

# Hoefer HE-PLUS

Horizontal Gel Electrophoresis System





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## Important Information – English

- If this equipment is used in a manner not specified by Hoefer, Inc. the protection provided by the equipment may be impaired.
- This instrument is designed for indoor laboratory use only.
- Only accessories and parts approved or supplied by Hoefer, Inc. may be used for operating, maintaining, and servicing this product.
- Warning! Because this instrument can develop sufficient voltage and current to produce a lethal shock, care must be exercised in its operation.
- This instrument is designed in accordance with the EN61010-1:2001 electrical safety standard. Nevertheless, it should be used only by properly trained operators. Read this entire manual before using the instrument and use only according to the instructions.
- The instrument must always be used with the earth lead of the power cord correctly grounded to earth at the mains outlet.
- Use only undamaged electrical wire and equipment specific for the voltages you will use. All equipment connected to high voltage should be in accordance with EN61010-1:2001.
- Keep the instrument as dry and clean as possible. Wipe regularly with a soft, damp cloth. Let the instrument dry completely before use.
- Do not operate the instrument in extreme humidity (above 80%). Avoid condensation by letting the unit equilibrate to ambient temperature when taking the instrument from a colder to a warmer environment.
- To permit sufficient cooling, ensure that the vents of the instrument are not covered.

## Důležité Informace – Czech

- Pokud by toto zařízení je použito způsobem, který není podle Hoefer, ochrana poskytovaná na základě Inc. zařízení může být narušena.
- Tento nástroj je určen pro vnitřní použití v laboratoři pouze.
- Pouze příslušenství a části schválené, nebo poskytnutých Hoefer, Inc. mohou být použity pro provoz, údržbu, a údržbě tohoto výrobku.
- Pozor! Protože tento nástroj může vyvinout dostatečný napětí a proud, který má vyrábět a smrticej šok, péče musí být vykonávána v jeho provoz.

- Tento nástroj je určen v souladu s EN61010-1:2001 elektrické bezpečnostní normy. Přesto, že by měly být použity pouze řádně vyškolení operátorů. Číst celé toto ruční před použitím nástroje a použití pouze v souladu s pokyny.
- Přístroj musí být vždy používají se na výkonu zemi věst šňůra správně zemněny k zemi na síti výústce.
- Využití pouze nepoškozené elektrické dráty a vybavení pro napětí budete používat. Všechna zařízení spojené s vysokým napětím by měla být v souladu s EN61010-1:2001.
- Si ponechá nástroje jako suchý a čistý jako možné. Otfete pravidelně s a měkké, vlhkým hadříkem. Necht' je nástroj nenastavený úplně před použitím.
- Nejsou provozována na nástroj v extrémní vlhkost (nad 80%). Předěšlo kondenzaci o pronájmu jednotky na okolní teplotu nechá při přijímání nástroj z chladnější do teplého prostředí.
- Pro umožnění dostatečné chlazení, zajistit, aby otvory nástroje jsou nevztahuje.

## Vigtig Information – Danish

- Hvis dette udstyr bruges i en måde ikke specificeret ved Hoefer, Inc. den beskyttelse, som er blevet forsynet af udstyret kan måske svækkes.
- Dette instrument er designet for indendørs laboratoriumbrug bare.
- Bare tilbehør og del godkendede eller forsynede ved Hoefer, Inc. kan måske bruges for drive, funktionsfejl, og betjening dette produkt.
- Advare! Fordi dette instrument kan udvikle tilstrækkelig spænding og strøm at fremstille et dødbringende chok, skal pleje bruges i dets drift.
- Dette instrument er designet i overensstemmelse med EN61010-1:2001 elektrisk sikkerhedsstandard. Alligevel, skulle det bruges bare af passende trænedede operatører. Læs denne hel håndbog før bruging instrumentet og brug bare i henhold til instruktionerne.
- Instrumentet skal altid bruges med jordblyet af netledningen rigtigt jordede til jord på hovedledning-sudløbet.
- Bruger bare uskadte elektrisk tråd og udstyr, som være specifik for spændingerne du vil bruge. Alt udstyr forbundet til høj spænding skulle være i overensstemmelse med EN61010-1:2001.
- Beholder instrumentet så tør og ren som mulig. Tør regulært med et blødt, fugtigt stof. Lad instrument-

tørken komplet før brug.

- Driver ikke instrumentet i yderst fugtighed (ovenfor 80%). Undgå kondensation ved lade enheden equilibrere til omgivende temperatur ved tage instrumentets fra et koldere til et varmere miljø.
- At tillade tilstrækkelig afkøling, forsikrer, at lufthullerne af instrumentet er ikke dækket.

