Thermo Scientific
Direct PCR

Amplify
without purification

- PCR directly from sample tissue
- Variety of sample types: blood, plants, animal and human tissues
- Less pipetting and faster cycling
- Direct loading on gels

Fisher Scientific

Thermo SCIENTIFIC

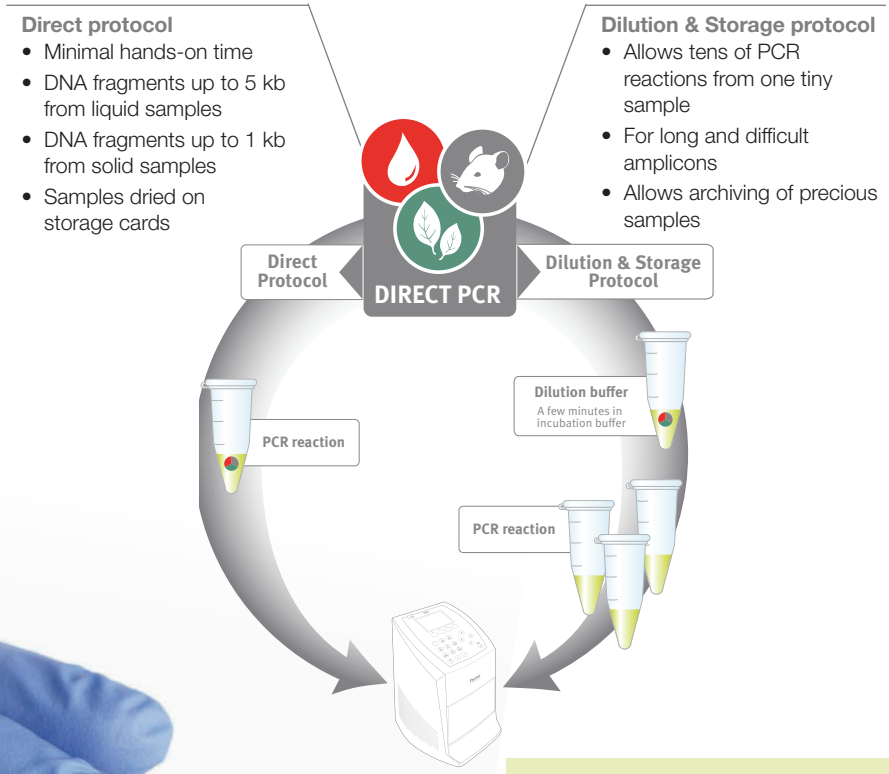
Amplify without prior DNA purification

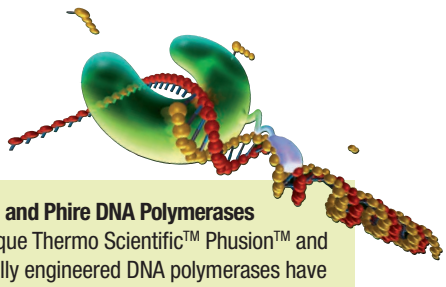
The Thermo Scientific™ Direct PCR approach delivers unprecedented convenience for DNA amplification by allowing PCR directly from unpurified samples. A tiny amount of source material is used directly in the PCR reaction without any purification steps, allowing significant savings in both time and cost.

Benefits

- No need for time-consuming and expensive DNA purification
- Very little sample material required
- Minimized pipetting with master mix format and loading dyes pre-added
- Extremely short PCR protocol times
- Tested with wide variety of sample types
- Robust hot start DNA polymerases guarantee high yields of specific product
- Rich composition of the kit - controls, water and DNA ladder included

Two short protocols for various needs





Based on specially engineered Thermo Scientific Phusion and Phire DNA Polymerases

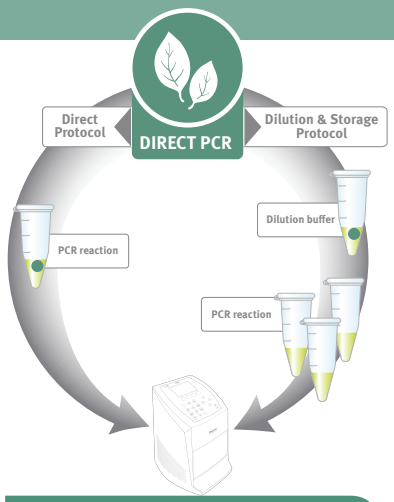
The Thermo Scientific Direct PCR approach is based on unique Thermo Scientific™ Phusion™ and Thermo Scientific™ Phire™ DNA Polymerases. These specially engineered DNA polymerases have superior features over any other PCR enzyme. Phusion and Phire DNA Polymerases are extremely fast, robust and highly tolerant of many PCR inhibitors present in unpurified sample materials. Due to their unique characteristics, these DNA polymerases are capable of reliably amplifying DNA in extremely challenging conditions – such as directly from a sample.

