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For Professional Use Only

AmpliSens® *HSV* I, II-FRT

PCR kit

Instruction Manual

AmpliSens®

EC REP

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1. INTENDED USE

AmpliSens® ***HSV*** **I, II-FRT** PCR kit is an *in vitro* nucleic acid amplification test for qualitative detection of *herpes simplex virus* types I and II (*HSV* I, II) DNA in the clinical materials (urogenital, rectal, and oropharyngeal swabs; exudate of blisters and erosive-ulcerative lesions of skin and mucosa; whole blood and cerebrospinal fluid) using real-time hybridization-fluorescence detection of amplified products.

The results of PCR analysis are taken into account in complex diagnostics of disease.

2. PRINCIPLE OF PCR DETECTION

Herpes simplex virus types I and II detection by the polymerase chain reaction (PCR) includes the following stages: (1) *HSV* I, II DNA extraction from the clinical materials in the presence of Internal Control (IC), which must be used in the extraction procedure in order to control the extraction process of each individual sample and to identify possible reaction inhibition; and (2) real-time PCR amplification of *HSV* I, II DNA and IC.

Herpes simplex virus types I and II detection by the polymerase chain reaction (PCR) is based on the amplification of the pathogen genome specific region using specific *HSV* I, II primers. In the real-time PCR, the amplified product is detected with the use of 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® ***HSV*** **I, II-FRT** PCR kit is a qualitative test that contains the Internal Control (Internal Control-FL (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® ***HSV*** **I, II-FRT** PCR kit uses “hot-start”, which greatly reduces the frequency of nonspecifically primed reactions. In variant FRT, “hot-start” is guaranteed by the separation of nucleotides and Taq-polymerase using a wax layer. The wax melts and reaction components mix only at 95 ºC. In variant FRT-100 F, “hot-start” is guaranteed by the separation of nucleotides and Taq-polymerase using chemically modified polymerase (TaqF). The chemically modified polymerase (TaqF) is activated by heating at 95 ºC for 15 min.

3. CONTENT

AmpliSens® ***HSV*** **I, II-FRT PCR kit** is produced in 2 forms:

AmpliSens® *HSV* I, II-FRT PCR kit variant FRT, **REF** R-V8(RG)-CE.

AmpliSens® *HSV* I, II-FRT PCR kit variant FRT-100 F, **REF** R-V8-F(RG,iQ)-CE.

AmpliSens® *HSV* I, II-FRT PCR kit variant FRT includes:

Reagent	*Description*	*Volume, ml*	*Quantity*
PCR-mix-1-FL *HSV* I, II ready-to-use single-dose test tubes (*under wax)*	clear liquid from colorless to light lilac colour	0.01	110 tubes of 0.2 ml
PCR-mix-2-FL-red	red clear liquid	1.1	1 tube
Positive Control complex (C+)	colorless clear liquid	0.2	1 tube
DNA-buffer	colorless clear liquid	0.5	1 tube
Negative Control (C-)*	colorless clear liquid	1.2	1 tube
Internal Control-FL (IC)**	colorless clear liquid	1.0	1 tube

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

** add **10 µl** of **Internal Control-FL (IC)** during the DNA extraction procedure directly to the sample/lysis mixture (see the **DNA-sorb-AM**, **REF** K1-12-100-CE protocol).

AmpliSens® *HSV* I, II-FRT PCR kit is intended for 110 reactions (including controls).

AmpliSens® *HSV* I, II-FRT PCR kit variant FRT-100 F includes:

Reagent	*Description*	*Volume, ml*	*Quantity*
PCR-mix-1-FL *HSV* I, II	clear liquid from colorless to light lilac colour	1.2	1 tube
PCR-mix-2-FRT	colorless clear liquid	0.3	2 tubes
Polymerase (TaqF)	colorless clear liquid	0.03	2 tubes
Positive Control complex (C+)	colorless clear liquid	0.2	1 tube
DNA-buffer	colorless clear liquid	0.5	1 tube
Negative Control (C-)*	colorless clear liquid	1.2	1 tube
Internal Control-FL (IC)**	colorless clear liquid	1.0	1 tube

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

** add **10 µl** of **Internal Control-FL (IC)** during the DNA extraction procedure directly to the sample/lysis mixture (see the **DNA-sorb-AM**, **REF** K1-12-100-CE protocol).

AmpliSens® *HSV* I, II-FRT PCR kit variant FRT-100 F is intended for 110 reactions (including controls).