## Belangrijke Informatie – Dutch

- Indien deze uitrusting in een manier wordt gebruikt die niet door Hoefer is gespecificeerd, Nv. de bescherming die door de uitrusting is verzorgd kan worden geschaad.
- Dit instrument is voor binnenlaboratoriumgebruik enkel ontworpen.
- Enkel onderdelen en delen keurden goed of leverden door Hoefer, Nv. kan voor het bedienen worden gebruikt, handhavend en onderhouden van dit product.
- Waarschuwend! Omdat dit instrument voldoende spanning en stroom kan ontwikkelen om een dodelijke schok te produceren, moet zorg in zijn operatie worden geefend.
- Dit instrument is in overeenstemming met de EN61010-1:2001 elektrische veiligheidsstandaard ontworpen. Niettemin zou het enkel door goed getrainde bedieningslieden moeten worden gebruikt. Lees dit volledige handboek voor het gebruik het instrument en gebruik enkel volgens de instructies.
- Het instrument moet altijd met de aardeleiding van het stroomsnoer correct grondde naar aarde aan het hoofdafzetgebied worden gebruikt.
- Gebruik enkel onbeschadigde elektrische draad en uitrustings specifiek voor de spanningen u zult gebruiken. Alle uitrustingen sloten aan aan hoogspanning zou in overeenstemming met EN61010-1:2001 moeten zijn.
- Houd het instrument zo droge en schone zoals mogelijk Bij. Wis regelmatig met een zacht, temperdoek. Verhuur het instrument droogt volledig voor het gebruik.
- Bedien niet het instrument in extreme vochtigheid (bovenstaande 80%). Vermijd condensatie door het verhuizen van de eenheid in evenwicht brengt naar omgevingstemperatuur wanneer nemen het instrument van een kouder naar een lievere omgeving.
- Om toe te staan voldoende afkoelen, verzeker dat de luchtopeningen van het instrument niet bedekt zijn.

## Tärkeää Tietoa – Finnish

- Jos tätä varusteita käytetään tavassa ei määritetty Hoeferille, Inc. suojelu ehkäisty varusteille saattaa olla avuton.
- Tämä väline suunnitellaan sisälaboratoriokäyttölle vain.
- Vain lisävarusteet ja osat hyväksyivät tai toimitti Hoeferin oheen, Inc.ää voi käyttää käyttämiselle, valvoalle, ja servicing tämä tuote.
- Varoittaminen! Koska tämä väline voi kehittää riittävä jännitteen ja virran tuottaa kuolettavan järkytyksen, huolta täytyy harjoittaa toiminnossaan.
- Tämä väline suunnitellaan EN61010-1:2001 sähköturvallisuusstandardin mukaisesti. Silti pitäisi käyttää vain ohi oikeasti koulutetut käyttäjät. Lue tämä kokonainen manuaalinen ennen välinettä ja käyttö vain ohjeiden mukaan.
- Välinettä täytyy käyttää aina valtanuoran maalyijystä perusti oikein maadoittaa sähköverkkoaukossa.
- Käyttää vain undamaged sähkömetallilankaa ja varusteita, täsmällinen jännitteille käyttää. Kaikki varusteet yhdistetty korkeaan jännitteeseen pitäisi olla EN61010-1:2001IN mukaisesti.
- Pitää välineen yhtä kuiva ja puhdas kuin mahdollinen. Pyyhi säännöllisesti pehmeällä, kostealla kankaalla. Anna väline kuivua täysin ennen käyttöä.
- Ei käytä välinettä extreme-ilmankestäudessa (80%)n yläpuolella. Vältä tiivistymistä antamalla yksikön equilibrere ympäröivään lämpötilaan kun ottaminen väline kylmempi lämpimämpään ympäristöön.
- Sallia riittävän jäähdyttäminen, varmistaa että välineen ilmareiät peitetään.

## Information Importante – French

- Si cet équipement est utilisé dans une manière pas spécifié par Hoefer, Inc. la protection fourni par l'équipement pourrait être diminuée.
- Cet instrument est conçu pour l'usage de laboratoire intérieur seulement.
- Seulement les accessoires et les parties ont approuvé ou ont fourni par Hoefer, Inc. pourrait être utilisé pour fonctionner, maintenir, et entretenir ce produit.
- Avertisant! Parce que cet instrument peut développer la tension et le courant suffisants pour produire un choc mortel, le soin doit être exercé dans son opération.
- Cet instrument est conformément conçu à l'EN61010-

1:2001 norme de sécurité électrique. Néanmoins, il devrait être seulement utilisé par les opérateurs convenablement entraînés. Lire ce manuel entier avant d'utiliser l'instrument et l'usage seulement selon les instructions.

- L'instrument toujours doit être utilisé avec l'avance de terre du cordon d'alimentation correctement a fondé à la terre à la sortie principale.
- Utiliser le fil et l'équipement électriques seulement intacts spécifiques pour les tensions que vous utiliserez. Tout équipement connecté à haute tension devrait être conformément à EN61010-1:2001.
- Garder l'instrument aussi sec et propre comme possible. Essuyer régulièrement avec un doux, étouffer du tissu. Laisser l'instrument sèche complètement avant l'usage.
- Ne pas fonctionner l'instrument dans l'extrême humidité (au-dessus de 80%). Éviter la condensation en laissant l'équilibre d'unité à la température ambiante en prenant l'instrument d'un plus froid à un environnement plus chaud.
- Permettre le refroidissement suffisant, garantir que les conduits de l'instrument ne sont pas couverts.