The superior performance of Phusion DNA Polymerase is based on fusion technology. The proofreading DNA polymerase (green) is fused to a small dsDNA binding protein (purple), creating a unique polymerase that generates PCR products with accuracy and speed unattainable with any other DNA polymerase. Similar technology is utilized in low-fidelity Thermo Scientific™ Phire™ Hot Start II DNA Polymerase to give this PCR enzyme speed, robustness and tolerance against various PCR inhibitors.

Efficient PCR from different plant materials across species

Thermo Scientific™ Phire™ Plant Direct PCR Master Mix

The Phire Plant Direct PCR Master Mix is designed to amplify DNA directly from plant samples. It has been tested with leaves and seeds from a wide variety of plant species. The kit includes Phire Hot Start II DNA Polymerase in a colored master mix optimized for direct DNA amplification from samples containing plant-derived inhibitors such as complex polysaccharides and polyphenols. The kit is an ideal choice for direct PCR.



Examples of materials tested

Leaves
- *Arabidopsis thaliana*
- Maize, rice, cotton
- Tobacco, grapevine

Tissue on storage cards
- Maize, tomato

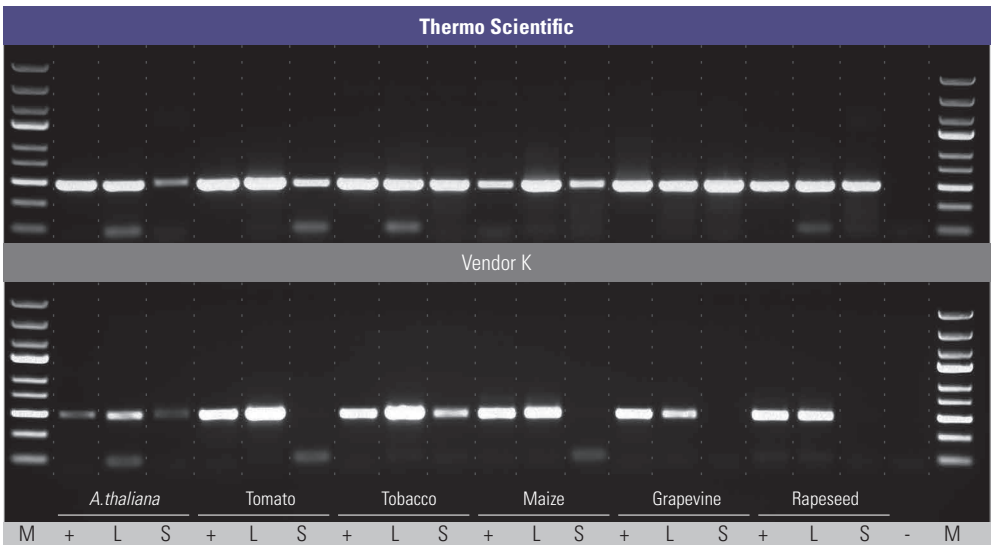
Seeds
- Apple, carrot, pumpkin

Fungi and moss
- *Marschantia polymorpha*
- *Agaricus sp.*

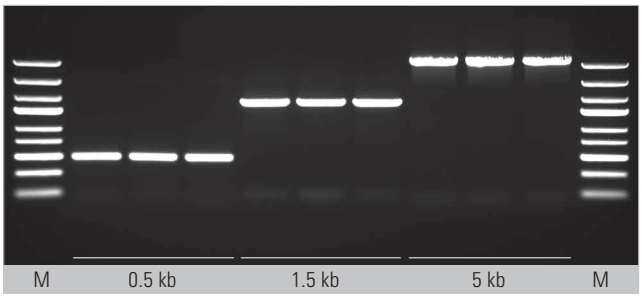
• See the full list of materials tested at thermoscientific.com/**directpcr**

Robust amplification from variety of plants

The Phire Plant Direct PCR Master Mix was tested with variety of plants, including difficult samples like grapevine, dried leaves and seeds.



