

ETT DirectControl Software QuickStart Manual

Version 2014a

Main view

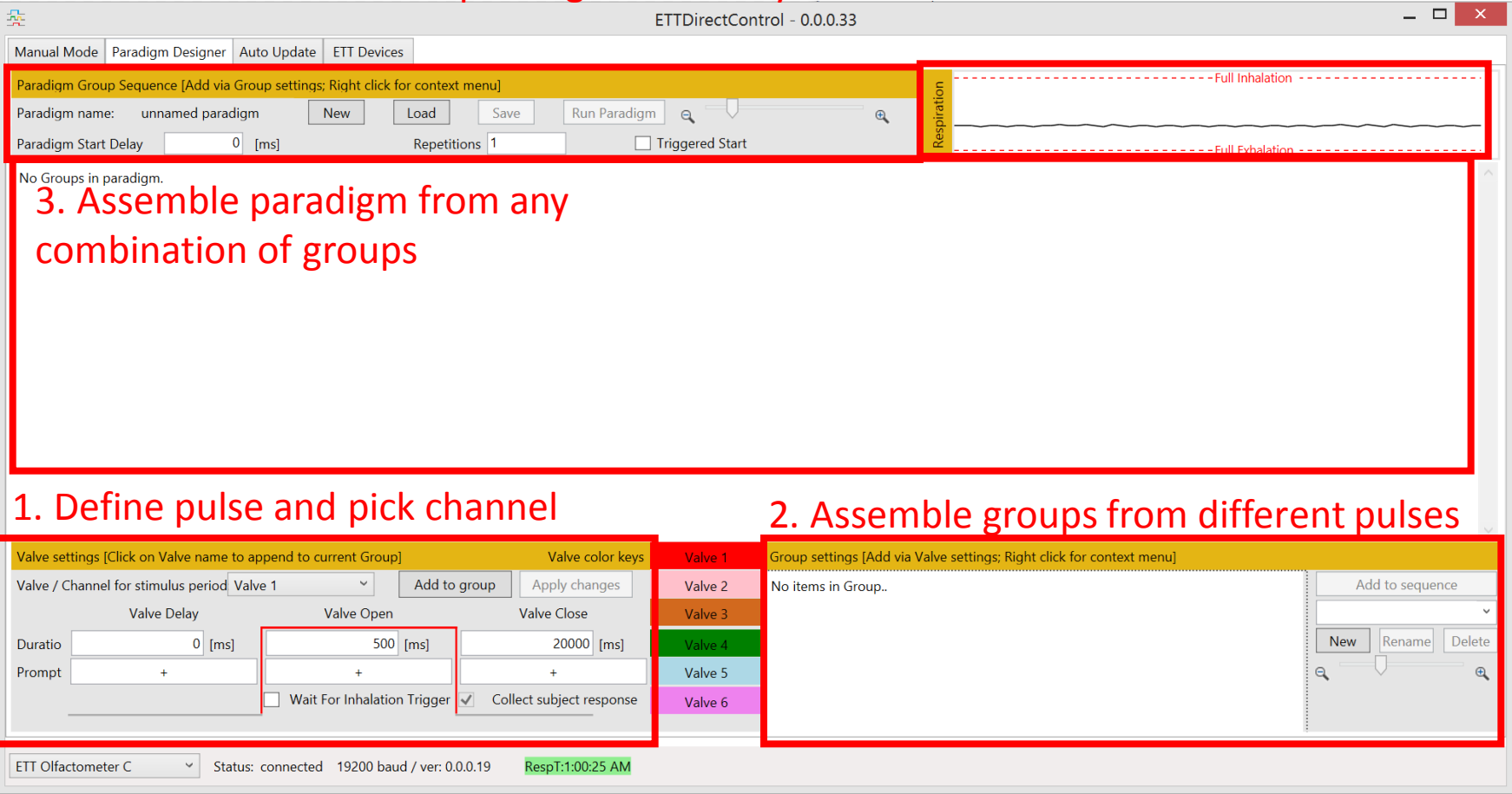
The screenshot displays the ETTDirectControl software interface, version 0.0.0.33. The window title is "ETTDirectControl - 0.0.0.33". The interface is divided into several sections:

- Top Bar:** Contains tabs for "Manual Mode", "Paradigm Designer", "Auto Update", and "ETT Devices".
- Paradigm Group Sequence:** A yellow header bar with the text "Paradigm Group Sequence [Add via Group settings; Right click for context menu]". Below it, there are fields for "Paradigm name: unnamed paradigm", "Paradigm Start Delay: 0 [ms]", "Repetitions: 1", and a "Triggered Start" checkbox. Buttons for "New", "Load", "Save", and "Run Paradigm" are also present.
- Respiration Graph:** A graph on the right side showing a respiratory waveform. The y-axis is labeled "Respiration". The graph is bounded by two horizontal dashed red lines labeled "Full Inhalation" (top) and "Full Exhalation" (bottom).
- Paradigm Content:** The main area below the graph is currently empty, displaying the text "No Groups in paradigm."
- Valve Settings:** A yellow header bar with the text "Valve settings [Click on Valve name to append to current Group]". Below it, there are fields for "Valve / Channel for stimulus period" (set to "Valve 1"), "Valve Delay: 0 [ms]", "Valve Open: 500 [ms]", and "Valve Close: 20000 [ms]". There are also checkboxes for "Wait For Inhalation Trigger" (unchecked) and "Collect subject response" (checked). Buttons for "Add to group" and "Apply changes" are also present.
- Valve Color Keys:** A vertical list of six colored boxes labeled "Valve 1" (red), "Valve 2" (pink), "Valve 3" (orange), "Valve 4" (green), "Valve 5" (cyan), and "Valve 6" (magenta).
- Group Settings:** A yellow header bar with the text "Group settings [Add via Valve settings; Right click for context menu]". Below it, there is a "No items in Group.." message and buttons for "Add to sequence", "New", "Rename", and "Delete".
- Status Bar:** At the bottom, it shows "ETT Olfactometer C" (selected), "Status: connected", "19200 baud / ver: 0.0.0.19", and "RespT:1:00:25 AM".

General principle

6. Run paradigm and analyze data

4. Specify further parameter for overall paradigm and save the paradigm



3. Assemble paradigm from any combination of groups

1. Define pulse and pick channel

2. Assemble groups from different pulses

5. [Optional] Adjust respiratory sensor tension on subject

Valve settings – pulse control

Valve settings [Click on Valve name to append to current Group]			Valve color keys	Valve 1
Valve / Channel for stimulus period	Valve 1	Add to group	Apply changes	Valve 2
	Valve Delay	Valve Open	Valve Close	Valve 3
Duration	0 [ms]	500 [ms]	20000 [ms]	Valve 4
Prompt	+	+	+	Valve 5
		<input type="checkbox"/> Wait For Inhalation Trigger	<input checked="" type="checkbox"/> Collect subject response	Valve 6

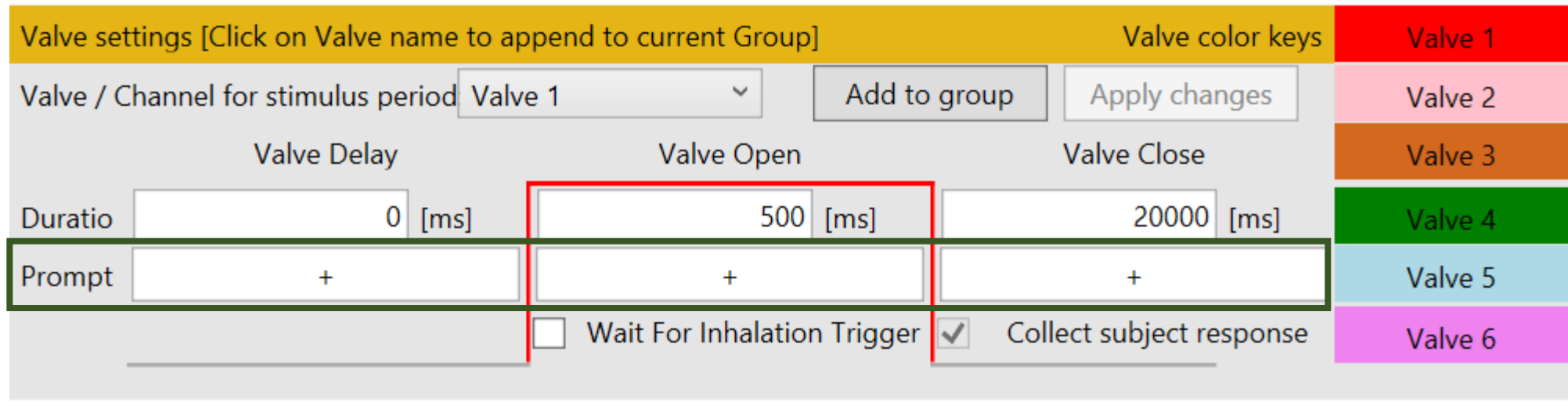
Valve delay period – time valve is closed before valve opens (duration can be set to 0 ms if not needed)

