



# PowerPlex® Fusion System

*Where Efficiency, Performance and Continents Meet.*

**The Power to Solve...** *from Sample to Analysis*

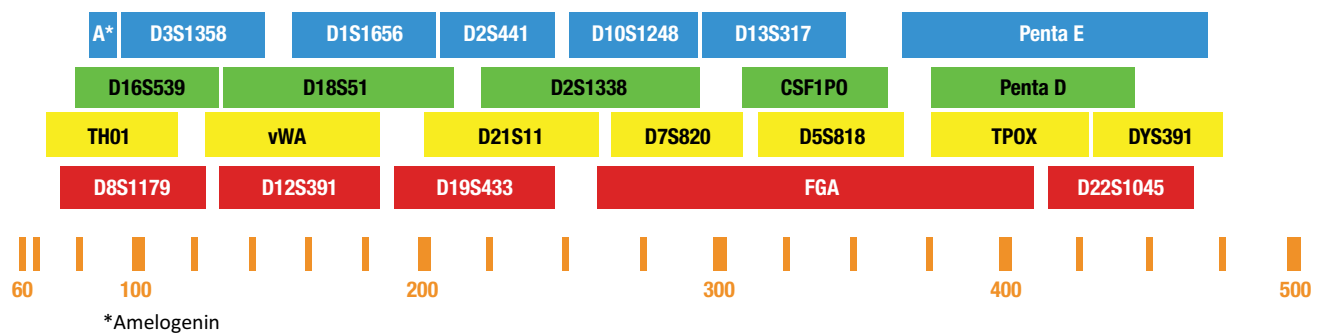


# The Power to Solve... *from Sample to Analysis*

Designed to meet CODIS and European standards, the PowerPlex® Fusion System allows laboratories to:

- Achieve the most inter-database compatibility and highest discrimination of any autosomal STR kit
- Improve laboratory efficiencies with rapid-cycling and direct-amplification protocols
- Obtain a higher success rate with difficult casework samples due to increased robustness and sensitivity
- Simplify validation and QC efforts by using one kit for both casework and databasing sections of the laboratory

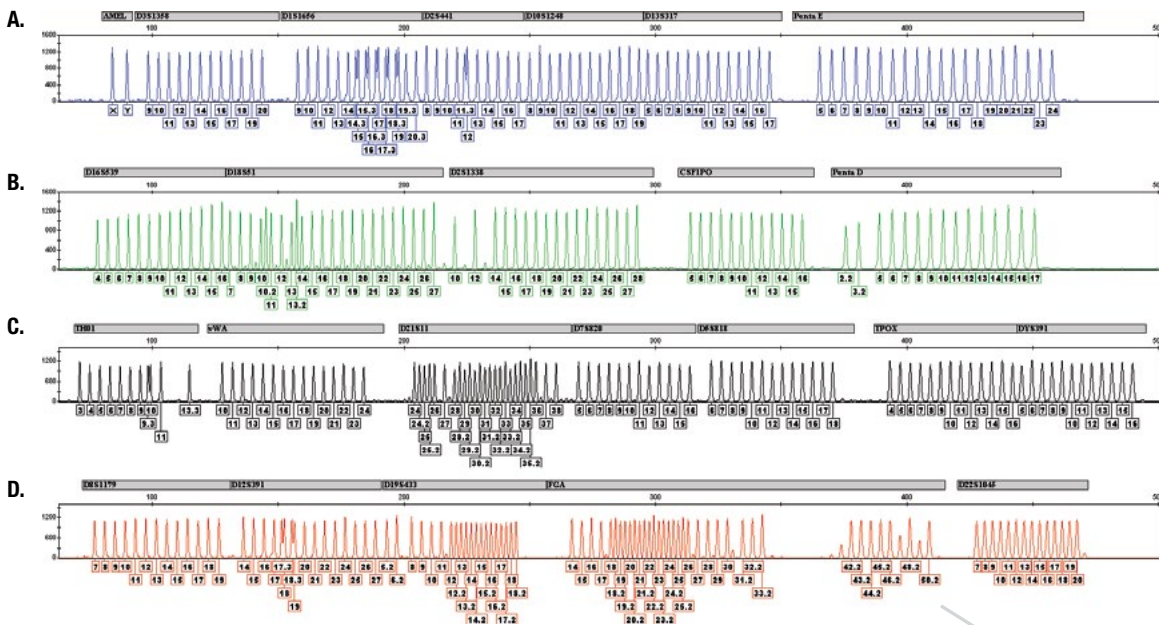
The PowerPlex® Fusion System provides all of the materials needed for co-amplification and fluorescent detection of 24 loci (23 STR loci and Amelogenin), including the CODIS core loci and European Standard Set (ESS) loci. This comprehensive set supports compatibility with present databases across multiple regions and encompasses an expanded set of loci to address future growth. With 24 loci, the PowerPlex® Fusion System offers the most STR loci and highest discrimination from a single reaction and delivers more information for demanding forensic, paternity and relationship-testing cases. Using proven STR chemistries for existing instrument platforms and software, the PowerPlex® Fusion System requires no software or instrument upgrades.