▲ Amplification of 0.5 kb DNA fragment directly from leaves (L) and seeds (S) from different plants. 0.5 mm punch of leaf or a small piece of crushed seed was placed directly into 50 µL of Phire Plant Direct PCR Master Mix. Same samples were amplified using a kit from Vendor K according to supplier's instructions.
M – Thermo Scientific™ O'GeneRuler™ Express DNA Ladder
+ control reaction with purified DNA
- no-template control

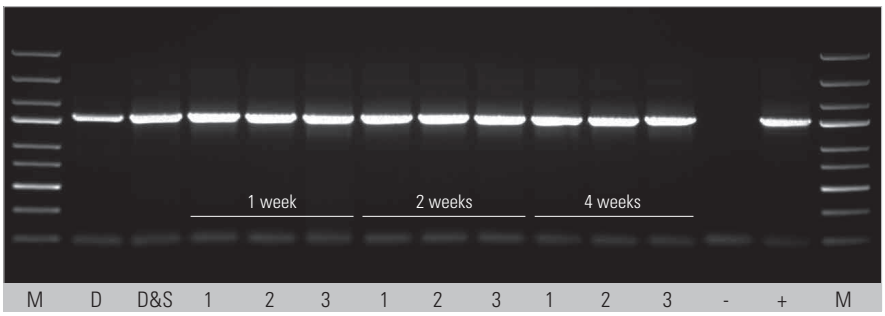


Reliable results at wide range of amplicon lengths

◀ Different length amplicons (0.5 kb, 1.5 kb and 5.0 kb) were amplified from dried Laurus leaves. 0.5 mm punches of leaves were placed directly into Phire Plant Direct PCR Master Mix.
M – O'GeneRuler Express DNA Ladder

Dilution & Storage protocol for retesting

For greater flexibility, Phire Plant Direct PCR Master Mix is optimized to work in Direct or Dilution & Storage protocols. With Dilution & Storage protocol one tiny sample can be used for multiple PCR reactions, and experiments can be reproduced with great accuracy even after a month.

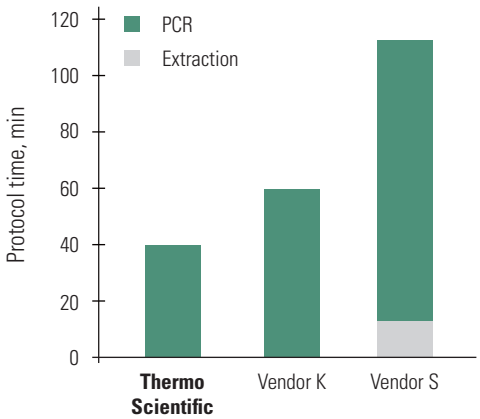


◀ 1.5 kb DNA fragment from tobacco leaves was amplified with Phire Plant Direct PCR Master Mix using Direct protocol (D) or Dilution & Storage protocol (D&S). With D&S protocol samples were stored in Dilution Buffer for 1, 2 and 4 weeks at different temperatures: 1 – -20 °C , 2 – +4 °C, 3 – room temperature.

M – O'GeneRuler Express DNA Ladder
+ control reaction with purified DNA
- no-template control

Fastest protocol from your sample to a loaded gel

In contrast to many other solutions for direct PCR, Phire Tissue Direct PCR Master Mix offers a truly direct protocol. Samples are added directly into PCR reaction mix with no prior incubation or extraction steps. Moreover, due to advanced polymerase used, the cycling times in many cases are twice shorter than with other systems. The Master Mix includes electrophoresis tracking dyes and a density reagent to further reduce your costs and processing time. Direct PCR reaction product can be directly loaded on a gel without adding a loading dye.



▲ Phire Plant Direct PCR Master Mix saves time.

Enjoy fast separation of the provided O'GeneRuler Express DNA ladder bands – reduce gel running times to

15 min!

