

# AmpliSens® VZV-FRT PCR kit



For Professional Use Only

## Instruction Manual

### KEY TO SYMBOLS USED

	Catalogue number		Caution
	Batch code		Contains sufficient for <n> tests
	Research Use Only		Use-by-Date
	Version		Consult instructions for use
	Temperature limit		Keep away from sunlight
	Manufacturer		Negative control of amplification
	Date of manufacture		Negative control of extraction
	Internal control		Positive control of amplification

### 1. INTENDED USE

**AmpliSens® VZV-FRT PCR kit** is an *in vitro* nucleic acid amplification test for qualitative detection of *Varicella-Zoster virus* DNA in the biological material (peripheral blood plasma, umbilical blood plasma, amniotic fluid, cerebrospinal fluid (CSF), blister content, saliva, oropharyngeal washes and swabs) using 'real-time' fluorescence-hybridization detection.

**NOTE:** For research use only. Not for diagnostic procedures.

### 2. PRINCIPLE OF PCR DETECTION

*Varicella-Zoster virus* DNA detection by the polymerase chain reaction (PCR) is based on the amplification of the pathogen genome specific region using specific VZV primers. In real-time PCR, the amplified product is detected using fluorescent dyes. These dyes are linked to oligonucleotide probes which bind specifically to the amplified product during thermocycling. The real-time monitoring of fluorescence intensities during the real-time PCR allows the detection of accumulating product without re-opening the reaction tubes after the PCR run.

**AmpliSens® VZV-FRT PCR kit** is a qualitative test that contains the Internal Control (Internal Control STI-87 (IC)). It must be used in the extraction procedure in order to control the extraction process of each individual sample and to identify possible reaction inhibition.

**AmpliSens® VZV-FRT PCR kit** uses "hot-start", which greatly reduces the frequency of nonspecifically primed reactions. "Hot-start" is guaranteed by using chemically modified polymerase (TaqF). Chemically modified polymerase (TaqF) is activated by heating at 95 °C for 15 min.

The PCR kit contains the system for prevention of contamination by amplicons using the enzyme uracil-DNA-glycosylase (UDG) and dUTP. The enzyme UDG recognizes and catalyzes the destruction of the DNA containing deoxyuridine, but has no effect on DNA containing deoxythymidine. Deoxyuridine is absent in the authentic DNA, but is always present in amplicons, because dUTP is a part of dNTP mixture in the reagents for the amplification. Due to the deoxyuridine containing contaminating amplicons are sensitive to the destruction by UDG before the DNA-target amplification. So the amplicons cannot be amplified.

The enzyme UDG is thermolabile. It is inactivated by heating at temperature above 50 °C. Therefore, UDG does not destroy the target amplicons which are accumulated during PCR. The results of amplification are registered in the following fluorescence channels:

Table 1

Channel for fluorophore	FAM	JOE
DNA-target	Internal Control DNA	Human <i>alphaherpesvirus</i> 3 DNA
Target gene	Artificially synthesized sequence	ORF38 DNA fragment

### 3. CONTENT

**AmpliSens® VZV-FRT PCR kit** is produced in 2 forms:

**variant FRT-50 F** R-V61-50-F(RG)-CE;

**variant FRT-50 F in bulk**<sup>1</sup> R-V61-50-F(RG)-CE-B.

**Variant FRT-50 F** includes:

Reagent	Description	Volume, ml	Quantity
PCR-mix-1-FL VZV	clear liquid from colorless to light lilac colour	0.6	1 tube
PCR-mix-2-FRT	colourless clear liquid	0.3	1 tube
Polymerase (TaqF)	colourless clear liquid	0.03	1 tube
Positive Control DNA VZV-FL (C+vzv)	colourless clear liquid	0.1	1 tube
TE-buffer	colourless clear liquid	0.5	1 tube
Negative Control (C-)*	colourless clear liquid	0.5	2 tubes
Internal Control STI-87 (IC)**	colourless clear liquid	0.6	1 tube

\* must be used in the extraction procedure as Negative Control of Extraction.

\*\* add 10 µl of **Internal Control STI-87 (IC)** during the DNA extraction procedure directly to the sample/lysis mixture (**RIBO-prep**).

**Variant FRT-50 F** is intended for 60 reactions (including controls).

### 4. ADDITIONAL REQUIREMENTS

- DNA/RNA extraction kit.
- Disposable powder-free gloves and laboratory coat.
- Pipettes (adjustable).
- Sterile RNase-free pipette tips with aerosol filters (up to 200 µl).
- Tube racks.
- Vortex mixer.
- Desktop centrifuge with a rotor for 2-ml reaction tubes.
- PCR box.
- Real-time instruments (for example, Rotor-Gene 3000, Rotor-Gene 6000 (Corbett Research, Australia); Rotor-Gene Q (QIAGEN, Germany)).
- Disposable polypropylene PCR tubes (0.1- or 0.2-ml):
  - a) 0.2-ml PCR tubes with optical transparent domed or flat caps if a plate-type instrument is used;
  - b) 0.2-ml PCR tubes with flat caps or strips of four 0.1-ml Rotor-Gene PCR tubes if a rotor-type instrument is used.
- Refrigerator for 2–8 °C.
- Deep-freezer with a temperature range from minus 24 to minus 16 °C.
- Reservoir for used tips.