## Wichtige Informationen – German

- Wenn diese Ausrüstung gewissermaßen nicht angegeben durch Hoefler, Inc verwendet wird, kann der durch die Ausrüstung zur Verfügung gestellte Schutz verschlechtert werden.
- Dieses Instrument wird für den Innenlaborgebrauch nur dafür entworfen.
- Nur Zusätze und Teile genehmigten oder lieferten durch Hoefler, Inc kann für das Funktionieren, das Aufrechterhalten, und die Wartung dieses Produktes verwendet werden.
- Die Warnung! Weil dieses Instrument genügend Stromspannung und Strom entwickeln kann, um einen tödlichen Stoß zu erzeugen, muss Sorge in seiner Operation ausgeübt werden.
- Dieses Instrument wird in Übereinstimmung mit dem EN61010-1:2001 elektrischen Sicherheitsstandard dafür entworfen. Dennoch sollte es nur von richtig erzo-genen Maschinenbedienern verwendet werden. Lesen Sie dieses komplette Handbuch vor dem Verwenden des Instrumentes und verwenden Sie nur gemäß den Instruktionen.
- Das Instrument muss immer mit der Erdleitung der Macht-Schnur richtig niedergelegt zur Erde am

Hauptausgang verwendet werden.

- Nur unbeschädigte elektrische Leitung und Ausrüstung spezifisch für die Stromspannungen verwenden, die Sie verwenden werden. Die ganze mit der Hochspannung verbundene Ausrüstung sollte in Übereinstimmung mit EN61010-1:2001 sein.
- Das Instrument ebenso trocken halten und reinigen wie möglich. Wischen Sie regelmäßig mit einem weichen, befeuchten Sie Stoff. Lassen Sie das Instrument trocken völlig vor dem Gebrauch.
- Das Instrument in der äußersten Feuchtigkeit (über 80 %) nicht bedienen. Vermeiden Sie Kondensation, die Einheit equilibrierte zur Umgebungstemperatur laßend, wenn Sie das Instrument von einem kälteren bis eine wärmere Umgebung nehmen.
- Um das genügend Abkühlen zu erlauben, stellen Sie sicher, dass die Öffnungen des Instrumentes nicht bedeckt werden.

## Informazioni Importanti – Italiano

- Se quest'apparecchiatura è usata in un modo specificato da Hoefler, Inc. la protezione fornito dall'apparecchiatura potrebbe essere indebolita.
- Questo strumento è designato per l'uso di laboratorio interno solo.
- Solo gli accessori e le parti hanno approvato o hanno fornito da Hoefler, Inc. potrebbe essere usato per operare, per mantenere, e per revisionare questo prodotto.
- Avvertendo! Perché questo strumento può sviluppare il voltaggio sufficiente e la corrente di produrre una scossa letale, la cura deve essere esercitata nella sua operazione. Questo strumento è designato conformemente all'EN61010-1:2001 la norma di sicurezza elettrica. Tuttavia, dovrebbe essere usato degli operatori solo correttamente addestrati. Leggere questo manuale intero prima di usare lo strumento e l'uso solo secondo le istruzioni.
- Lo strumento deve essere sempre usato col piombo di terra della spina di alimentazione correttamente hanno messo a terra alla presa di corrente principale.
- Usa il filo metallico e l'apparecchiatura solo intatti elettrici specifici per i voltaggi che lei userà. Tutta l'apparecchiatura collegata all'alto voltaggio dovrebbe essere conformemente a EN61010-1:2001.
- Tiene lo strumento come secco e pulito come possibile. Pulire regolarmente con un morbido, per spegnere il panno. Lasciare lo strumento asciuga completamente prima dell'uso.

- Non opera lo strumento nell'umidità estrema (al di sopra di 80%). Evitare la condensazione lasciando l'unità equilibrata alla temperatura ambiente quando portare lo strumento da un più freddo a un ambiente più caldo.
- Di permettere raffreddare sufficiente, assicura che gli sbocchi dello strumento non sono coperti.

## Viktig Informasjon – Norwegian

- Hvis dette utstyret blir brukt i en måte ikke spesifisert ved Hoefer, Inc. beskyttelsen som ha blitt git av utstyret kan bli svekket.
- Dette instrumentet er utformet for innendørs laboratoriumbruk bare.
- Bare tilbehør og deler godkjente eller forsynte ved Hoefer, Inc. kan bli brukt for drive, vedlikeholde, og betjene dette produktet.
- Varsler ! Fordi dette instrumentet kan utvikle tilstrekkelig spenning og strøm til å produsere et dødelig sjokk, må bli øvd bekymring i dets drift.
- Dette instrumentet er utformet i samsvar med EN61010-1:2001 elektrisk sikkerhetsstandard. Likevel burde bli brukt det bare av skikkelig utdannede operatører. Les denne hele håndboken før brukning instrumentet og bruken bare gi til instruksjonene.
- Instrumentet må alltid bli brukt med jorden blyet av kraftkabelen som riktig ha blitt jordet til jord på hovedledningen utløp.
- Bruker bare uskadd elektrisk ledningsfremføring og utstyr som er spesifikk for spenningene du vil bruke. All utstyr komplet til høyspenning burde være i samsvar med EN61010-1:2001.
- Beholder instrumentet som tørker og rengjør som mulig. Visk regulært med et mykt, fuktig stoff. La instrumentet tørker komplett før bruk.
- Driver instrumentet i ekstrem fuktighet ikke (ovenfor 80%). Unngå kondensasjon ved å la enheten equilibrere til omgivelsestemperatur ved taen instrumentet fra et kaldere til et varmere miljø.
- Til å tillate tilstrekkelig kjølig, sikrer at ventilasjonssåpningene av instrumentet er ikke dekket.