**Figure 1. Configuration of the PowerPlex® Fusion System.** The PowerPlex® Fusion System allows co-amplification and fluorescent detection of 24 loci, including all CODIS and ESS loci: D3S1358, D1S1656, D2S441, D10S1248, D13S317, D16S539, D18S51, D2S1338, CSF1PO, TH01, vWA, D21S11, D7S820, D5S818, TPOX, D8S1179, D12S391, D19S433, FGA, D22S1045 plus Penta E, Penta D, DYS391 and Amelogenin.

## Increased Genotyping Efficiency and Accuracy

The PowerPlex® Fusion System offers enhanced genotyping accuracy due to the expanded marker panels, which accommodate 36 new alleles. Moreover, new virtual bins were added to increase the genotyping efficiency of the system, resulting in fewer inconclusive allele calls.



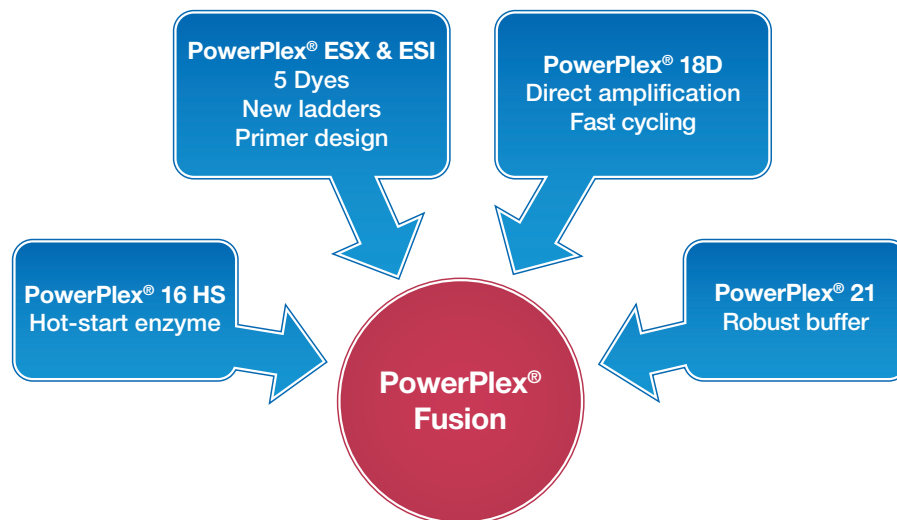
**Figure 2. The expanded PowerPlex® Fusion System panels and bins.** The PowerPlex® Fusion Allelic Ladder Mix was analyzed with an Applied Biosystems® 3130 Genetic Analyzer using a 3kV, 3-second injection. The sample file was analyzed with the GeneMapper® ID software, version 3.2, and PowerPlex® Fusion panels and bins text files. Each of the panels specifies the respective labeled allelic ladder components and their allele designations. **Panel A.** Fluorescein-labeled loci. **Panel B.** JOE-labeled loci. **Panel C.** TMR-ET-labeled loci. **Panel D.** CXR-ET-labeled loci.