### 5. GENERAL PRECAUTIONS

The user should always pay attention to the following:

- Use sterile pipette tips with aerosol filters and use a new tip for every procedure.
- Store all extracted positive material (specimens, controls and amplicons) away from all other reagents and add it to the reaction mix in a distantly separated facility.
- Thaw all components thoroughly at room temperature before starting an assay.
- When thawed, mix the components and centrifuge briefly.
- Use disposable protective gloves and laboratory cloths, and protect eyes while samples and reagents handling. Thoroughly wash hands afterwards.
- Do not eat, drink, smoke, apply cosmetics, or handle contact lenses in laboratory work areas.
- Do not use a kit after its expiration date.
- Dispose of all specimens and unused reagents in accordance with local regulations.
- Samples should be considered potentially infectious and handled in biological cabinet in compliance with appropriate biosafety practices.
- Clean and disinfect all samples or reagents spills using a disinfectant, such as 0.5 % sodium hypochlorite or another suitable disinfectant.
- Avoid inhalation of vapors, samples and reagents contact with the skin, eyes, and mucous membranes. Harmful if swallowed. If these solutions come into contact, rinse the injured area immediately with water and seek medical advice if necessary.
- Safety Data Sheets (SDS) are available on request.
- Use of this product should be limited to personnel trained in DNA amplification techniques.
- Workflow in the laboratory must be one-directional, beginning in the Extraction Area and moving to the Amplification and Detection Area. Do not return samples, equipment and reagents in the area where the previous step was performed.



Some components of this kit contain sodium azide as a preservative. Do not use metal tubing for reagent transfer.

### 6. SAMPLING AND HANDLING

**NOTE:** Obtaining samples of biological materials for PCR-analysis, transportation, and storage are described in manufacturer's handbook [1]. It is recommended that this handbook is read before starting work.

**AmpliSens® VZV-FRT PCR kit** is intended for the analysis of DNA extracted with DNA extraction kits from the biological material (peripheral blood plasma, umbilical blood plasma, amniotic fluid, cerebrospinal fluid (CSF), blister content, saliva, oropharyngeal washes and swabs).

<sup>1</sup> In bulk form contains unlabeled tubes. Tubes with identical reagent are packed in one bag with label.

## 7. WORKING CONDITIONS

AmpliSens® VZV-FRT PCR kit should be used at 18–25 °C.

## 8. PROTOCOL

### 8.1. DNA extraction

It is recommended to use the following nucleic acid extraction kits:

- RIBO-prep.
- NucliSENS easyMAG automated system (for details see Guidelines [2]).

**NOTE:** Extract DNA according to the manufacturer's instructions.

### 8.2. Preparing PCR

#### 8.2.1. Preparing tubes for PCR

The total reaction volume is 25 µl, the volume of DNA sample is 10 µl.

1. Prepare the mixture of PCR-mix-2-FRT and polymerase (TaqF): transfer the entire contents of the tube with polymerase (TaqF) (30 µl) into the tube with PCR-mix-2-FRT (300 µl) and carefully vortex. Mark the date of mixture's preparation on the tube.

**NOTE:** This mixture is calculated for the analysis of 60 samples.  
Store the mixture at 2–8 °C for 3 months and use as necessary.

If the mixture cannot be used within 3 months, prepare the mixture for a smaller number of reactions, for example, mix 150 µl of PCR-mix-2-FRT and 15 µl of polymerase (TaqF) (for 30 reactions).

2. Prepare the reaction mixture. Keep in mind that the analysis of even one DNA sample should include two controls of amplification: positive control (Positive Control DNA VZV-FL (C+vzv)) and negative control (TE-buffer). Moreover, when calculating reagent volumes take into account one extra reaction.
3. Mix PCR-mix-1-FL VZV and the mixture of PCR-mix-2-FRT and polymerase (TaqF) in a single tube. Volumes per one PCR reaction are the following:
  - 10 µl of PCR-mix-1-FL VZV
  - 5 µl of mixture of PCR-mix-2-FRT and polymerase (TaqF)

Calculations of the reaction mixture for different number of reactions are provided in the Table 2.