## Wazne Informacje – Polish

- Jeżeli ten sprzęt jest wykorzystywany w sposób nie określone przez Hoefer, Inc. do ochrony przewidzianej przez urządzenie może zostać obniżony.
- Instrument ten jest przeznaczony do użytku w labora-

toriach kryty tylko.

- Tylko akcesoriów i części zatwierdzone lub dostarczone przez Hoefer, Inc. mogą być wykorzystane do eksploatacji, utrzymania i obsługi tego produktu.
- Uwaga! Ponieważ ten akt prawny może być rozwinięcie odpowiednich napięcie i bieżących do wyprodukowania śmiertelnego szoku, opiekę musi być wykonywane w działaniu.
- Ten instrument został zaprojektowany zgodnie z tym EN61010-1: 2001 Bezpieczeństwo elektryczne standard. Niemniej jednak, należy stosować jedynie przez odpowiednio przeszkoleni operatorów. Znajdą państwo to cały podręcznika przed zastosowaniem instrumentu i stosować jedynie zgodnie z instrukcjami.
- Instrument musi zawsze być wykorzystane z ziemi doprowadzić do zasilania detonującego właściwie uzasadnione na ziemię w sieci wodociągowej rynku zbytu.
- Wykorzystanie tylko nieuszkodzona elektrycznych drutów i urządzenia specjalne do napięć zapłącą wykorzystania. Wszystkie urządzenia podłączone do wysokiego napięcia powinny być zgodne z EN61010-1: 2001.
- Kontrolować instrumentu jako suche i czyste jak to możliwe. Wytrzeć regularnie przy pomocy miękkiego wilgotnej szmatki. Niech się instrumentem całkowicie wysuszyć przed użyciem.
- Nie prowadzą do instrumentu w skrajnych wilgotności (powyżej 80%). Zapobiec kondensacji najmu przez jednostkę równoważyć do temperatury pokojowej przy podejmowaniu instrumentu z chłodniejsze w cieplejszych środowiska.
- Aby umożliwić wystarczające chłodzenia, zapewniają, że rozcięcia of the instrument nie objęte ubezpieczeniem.

## Informações Importantes – Portuguese

- Se este equipamento é usado numa maneira não especificada por Hoefer, Inc. que a protecção fornecida pelo equipamento pode ser comprometida.
- Este instrumento é projectado para uso de interior de laboratório só. Só acessórios e partes aprovaram ou forneceu por Hoefer, Inc. pode ser usada para operar, manter, e servicing este produto.
- Advertindo! Porque este instrumento pode desenvolver voltagem suficiente e corrente produzir um choque letal, cuidado deve ser exercitado em

sua operação.

- Este instrumento é projectado de acordo com o EN61010-1:2001 condição de segurança eléctrica. Não obstante, deve ser usado só por operadores adequadamente treinados. Leia este manual inteiro antes de usar o instrumento e use só de acordo com as instruções.
- O instrumento sempre deve ser usado com o chumbo de terra do cordão de poder corretamente baseado a terra nos cabos saída principais.
- Usa fio eléctrico só intacto e equipamento específico para as voltagens que você usará. Todo equipamento conectado a voltagem alta deve ser de acordo com EN61010-1:2001.
- Mantem o instrumento tão seco e limpo como possível. Limpe regularmente com um pano húmido macio. Deixe o instrumento secar completamente antes de uso.
- Não opera o instrumento em humidade extrema (acima de 80%). Evite condensação deixando o equilíbrio de unidade a temperatura ambiental quando tomar o instrumento de um mais frio a um ambiente mais quente.
- Permitir esfriar suficiente, assegura que as aberturas do instrumento não são cobertas.

## Información Importante – Spanish

- Si este equipo es utilizado en una manera no especificado por Hoefer, S.a. la protección proporcionado por el equipo puede ser dañada.
- Este instrumento es diseñado para el uso interior del laboratorio sólo. Sólo accesorios y partes aprobaron o suministraron por Hoefer, S.a. puede ser utilizado para operar, para mantener, y para atender a este producto.
- Advertiendo! Porque este instrumento puede desarrollar voltaje y corriente suficientes para producir un golpe mortal, el cuidado debe ser ejercitado en su operación.
- Este instrumento es diseñado de acuerdo con el EN61010-1:2001 estándar eléctrico de seguridad. No obstante, debe ser utilizado sólo por operarios adecuadamente capacitados. Lea este manual entero antes de utilizar el instrumento y el uso sólo según las instrucciones.
- El instrumento siempre debe ser utilizado con el plomo de la tierra del cable de alimentación molió correctamente a la tierra en la salida de red.
- Utiliza alambre y equipo eléctricos sólo ilesos específicos para los voltajes que usted utilizará. Todo equipo

conectado al voltaje alto debe ser de acuerdo con EN61010-1:2001.

