

# TE70X Semi-dry Blotters

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TE70X Semi-dry transfer unit  
TE77X Semi-dry transfer unit  
TE70XP Semi-dry transfer unit  
TE77XP Semi-dry transfer unit





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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, Inc. 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 poskytnuté 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 smrtící 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. Čist 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. Otřete 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 træned operatører. Læs denne hel håndbog før brugning 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 specifikt 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 equilibrate til omgivende temperatur ved tageen 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 geoefend.
- Dit instrument is in overeenstemming met de EN61010-1:2001 elektrische veiligheidsstandaard ontworpen. Niettemin zou het enkel door goed getrainde bedieningsleden 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 verhuur 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. suojele ehkäisty varusteille saattaa olla avuton.
- Tämä väline suunnitellaan sisälaboratoriokäyttöön vain.
- Vain lisävarusteet ja osat hyväksyivät tai toimitti Hoeferille, 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-ilmankosteudessa (80%)n yläpuolella. Vältä tiivistymistä antamalla yksikön equilibrate 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 spécifique 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.
- Avertissement! 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 à 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 Hoefel, 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 Hoefel, 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 erzeugten 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 equilibrate 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 Hoefel, Inc. la protezione fornito dall'apparecchiatura potrebbe essere indebolita.
- Questo strumento è disegnato per l'uso di laboratorio interno solo.
- Solo gli accessori e le parti hanno approvato o hanno fornito da Hoefel, 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 disegnato 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 equilibra 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 koplet 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 equilibrate til omgivelsestemperatur ved taen instrumentets fra et kaldere til et varmere miljø.
- Til å tillate tilstrekkelig kjølig, sikrer at ventilasjon-såpningene 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 laboratoriach 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 rozwiniecie 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, zapewnijają, 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 canos 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. Enjague 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 tillhandahåll 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

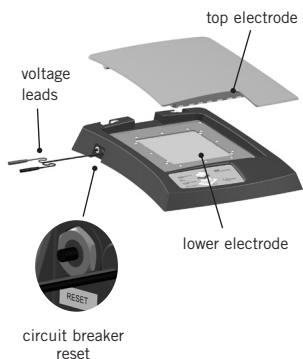


Denna symbol anger att elektriska och elektroniska utrustningar inte får avyttras som osorterat hushållsavfall och måste samlas in separat. Var god kontakta en auktoriserad tillverkarrepresentant för information angående avyttring av utrustningen.

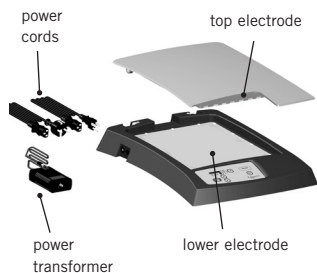


# 1. TE70X Semi-dry Blotters: Description

## TE70X



## TE77XP



**Fig 1.** Semi-dry transfer unit main components.

The TE70X, TE77X, TE70XP, and the TE77XP semi-dry blotters rapidly transfer proteins from polyacrylamide gels onto a membrane by means of a low current and low voltage electrotransfer with minimal Joule heating. Most transfers are complete in one hour or less.

The smaller TE70X unit transfer surface is 14 × 16 cm, suitable for transferring standard gels, including those from the SE600 Chroma and the SE400. The larger TE77X transfer surface is 21 × 26 cm, suitable for transferring large format gels.

The TE70X and TE77X have safety circuits built into the instrument that limit the voltage to 30 V and the current to 0.5 A. The circuits protect the user from unnecessary electrical hazards.

The TE70XP and the TE77XP have a built-in power supply for transferring gels. This eliminates the need for an external power supply. These instruments can deliver up to 30 V and 0.5 A. The instruments also monitor the transfer stack resistance, and can stop a transfer if large changes indicate that the buffer system is depleting.

Multiple gels can be transferred at the same time by placing several small gels of the same thickness side by side, or by stacking two gels vertically in a carefully constructed multi-layered stack.

The electrodes are made of the best possible materials to ensure the units last a long time.

