

ProcartaPlex™ Human High Sensitivity Simplex and Combinable Panels

USER GUIDE

Publication Number MAN0019074

Revision C.0 (33)



Revision history: MAN0019074 C.0 (33) (English)

Revision	Date	Description
C.0 (33)	5 October 2023	An edit was made to the Contents and storage table.
B.0 (32)	26 April 2023	The format and content were updated to align with recent standardized elements for the ProcartaPlex products.
A.0 (31)	6 April 2020	The format and content were updated.
.09	1 December 2016	New document for ProcartaPlex Human High Sensitivity Assays.

The information in this guide is subject to change without notice.

DISCLAIMER: TO THE EXTENT ALLOWED BY LAW, THERMO FISHER SCIENTIFIC INC. AND/OR ITS AFFILIATE(S) WILL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, INDIRECT, PUNITIVE, MULTIPLE, OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING FROM THIS DOCUMENT, INCLUDING YOUR USE OF IT.

End User License Agreement for Luminex Assay Products: By opening the packaging containing this Assay Product (which contains fluorescently labeled microsphere beads authorized by Luminex Corporation) or using this Assay Product in any manner, you are consenting and agreeing to be bound by the End User Terms and Conditions and the End User License Agreement available at <https://www.luminexcorp.com/end-user-terms-and-conditions/#sec3>. If you do not agree to all of the terms and conditions, you must promptly return this Assay Product for a full refund prior to using it in any manner.

TRADEMARKS: All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. xMAP, Luminex 100/200, MAGPIX, INTELLIFLEX and FLEXMAP 3D are trademarks of Luminex Corp.

©2016-2023 Thermo Fisher Scientific Inc. All rights reserved.

Contents

■	CHAPTER 1	Product information	4
		Product description	4
		Contents and storage	4
		Required materials not supplied	5
		Procedural guidelines	5
		Workflow	6
■	CHAPTER 2	Methods	8
		Prepare the samples	8
		Prepare plasma samples	8
		Prepare serum samples	8
		Prepare cell culture supernatants	8
		Prepare the reagents	8
		Prepare 1X Wash Buffer	9
		Prepare 1X High Sensitivity Simplex Beads	9
		Prepare 1X detection antibody mixture	10
		Prepare Standard Mix	10
		Prepare 4-fold serial dilution	11
		Assay protocol	13
		Instrument settings	16
		Analyze results	16
■	APPENDIX A	Recommended plate layout	17
■	APPENDIX B	Documentation and support	18
		Customer and technical support	18
		Limited product warranty	18



Product information

Product description

The ProcartaPlex™ Human High Sensitivity Simplex and Combinable Panels have been optimized for detection of multiple analytes from serum, plasma, and cell culture supernatants.

ProcartaPlex™ Human High Sensitivity Simplex and Combinable Panels are designed to be combinable with each other so that you can create your own multiplex panel that utilizes Luminex™ xMAP™ technology for protein detection/quantitation. When combining multiple Simplex Kits only one buffer kit (Basic Kit) is needed for each assay plate regardless of plex size. The buffer kits are sold separately and are optimized for the different species and kit formats. When combining Simplex Kits with Combinable Panels Kits, there is no need to purchase a buffer kit. All buffers are included in the Combinable Panel Kit.

For detailed product information, visit thermofisher.com/procartaplex

Contents and storage

Upon receipt, store the kit at 2°C to 8°C. When stored as indicated, all reagents are stable until the expiration date.

Components supplied	Basic kit	Simplex kit	Combinable panels
Antigen Standards, premixed		✓	✓
Detection Antibody (50X) ^[1]		✓	✓
Antibody Coupled Magnetic Beads, Simplexes (50X) ^[1]		✓	
Antibody Coupled Magnetic Beads, premixed panels (1X) ^[1]			✓
Streptavidin-PE (SA-PE) (1X) ^[1]	✓		✓
Amplification Reagent 1	✓		✓
Amplification Reagent 2	✓		✓
Wash Buffer Concentrate (10X) ^[1]	✓		✓
Detection Antibody Diluent	✓		✓
Universal Assay Buffer (1X) ^[1]	✓		✓
Reading Buffer ^[1]	✓		✓
PCR 8-Tube Strip	✓		✓

(continued)

Components supplied	Basic kit	Simplex kit	Combinable panels
96-well Flat Bottom Plate	✓		✓
Black Microplate Lid	✓		✓
Plate Seals	✓		✓

^[1] Contains sodium azide.