Valve open period – time valve is opened (most important section – odorant on selected channel will be delivered for specified amount of time) – optionally onset can be delayed until subject inhales (measured via respiratory sensor belt)

Valve close period – time valve is closed post stimulus (period > 15s is necessary to prevent habituation and can be used for subject feedback)

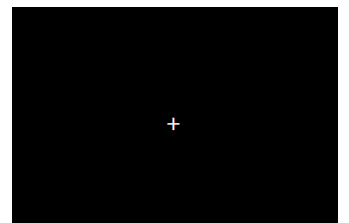
Valve settings – text prompts

Valve settings [Click on Valve name to append to current Group]			Valve color keys
Valve / Channel for stimulus period	Valve 1	Add to group	Apply changes
	Valve Delay	Valve Open	Valve Close
Duration	0 [ms]	500 [ms]	20000 [ms]
Prompt	+	+	+
	<input type="checkbox"/> Wait For Inhalation Trigger	<input checked="" type="checkbox"/> Collect subject response	



During each period of the individual pulses a specific user prompt can be specified

- A '+' sign or blank is default
- Potential prompts are:
 - Valve open period: 'sniff'
 - Valve close period: 'rate' in conjunction with having 'collect subject response' checked
- Prompts will guide the user through the paradigm and allow for interaction
- If feedback is collected the user will simply hit keyboard keys while the 'visual cue' window is in focus
- For free scale user feedback a freely pressure sensing response device is available to acquire feedback gliding scale

