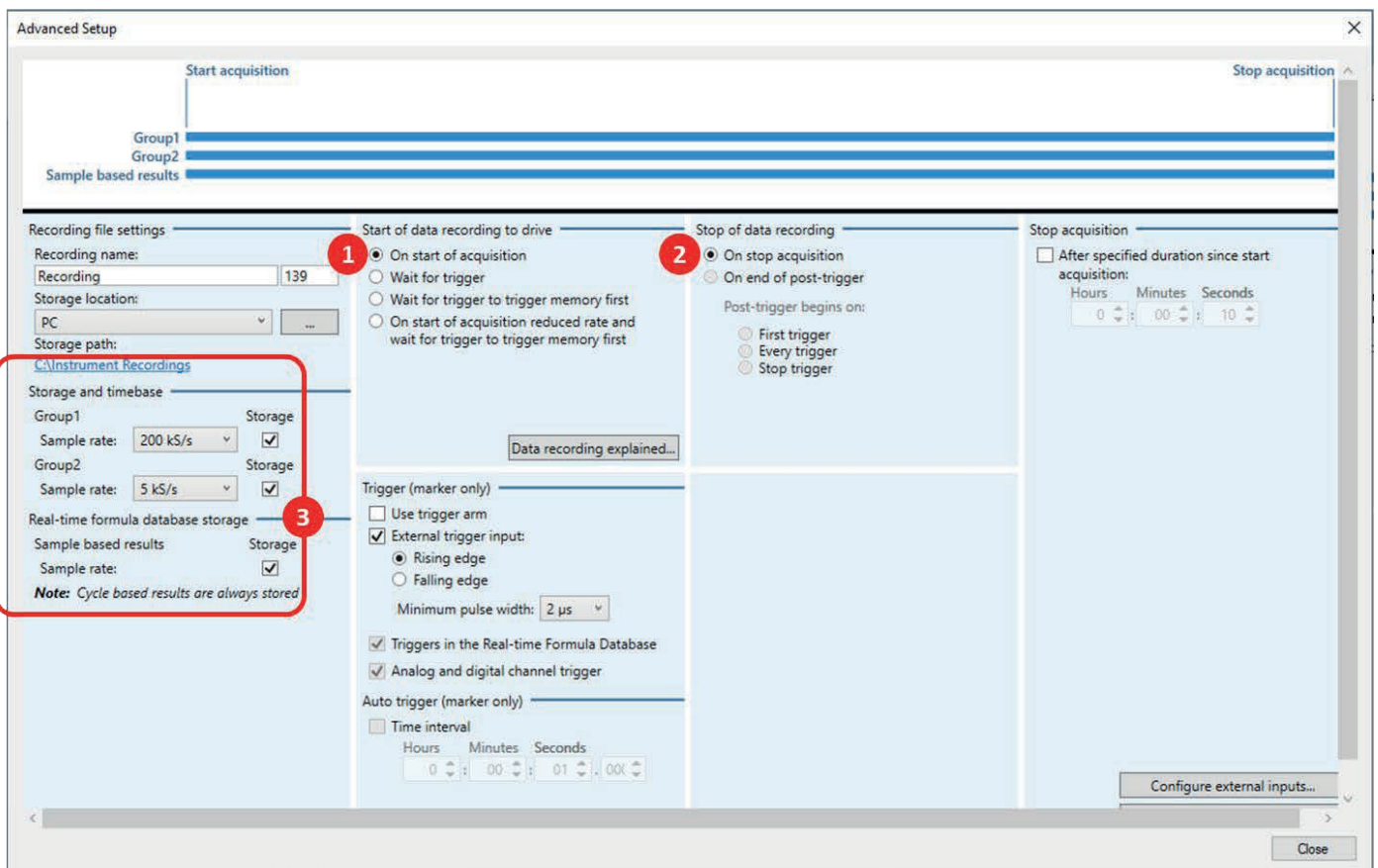   - In Perception 7 this was called "Continuous recording"