**367 alleles**  
**224 virtual bins**  
**591 total alleles**

# The Power to Solve... *from Sample to Analysis*

## PowerPlex® Fusion—Built on Proven Technology

Proven technological advances from previously launched PowerPlex® STR systems such as a robust buffer system, direct-amplification capability and fast cycling conditions are just a few of the technology gains integrated into the PowerPlex® Fusion System. In addition, a powerful hot-start enzyme and optimized primer design help to make the PowerPlex® Fusion System the most advanced PowerPlex® STR system developed to date.



## More Discriminatory Power, More Data Sharing

As DNA databases continue to grow and international cooperation increases, a common set of markers is a prerequisite to facilitate data sharing and minimize adventitious matches. The PowerPlex® Fusion System offers the most discriminatory power and enables data sharing by incorporating common and informative loci used throughout the world (Table 1).

The PowerPlex® Fusion System includes two highly polymorphic loci: Penta D and Penta E. Valued for their high discrimination and low levels of stutter product, these two loci have been uploaded into databases across the globe for more than a decade. In the United States alone, more than 1 million samples with Penta data have been uploaded into the National Database Index System (NDIS).

The Probability of Identity value achieved with the PowerPlex® Fusion loci set is exceptional. By combining US CODIS and ESS loci, the system offers significant gains in discriminatory power and helps ensure fewer adventitious matches are obtained.

## Maximum Discriminatory Power

STR Typing Kits (Locus Combinations)	Total (n = 1036)
<b>CODIS 13 Loci</b>	$5.02 \times 10^{-16}$
AmpF/STR® Identifiler® Kit	$6.17 \times 10^{-19}$
PowerPlex® 16 System	$2.82 \times 10^{-19}$
PowerPlex® 18D System	$3.47 \times 10^{-22}$
<b>ESS 12 Loci</b>	$3.04 \times 10^{-16}$
PowerPlex® ESI 16 and ESX 16 Systems, AmpF/STR® NGM™ Kit	$2.80 \times 10^{-20}$
PowerPlex® ESI 17 and ESX 17 Systems, AmpF/STR® NGM SElect™ Kit	$1.85 \times 10^{-22}$
PowerPlex® 21 System	$6.71 \times 10^{-27}$
<b>CODIS 20 Loci (-DYS391)</b>	$9.35 \times 10^{-24}$
GlobalFiler® Kit	$7.73 \times 10^{-28}$
PowerPlex® Fusion System	$6.58 \times 10^{-29}$

**Table 1. Probability of identity values for common STR kits.** A probability of identity value (PI) is defined as the probability that two individuals selected at random will have an identical genotype at the tested locus. PI values are calculated by adding the square of the genotype frequencies. The PI values for the PowerPlex® Fusion System is significantly lower than the PI values seen with currently available STR typing kits, offering the most discrimination of any kit. **Note:** PI values do not include Amelogenin.

Reference: Butler, J.M., Hill, C.R. and Coble, M.D. Variability of new STR loci and kits in US population groups. *Profiles in DNA* www.promega.com/resources/articles/profiles-in-dna/2012/variability-of-new-str-loci-and-kits-in-us-population-groups/ Published 2012. Accessed April, 2012.

PowerPlex® Fusion System...built to meet  
the challenges of today *and* tomorrow.

# The Power to Solve... from Sample to Analysis



## Get More Done in Less Time

With a cycling time of less than 90 minutes, the PowerPlex® Fusion System saves approximately two hours per run, increasing productivity and enabling faster casework turnaround times.

## Meet the Challenges of Casework

The difficulties of performing casework—inhibitor-laden samples, low template DNA amounts and increasing demands for shorter times to results—are no match for the PowerPlex® Fusion System. In addition, nine loci are less than 215bp in length, helping to ensure that full profiles can be obtained with degraded casework samples. Designed to meet these challenges head on, the PowerPlex® Fusion System offers faster, more accurate answers with a higher success rate.