---

## Unpacking

Unwrap all packages carefully and compare contents with the packing list, making sure all items arrived. If any part is missing, contact Hoefler, Inc. Inspect all components for damage that may have occurred while the unit was in transit. If any part appears damaged, contact the carrier immediately. Be sure to keep all packing material for damage claims or to use should it become necessary to return the unit.

## Specifications

### This declaration of conformity is only valid for the instrument when it is:

- used in laboratory locations.
- used as delivered from Hofer, Inc. except for alterations described in the user manual.
- connected to other CE labeled instruments or products recommended or approved by Hofer, Inc.

	TE70X	TE77X	TE70XP	TE77XP
Electrode size (cm)	14 × 16	21 × 26	14 × 16	21 × 26
<i>Inputs:</i>				
Voltage (V)	30 (DC)*	30 (DC)*	100–240 (AC)	100–240 (AC)
Current (A)	0.5*	0.5*	0.7	0.7
<i>Output:</i>				
Voltage (VDC)	30	30	30	30
Current (A)	0.5	0.5	0.5	0.5
Frequency (Hz)			47–63	47–63

\*Maximum setting for the customer's power supply.

#### Minimum transfer stack thickness:

TE70X, TE70XP	3.2 mm / 12.0 mm
TE77X, TE77XP	2.8 mm / 12.0 mm

Environmental operating conditions:	Indoor use: 4–40 °C Humidity up to: 80% Altitude up to: 2000 m Installation category: II Pollution degree: 2
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Dimensions (w × d × h):	38 × 46 × 9 cm (15 × 18 × 3.5 in)
-------------------------	--------------------------------------

Weight:	Shipping 6.8 kg Unit 3.7 kg
---------	--------------------------------

Certification:	EN61010-1, EN 61326, CE UL61010-1-2004 CSA 22.2 61010-1-04
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## 2. Operating instructions

To transfer proteins, prepare the unit, assemble the stack, and connect to a power supply if necessary. Then run the transfer for the required amount of time. Each step is described below.

**1**

---

Prepare the unit by rinsing the electrodes with distilled water.

**2**

---

### Prepare the gel

Cut away the wells and/or stacking gel section. Equilibrate the gel in transfer buffer if required.

**3**

---

### Prepare the transfer stack

Cut the blot paper and transfer membrane to the same size as the gel. Stack the layers carefully so the edges align. If for some reason the membrane needs to be larger than the gel, use a mylar mask (see optional step below) to ensure the current does not bypass the gel.

### *Optional:* Cut a mask to the proper size

Measure the gel. Cut an opening centered in the solid mask to a size roughly 2 mm smaller than the gel. Take care with sharp blades when cutting the masks. Place the mask in the base of the unit, centering the opening.

**Note:** Take care to place the gel correctly on the first try because proteins begin to transfer immediately; once transfer has begun, moving the gel will distort results or cause “shadow” bands on the blot.

---

## 4

### Prepare the blotting paper

For each gel, cut at least 6 pieces of blotting paper the *same size as the gel* or *slightly smaller*.

Gauge the thickness or number of blotting paper layers according to the amount of buffer required; up to 300 ml of buffer may be required for larger gels or for transfers of 60 minutes in order to prevent the stack from drying out or the buffer from becoming depleted.

Saturate at least 3 pieces of the blotting paper with transfer buffer. One by one, center each sheet on the lower electrode and remove all trapped air by rolling a clean pipet or roller from the center toward the edges.

---

## 5

### Prepare the membrane

For each gel, cut 1 membrane the same size as the gel or slightly smaller. (A larger membrane may contact an electrode panel, creating a pathway by which current can bypass the gel.)

Pre-wet nitrocellulose or nylon membranes with distilled water. Pre-wet PVDF or other hydrophobic membranes with methanol. Then soak all membrane types in transfer buffer for 2–5 minutes.

**Note:** Each 21 × 26 cm blot paper will absorb approximately 50 ml of transfer buffer. Each 14 × 16 cm blot paper will absorb approximately 20 ml of buffer.