Kit Component	F-160S 100 rxns	F-160L 500 rxns
2x Phire Plant Direct PCR Master Mix	2 × 1.25 mL	10 × 1.25 mL
Dilution Buffer	5 mL	2 × 12.5 mL
Control primer mix (25 µM each)	40 µL	40 µL
Water, nuclease-free	2 × 1.25 mL	10 × 1.25 mL
O'GeneRuler Express DNA Ladder	100 appl. (50 µg)	

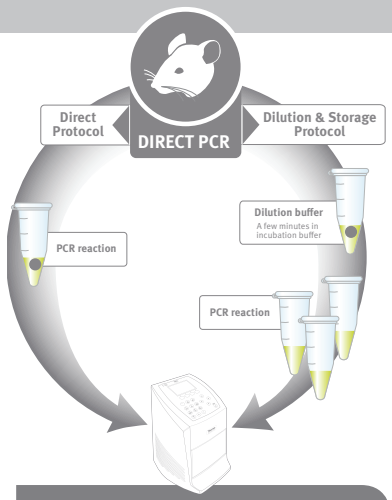
"The quality of PCR results was as good or better than with more time-consuming extraction methods, followed by PCR."

Dr. Margaret Docker, Department of Biological Sciences, University of Manitoba, Winnipeg, Canada

PCR directly from a variety of animal and human tissues

Thermo Scientific™ Phire™ Tissue Direct PCR Master Mix

The Phire Tissue Direct PCR Master Mix has been developed for amplification of DNA directly from a wide variety of tissues obtained from mice, human, fish, birds and insects. The Master Mix containing Phire Hot Start II DNA Polymerase is specially formulated to perform PCR in the presence of different animal tissue-derived inhibitors such as collagen, melanin and eumelanin (hair, skin) or myoglobin (muscle). The kit also includes Thermo Scientific™ DNARelease™ Additive, which can be used to improve the release of DNA from difficult tissues.

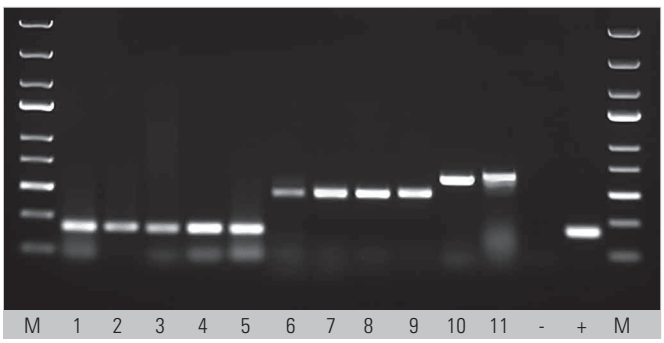


Examples of materials tested

- Mouse tissues: ear, tail, liver, spleen, brain
- Cultured mouse cells: fibroblasts
- Drosophila: wing, whole insect
- Zebrafish: fin
- *Caenorhabditis elegans:* whole worm
- Dog: hair
- Human specimen: buccal swabs, fingernails, saliva, teeth, skin biopsies, hair, FFPE tissue

• See the full list of materials tested at thermoscientific.com/**directpcr**

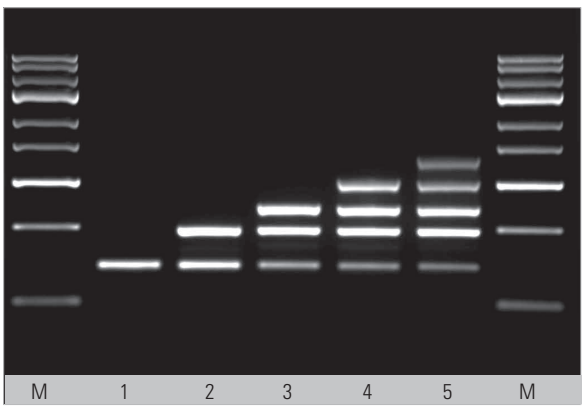
Outstanding robustness



▲ DNA fragments from different human and animal tissue samples were successfully amplified with Phire Tissue Direct PCR Master Mix. 1, 2, 3 – mouse tail, ear and hair; 4, 5 – bird muscle and feather; 6, 7, 8, 9 – human hair, tooth, nail and saliva; 10 – zebrafish muscle; 11 – fruit fly.