- Mantiene el instrumento tan seco y limpio como posible. Enjugo regularmente con un suave, el trapo húmedo. Permita que el instrumento seque completamente antes de uso.
- No opera el instrumento en la humedad extrema (encima de 80%). Evite condensación permitiendo la unidad equilibra a la temperatura ambiente al tomar el instrumento de un más frío a un ambiente más tibio.
- Permitir refrigeración suficiente, asegure que las aberturas del

## Viktig Information – Swedish

- om denna utrustning används i ett sätt som inte har specificeras av Hoefer, Inc. skyddet tillhandahöll vid utrustningen kan skadas.
- Detta instrument formges för inomhuslaboratorium användning bara.
- Bara medhjälpare och delar godkände eller levererade vid Hoefer, Inc. kan användas för fungera, underhålla, och servicing denna produkt.
- varna! Därför att detta instrument kan utveckla tillräcklig spänning och ström att producera en dödlig stöt, måste övas omsorg i dess funktion.
- Detta instrument formges i överensstämmelse med EN61010-1:2001 elektriska säkerheten standarden. Icke desto mindre, bör det användas bara av riktigt utbildade operatörer. Läs denna hela handbok före använda instrumentet och använd bara enligt undervisningarna.
- Instrumentet måste alltid användas med jorden blyet av kraften repet riktigt grounded till jorden på det huvudutloppet.
- Använder bara undamaged elektrisk tråd och utrustning specifik för spänningarna du ska använda. All utrustning kopplats som till hög spänning skulle vara i överensstämmelse med EN61010-1:2001.
- Håller instrumentet då torkar och rengör som möjlig. Torka regelbundet med en mjuk, fuktig trasa. Låt instrumentet torka fullständigt före användningen.
- Fungerar inte instrumentet i extrem fuktighet (över 80%). Undvik kondensering vid låta enheten equilibrate till omgivande temperatur när ta instrumentet från en kallare till en varmare miljö.
- Att tillåta tillräcklig kyla, ser till att hålen av instrumentet inte täcks.

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## Waste Electrical and Electronic Equipment (WEEE)

English



This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

French



Ce symbole indique que les déchets relatifs à l'équipement électrique et électronique ne doivent pas être jetés comme les ordures ménagères non-triées et doivent être collectés séparément. Contactez un représentant agréé du fabricant pour obtenir des informations sur la mise au rebut de votre équipement.

German



Dieses Symbol kennzeichnet elektrische und elektronische Geräte, die nicht mit dem gewöhnlichen, unsortierten Hausmüll entsorgt werden dürfen, sondern separat behandelt werden müssen. Bitte nehmen Sie Kontakt mit einem autorisierten Beauftragten des Herstellers auf, um Informationen hinsichtlich der Entsorgung Ihres Gerätes zu erhalten.

Italian



Questo simbolo indica che i rifiuti derivanti da apparecchiature elettriche ed elettroniche non devono essere smaltiti come rifiuti municipali indifferenziati e devono invece essere raccolti separatamente. Per informazioni relative alle modalità di smantellamento delle apparecchiature fuori uso, contattare un rappresentante autorizzato del fabbricante.

Spanish



Este símbolo indica que el equipo eléctrico y electrónico no debe tirarse con los desechos domésticos y debe tratarse por separado. Contacte con el representante local del fabricante para obtener más información sobre la forma de desechar el equipo.

Swedish



Denna symbol anger att elektriska och elektroniska utrustningar inte får avyttras som osorterat hushållsavfall och måste samlas in separat. Var god kontakta en auktoriserad tillverkarrepresentant för information angående avyttring av utrustningen.



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## Packing List Hoefer HE-PLUS Gel System

### Units include:

Tank with lid, power supply, power cord, and standard casting set (one – 13 × 12.5 cm UV Transmittant Casting Tray, two – 6 × 12.5 cm UV Transmittant Casting Trays, four – 1 mm 14/28 reversible multichannel compatible combs, and a casting stand).

The packing lists should be referred to as soon as the units are received to ensure that all components have been included. The unit should be checked for damage when received, save packaging for carrier. Please contact your supplier if there are any problems or missing items.

## Usage Guidance and Restrictions

- Temperature range between 4 °C and 40 °C.
- Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.
- Not for outdoor use.

This apparatus is rated POLLUTION DEGREE 2 in accordance with IEC 664. POLLUTION DEGREE 2, states that: “Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected”.

## Specifications

Unit dimensions (W × L × H)	24.5 × 17.0 × 6.2 cm
Gel dimensions (W × L)	12.5 × 13.0 cm
Maximum sample capacity	112 samples (4 combs, 28 samples each)
Buffer capacity	350 ml
Distance between electrodes	13.5 cm

### Electrophoresis Tank

Overall dimension (W × L × H)	18.3 × 16.4 × 5.6 cm
Material characteristic	UV transmitting (50% at 254 nm, 80% at 312 nm)
Solution volume	350 ml (includes buffer and gels)

### Safety Lid

Overall dimension (W × L × H)	19.7 × 16.9 × 3.8 cm
Material characteristic	UV non-transmitting acrylic

### Power Supply

Overall dimension (W × L × H)	7.5 × 17.0 × 6.2 cm
Weight	410 g
Input voltage	AC 100 – 240 V, 50/60 Hz
Output voltage	10 to 150 volts in 10 V steps; Constant peak voltage of 150 V
Output amperage	10 to 400 mA in 5 mA steps
Maximum wattage	45 W
Timer	99 hours 59 min, and continuous model
Safety switch	A microsensor in the power supply prevents output without the safety lid in place.
Memory function	Automatic memory (the last used Volt and Time)

