AmpliSens® *C.albicans / C.glabrata / C.krusei*-MULTIPRIME-FRT PCR kit

RUO

For Professional Use Only

Instruction Manual

KEY TO SYMBOLS USED

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

1. INTENDED USE

AmpliSens® *C.albicans / C.glabrata / C.krusei*-MULTIPRIME-FRT PCR kit is an *in vitro* nucleic acid amplification test for simultaneous detection of DNA of *Candida albicans, Candida glabrata,* and *Candida krusei* in the biological material (urogenital, rectal, and pharyngeal swabs; conjunctival discharge; prostate gland secretion; and urine samples) using real-time hybridization-fluorescence detection of amplified products.

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

2. PRINCIPLE OF PCR DETECTION

C.albicans / C.glabrata / C.krusei DNA detection by the polymerase chain reaction (PCR) is based on the amplification of the pathogen genome specific region using specific *C.albicans / C.glabrata / C.krusei* primers. In 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® *C.albicans / C.glabrata / C.krusei*-MULTIPRIME-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® *C.albicans / C.glabrata / C.krusei*-MULTIPRIME-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). The 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	ROX	Cy5
DNA-target	*Candida albicans* DNA	*Candida glabrata* DNA	*Candida kruseis* DNA	Internal Control
Target gene	gene ITS-2	gene ITS-2	gene ITS-2	Artificially synthesized sequence

3. CONTENT

AmpliSens® *C.albicans / C.glabrata / C.krusei*-MULTIPRIME-FRT PCR kit is produced in 2 forms:

variant FRT-100 F, REF R-F3-F(RG,iQ)-CE;

variant FRT-100 F in bulk[1], REF R-F3-F(RG,iQ)-CE-B.

Variant FRT-100 F includes:

Reagent	Description	Volume, ml	Quantity
PCR-mix-1-FL *C.albicans / C.glabrata / C.krusei*	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 **DNA-sorb-AM** protocol).

Variant FRT-100 F is intended for 110 reactions (including controls).

4. ADDITIONAL REQUIREMENTS

- DNA extraction kit.
- Transport medium.
- Disposable powder-free gloves and laboratory coat.
- Pipettes (adjustable).
- Sterile 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 3000/6000 (Corbett Research, Australia); Rotor-Gene Q (Qiagen, Germany); iQ5 (Bio-Rad, USA); Mx3000P (Stratagene, USA) or equivalent).
- Disposable polypropylene tubes :
  a) thin-walled 0.2-ml PCR tubes with optical transparent domed or flat caps or strips of eight 0.2-ml tubes with optical transparent caps if a plate-type instrument is used;
  b) thin-walled 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 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.

[1] In bulk form contains unlabeled tubes. Tubes with identical reagent are packed in one bag with label.

6. SAMPLING AND HANDLING

NOTE: 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® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-FRT PCR kit is intended for the analysis of DNA extracted with DNA extraction kits from the biological material (urogenital, rectal, and pharyngeal swabs; conjunctival discharge; prostate gland secretion; urine samples (sediment of the first portion of the morning specimen)).

7. WORKING CONDITIONS

AmpliSens® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-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**.
- For other nucleic acid extraction kits see Guidelines [2].

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

In the extraction procedure it is necessary to carry out the control reactions as follows:

C– – Add **100 µl of Negative Control (C–)** to the tube labeled C– (Negative Control of Extraction).

NOTE: Extract the DNA according to the manufacturer's protocol.