Retain the lot-specific Certificate of Analysis (CoA) that contains the product expiration date. The Certificate of Analysis also contains important information such as bead number, analyte names, and highest standard concentration required for the assay setup on the xMAP™ instrument.

Required materials not supplied

Catalog numbers that appear as links open the web pages for those products.

- xMAP™ instrument
- Hand-Held Magnetic Plate Washer (Cat. No. [EPX-55555-000](#))
- Deionized water
- Fresh cell culture medium for running cell culture supernatant samples
- Vortex mixer (e.g., Cat. No. [88882010](#))
- Microcentrifuge
- Adjustable single and multichannel pipettes with disposable tips and low-volume reservoirs (e.g., Cat. No. [95128093](#))
- Beakers, flasks, and cylinders necessary for preparation of reagents
- Orbital microplate shaker with at least 1.5-mm or 0.059-inch orbit diameter capable of maintaining a speed of 600 ± 50 rpm (e.g., Cat. No. [88882006](#))

Note: Use of rockers or large orbit shakers can cause adverse results.

Procedural guidelines

- Thoroughly read this user guide and the certificate of analysis before using the kit.
- All chemicals should be considered potentially hazardous.
- To avoid cross-contamination, do not invert the assay plate during the assay or allow contents from one well to mix with another well.
- Use a multichannel pipette and reagent reservoirs whenever possible to achieve optimal assay precision.
- This protocol was developed using the Hand-Held Magnetic Plate Washer (Cat. No. [EPX-55555-000](#)). Other washers should be validated by the end user.
- Ensure that the xMAP™ instrument has been properly calibrated and set up before preparing and running the assay.

Workflow

Assay protocol

Prepare antigen standard

Add capture beads

IMPORTANT! Simplex kits contain 50X beads. Refer to Table 1 for dilution instructions, which vary according to the number of combined Simplex Beads. Combinable Panels include beads at working concentrations.

1. Vortex beads 30 sec.
2. Add 50 μ L of beads to each well. Remove liquid.

Note: If required, add next type of beads. Repeat, until all beads needed are on the plate.

Note: Wash the plate after adding the beads.

Add samples and standards

1. Add the following according to sample type:
 - For serum and plasma samples:** Add 25 μ L of Universal Assay Buffer, then add 25 μ L of standards or samples. For background wells, add 50 μ L of 1X UAB.
 - For cell culture supernatant samples:** Add 50 μ L of standards or samples. For background wells, add 50 μ L of cell culture medium.
2. Seal the plate and incubate with shaking for 30 min at room temp.
3. Store plate overnight at 4°C in the dark.
4. Shake plate at room temperature for 30 min.
5. Wash plate twice.

Add detection antibody

1. Add 25 μ L of Detection Antibody Mix (1X).
2. Seal the plate and incubate with shaking for 30 min at room temp.
3. Wash plate twice.

Add Streptavidin-PE

1. Add 50 μ L of Streptavidin-PE.
2. Seal the plate and incubate with shaking for 30 min at room temp.
3. Wash plate twice.

Add Amplification Reagent 1

1. Add 50 μ L of Amplification Reagent 1.
2. Seal the plate and incubate with shaking for 30 min at room temp.

Assay protocol

Add Amplification Reagent 2

1. Add 50 μL of Amplification Reagent 2.
2. Seal the plate and incubate with shaking for 30 min at room temp.

Resuspend beads

1. Add 120 μL of Reading Buffer.
2. Seal the plate and shake for 5 min at room temp.

Acquire data on xMAP™ system

Prepare the samples

Thaw frozen serum and plasma samples on ice and mix well by vortexing. Centrifuge at $10,000 \times g$ for 5–10 minutes to pellet out particulates. Avoid multiple freeze/thaw cycles. If samples are high in lipid content, centrifuge at $10,000 \times g$ for 10 minutes and transfer contents to a new tube.

Prepare plasma samples

1. Collect samples in sodium citrate or EDTA tubes. If using heparin as an anticoagulant, no more than 10 IU of heparin per mL of blood collected should be used to prevent assay interference that can result in a false positive signal.
2. Centrifuge samples at $1,000 \times g$ at 4°C for 10 minutes within 30 minutes of collection.
3. Collect the plasma fraction. Use immediately or store aliquots at -80°C .