## Sensitivity

Casework samples often contain minimal amounts of DNA for analysis, so it is critical that STR systems effectively amplify DNA from those precious samples. The PowerPlex® Fusion System reliably produces complete profiles from as little as 100pg of human DNA, whereas partial profiles are regularly seen with DNA inputs lower than 100pg.

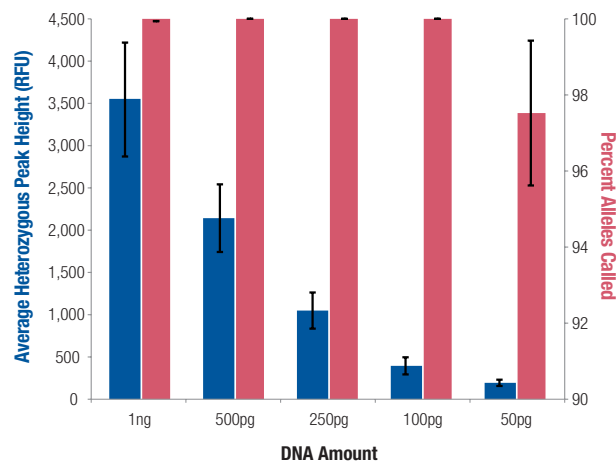


Figure 3. The PowerPlex® Fusion System demonstrates sensitivity sufficient to reliably generate full profiles with as little as 100pg of input DNA.

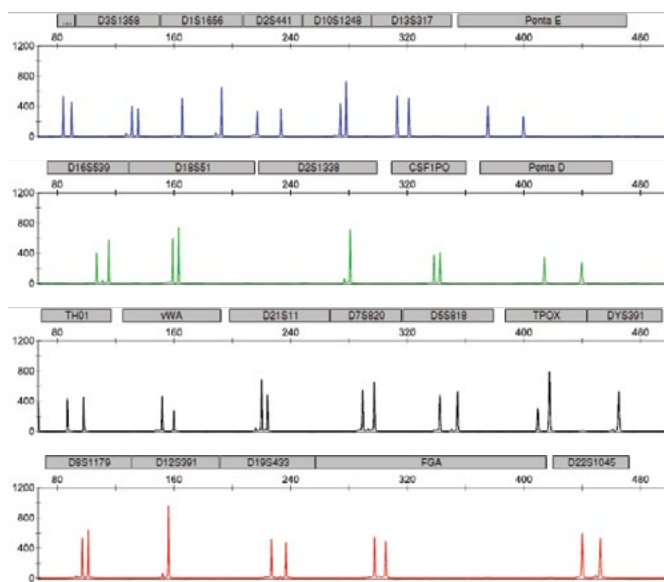
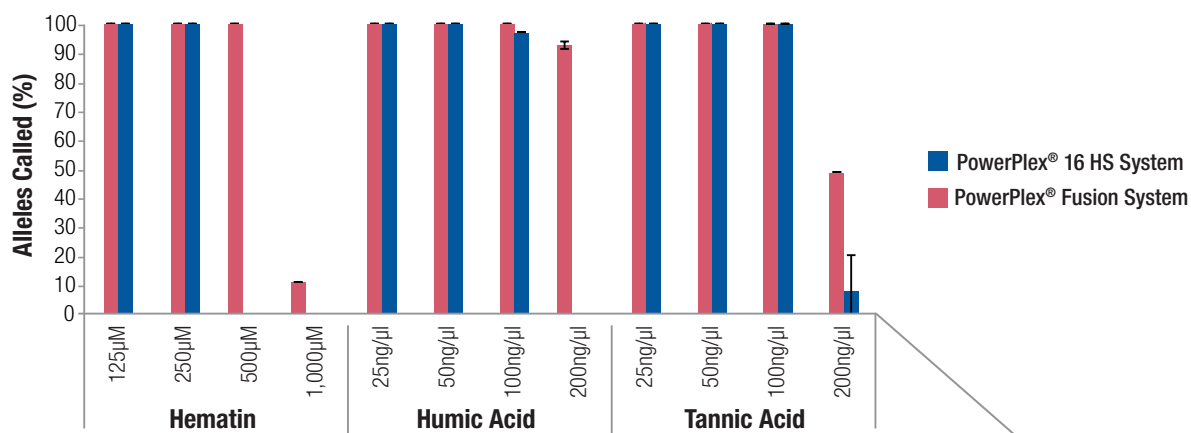


Figure 4. Amplification of 100pg of human DNA using 30 cycles and the PowerPlex® Fusion System. Amplified products were separated on an Applied Biosystems® 3130x/ Genetic Analyzer (3kV, 5-second injection).