8.2. Preparing 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.

8.2.1 Preparing tubes for PCR

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

1. Thaw the required number of tubes with **PCR-mix-2-FRT**. Vortex the tubes with **PCR-mix-1-FL *C.albicans* / *C.glabrata* / *C.krusei*, PCR-mix-2-FRT, and polymerase (TaqF)** and sediment the drops by short centrifugation (1-2 s).
   Take the required number of tubes/strips for amplification of the DNA obtained from test and control samples.
2. For N reactions (including 2 controls), add to a new tube:
   – **10·(N+1) µl** of **PCR-mix-1-FL *C.albicans* / *C.glabrata* / *C.krusei***,
   – **5.0·(N+1) µl** of **PCR-mix-2-FRT**,
   – **0.5·(N+1) µl** of **polymerase (TaqF)**.
   Mix the prepared mixture and sediment the drops by short centrifugation (1-2 s). Transfer **15 µl** of the prepared mixture to prepared tubes.
3. Add **10 µl** of **DNA** obtained at the DNA extraction stage to the prepared tubes.
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 (C+)** to the tube labeled **C+** (Positive Control of Amplification).

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

8.2.2. Amplification

Program the real-time amplification instrument according to manufacturer's manual and Guidelines [2].

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

Table 2

AmpliSens-1 amplification program

	Rotor-type instruments[2]			Plate-type instruments[3]		
Step	**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, JOE, ROX, and Cy5 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* and Guidelines [2].
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 four channels:

– The signal of the *Candida albicans* DNA amplification product is detected in the channel for the FAM fluorophore.
– The signal of the *Candida glabrata* DNA amplification product is detected in the channel for the JOE fluorophore.
– The signal of the *Candida krusei* DNA amplification product is detected in the channel for the ROX fluorophore
– The signal of the (IC) DNA amplification product is detected in the channel for the Cy5 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:

– *Candida albicans* DNA is **detected** in a sample if the *Ct* value is determined in the results grid in the channel for the FAM fluorophore. Moreover, the fluorescence curve of the sample should cross the threshold line in the area of typical exponential growth of fluorescence.
– *Candida glabrata* DNA is **detected** in a sample if the *Ct* value is determined in the results grid in the channel for the JOE fluorophore. Moreover, the fluorescence curve of the sample should cross the threshold line in the area of typical exponential growth of fluorescence.
– *Candida krusei* DNA is **detected** in a sample if the *Ct* value is determined in the results grid in the channel for the ROX fluorophore. Moreover, the fluorescence curve of the sample should cross the threshold line in the area of typical exponential growth of fluorescence.
– *Candida albicans, Candida glabrata* и *Candida krusei* DNA are **not detected** if the *Ct* value is not determined (absent) in the results grid (the fluorescence curve does not cross the threshold line) in the channels for the FAM, JOE, ROX fluorophores, whereas the *Ct* value determined in the results grid in the channel for the Cy5 fluorophore does not exceed the specified boundary value.
  The result of analysis is **invalid** if the *Ct* value is not determined in the results grid (absent) in the channel for the FAM, JOE, ROX and Cy5 fluorophore. In such cases PCR should be repeated for this sample.

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 the Positive and Negative Controls of amplification as well as for the Negative Control of extraction are correct (see Table 3).

Table 3

Results for controls

Control	Stage for control	*Ct* value in the channel for fluorophore			
		FAM	**JOE**	**ROX**	**Cy5**
C–	DNA extraction	Absent	Absent	Absent	**<**boundary value
NCA	PCR	Absent	Absent	Absent	Absent
C+	PCR	**<**boundary value	**<**boundary value	**<**boundary value	**<**boundary value

10. TROUBLESHOOTING

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

1. The *Ct* value determined for the Positive Control of amplification (C+) in the channel for the FAM**,** and/or JOE**,** and/or ROX fluorophore is greater than the specified boundary value or absent. The amplification should be repeated for all the samples in which *Ct* value is absent in the respective channel.
2. The *Ct* value is determined for the Negative Control of Extraction (C–) and/or the Negative Control of Amplification (NCA) in the channel for the FAM**,** and/or JOE**,** and/or ROX fluorophore. The PCR analysis (beginning with the DNA extraction stage) should be repeated for all samples in which *Ct* value is determined in the respective channel.