**NOTE:** When the total number of reactions is 60 use the simplified preparation: transfer the entire content of the tubes with PCR-mix-1-FL VZV and polymerase (TaqF) into the tube with PCR-mix-2-FRT

Table 2

Scheme of reaction mixture preparation		
Reagent volume per 1 reaction, µl	Total reagent volume for the specified number of reactions	
	10.0	5.0
Number of test samples	PCR-mix-1-FL VZV*, µl	Mixture of PCR-mix-2-FRT and polymerase (TaqF)†, µl
4	70	35
5	80	40
6	90	45
7	100	50
8	110	55
9	120	60
10	130	65
11	140	70
12	150	75
13	160	80
14	170	85
15	180	90
16	190	95
17	200	100
18	210	105
19	220	110
20	230	115
21	240	120
22	250	125
23	260	130
24	270	135
25	280	140
26	290	145
27	300	150
28	310	155
33	360	180

\* The specified volumes include 2 control points (positive and negative control of amplification) and 1 extra reaction.

4. Take the required number of tubes for amplification of DNA from test and control samples.

5. Transfer 15 µl of the prepared reaction mixture to each PCR tube.

6. Add 10 µl of DNA samples obtained from the test and control samples.

7. Carry out the control reactions:

- C+vzv — Add 10 µl of Positive Control DNA VZV to the tube labelled C+vzv (Positive Control of Amplification).
- NCA — Add 10 µl of TE-buffer to the tube labelled NCA (Negative Control of Amplification).
- C– — Add 10 µl of the DNA sample extracted from the Negative Control (C–) to the tube labelled C– (Negative Control of Extraction)

### 8.2.2. Amplification

Program the real-time amplification instrument according to manufacturer's manual.

1. Create a temperature profile on your instrument as follows:

Table 3

AmpliSens-1 amplification program for rotor-type instruments <sup>2</sup>				
Step	Temperature, °C	Time	Fluorescence detection	Cycles
1	95	15 min	–	1
2	95	5 s	–	5
	60	20 s	–	
	72	15 s	–	
3	95	5 s	–	40
	60	20 s	FAM, JOE	
	72	15 s	–	

2. Adjust the fluorescence channel sensitivity according to *Important Product Information Bulletin*.
3. Insert tubes into the reaction module of the device.
4. Run the amplification program with fluorescence detection.
5. Analyse results after the amplification program is completed.

## 9. DATA ANALYSIS

Analysis of results is performed by the software of the real-time PCR instrument used by measuring fluorescence signal accumulation in two channels:

- The signal of the IC DNA amplification product is detected in the channel for the FAM fluorophore.
- The signal of the *Varicella-Zoster virus* DNA amplification product is detected in the channel for the JOE fluorophore.

See Guidelines [2] for data analysis settings for the instrument.

The results are interpreted by the presence (or absence) of an intercept between the fluorescence curve and the threshold line set at the specific level that corresponds to the presence (or absence) of a Ct value of the DNA sample in the corresponding column of the results grid.

The result of amplification in the appropriate channel is considered positive if a fluorescence curve is S-shaped (typical real-time PCR shape) and crosses the threshold line at the area of reliable growth of fluorescence.

The result of amplification in the appropriate channel is considered negative if a fluorescence curve does not have the typical shape and does not cross the threshold line (Ct is undefined).

Principle of interpretation is the following:

- VZV DNA is **detected** in a sample if the Ct value determined in the results grid in the channel for the JOE fluorophore does not exceed the boundary Ct value specified in the *Important Product Information Bulletin*. Moreover, the fluorescence curve of the sample should cross the threshold line in the area of typical exponential growth of fluorescence.
- VZV DNA is **not detected** in a sample if the Ct value is not determined (absent) in the channels for the JOE fluorophore, whereas the Ct value determined in the channel for the FAM fluorophore is less than the boundary Ct value specified in the *Important Product Information Bulletin*.
- The result is **invalid** if the Ct value is not determined (absent) in the channel for the JOE fluorophore, whereas the Ct value in the channel for the FAM fluorophore is not determined (absent) or is greater than the specified boundary Ct value. In such cases, the PCR analysis should be repeated starting from the DNA extraction stage. If the same result is obtained in the second run, re-sampling of material is recommended.
- The result is **equivocal** if the Ct value determined in the channel for the JOE fluorophore is greater than the boundary Ct value specified in the *Important Product Information Bulletin*. In such cases, the PCR analysis should be repeated starting from the DNA extraction stage. If the same result is obtained, the sample is considered positive. If the obtained Ct values are not reproduced in two repeats, the result is considered **equivocal**.

**NOTE:** Boundary Ct values are specified in the *Important Product Information Bulletin* enclosed to the PCR kit. See also Guidelines [2]

The result of the analysis is considered reliable only if the results obtained for Positive and Negative Controls of amplification as well as for the Negative Control of extraction are correct (see Table 4).