4. ADDITIONAL REQUIREMENTS

- DNA extraction kit.
- Transport medium.
- Disposable powder-free gloves and a laboratory coat.
- Pipettes (adjustable).
- Sterile pipette tips with aerosol filters (up to 100 µl).
- Tube racks.
- Vortex mixer.
- Desktop centrifuge with a rotor for 2-ml reaction tubes.
- PCR box.
- Real-time instruments (for example, Rotor-Gene 3000/6000 (Corbett Research, Australia); Rotor-Gene Q (QIAGEN, Germany), iCycler iQ or iCycler iQ5 (Bio-Rad, USA), Mx3000P (Stratagene, USA)).
- Disposable polypropylene PCR tubes (0.1- or 0.2-ml) when working with PCR kit variant FRT-100 F.
  a) 0.2-ml PCR tubes with optical transparent domed 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 at the temperature 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 samples and reagents contact with the skin, eyes, and mucous membranes. If these solutions come into contact, rinse the injured area immediately with water and seek medical advice immediately.
- 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

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

AmpliSens® *HSV* I, II-FRT PCR kit is intended for analysis of the DNA extracted with DNA extraction kits from the clinical material (urogenital, rectal, and oropharyngeal swabs, exudate of blisters and erosive-ulcerative lesions of skin and mucosa, whole blood, cerebrospinal fluid).

7. WORKING CONDITIONS

AmpliSens® *HSV* I, II-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:

- DNA-sorb-AM, **REF** K1-12-100-CE.
- DNA-sorb-B, **REF** K1-2-100-CE for DNA extraction from whole blood and cerebrospinal fluid samples.

The DNA extraction for each sample is carried out in the presence of **Internal Control-FL**

(IC).

Extract the DNA according to the manufacturer's protocol.

8.2. Preparing PCR

8.2.1 Preparing tubes for PCR

The type of tubes depends on the PCR instrument used for analysis. Use disposable filter tips for adding reagents, DNA and control samples into tubes.

Variant FRT

The total reaction volume is **30 µl**, the volume of the DNA sample is **10 µl**.

1. Prepare the required number of the tubes with **PCR-mix-1-FL *HSV* I, II** and wax for amplification of DNA from clinical and control samples.
2. Add **10 µl** of **PCR-mix-2-FL-red** to the surface of the wax layer into each tube ensuring that it does not fall under the wax and mix with **PCR-mix-1-FL *HSV* I, II.**

Variant FRT-100 F

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

1. Thaw the tube with **PCR-mix-2-FRT**. Vortex the tubes with **PCR-mix-1-FL *HSV* I, II, PCR-mix-2-FRT,** and **polymerase (TaqF),** and then centrifuge briefly.

   Take the required number of the tubes/strips for amplification of the DNA obtained from clinical and control samples.
2. For N reactions, add to a new tube:

   10*(N+1) µl of **PCR-mix-1-FL *HSV* I, II;**

   5.0*(N+1) µl of **PCR-mix-2-FRT;**

   0.5*(N+1) µl of **polymerase (TaqF).**

   Vortex the tube, then centrifuge briefly. Transfer **15 µl** of the prepared mixture to each tube.

Steps 3 and 4 are required in both variants.

3. Add **10 µl** of **DNA samples** obtained at the DNA extraction stage.
4. Carry out the control amplification reactions:

NCA – Add **10 µl** of **DNA-buffer** to the tube labeled NCA (Negative Control of Amplification).

C+ – Add **10 µl** of **Positive Control complex** to the tube labeled C+ (Positive Control of Amplification).

C– – Add **10 µl** of **the sample extracted from the Negative Control (C–) reagent** to the tube labeled C- (Negative Control of Extraction).

8.2.2. Amplification

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

Table 1

AmpliSens-1 program

Step	*Rotor-type Instruments*[1]			*Plate-type Instruments*[2]		
	Temperature, °C	*Time*	*Cycles*	*Temperature, °C*	*Time*	*Cycles*
1	**95**	15 min	1	**95**	15 min	1
2	**95**	5 s	5	**95**	5 s	5
	60	20 s		**60**	20 s	
	72	15 s		**72**	15 s	
3	**95**	5 s	40	**95**	5 s	40
	60	20 s Fluorescence acquiring		**60**	30 s Fluorescence acquiring	
	72	15 s		**72**	15 s	

Fluorescent signal is detected in the channels for the FAM and JOE fluorophores (other channels are enabled if several tests are simultaneously carried out in a single run).

2. Adjust the fluorescence channel sensitivity according to the *Important Product Information Bulletin.*
3. Insert tubes into the reaction module of the device.
4. Run the amplification program with fluorescence detection.
5. Analyze 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 *HSV* I, II DNA amplification product is detected in the channel for the FAM fluorophore;
- The signal of the IC DNA amplification product is detected in the channel for the JOE fluorophore.

Results are interpreted by the crossing (or not-crossing) the fluorescence curve with 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.

Principle of interpretation is the following:

- *HSV* I, II DNA is **detected** if the *Ct* value is determined in the result grid in the channel for the FAM fluorophore. Moreover, the fluorescence curve of the sample should cross

[1] For example, Rotor-Gene 3000/Rotor-Gene 6000 (Corbett Research, Australia), Rotor-Gene Q (QIAGEN, Germany).
[2] For example, iCycler iQ, iQ5 (Bio-Rad, USA), Mx3000P, Mx3000 (Stratagene, USA).

the threshold line in the area of typical exponential growth of fluorescence.