Prepare serum samples

1. Allow blood to clot for 20–30 minutes at $20\text{--}25^{\circ}\text{C}$.
2. Centrifuge at $1,000 \times g$ for 10 minutes at $20\text{--}25^{\circ}\text{C}$.
3. Collect the serum fraction. Alternatively, a serum separator tube can be used following the manufacturer's instructions.
4. Use immediately or store aliquots at -80°C . Avoid multiple freeze/thaw cycles.

Prepare cell culture supernatants

1. Centrifuge samples at 1,400 rpm for 10 minutes at 4°C to remove particulates.
2. Aliquot the clarified medium into clean polypropylene microcentrifuge tubes.
3. Use immediately or store aliquots at -80°C . Avoid multiple freeze/thaw cycles.

Prepare the reagents

Before starting with the assay protocol, define the plate map. Mark the standard, sample, and background wells to determine the number of wells used (see Appendix A, “Recommended plate layout”).

Prepare 1X Wash Buffer

Bring the Wash Buffer Concentrate (10X) to room temperature and vortex for 15 seconds. Mix 20 mL of the Wash Buffer Concentrate (10X) with 180 mL ddH₂O. Mix gently to avoid foaming. Wash Buffer (1X) can be stored at 2–8°C for up to 6 months.

Note: Additional Wash Buffer Concentrate (200 mL, Cat. No. [EPX-66666-001](#)) can be purchased separately for automated plate washers.

Prepare 1X High Sensitivity Simplex Beads

High Sensitivity Simplex Kits are provided with concentrated 50X beads, which will require dilution before use. The dilution is dependent on the number of different Simplex Beads that are combined (Table 1).

IMPORTANT! ProcartaPlex™ Simplex Kits and/or Combinable Panels can be mixed for enhanced flexibility. Ensure that the bead regions from your ProcartaPlex™ Simplex Kits or panels do not overlap. Some analytes use the same bead region and cannot be combined in one multiplex assay. Check the compatibility of our analytes using our [online panel configurator](#) or contact our technical support.

1. Vortex each High Sensitivity Simplex Bead vial (50X) for 30 seconds, then add 100 µL of each High Sensitivity Simplex Bead vial (50X) to a mixing bottle if using a whole plate (otherwise adjust the volume accordingly).
2. Add Wash Buffer (1X) to a final volume of 5 mL. To combine 2 or more different High Sensitivity Simplex Bead vials, follow Table 1 (using a whole plate):

Table 1 Dilution of High Sensitivity Simplex Beads

Number of different High Sensitivity Simplex Bead vials to be mixed	Total volume of mixed bead solution	Volume of Wash Buffer (1X) to add
1	100 µL	4,900 µL
2	200 µL	4,800 µL
3	300 µL	4,700 µL
4	400 µL	4,600 µL
5	500 µL	4,500 µL
6	600 µL	4,400 µL

Prepare 1X detection antibody mixture

For simplex and combinable panels, detection antibody is provided at 50X concentration. Add 60 μL of each detection antibody concentrate to the mixing bottle and bring volume to a total of 3 mL using detection antibody diluent if using a whole plate (otherwise adjust the volume accordingly).

Number of vials of detection antibody	Total volume of detection antibody	Volume of diluent to add
1	60 μL	2,940 μL
2	120 μL	2,880 μL
3	180 μL	2,820 μL
4	240 μL	2,760 μL
5	300 μL	2,700 μL
6	360 μL	2,640 μL

Prepare Standard Mix

Carefully read the Certificate of Analysis for lot-specific information on the kit components. These kits are supplied with multiple lyophilized Standard Mixes for generation of standard curves. Two vials of each Standard Mix are provided to permit the user to run the assay twice if running a partial plate. For experiments measuring serum or plasma samples, use 1X UAB as the diluent to reconstitute and dilute the standard. For experiments measuring cell culture supernatant samples, use fresh cell culture medium as the diluent.

Note: Change pipette tips after each dilution step and avoid air bubbles.