M – O'GeneRuler Express DNA Ladder
+ and - control reactions
- no-template control

> "By side stepping the need to extract and clean up the DNA we can save up to half a day using the Direct PCR kit, great when we are working with a number of different strains."
>
> Laura Weldon, Technician, Nematode Biology Research, Bristol, UK



Multiplex direct PCR

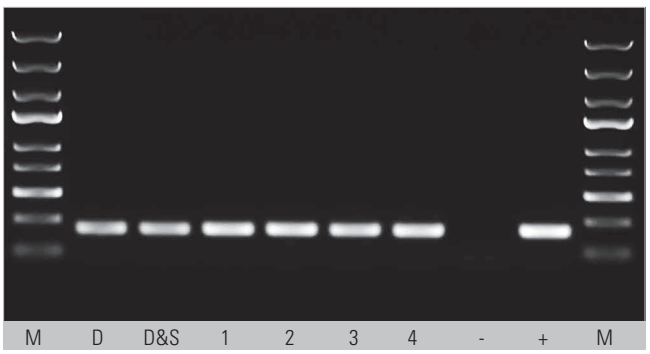
Phire Tissue Direct PCR Master Mix is suitable for multiplex reactions, enabling simultaneous determination of several markers in one reaction.

◀ Five different length DNA amplicons, ranging from 185 to 650 bp, were amplified from mouse ear in 1-plex to 5-plex reaction with Phire Tissue Direct PCR Master Mix.

M – O'GeneRuler Express DNA Ladder

Dilution & Storage protocol for retesting

For greater flexibility, Phire Tissue Direct PCR Master Mix is optimized to work in Direct or Dilution & Storage protocols. With Dilution & Storage protocol one tiny sample can be used for multiple PCR reactions, and experiments can be reproduced with great accuracy even after a month.



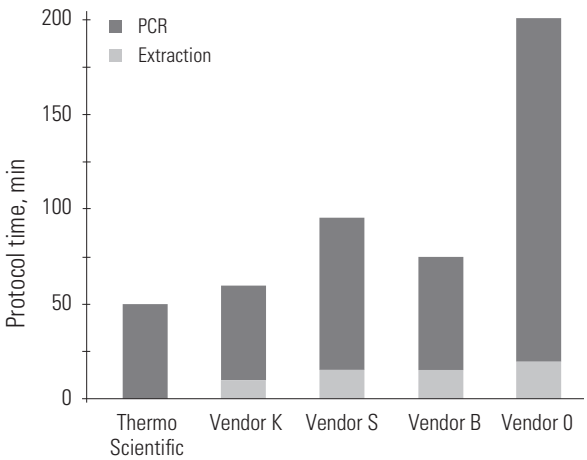
▲ 237 bp DNA fragment from mouse ear was amplified with Phire Tissue Direct PCR Master Mix using Direct and Dilution & Storage protocols. The same fragment was amplified after samples were stored in Dilution Buffer for several weeks at +4˚C.

D – Direct protocol, D&S – Dilution & Storage protocol, 1, 2, 3, 4 – Dilution & Storage protocol after one, two, three and four weeks storage in Dilution Buffer.

M – O'GeneRuler Express DNA Ladder
+ control reaction with purified mouse DNA
- no-template control.

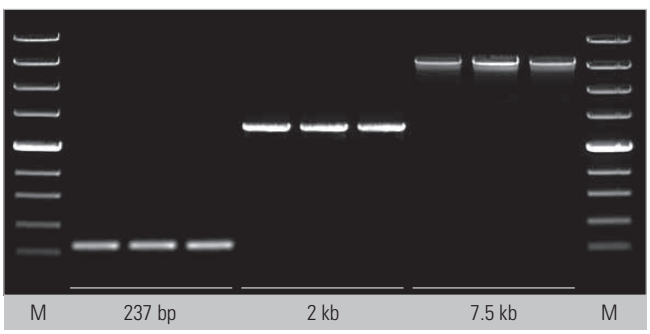
Fastest protocol from your sample to a loaded gel

In contrast to many other solutions for direct PCR, Phire Tissue Direct PCR Master Mix offers a truly direct protocol. Samples are added directly into PCR reaction mix with no prior extraction steps. Moreover, due to advanced polymerase used, the cycling times in many cases are twice shorter than with other systems. The Master Mix includes electrophoresis tracking dyes and a density reagent to further reduce your costs and processing time. Direct PCR reaction product can be directly loaded on a gel without adding a loading dye.



▲ Phire Tissue Direct PCR Master Mix saves time.

Reliable results in a wide range of amplicon lengths



▲ Different length amplicons (237 bp, 2 kb, 7.5 kb) were successfully amplified directly from human saliva with Phire Tissue Direct PCR Master Mix.