- *HSV* I, II DNA is **not detected** if the *Ct* value is not determined (absent) in the channel for the FAM fluorophore (the fluorescence curve does not cross the threshold line), whereas the *Ct* value determined in the channel for the JOE fluorophore is less than the specified boundary *Ct* value.
- The result is **invalid** if the *Ct* value is not determined (absent) in the channel for the FAM fluorophore, whereas the *Ct* value in the channel for the JOE fluorophore is not determined (absent) or greater than the specified boundary *Ct* value. In such cases, the PCR analysis should be repeated.

Boundary *Ct* values are specified in the *Important Product Information Bulletin* enclosed in 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 2).

Table 2

Results for controls

Control	**Stage for control**	***Ct* value in the channel for fluorophore**	
		FAM	**JOE**
C-	DNA extraction	Absent	**<**boundary value
NCA	PCR	Absent	Absent
C+	PCR	**<**boundary value	**<**boundary value

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+) in the channel for the FAM fluorophore is greater than the boundary *Ct* value or absent, the amplification should be repeated for all samples in which *HSV* I, II DNA was not detected.
2. If the *Ct* value is determined for the Negative Control of Amplification (NCA) and/or Negative Control of Extraction (C–) in the channel for the FAM fluorophore, the PCR analysis should be repeated for all samples in which *HSV* I, II DNA was detected.

If you have any further questions or if you encounter problems, please contact our Authorized representative in the European Community.

11. TRANSPORTATION

AmpliSens® *HSV* I, II-FRT PCR kit should be transported at 2–8 ºC for no longer than 5 days.

12. STABILITY AND STORAGE

All components of the **AmpliSens® *HSV* I, II-FRT** PCR kit are to be stored at 2–8 °C when not in use (except for polymerase (TaqF) and PCR-mix-2-FRT). All components of the **AmpliSens® *HSV* I, II-FRT** PCR kit are stable until the expiry date on the label. The shelf life of reagents before and after the first use is the same, unless otherwise stated.

Polymerase (TaqF) and PCR-mix-2-FRT are to be stored at the temperature from minus 24 to minus 16 °C when not in use.

PCR-mix-1-FL *HSV* I, II is to be kept away from light.

13. SPECIFICATIONS

13.1. Analytical sensitivity

Clinical material	Transport medium	Nucleic acid extraction kit	PCR kit	Analytical sensitivity, GE/m[3]
Urogenital swabs	Transport Medium for Swabs or Transport Medium with Mucolytic	DNA-sorb-AM	PCR kit variant FRT	1×10^3

13.2. Analytical specificity

The analytical specificity of **AmpliSens® *HSV* I, II-FRT** PCR kit is ensured by the selection of specific primers and probes as well as stringent reaction conditions. The primers and probes have been checked for possible homologies to all sequences published in gene banks by sequence comparison analysis.

Nonspecific reactions were absent while testing human DNA samples and DNA panel of the following microorganisms: *CMV, EBV, HHV* types 6 and 7, *HPV*, *Gardnerella vaginalis, Lactobacillus* spp*., Escherichia coli, Staphylococcus aureus, Streptococcus pyogenes, Streptococcus agalactiae, Candida albicans, Mycoplasma hominis, Ureaplasma urealyticum, Ureaplasma parvum, Mycoplasma genitalium, Neisseria flava, Neisseria subflava, Neisseria sicca, Neisseria mucosa, Neisseria gonorrhoeae, Chlamydia trachomatis, Treponema pallidum, Trichomonas vaginalis,* and *Toxoplasma gondii.*

The clinical specificity of **AmpliSens® *HSV* I, II-FRT** PCR kit was confirmed in laboratory clinical trials.

14. REFERENCES

1. Handbook “Sampling, Transportation, and Storage of Clinical Material for PCR Diagnostics” developed by Federal State Institute of Science “Central Research

[3] Genome equivalents (GE) of the pathogen agent per 1 ml of a sample placed in the transport medium.

Institute of Epidemiology" of Federal Service for Surveillance on Consumers' Rights Protection and Human Well-Being, Moscow, 2010.
2. Guidelines "Real-Time PCR Detection of STIs and Other Reproductive Tract Infections", developed by Federal Budget Institution of Science "Central Research Institute for Epidemiology" of Federal Service for Surveillance on Consumers' Rights Protection and Human Well-Being, Moscow.

15. QUALITY CONTROL

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

16. KEY TO SYMBOLS USED

REF	Catalogue number		Caution
LOT	Batch code	Σ	Sufficient for
IVD	*In vitro* diagnostic medical device		Expiration Date
VER	Version		Consult instructions for use
	Temperature limitation		Keep away from sunlight
	Manufacturer	**NCA**	Negative control of amplification
	Date of manufacture	**C–**	Negative control of extraction
EC REP	Authorised representative in the European Community	**C+**	Positive control of amplification
		IC	Internal control

List of Changes Made in the Instruction Manual

VER	Location of changes	Essence of changes
22.06.11 RT	Cover page, text	The name of Institute was changed to Federal Budget Institute of Science “Central Research Institute for Epidemiology”
05.11.15 PM	Through the text	Corrections in accordance with the template
	9. Data analysis	The sections were rewritten
	10. Troubleshooting	
14.03.18 PM	Footer, 3. Content	**REF** R-V8(iQ)-CE was deleted
	3. Content	The color of reagents was specified