1. Centrifuge each different standard mix stock vial at 2,000 x g for 10 seconds.
2. Add 50 μL of diluent to each stock vial.
3. Vortex the vials at high speed for 30 seconds and centrifuge at 2,000 x g for 10 seconds to collect contents at the bottom of the vial.
4. Incubate on ice for 10 minutes to ensure complete reconstitution.
5. Pool entire content of each stock vial into one of the vials and fill up to a total volume of 250 μL .

- Vortex the vial at high speed for 10 seconds and centrifuge at 2,000 x g for 10 seconds to collect contents at the bottom of the vials.
- Predilute the reconstituted standard 1:10 (e.g., 25 µL of reconstituted standard with 225 µL diluent). For serum or plasma samples, use 1X UAB; for cell culture supernatant samples, use the cell culture media that was used to culture the cells.

# of standard sets	Reconstitution volume per vial	Pooled volume	Buffer to add	Total volume
1	50 µL	50 µL	200 µL	250 µL
2	50 µL	100 µL	150 µL	250 µL
3	50 µL	150 µL	100 µL	250 µL
4	50 µL	200 µL	50 µL	250 µL
5	50 µL	250 µL	0 µL	250 µL

Prepare 4-fold serial dilution

- Label the tubes in the 8-Tube Strip: Std1, Std2, Std3, Std4, Std5, Std6 and Std7.
- Add 200 µL of the reconstituted and prediluted standard mix into Std1 tube.
- Add 150 µL of diluent into Std2–Std7 tubes.
- Transfer 50 µL from Std1 tube into Std2 tube.
- Mix by pipetting up and down 10 times.
- Transfer 50 µL of the mixed standards from Std2 tube into Std3 tube using new pipette tip.
- Mix by pipetting up and down 10 times.
- Repeat steps 4–7 for tubes Std4–Std7, changing pipette tips between dilution steps.
- Add 150 µL of diluent to the last tube of the 8-Tube Strip to serve as a background.

10. Keep tubes on ice until ready to use.

Note: Use reconstituted standards immediately. Reconstituted standards cannot be stored. Discard unopened standard vials if the entire plate was used in a single experiment.

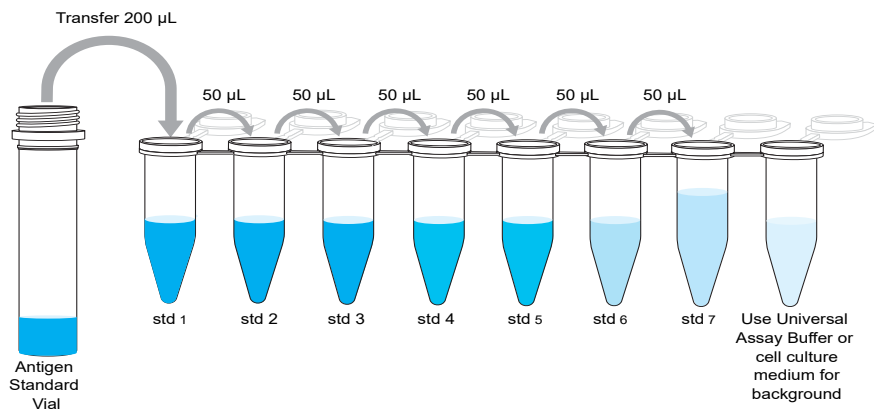


Figure 1 4-fold serial dilution

Assay protocol

1. Define the plate map by marking the standard, sample, and blank wells using the plate map in Appendix A, “Recommended plate layout”.
2. Add Capture Bead Mix to the plate.

Note: High Sensitivity Combinable Panels contain only one 1X Capture Bead vial.

- a. Vortex the 1X Capture Bead Mix vial for 30 seconds at high speed.
- b. Using a multichannel pipette, add 50 μL of the Capture Bead Mix to each well of the plate according to the table:

Number of different bead vials to be mixed	Amount added to each well
1	50 μL
2	100 μL
3	150 μL
4	200 μL
5	250 μL
6	300 μL

IMPORTANT! If working with Simplex kits only, add 50 μL per well of diluted 1X Simplex Beads prepared according to “Prepare 1X High Sensitivity Simplex Beads” on page 9.

Note: Combinable panels are provided with magnetic beads at a 1X working concentration. Diluted Simplex Beads (1X) can be added alone or in combination with combinable panels. Note that 50 μL per bead vial per well is required.