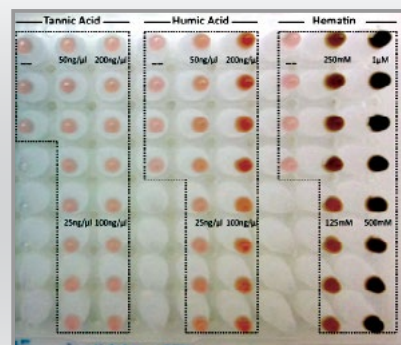
## Unbeatable Inhibitor Tolerance

By including a robust buffer system that tolerates the most challenging inhibitors, the PowerPlex® Fusion System minimizes the need to re-amplify samples generally thought to be too challenging and saves your lab countless hours of repeat analysis.

## Detect More Alleles with PowerPlex® Fusion



**Figure 5.** DNA (500pg) was amplified with the indicated kits in the presence of common inhibitors. Amplified products were separated using an Applied Biosystems® 3130x Genetic Analyzer (3kV, 5-second injection). Percentage of alleles detected is indicated for each system.

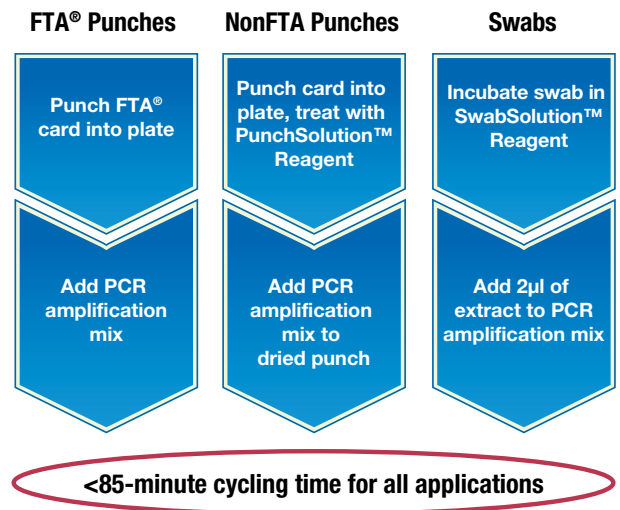


**Figure 6.** Notable discoloration in the amplification wells illustrates the high concentration of inhibitors present in the reactions.

# The Power to Solve... from Sample to Analysis

## Perform Direct Amplification With More Sample Types

Demonstrating the same flexibility established with the PowerPlex® 21 System, the PowerPlex® Fusion System allows direct amplification of DNA from FTA® card punches, pretreated nonFTA cards and commonly used swabs to streamline workflows and expand sample throughput.



## FTA® Punch Analysis

As seen in Figures 7 and 8, the PowerPlex® Fusion System enables direct amplification of DNA from unwashed FTA® card punches, simplifying your process and saving hours per plate.

### Blood on FTA® Card Punch, PowerPlex® Fusion System

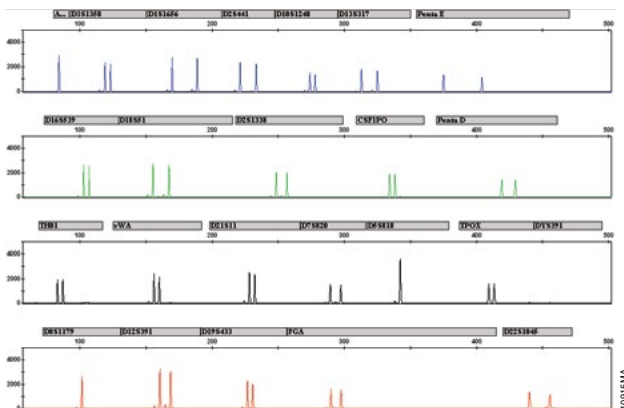


Figure 7. Direct amplification of one 1.2mm punch from blood on an FTA® card using the recommended protocol. Amplified products were separated using an Applied Biosystems® 3130x/ Genetic Analyzer (3kV, 5-second injection).