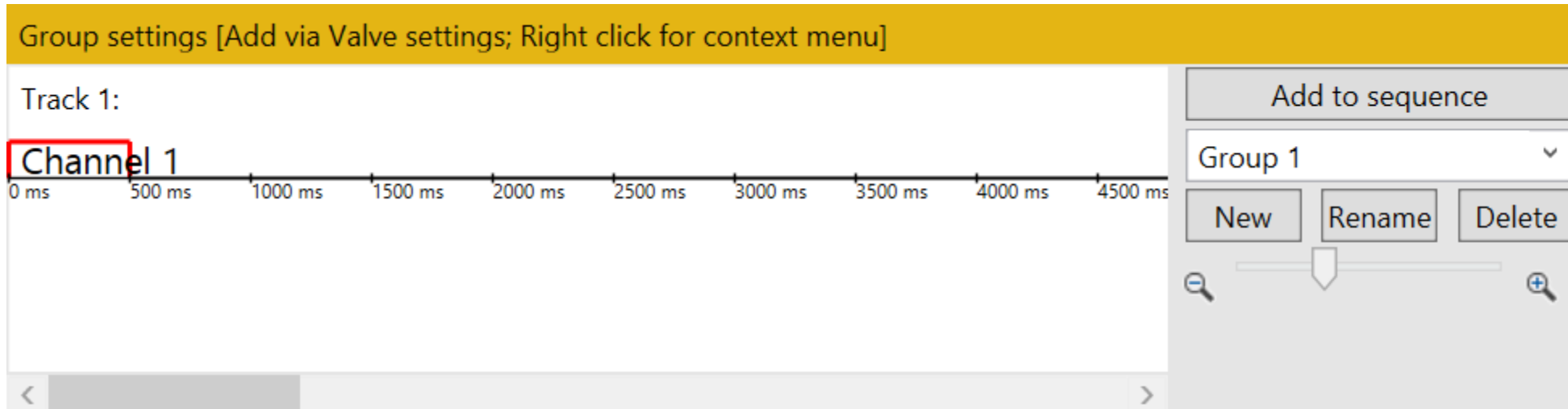


Valve settings – connect to group settings

Valve settings [Click on Valve name to append to current Group]			Valve color keys	Valve 1	
Valve / Channel for stimulus period	Valve 1	<input type="button" value="Add to group"/>	<input type="button" value="Apply changes"/>	Valve 2	
	Valve Delay	Valve Open	Valve Close	Valve 3	
Duratio	<input type="text" value="0"/> [ms]	<input type="text" value="500"/> [ms]	<input type="text" value="20000"/> [ms]	Valve 4	
Prompt	<input type="text" value="+"/> [ms]	<input type="text" value="+"/> [ms]	<input type="text" value="+"/> [ms]	Valve 5	
	<input type="checkbox"/>	Wait For Inhalation Trigger	<input checked="" type="checkbox"/>	Collect subject response	Valve 6

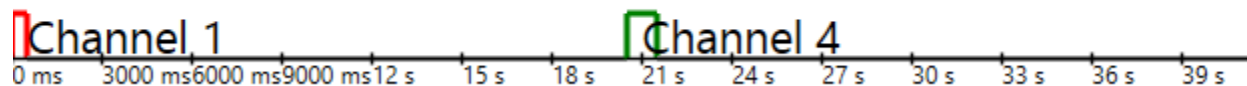
- Once a pulse shape is configured and optional additional features are configured, 'Add to group' will append the pulse to the group view
- A simple right click on the pulse will reveal a context menu → 'Edit' will load the specific parameters into the 'Valve settings' view and can be manipulated (all parameters are editable) until the new parameters will be save via 'Apply changes'
- The color legend on the right side of this view, always provides an easy overview to the current color codes of specific pulses

Group settings - Tracks



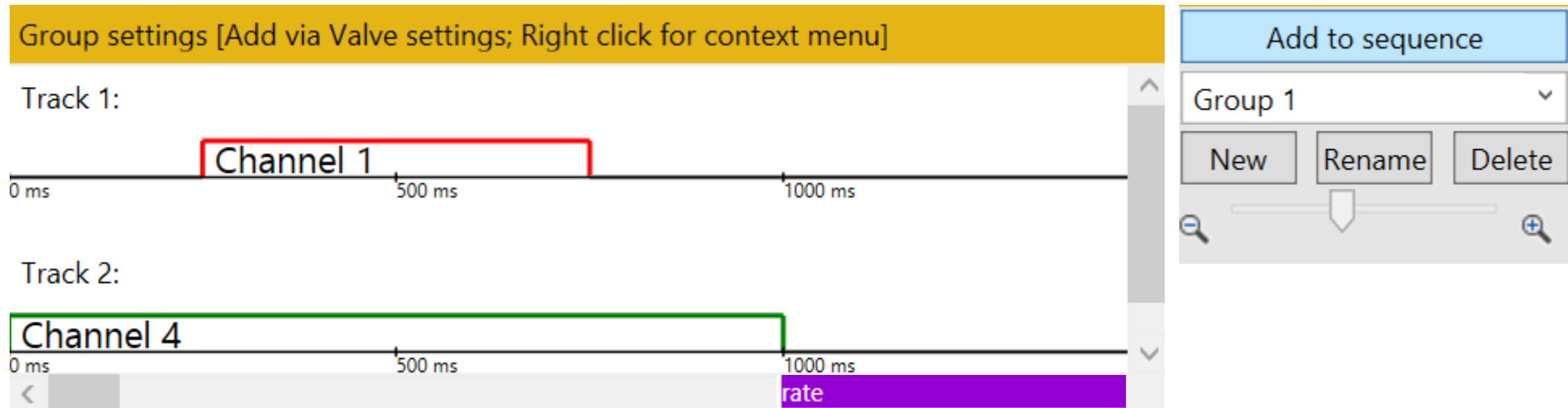
- Once a pulse shape is added to the group settings, it will always be appended at the end of the most top track
- The group view is scrollable horizontally (time) and vertically (parallel tracks)