Figure 5: Acquisition mode: On start of acquisition

- Wait for trigger (❶ in Figure 6)
    - A single sweep recording directly to a drive, based on a single trigger
    - The recording stops after the post-trigger time has elapsed ❷
    - Data for Group1 is recorded at 200kS/s and stored, for Group2 at 5kS/s and also stored ❸.
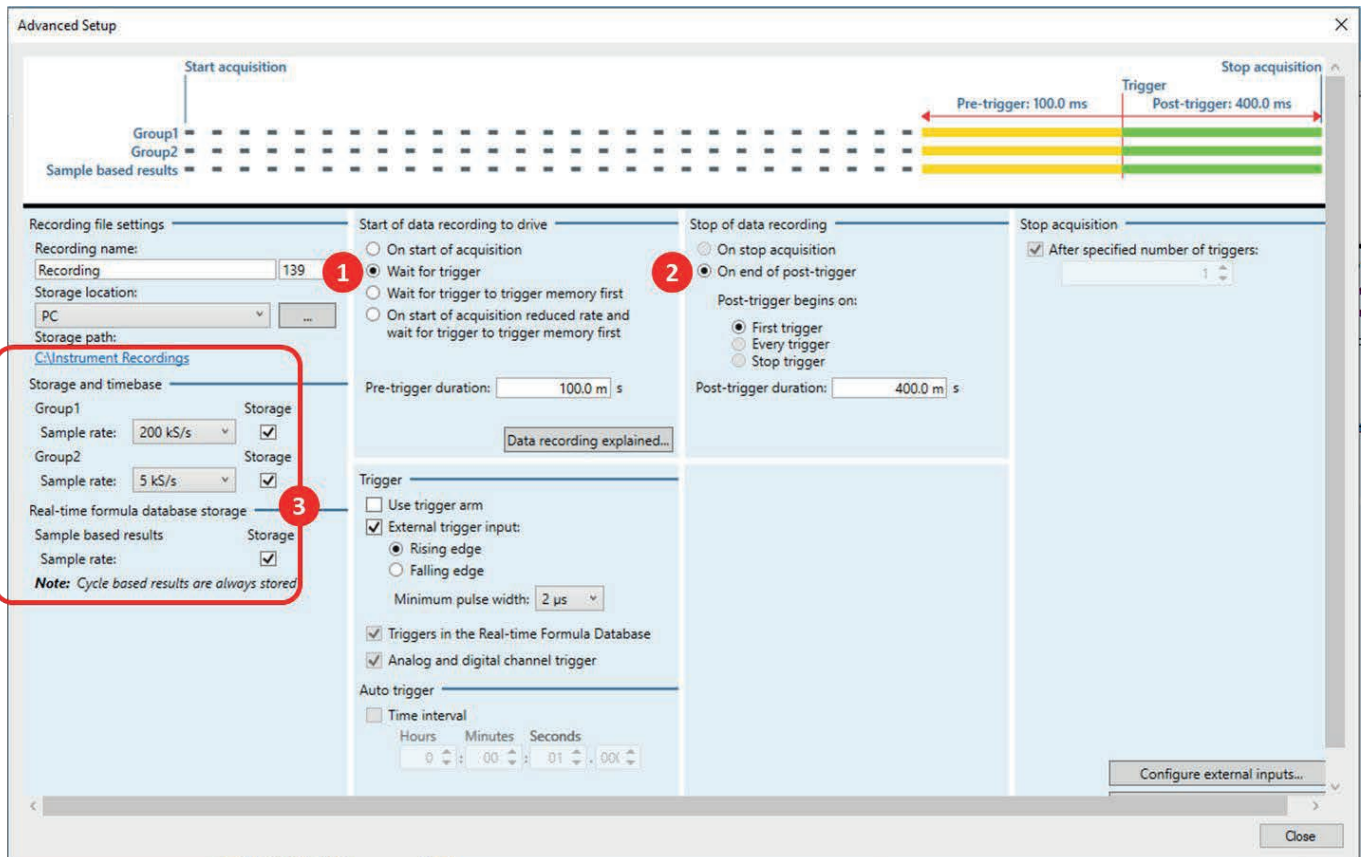   - In Perception 7 this was called "Circular recording"