M – Thermo Scientific™ ZipRuler™ Express DNA Ladder 2

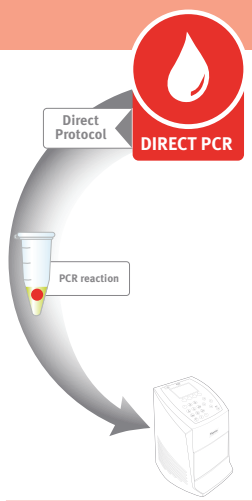
The Universal Control Primer Mix is compatible with multiple animal species for your positive controls.

Kit Component	F-170S 100 rxns	F-170L 500 rxns
2x Phire Tissue Direct PCR Master Mix	2 × 1.25 mL	10 × 1.25 mL
Dilution Buffer	5 mL	2 × 12.5 mL
DNARelease Additive	3 × 100 µL	1.3 mL
Universal Control primer mix	40 µL	40 µL
Water, nuclease-free	2 × 1.25 mL	10 × 1.25 mL
O'GeneRuler Express DNA Ladder	100 appl. (50 µg)	

Excellent results from a broad spectrum of blood samples

Thermo Scientific™ Phusion™ Blood Direct PCR Master Mix

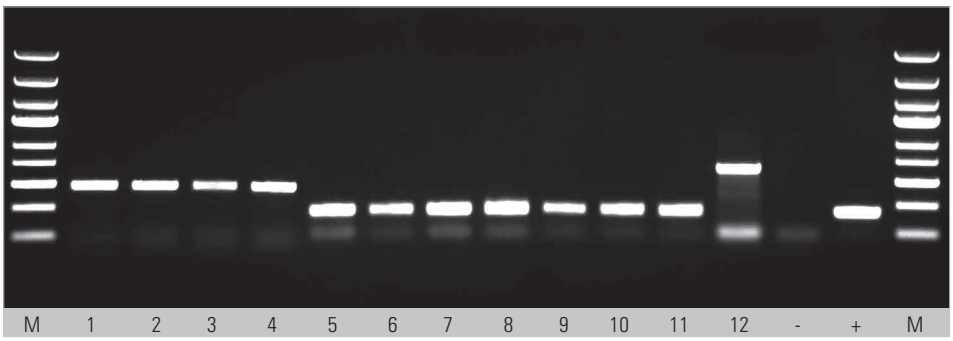
The Phusion Blood Direct PCR Master Mix is designed for amplification of DNA from whole blood at blood concentrations of up to 40% in the PCR reaction. This is achieved with specially modified Phusion Hot Start II High-Fidelity DNA Polymerase which is resistant to PCR inhibitors present in blood and also to most widely used blood preservatives (e.g., heparin, EDTA, citrate). This makes the Phusion Blood Direct PCR Master Mix an ideal choice for direct PCR from different types of blood.



Examples of materials tested

- Whole blood from: mouse, pig, cat, dog, cow, bird, human
- Blood preserved using heparin, citrate or EDTA
- Blood stored on Whatman 903 and FTA cards

Variety of blood samples

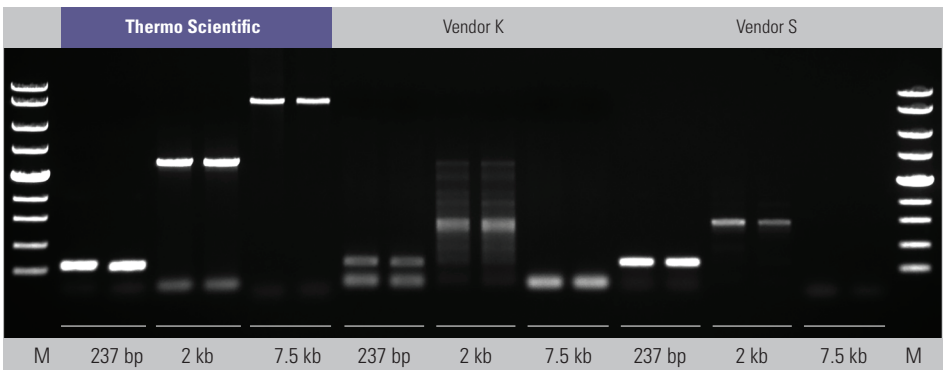


▲ DNA successfully amplified from human blood and blood from variety of animals.
1, 2, 3, 4 – human blood preserved with heparin, citrate, EDTA and stored on cards;
5 – mouse; 6 – cat; 7 – dog; 8 – cow; 9 – avian; 10 – sheep; 11 – horse; 12 – fish.
M – O'GeneRuler Express DNA Ladder
+ control reaction with purified DNA
- no tempate control