Table 4

Results for controls			
Control	Stage for control	Ct value in the channel for fluorophore	
		JOE/Yellow	FAM/Green
C–	DNA extraction	Absent	< boundary Ct value
NCA	Amplification	Absent	Absent
C+vzv	Amplification	< boundary Ct value	Absent

## 10. TROUBLESHOOTING

Results of analysis are not taken into account in the following cases:

1. If the Ct value determined for the Positive Control of amplification (C+vzv) in the channel for JOE fluorophore is absent or is greater than the boundary Ct value, PCR and detection should be repeated for all samples in which *Varicella-Zoster virus* DNA was not detected.
2. If the Ct value is determined for C– in the channel for JOE fluorophore and/or for NCA in the channels for FAM and JOE fluorophores, this indicates contamination of reagents or samples. In such cases, the results of analysis must be considered as invalid. Test analysis must be repeated and measures to detect and eliminate the source of contamination must be taken.
3. If Ct value is absent in the channel for FAM fluorophore for test samples, this indicates DNA extraction failure. Repeat the analysis for such samples starting from DNA extraction.
4. If the Ct value in the channel for FAM fluorophore is greater than the specified boundary Ct value, whereas the Ct value in the channel for JOE fluorophore is greater than the specified boundary Ct value, the sample should be analyzed once again starting from the DNA extraction stage. High Ct values can be caused by DNA loss during extraction or by the presence of inhibitors.

## 11. TRANSPORTATION

AmpliSens® VZV-FRT PCR kit should be transported at 2–8 °C for no longer than 5 days.

<sup>2</sup> For example, Rotor-Gene 3000, Rotor-Gene 6000, Rotor-Gene Q, or equivalent.

## 12. STABILITY AND STORAGE

All components of the **AmpliSens® VZV-FRT** PCR kit (except for PCR-mix-1-FL VZV, polymerase (TaqF), and PCR-mix-2-FRT) are to be stored at 2–8 °C when not in use. All components of the **AmpliSens® VZV-FRT** PCR kit are stable until the expiration date on the label. The shelf life of opened reagents is the same as that of unopened reagents, unless otherwise stated.

**NOTE:** PCR-mix-1-FL VZV, polymerase (TaqF), and PCR-mix-2-FRT are to be stored at temperature from minus 24 to minus 16 °C.

**NOTE:** PCR-mix-1-FL VZV is to be kept away from light.

## 13. SPECIFICATIONS

### 13.1. Sensitivity

The analytical sensitivity of **AmpliSens® VZV-FRT** PCR kit is the following:

Biological material	Nucleic acid extraction kit	Sensitivity, copies/ml
Peripheral blood plasma, umbilical blood plasma, amniotic fluid, CSF, blister content, saliva, oropharyngeal swab and washes	RIBO-prep	500

### 13.2. Specificity

The analytical specificity of **AmpliSens® VZV-FRT** PCR kit is ensured by selection of specific primers and probes as well as strict reaction conditions. The primers and probes were checked for possible homologies to all sequences deposited in gene banks by sequence comparison analysis. Nonspecific responses were not detected during testing of the following viruses (*Epstein-Bar virus*, *human cytomegalovirus*, *human herpes virus I* and *II*, *human herpes virus VI*, *measles virus*, *rubella virus*, *parvovirus B19*), bacterial agents (*Streptococcus pyogenes*, *Staphylococcus aureus*, *Streptococcus agalactiae*, etc.), and *Toxoplasma gondii*.

## 14. REFERENCES

- Handbook "Sampling, Transportation, and Storage of Clinical Material for PCR Diagnostics", developed by Federal State Institute of Science "Central Research Institute of Epidemiology" of Federal Service for Surveillance on Consumers' Rights Protection and Human Well-Being.
- Guidelines to **AmpliSens® VZV-FRT** PCR kit for qualitative detection of *Varicella-Zoster virus* DNA in the biological material (peripheral blood plasma, umbilical blood plasma, amniotic fluid, cerebrospinal fluid (CSF), blister content, saliva, oropharyngeal washes and swabs) using 'real-time' fluorescence-hybridization detection.

## 15. QUALITY CONTROL

In compliance with Federal State Institute of Science "Central Research Institute of Epidemiology" ISO 13485-Certified Quality Management System, each lot of **AmpliSens® VZV-FRT** PCR kit has been tested against predetermined specifications to ensure consistent product quality.

### List of Changes Made in the Instruction Manual

VER	Location of changes	Essence of changes
13.07.23 EM	3. Content Footer	<b>REF</b> R-V61-50-F(RG)-CE was added

## AmpliSens®



Federal Budget Institute of  
Science "Central Research  
Institute for Epidemiology"  
3A Novogireevskaya Street  
Moscow 111123 Russia