3. Wash beads using a Hand-Held Magnetic Plate Washer.

Note: To avoid loss of beads, secure the plate using the clamps on both sides of the Hand-Held Magnetic Plate Washer during this procedure.

Note: This protocol was developed using the Hand-Held Magnetic Plate Washer (Cat. No. [EPX-55555-000](#)). Other washers should be validated by the end user.

- a. Place the plate on the Hand-Held Magnetic Plate Washer and wait 2 minutes to allow the beads to settle on the bottom of each well.
- b. Remove the liquid by quickly inverting the washer/plate assembly over a sink or waste container.
- c. Gently blot the inverted washer/plate assembly onto several layers of paper towels or absorbent surface to remove any residual liquid.
- d. Add 150 μL of 1X Wash Buffer into each well and wait 30 seconds.

- e. Remove the liquid by quickly inverting the washer/plate assembly over a sink or waste container.
 - f. Gently blot the inverted washer/plate assembly onto several layers of paper towels or absorbent surface to remove any residual liquid.
 - g. Remove the plate from the magnet and proceed to step 4.
4. Add samples and standards to the plate.
- a. **Serum and plasma:** Add 25 μL of 1X UAB to each well followed by 25 μL of prepared standards or samples as defined on the plate layout. Add an additional 25 μL of 1X UAB to the wells designated as backgrounds. **Cell culture supernatants:** Add 50 μL of prepared standards or samples as defined on the plate layout. Add 50 μL of cell culture medium to the wells designated as backgrounds.
 - b. Seal the plate using one of the provided Plate Seals and cover with the provided Microplate Lid. Shake at 600 rpm for 30 minutes at room temperature.
 - c. Store the plate on a level surface at 4°C overnight.
 - d. After overnight incubation, shake the plate at 600 rpm for 30 minutes at room temperature.
5. Remove and discard the Plate Seal. Wash the plate following the steps below.
- a. Place the plate on the Hand-Held Magnetic Plate Washer and wait 2 minutes to allow particles to settle on the bottom of each well.
 - b. Remove the liquid by quickly inverting the washer/plate assembly over a sink or waste container.
 - c. Gently blot the inverted washer/plate assembly onto several layers of paper towels or absorbent surface to remove any residual liquid.
 - d. Add 150 μL of 1X Wash Buffer into each well and wait 30 seconds.
 - e. Remove the liquid by quickly inverting the washer/plate assembly over a sink or waste container.
 - f. Gently blot the inverted washer/plate assembly onto several layers of paper towels or absorbent surface to remove any residual liquid.
 - g. Repeat steps 5d-f once for a total of two washes.
 - h. Remove the plate from the magnet and proceed to step 6.
6. Add Biotinylated Detection Antibody Mix to the plate.
- a. Using a multichannel pipette, add 25 μL of the detection antibody solution to each well of the plate. Gently tap the plate to evenly distribute the solution in the wells.
 - b. Seal the plate using a new Plate Seal and cover with the provided Microplate Lid. Shake at 600 rpm for 30 minutes at room temperature.

7. Wash the plate twice following step 5.
8. Add Streptavidin-PE (SA-PE) to the plate.
 - a. Add 50 μ L of SA-PE solution to each well.
 - b. Seal the plate using new Plate Seal and cover with the provided Microplate Lid. Shake at 600 rpm for 30 minutes at room temperature.
9. Wash the plate twice following step 5.
10. Add Amplification Reagent 1.
 - a. Add 50 μ L of Amplification Reagent 1 into each well.
 - b. Seal the plate with a new Plate Seal and cover the plate with the provided Microplate Lid. Shake at 600 rpm for 30 minutes at room temperature. After incubation, immediately proceed to step 11.

IMPORTANT! Do not wash the plate. Proceed directly to next step.

11. Add Amplification Reagent 2.
 - a. Add 50 μ L of Amplification Reagent 2 into each well.
 - b. Seal the plate with a new Plate Seal and cover the plate with the provided Microplate Lid. Shake at 600 rpm for 30 minutes at room temperature.
12. Wash the plate twice following step 5.
13. Prepare the plate for immediate or later analysis on a xMAP™ instrument.
 - a. Add 120 μ L of reading buffer into each well.
 - b. Seal the plate using new Plate Seal and cover with the provided Microplate Lid. Shake at 600 rpm for 5 minutes at room temperature.