Kit Component	F-175S 100 rxns	F-175L 500 rxns
2x Phusion Blood Direct PCR Master Mix	1 mL	5 × 1 mL
50 mM EDTA (pH 8.0)	0.5 mL	0.5 mL
50 mM $MgCl_2$ solution	1.5 mL	1.5 mL
100 % DMSO	0.5 mL	0.5 mL
Universal Control Primer Mix	40 µL	40 µL
Water, nuclease-free	1.25 mL	4 × 1.25 mL
O'GeneRuler Express DNA Ladder	100 appl. (50 µg)	

The Universal Control Primer Mix is compatible with multiple animal species for your positive controls.

Extreme robustness with a wide range of amplicon lengths



▲ 237 bp, 2 kb and 7.5 kb fragments were amplified directly from human blood (EDTA-treated) with Phusion Blood Direct PCR Master Mix and other vendors' kits. Blood was placed directly into reactions and PCR was performed according to suppliers' instructions.
M – ZipRuler Express DNA Ladder 2

Start your Direct PCR experiment today

Category	Cat. No.	Product Description	Quantity
NEW Direct PCR Master Mixes	F-160S	Phire Plant Direct PCR Master Mix	100 rxns (50 µL each)
	F-160L		500 rxns (50 µL each)
	F-170S	Phire Tissue Direct PCR Master Mix	100 rxns (50 µL each)
	F-170L		500 rxns (50 µL each)
	F-175S	Phusion Blood Direct PCR Master Mix	100 rxns (20 µL each)
	F-175L		500 rxns (20 µL each)
Direct PCR Kits	F-130WH	Phire Plant Direct PCR Kit	200 rxns (50 µL each)
	F-140WH	Phire Animal Tissue Direct PCR Kit	200 rxns (50 µL each)
	F-150	Phusion Human Specimen Direct PCR Kit	200 rxns (20 µL each)
	F-547S	Phusion Blood Direct PCR Kit	100 rxns (20 µL each)
	F-547L		500 rxns (20 µL each)

- For further information visit thermoscientific.com/**directpcr**

"Cleanest genotyping results I've ever had, in the shortest time, with the least amount of work."

Suz Rix, Research Assistant, Institute of Child Health, University College London, UK

Add speed and improve performance

Thermo Scientific™ Piko™ Thermal Cyclers

To further optimize your Direct PCR protocols, combine them with the small and fast Piko Thermal Cycler. It allows you to complete the PCR runs in as little as 30 minutes! Although merely half the size of other instruments, Piko Thermal Cycler utilizes advanced technical solutions and meets the highest criteria in performance. The small size and low power consumption of the Piko Thermal Cycler also make it ideal for field use.

- For more information, please visit thermoscientific.com/**piko**

Thermo Scientific™ Ultra-thin Wall Reaction Vessels

Ultra-thin wall (UTW) reaction vessels have tube walls only half as thick as other thin-walled tubes, which improves thermal transfer between the heating block and reaction mix. Together, Piko Thermal Cycler and UTW reaction vessels allow significant reduction in PCR run times.

Fisher Scientific
Part of Thermo Fisher Scientific

Austria: +43 (0) 800 20 88 40 **Belgique/België:** +32 (0) 056 260 260 **Denmark:** +45 070 27 99 20
España: +34 902 239 303 **Finland:** +358 (0) 9 8027 6280 **France:** +33 (0) 3 88 67 53 20
Germany: +49 (0) 180 5 258221 **Ireland:** +353 (0) 1 885 5854 **Italia:** +39 02 953 28 258
Netherlands: +31 (0) 20 487 70 00 **Norway:** +47 (0) 22 95 59 59 **Portugal:** +351 21 425 33 50/4
Suisse/Switzerland: +41 (0) 56 618 41 11 **Sweden:** +46 (0) 31 352 32 00 **UK:** +44 (0)1509 23 11 66

Thermo SCIENTIFIC
Part of Thermo Fisher Scientific

MB1356CCG