Figure 6: Acquisition mode: Wait for trigger

- Wait for trigger to trigger memory first (❶ in Figure 7)
  - A recording with multiple sweeps (in this case 5 triggers specified ❷), first recorded to (very fast) trigger memory and after that collected in a PNRF file on a drive
  - In this case, the selection was made ❸ to (re)start) the post-trigger time at every trigger (see Figure 3b)
  - No continuous data stored, only sweep data ❹
  - Sweep data for Group1 is recorded at 2MS/s and stored, for Group2 at 100kS/s and also stored ❺.
  - In Perception 7 this was called "Single sweep and Multi sweep recording with sweep stretch". If we would have selected at ❸ "First trigger", this would have resulted in sweeps like in Figure 3b, which mode in Perception 7 was called "Single sweep and Multi sweep recording without sweep stretch". If we would have selected at ❸ "Stop trigger", this would have resulted in sweeps like in Figure 3c. Stop triggers were not available in Perception 7.
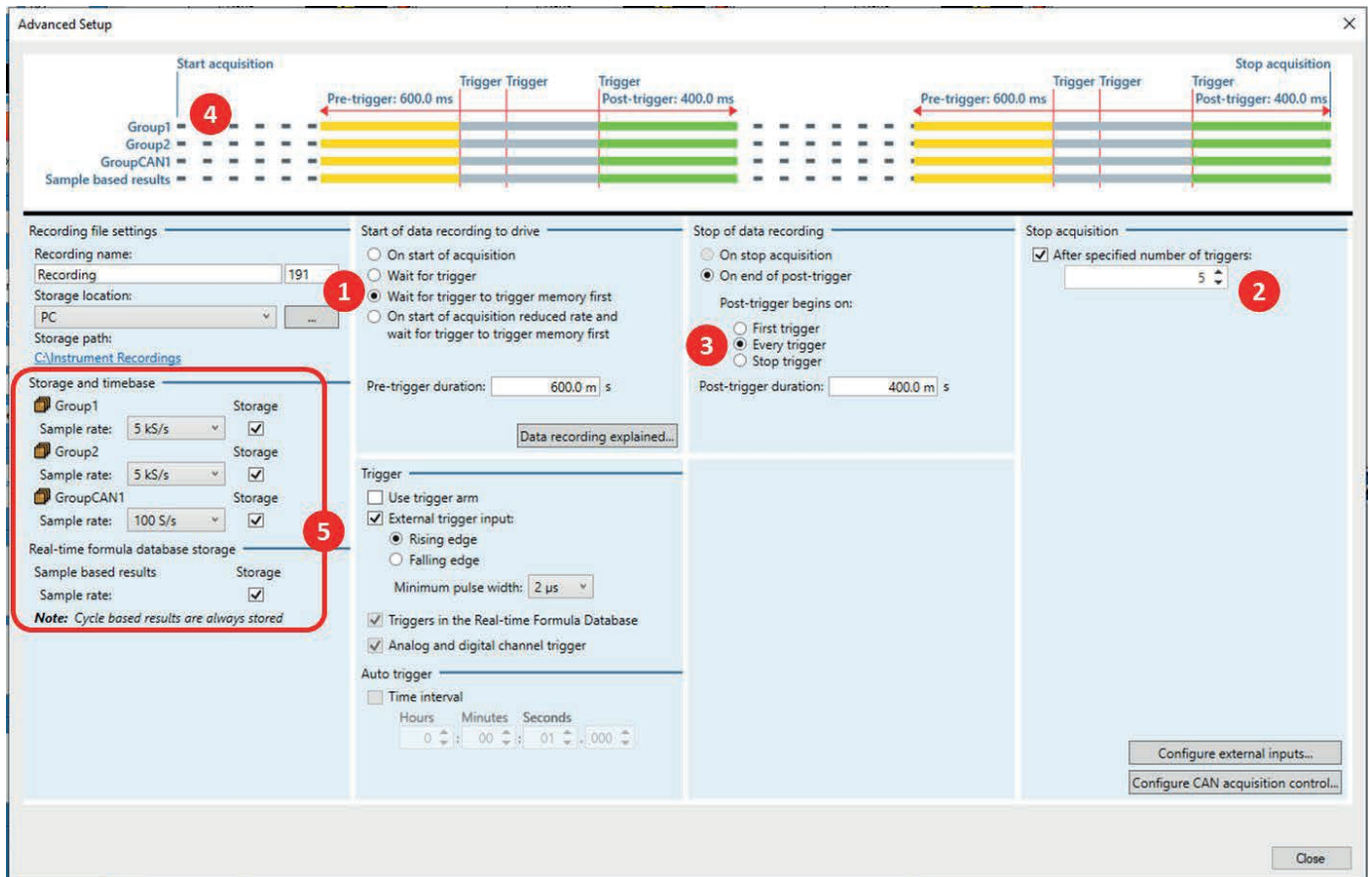