Note: Alternatively, it is also possible to store the 96-well plate overnight at 4°C. On the next day, shake the plate at 600 rpm for 5 minutes at room temperature and proceed with the next step below.

14. Remove the Plate Seal and run the plate on a xMAP™ instrument.

Instrument settings

Follow the recommended guidelines and procedures for calibration and verification of the instrument. Laser-based systems require 30 minutes to warm up prior to use.

Instrument	Acquisition volume	Timeout (optional)	Bead type	DD gate	Reporter gain	Min. bead count
MAGPIX™	50 µL ^[1]	N/A	N/A	N/A	Standard PMT	50
INTELLIFLEX™	30 µL	40 sec	MagPlex™	7,000–17,000	Standard PMT	50
FLEXMAP 3D™ Luminex™ 100/200™	50 µL	60 sec	MagPlex™	7,500–25,000	Standard PMT	50
Bio-Rad™ Bio-Plex™	50 µL	60 sec	MagPlex™	5,000–25,000	Standard PMT	50

^[1] MAGPIX volume can be changed during the run to optimize bead count.

Note: To assure a good bead count, the probe height must be adjusted to the plate provided in the kit. We recommend using two 5.08 mm spacer disks to adjust the sample probe height for Mylar-bottom plates.

Analyze results

The concentration of the samples can be calculated by plotting the expected concentration of the standards against the NET MFI generated by each standard. For Bio-Plex™ Manager, plot standard concentrations against FI-Bkgd. A 4PL or 5PL algorithm is recommended for the best curve fit. Analyze the assayed samples according to the operation manual for the Luminex™ or Bio-Plex™ instrument.

We offer a free and robust analysis software package for data analysis. To analyze the data, follow the instructions below or contact our technical support.

1. Export the run data in .csv format and navigate to the ProcartaPlex™ Analysis App on Thermo Fisher Connect: <https://apps.thermofisher.com/apps/procartaplex>

Note: Before exporting .csv raw data from Bio-Plex™ Manager, please make sure to set 'Analytes Labels' under 'Document Export Properties' to 'Name (Region)'. The .csv raw data exported as Report Type 'xPONENT' from INTELLIFLEX™ instruments are supported.

2. Upload the .csv files to the ProcartaPlex™ Analysis App to analyze the run data. The intuitive software features 4PL/5PL curve fit optimization, group-wise statistical and heat map analysis. Users can export detailed reports including images for presentations and publications.

Note: The sample dilution factor must be accounted for in the software analysis.

IMPORTANT! For ProcartaPlex™ getting started guides, technical literature, protocol support tools, and common troubleshooting questions visit [thermofisher.com/procartaplexsupport](https://www.thermofisher.com/procartaplexsupport)
For more complete troubleshooting questions and answers, visit our FAQ database at [thermofisher.com/procartaplexfaqs](https://www.thermofisher.com/procartaplexfaqs)



Recommended plate layout

Standards		Samples									
1	1	1	1	9	9	17	17	25	25	33	33
2	2	2	2	10	10	18	18	26	26	34	34
3	3	3	3	11	11	19	19	27	27	35	35
4	4	4	4	12	12	20	20	28	28	36	36
5	5	5	5	13	13	21	21	29	29	37	37
6	6	6	6	14	14	22	22	30	30	38	38
7	7	7	7	15	15	23	23	31	31	39	39
Bkgd ^[1]	Bkgd	8	8	16	16	24	24	32	32	40	40

^[1] Background

	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												



Documentation and support

Customer and technical support

Visit thermofisher.com/support for the latest service and support information.

- Worldwide contact telephone numbers
- Product support information
 - Product FAQs
 - Software, patches, and updates
 - Training for many applications and instruments
- Order and web support
- Product documentation
 - User guides, manuals, and protocols
 - Certificates of Analysis
 - Safety Data Sheets (SDSs; also known as MSDSs)

Note: For SDSs for reagents and chemicals from other manufacturers, contact the manufacturer.

Limited product warranty

Life Technologies Corporation and/or its affiliate(s) warrant their products as set forth in the Life Technologies' General Terms and Conditions of Sale at www.thermofisher.com/us/en/home/global/terms-and-conditions.html. If you have any questions, please contact Life Technologies at www.thermofisher.com/support.