### Buccal Sample on FTA® Card Punch, PowerPlex® Fusion System

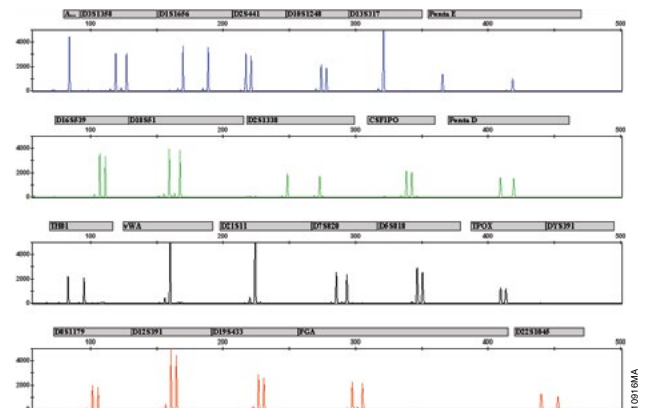
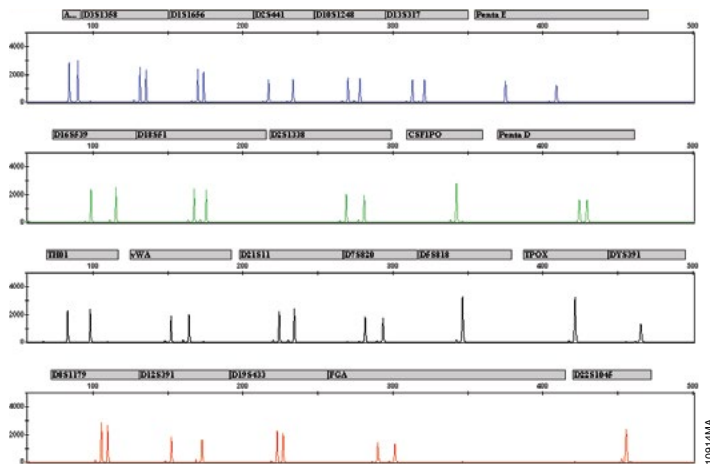


Figure 8. Direct amplification of two 1.2mm punches from a buccal sample on an FTA® card using the recommended protocol. Amplified products were separated using an Applied Biosystems® 3130x/ Genetic Analyzer (3kV, 5-second injection).

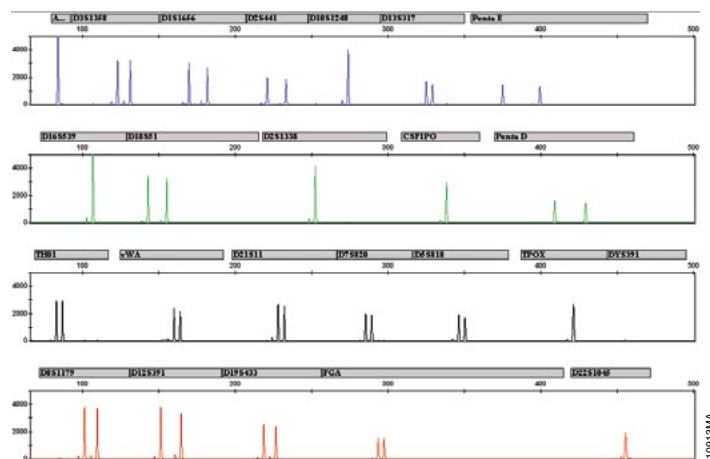


## Swab Sample, PowerPlex® Fusion System



**Figure 9. Amplification of DNA from a swab.** A swab was pretreated with SwabSolution™ Reagent as recommended in the *SwabSolution™ Kit Technical Manual*. Following incubation, 2µl of extract was added to the PCR amplification mix. Amplified products were separated using an Applied Biosystems® 3130x1 Genetic Analyzer (3kV, 5-second injection).