Track 1:



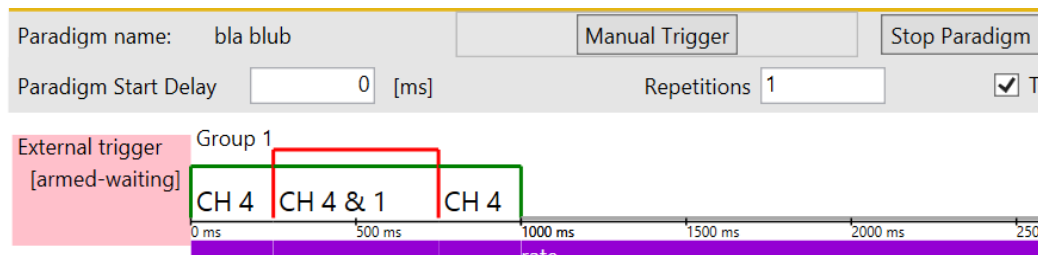
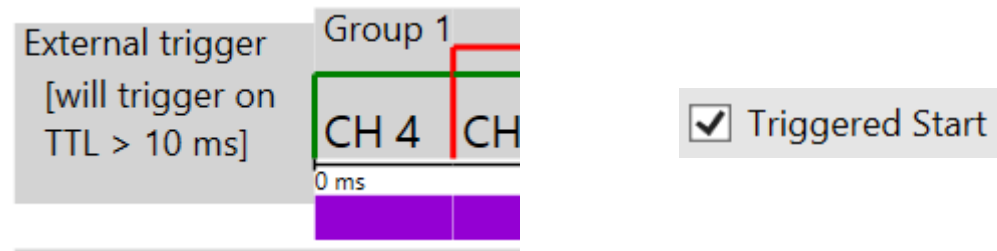
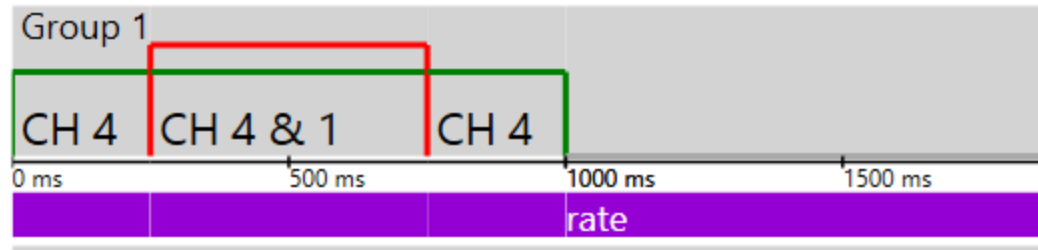
- A right click on each individual channel will reveal a specific context menu to:
 - Move channel onto parallel track or switch with channel to the left or right
 - Edit the channel settings
 - Clone and append the channel or remove

Group settings – tracks vs final output



- In a few very simple steps complex valve opening and closing sequences with parallel actions can be generated
- The total output flow will always be equal and is equally distributed over each channel opened at a time
- If all channels are closed the same amount of total air is delivered smoothly to the subject over a flush / blank channel
- The 'Add to sequence' button will insert the whole sequence into the paradigm sequence above
- Groups can be re-used, edited, renamed and deleted at any time
- An independent zoom slider allows to zoom into the most intricate features
- Non-standard text prompts will be visualized as a white on purple track under the channel it belongs to
 - An overall single track visual prompt output will be generated from the individual prompts based on order