**Note:** If not using Hoefer blotting paper, additional pieces may be required to achieve desired results.

**Note:** Always wear gloves when handling membranes to avoid leaving fingerprints.

## 6

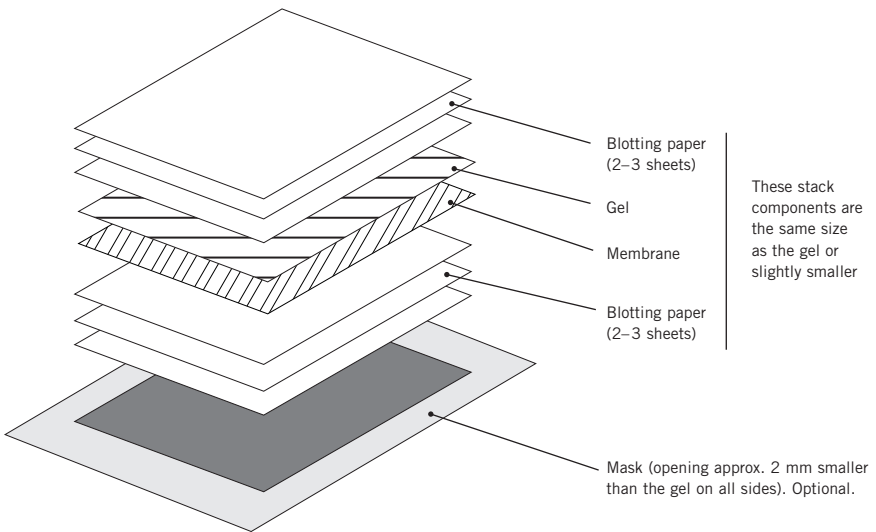
**Important!** Stack each layer with care, with edges parallel. As each layer is added, remove all air pockets by rolling a clean pipet from the center to the edges. Add a few drops of buffer to trouble areas to help remove air pockets.

**Note:** If not using Hoefer blotting paper, additional pieces may be required to achieve desired results.

### Complete the stack

- Place the pre-wet membrane onto the stack of blotting paper.
- Place the gel on the membrane.  
**Note:** Proteins bind to the membrane as soon as contact occurs, so it is important to place the gel correctly on the first try.
- Cover the gel with three layers of buffer saturated blotting paper.

**Fig 2.** Transfer stack for a single gel.



**Note:** When transferring multiple gels, transfer efficiency depends on such factors as gel thickness, gel position in the stack, transfer buffer, membrane type, and, most importantly, the characteristics of the protein. The gel closest to the anode generally transfers the most completely. It is preferable to lay gels side-by-side rather than stacking them.

**Multiple gels:** Either lay gels of the same thickness side-by-side (Fig 3), or stack 2 sandwiches layered as shown (Fig 4).

For best results, the transfer stack should be centered in the electrode panels.

If two gels are stacked, separate them with porous cellophane — **not plastic wrap!** (Cellophane permits electric current to pass but stops proteins.) Cut the cellophane slightly smaller than the gel and wet with transfer buffer.

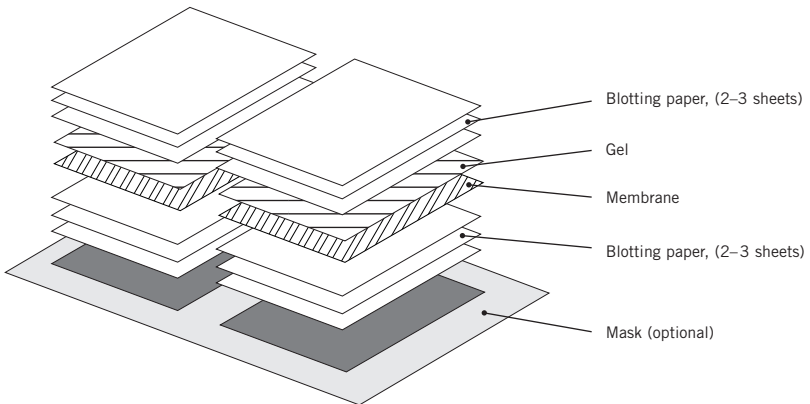
Several sheets of buffer-soaked blotting paper on *each* gel provides electrical continuity.