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## Operating Instructions

### A. Guidelines for Selecting Electrophoresis Buffers and Gel Concentrations

The two most commonly used buffers for horizontal electrophoresis of double stranded DNA in agarose gels are Tris-Acetate-EDTA (TAE) and Tris-Borate-EDTA (TBE). While the resolving powers of these buffers are very similar, the relative buffer capacities are very different, conferring different run attributes which are summarized below:

#### TAE

Tris-acetate has traditionally been the more commonly used buffer. However, its relatively low buffer capacity will become exhausted during extended electrophoresis, making buffer recirculation necessary in runs exceeding 140 mA-hours. Potential advantages of using TAE buffer over TBE buffer include superior resolution of supercoiled DNA and approximately 10% faster migration of double-stranded linear DNA fragments.

#### TBE

Tris-borate's significantly greater buffering capacity and its relatively low current draw eliminates the need for recirculation in all but the most extended runs (> 300 mA-hours). TBE buffer systems are not recommended when fragments are to be recovered from the gel after electrophoresis.

---

**1**

Make 500 ml of either 1X TAE or 1X TBE electrophoresis buffer.

**2**

Weigh an appropriate quantity of agarose (see Table 1) and place it into a 250 ml flask. Add a sufficient quantity of either 1X TAE or 1X TBE buffer (prepared in step 1) to achieve a final volume of 100 ml agarose solution.

**Table 1: Gel Concentrations and Resolving Ranges**

<b>Concentration of Agarose in Gel (%w/V)</b>	<b>Agarose (g) per 100 ml Buffer</b>	<b>Efficient Range of Separation of Linear DNA (Kb)</b>
0.3	0.3	5–60
0.6	0.6	1–20
0.7	0.7	0.8–10
0.9	0.9	0.5–7
1.2	1.2	0.4–6
1.5	1.5	0.2–3
2.0	2.0	0.1–2

Table taken from Sambrook, J., Fritsch, E.F., & Maniatis, T. (1989) Molecular Cloning, A Laboratory Manual, 1, 6.8 613.

---

**3**

Make note of the total solution volume so that degree of evaporation can be determined and corrected for.

**4**

Heat the agarose slurry in a microwave oven for 90 seconds. Swirl the flask to make sure any grains sticking to the walls enter into the solution. Undissolved agarose appears as small “lenses” floating in the solution. Heat for an additional 30–60 seconds. Re-examine the solution and repeat the heating process until the agarose completely dissolves.

**5**

Add deionized water to replace any volume lost through evaporation during the heating process.

**6**

Add your detection reagent (i.e. Ethidium Bromide) to the manufacturers' recommended concentration. Mix by gently swirling the flask.

**Note:** The addition of Ethidium Bromide to both the gel and the running buffer will result in maximum detection levels by providing high levels of sample fluorescence with an evenly low level of background.

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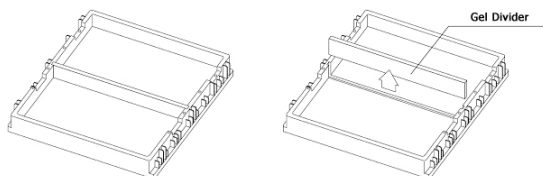
## B. Casting the Gel

**1**

Place the gel casting stand on a lab bench.

**2**

Insert the gel casting tray into the casting stand. If you are using the 6 × 12.5 cm gels place the spacer in the center of the casting stand, then insert the two 6 × 12.5 cm landscape gel trays.



**3**

When the gel solution has cooled to approximately 55 °C, slowly pour it into the gel tray. If hotter gel solutions are routinely poured, the tray may warp over time.

**4**

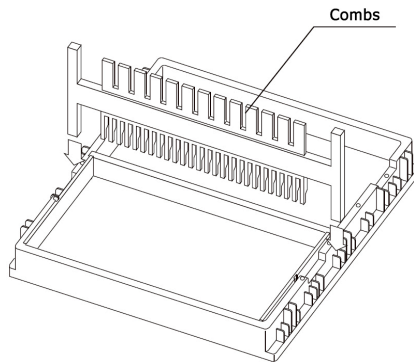
If bubbles form on the surface of the gel upon pouring, use the comb to either pop them or lightly brush them to the sides of the gel. If large bubbles are allowed to harden within the gel, they may cause artifacts to occur during electrophoresis.

---

**5**

Insert one or more combs by placing them into the slots in the casting stand. For best results, place the comb in the slot nearest the end of the casting fixture. If two combs are desired, place the second in the center comb slot.

<b>Comb Description</b>	<b>Well Width</b>	<b>Sample Vol. 1 mm</b>	<b>Code No.</b>
1 mm, 14 tooth dual format	5 mm	5 $\mu$ l	HE-PLUS1428
1 mm, 28 tooth dual format	2.5 mm	2.5 $\mu$ l	HE-PLUS1428
1 mm, 5 tooth dual format	8 mm	8 $\mu$ l	HE-PLUS0508
1 mm, 8 tooth dual format	4 mm	4 $\mu$ l	HE-PLUS0508



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**6**

Allow the gel to harden undisturbed for at least 30 minutes.