Figure 7: Acquisition mode: Wait for trigger to trigger memory first

- On start of acquisition reduced rate and wait for trigger to trigger memory first (❶ in Figure 8)
  - A recording with multiple sweeps (in the example again 5 triggers specified ❷), first recorded to (very fast) trigger memory, combined with a continuous recording ❸, everything stored in a single PNRF file
  - The data that is actually recorded ❹: Sweep data for Group1 is recorded at 2MS/s and stored, continuous data for Group1 for is recorded at 100kS/s but not stored. Sweep data for Group2 is not stored but continuous data is recorded at 500S/s and stored.
  - In Perception 7, the recording in Group2 was called "Dual rate recording".
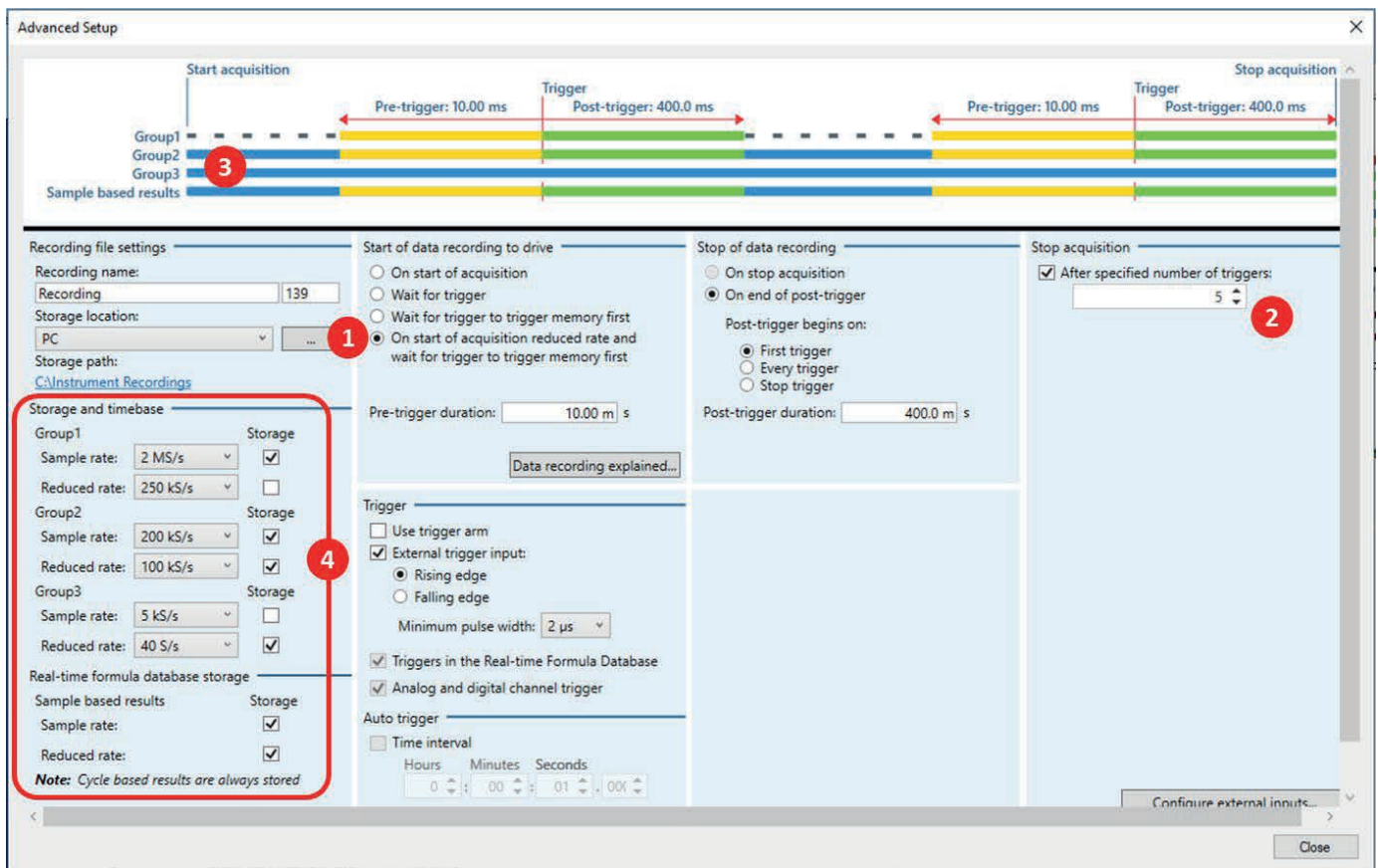

Figure 8: Acquisition mode: On start of acquisition and wait for trigger to trigger memory first

Summary

In Perception V8, very few of the underlying ideas regarding acquisition modes were changed as compared to V7, but everything related to acquisition modes was brought together in a single interface element, showing clearly what is recorded, at which sample rate and when. This easily allows for making advanced setups for data acquisition. Also some new terminology was introduced explained in this document.
A dedicated stop-trigger mechanism was added and it is allowed to have different sample rates for different groups allowing the different signals to be sampled at suitable sample rates.