## Blood on S&S 903 Paper, PowerPlex® Fusion System



**Figure 10. Amplification of DNA from S&S 903 paper.** One 1.2mm buccal punch on S&S 903 paper was pretreated with PunchSolution™ Reagent as recommended in the *PunchSolution™ Kit Technical Manual*. Amplified products were separated using an Applied Biosystems® 3130x1 Genetic Analyzer (3kV, 5-second injection).

## Swabs

The PowerPlex® Fusion System works with the SwabSolution™ Kit to provide reproducible, high-quality STR profiles from swab samples. Laboratories can achieve significant time savings and expanded throughput capabilities due to the minimal number of steps involved in sample preparation.

## NonFTA Punch Analysis

When used with the PunchSolution™ Kit, the PowerPlex® Fusion System provides robust amplification profiles from nonFTA card punches, saving laboratories considerable time and steps with each run, thereby freeing up time for more value-added activities.

# The Power to Solve... *from Sample to Analysis*

## Don't Wait...Obtain More Meaningful Forensic Analyses Now

	CE Instrument	PowerPlex® Fusion System	6-Dye Kits
Instrument Compatibility	ABI PRISM® 310 Genetic Analyzer	Yes	No
	Applied Biosystems® 3130 and 3130x/ Genetic Analyzer	Yes	Software upgrade required
	Applied Biosystems® 3500 and 3500xL Genetic Analyzer	Yes	Yes

Budgets are tight. Use your grant funds wisely. The PowerPlex® Fusion System is the only STR multiplex that meets CODIS and ESS standards and doesn't necessitate the effort and expense of an instrument or software upgrade to bring the system online. The PowerPlex® Fusion System provides the highest level of discrimination without the uncertainty of software upgrades and instrument validation headaches. The PowerPlex® Fusion System is designed specifically for use with the ABI PRISM® 3100 and 3100-*Avant* Genetic Analyzers and Applied Biosystems® 3130, 3130x/, 3500 and 3500xL Genetic Analyzers.

---

**Meet CODIS and ESS standards without upgrading your instrument and software.**

---

# PowerPlex® Fusion System

## Ordering Information

Product	Size	Cat.#
PowerPlex® Fusion System	200 reactions	DC2402
	800 reactions	DC2408
WEN Internal Lane Standard 500	200µl	DG5001
PowerPlex® 5C Matrix Standards, 310	50 µl (each dye)	DG5640
PowerPlex® 5C Matrix Standard	5 preps	DG4850

The PowerPlex® Fusion System contains a 5X primer pair mix and 5X master mix, which allow convenient pipetting during reaction setup. Also included in the kit are the pre-amplification reagents: amplification-grade water and 2800M Control DNA. The post-amplification reagents include the PowerPlex® Fusion Allelic Ladder Mix and WEN ILS 500 size standard.