11. TRANSPORTATION

AmpliSens® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-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® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-FRT** PCR kit (except for polymerase (TaqF) and PCR-mix-2-FRT) are to be stored at 2–8 °C when not in use. All components of the **AmpliSens® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-FRT** PCR kit are stable until the expiry date on the label. PCR kit **variant FRT-100 F** can be stored without unpacking at 2 to 8 °C for 3 months from the date of manufacture before opening. Once opened, PCR kit **variant FRT-100 F** should be unpacked in accordance with the storage temperatures for each component. The shelf life of opened reagents is the same as that of unopened reagents, unless otherwise stated.

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

NOTE: PCR-mix-1-FL *C.albicans* / *C.glabrata* / *C.krusei* is to be kept away from light.

[2] For example, Rotor-Gene 3000, Rotor-Gene 6000, Rotor-Gene Q or equivalent.
[3] For example, iQ5, Mx3000P, Mx3000, DT-96 or equivalent.

13. SPECIFICATIONS

13.1. Sensitivity

Biological material	Transport medium	Nucleic acid extraction kit	Microorganism	Sensitivity, GE/ml [4]
Urogenital swabs	Transport Medium for Swabs or Transport Medium with Mucolytic Agent	DNA-sorb-AM	*Candida albicans*	$1x10^3$
			Candida glabrata	$1x10^3$
			Candida krusei	$1x10^3$
Urine	—	DNA-sorb-AM	*Candida albicans*	$2x10^3$
			Candida glabrata	$2x10^3$
			Candida krusei	$2x10^3$

NOTE: The analytical sensitivity of each microorganism does not change even at high concentrations of two other microorganisms (to 10^9 GE/ml).

13.2. Specificity

The analytical specificity of **AmpliSens® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-FRT** PCR kit is ensured by 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 responses were absent while testing human DNA samples and DNA samples of the following microorganisms: *Gardnerella vaginalis, Lactobacillus* spp., *Escherichia coli, Staphylococcus* spp., *Streptococcus* spp., *Chlamydia trachomatis, Mycoplasma hominis, Ureaplasma urealyticum, Ureaplasma parvum, Mycoplasma genitalium, Candida albicans, Candida glabrata, Candida krusei, Neisseria* spp., *Neisseria gonorrhoeae, Trichomonas vaginalis, Treponema pallidum, Toxoplasma gondii, HSV* types 1 and 2, *CMV,* and *HPV*.

14. REFERENCES

1. Handbook “Sampling, Transportation, and Storage of Clinical Material for PCR Diagnostics”, developed by Federal Budget Institute of Science “Central Research Institute for Epidemiology” of Federal Service for Surveillance on Consumers’ Rights Protection and Human Well-Being.
2. Guidelines “Real-Time PCR Detection of STIs and Other Reproductive Tract Infections”, developed by Federal Budget Institute of Science “Central Research Institute for Epidemiology”.

15. QUALITY CONTROL

In compliance with Federal Budget Institute of Science “Central Research Institute for Epidemiology” ISO 13485-Certified Quality Management System, each lot of **AmpliSens® *C.albicans* / *C.glabrata* / *C.krusei*-MULTIPRIME-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
21.06.11 LA	Cover page, text	The name of Institute was changed to Federal Budget Institute of Science “Central Research Institute for Epidemiology”
01.07.13 ME	Cover page	Symbol IVD was changed to RUO
	Key to Symbols Used	
05.07.17 LE	Text	Corrections according to the template
	8.1. DNA extraction	Information about controls of extraction was added
	9. Data analysis	The sections was rewritten
	10. Troubleshooting	
	13.1. Sensitivity	The column with the transport media was added
15.12.17 PM	3. Content	The color of a reagent was specified
03.06.21 VA	Through the text	The text formatting was changed
	Footer	The phrase “For research use only. Not for diagnostic procedures” was added
	2. Principle of PCR detection	The information about the enzyme UDG was added. The information about “hot-start” was corrected. The table with targets was added
11.08.23 EM	3. Content Footer	REF R-F3-F(RG,iQ)-CE was added

AmpliSens®

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[4] Genome equivalents of microorganism per 1 ml of the sample from transport medium.