---

## C. Removing the Comb

### 1

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When the gel is solidified and fully opaque, carefully remove the comb with a gentle wiggling, upward motion. If the comb is difficult to remove or if a low percentage gel is being used, overlay the comb area with a small volume of 1X electrophoresis buffer to preserve the integrity of the wells. Check the wells to ensure their bases are intact.

## D. Loading the Samples onto the Gel

### 1

---

Remove the casting tray containing the hardened agarose gel from the casting fixture by lifting the ends. Place the tray and gel into the main unit assembly such that the sample wells are on the same end as the negative (black) electrode.

### 2

---

Fill the unit with the remaining 1X electrophoresis buffer containing Ethidium Bromide made previously, covering the gel to a depth of 1–5 mm. Approximately 350 ml of buffer will be required.

### 3

---

Load the samples into the wells with a micropipette or similar device taking care not to puncture the bottom of the wells or load the sample onto the top of the gel.

**Note:** Use of the same batch of electrophoresis buffer for both the gel and the running buffer is very important. Slight variations in buffer composition between gel and running buffer may result in ionic or pH gradients that can significantly impact the mobility of the samples.





## E. Electrical Connections to the Safety Lid

The Hoefer HE-PLUS Gel System can only be operated with the safety lid in place. Electrical current is supplied through the tank electrodes from the power supply. A micro switch connector in the power supply ensures a complete current path, yet allows the lid to be removed from the unit without disturbing the loaded samples.

**1**

---

Make sure the power supply is turned off.

**2**

---

Plug the male ends of the black (-) and red (+) electrodes into the jacks on the side of the power supply.

**3**

---

After the samples have been loaded into the gel, place the lid over the unit so that the lid covers align with the tank.

Set the lid straight down so that the lid rests squarely on the tank.

**4**

---

Plug the power supply into a wall outlet.

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## F. Setting the Power Supply

**1**

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Ensure an approved power cord that satisfies your regional voltage standard is used. Input voltage is automatically detected by the system.

**2**

---

Use the mode key > to move between voltage, amperage and time parameters.

**3**

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To increase or decrease voltage use up (^) and down (v) arrow keys.

To increase or decrease amperage use up and down arrow keys.

**4**

---

Set the timer. Increase or decrease the value with the up and down arrow keys. Between 99 hours and 59 minutes can be set as the run time. Set "0" for Continuous.

On the left side of the Output key the flashing LED indicates that the timer operation has been paused. When setting up the timer in this state, set up after having pushed the output button for a long time so as to reset the timer.

**5**

---

Select the required output voltage up to 150 volt or 400 mA.

**6**

---

Press the start/stop key to start the run.



**CAUTION:** Do not jar or bump the gel box once the lid is placed. The electrical connection is made by gravity once the lid is in position. While this design helps to minimize sample disturbance during lid placement, it also may result in a disruption of power to the unit if the lid or unit are disturbed during the run.



**CAUTION:** DO NOT EXCEED THE MAXIMUM OPERATING VOLTAGE OF 150 VOLTS.

## G. To Pause a Run and/or Change Parameters

①

To pause the run select Pause. During the pause mode the voltage amperage or time can be changed by highlighting the function and using the arrow keys then pressing enter. Once the changes have been made the start button can be pressed to resume the run.

②

To stop the run press the pause button for 30 seconds. Stop will appear.

## H. Sample Electrophoresis

①

The maximum suggested applied voltage for the electrophoresis of DNA in agarose gels using the Hoefer HE-PLUS Gel System is 150 volts.

②

In a 1% TBE gel, this translates into a run time of approximately 1 hour. Lower voltages may be used, of course, and as a general rule, a 70 V run will take twice as long as a 145 V run. Higher voltages may be used to decrease run time, however, if the unit is being operated at higher voltages than 150 V, the heat generated during electrophoresis may decrease sample resolution. Such artifacts may be avoided by running the unit in a cold room or adding 1X electrophoresis buffer “ice cubes” to keep the unit properly cooled.

③

Follow the sample migration into the gel using the loading dye as an indicator. (See page 12 for the Sample Loading Buffer recipe.) Allow the samples to migrate until the fragments have separated, normally until the bromophenol blue dye front has migrated  $\frac{3}{4}$  of the way down the gel.

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## I. Detection and Documentation of Separated Fragments

1

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At the completion of the run, turn off the power supply and disconnect the power cord. Remove the lid and remove the gel tray. Alternatively the entire tank can be placed on a Transilluminator.

2

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Ethidium Bromide stained samples are visualized by exposing them to medium wavelength (312 nm) UV light. Because the gel casting tray is UV transmittant, the gel does not need to be removed from the tray before viewing. Place the gel casting tray containing the gel on the filter surface of a UV Transilluminator for convenient viewing.

**Note:** If the gel contains Ethidium Bromide, the progress of electrophoresis may be monitored during the run by turning off the power supply, removing the lid, and shining a medium-wave UV light onto the gel. The resolved bands will appear as orange bands against a dark purple background.