Paradigm sequence - overview

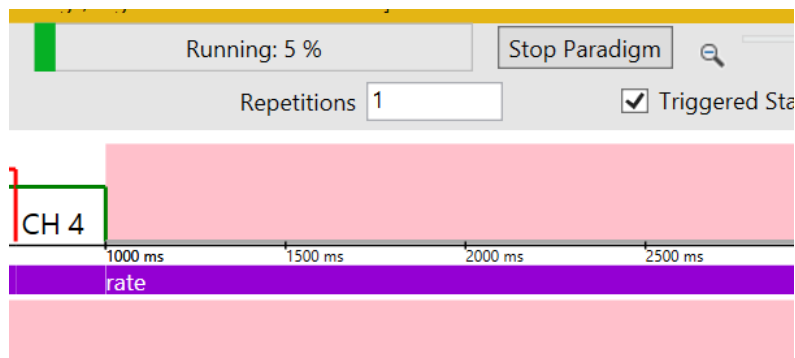


- Visualization of final compiled valve settings and text prompts
- Groups can be edited at any time
- A start trigger for the overall paradigm can be selected
- Paradigm will pause until TTL (>10 ms , 5V) on device trigger in port
- This is useful to synchronize the paradigm with external devices or have an organized defined start
- By hitting the 'Manual trigger' button a triggered start doesn't require a TTL high anymore
- This trigger will still appear in the protocol file

Paradigm sequence - paradigms

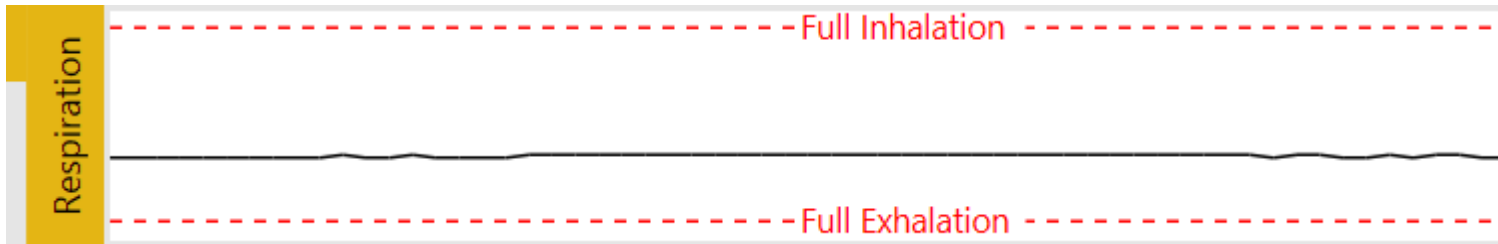
Paradigm name: bla blub
Paradigm Start Delay [ms]

Repetitions



- An overall paradigm delay can be defined and will be visualized upon addition of the first group to the paradigm view
- Before initial execution, a paradigm needs to be saved under a unique name
- This name will be used in the data files
- Repetitions allow to run the visualized paradigm sequence more than once without interruption
- During execution the paradigm progress will be visualized with progress bar and percentage as a function of time based on the start time of the most recent sub-section
- Currently active sub-sections will be marked with a red overlay during activity as opposed to a gray overlay while selected in 'edit mode'
- An additional zoom-slider allows for adjustments to the time scale of the overall paradigm during visualization

Paradigm sequence - Respiration



- During paradigm execution the paradigm view will automatically scroll vertically with the progress of the paradigm
- Additionally a visualization of the past 6 s of respiratory data will appear automatically in the top right corner
- During setup the sensor belt tension should be adjusted for each subject to ensure full utilization of the graph to in turn ensure optimal onset/inhalation detection
- A detected onset will be marked with a vertical red line
- If the inhalation trigger is used within the paradigm its location will be denoted with a red 'RT' in each view
- The paradigm will be paused upon hitting this requirement and only be continued once an onset is detected

Manual mode

Manual Mode Paradigm Designer Auto Update ETT Devices

Valve 1 Valve 2 Valve 3 Valve 4 Valve 5 Valve 6 Flush

Respiratory graph

Full Inhalation

Full Exhalation

ETT Olfactometer C Status: connected 19200 baud / ver: 0.0.0.19 T:2:01:26 AM RespT:2:00

- Instant open and close of valves (one at a time) to test odorant concentration or other test purposes
- If available on the connected device the current respiratory graph will be presented (-6s to 0s)

VisualQueue window – user interaction

- If the paradigm uses any text prompts or collects responses during the paradigm start a 'VisualQueue' window will automatically pop up
- It can be set to fullscreen on a secondary monitor to allow the user to interact
- While the window is in focus any key pressed on the keyboard will be recorded in the data file and visualized in the status bar during paradigm execution