## Supporting Products

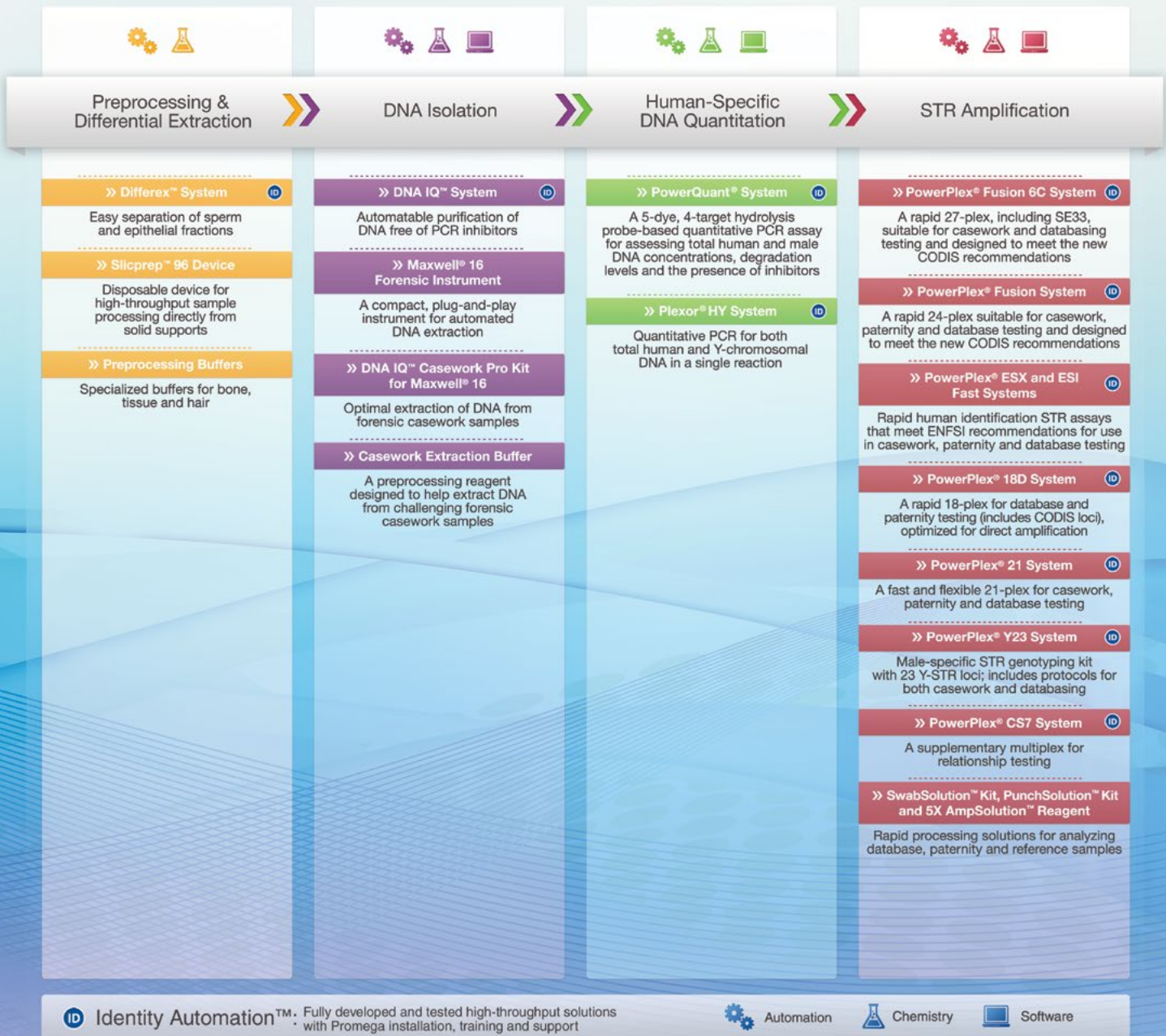
Product	Size	Cat.#
SwabSolution™ Kit	100 preps	DC8271
PunchSolution™ Kit	100 preps	DC9271

Promega offers custom packaging and solutions to meet your needs:

- A complete range of packaging options including customized format, container size, labeling and kit packaging
- Lot reservation and scheduled ordering to provide single or multiple lots as desired



## The Power to Solve



Maxwell, Plexor, PowerPlex and PowerQuant are registered trademarks of Promega Corporation. AmpSolution, Differex, DNA IQ, Identity Automation, PunchSolution, Slicprep and SwabSolution are trademarks of Promega Corporation.

ABI PRISM, AmpF/STR, Applied Biosystems, GeneMapper and Identifiler are registered trademarks of Applied Biosystems. FTA is a registered trademark of Flinders Technologies, Pty, Ltd., and is licensed to Whatman. GlobalFiler is a registered trademark of Life Technologies Corporation. NGM and NGM SElect are trademarks of Life Technologies, Inc.

Products may be covered by pending or issued patents or may have certain limitations. Please visit our Web site for more information.