## Troubleshooting Guide

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
<b>The LCD screen remains blank and the fan does not run when the power is turned on.</b>	AC power cord is not connected.	Check AC power cord connections at both ends. Use the correct cords.
	The fuse has blown.	Replace the fuse.
<b>Operation stops with alarm: The screen displays "NO LOAD".</b>	Electrophoresis tank is not connected to the power supply or there is a broken circuit in the electrophoresis cell.	Check the connections to the power supply and on your electrophoresis cell to make sure the connection is intact; check condition of wires in electrophoresis unit. Close the circuit by reconnecting the cables. Press RUN/PAUSE to restart the run.
	Buffer concentration incorrect.	Replace buffer.
<b>Operation stops with alarm: Display shows "OVER VOLTAGE".</b>	Circuit is interrupted.	Verify that the running buffer is correct.
		Verify the all connections are attached correctly. Turn the Power Switch off and on again; restart application.  If you cannot restart the instrument, turn off the power, disconnect the power cord from the outlet, and contact Technical Service.
<b>Operation stops with alarm: Display shows "LEAKAGE".</b>	Ground leak detected during run.	Check the electrophoresis system for improper grounding. Restart the power supply by turning the Power switch off and on.
		Turn power off then check the gel tank for buffer leakage.
<b>LID alarm.</b>	Cover of gel tank not in correct place.	Turn off power supply. Place the lid so the magnet is pressed against the power supply and restart.
		If you cannot restart the instrument, turn off the power, disconnect the power cord from the outlet, and contact Technical Service.

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## Solutions

### Tris Acetate EDTA Buffer (TAE)

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#### *1X Working Concentration:*

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40 mM Tris base

---

20 mM Glacial Acetic Acid (NaOAc)

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2.0 mM EDTA

---

pH 8.3

---

#### *10X Stock Solution:*

---

48.4 g Tris Base

---

16.4 g or 11.42 ml NaOAc

---

7.4 g EDTA or 20 ml 0.5 M EDTA (pH 8.0)

---

H<sub>2</sub>O to 1 liter

---

### Tris Borate EDTA Buffer (TBE)

---

#### *1X Working Concentration:*

---

89 mM Tris Base

---

89 mM Boric Acid

---

2.0 mM EDTA

---

pH 8.0

---

#### *10X Stock Solution:*

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108 g Tris Base

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55 g Boric Acid

---

6.72 g EDTA or 40 ml 0.5 M EDTA (pH 8.0)

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H<sub>2</sub>O to 1 liter

---

### Sample Loading Buffer, DNA

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#### *6X Stock Solution:*

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30% Glycerol in H<sub>2</sub>O

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0.25% Xylene cyanol

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0.25% Bromophenol blue

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pH 8

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## References

1. Lehrach, H., et al. 1977. *Biochemistry* 16:4743.
2. Sambrook, J., Fritsch, E.F., and Maniatis, T., (1989). *Molecular Cloning, A Laboratory Manual*, vol 1. Cold Spring Harbor Press, New York.
3. Selden, R.F. (1988) Analysis of RNA by Northern Hybridization,” in *Current Protocols in Molecular Biology*, F.M. Ausubel, et. al, editors, volume 1, p.4.9.1. Green Publishing Associates and Wiley-Interscience.

## Ordering Information

<b>Product</b>	<b>Code No.</b>
HE-PLUS Electrophoresis complete system 115 V. Includes gel tank, safety lid, power supply and standard casting kit.	HE-PLUS-115V
HE-PLUS Electrophoresis complete system 230 V. Includes gel tank, safety lid, power supply and standard casting kit.	HE-PLUS-230V

### Accessory Items

HE-PLUS Large Gel trays 12.5 × 13 cm set of 2	HE-PLUS11
HE-PLUS Medium Gel trays 12.5 × 6 cm set of 2	HE-PLUS12
HE-PLUS Mini Gel trays 6 × 6 cm set of 4	HE-PLUS13
HE-PLUS Large/Medium comb 14/28 Wells set of 2	HE-PLUS1428
HE-PLUS Mini comb 5/8 Wells set of 2	HE-PLUS0508
HE-PLUS Mini Casting kit. Includes 4 gel trays, 2 combs (5/8 Wells) and casting stand	HE-PLUS16
HE-PLUS Casting Stand for all 3 gel sizes	HE-PLUS17
HE-PLUS Standard Casting kit. Includes 1 large gel tray, 2 medium gel trays, 4 combs (14/28 Wells) and casting stand	HE-PLUS18





**Important:** The units should never come into contact with the following cleaning agents, these will cause irreversible and cumulative damage:

Acetone, Phenol, Chloroform, Carbon tetrachloride, Methanol, Ethanol, Isopropyl alcohol, Alkalis.

## Care and Maintenance

### Cleaning

Units are best cleaned using warm water and a mild detergent. Water at temperatures above 60 °C can cause damage to the unit and components. The units should not be left in detergents for more than 30 minutes. The tank should be thoroughly rinsed with warm water and distilled water to prevent build up of salts but care should be taken not to damage the enclosed electrode. Vigorous cleaning is not necessary or advised. Air drying is recommended before use.

### RNase Decontamination

This can be performed using the following protocol:

- Clean the units with a mild detergent as described above.
- Wash with 3% hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) for 10 minutes.
- Rinse with 0.1% DEPC- (diethyl pyrocarbonate) treated distilled water.
- **Caution!** DEPC is a suspected carcinogen. Always wear gloves and safety glasses.

RNaseZAP™ (Ambion) can also be used. Please consult the instructions for use with acrylic gel tanks.



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