**7**

Place the Cover on top of the transfer stack. Do not remove the cover until after the transfer is complete in order to prevent stack components from moving.

**Fig 3.** Transfer stacks for gels placed side-by-side.

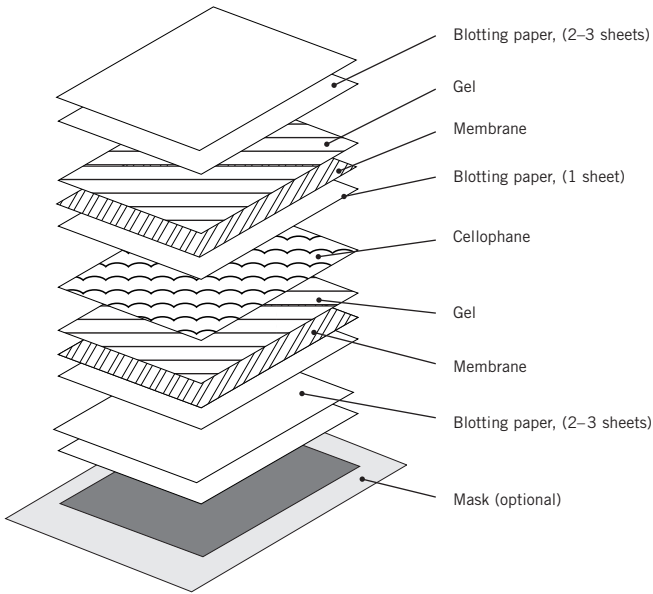
**Note:** There must be no electrical contact between the two stacks.





**Fig 4.** Transfer stack for stacked gels.

Separate the stack for each gel with a sheet of cellophane.





# Electrotransfer

## TE70X and TE77X

1

**The power supply should be switched off and both the current and voltage controls set at zero**

Then plug the color-coded leads from the base of the transfer unit into the power supply jacks, matching red to red and black to black. Do not reverse polarity. The lid contains the black, or negative electrode. The base contains the red, or positive electrode.

2

**Set the power supply voltage and current**

Set the voltage limit to 30 V maximum. The input voltage must not exceed 30 V or the protection will be activated. The maximum current should not exceed 0.8 mA/cm<sup>2</sup> of the gel surface or 500 mA maximum. If transferring several layers of gels, a longer time may be required.

3

**If available, set the power supply timer**

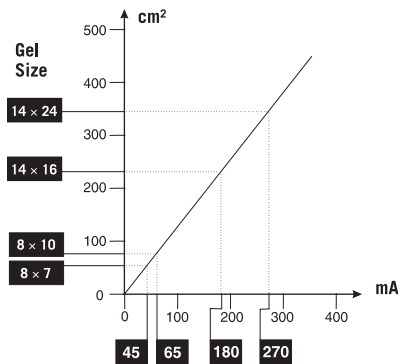
Most transfers are complete within one hour, but larger proteins, proteins from native gels, and thicker gels may require an additional 1 hour of transfer time. The optimum transfer time for each protein and gel system must be determined empirically.

**Note:** Transfers exceeding one hour may require additional sheets of buffer saturated blot paper in the transfer stack.

**Note:** Generally, smaller fragments transfer more quickly than larger ones.

**Fig 5.** Recommended current settings for different gel sizes.

Use the graph to quickly find the current setting for your gel size, or calculate the gel area (cm<sup>2</sup>) and multiply it by 0.8 mA.



## TE70XP and TE77XP

①

**Note:** While setting the time, there is an extra setting labelled "ON" above the 4:00 upper limit. This will disable the timer, allowing the transfer to run continuously until manually turned off by the user.

Turn the instrument on using the POWER button on the front keypad.

The instrument works by setting the current and time, and then starting the transfer. During the transfer, the voltage can be displayed. The transfer cannot be set to run at constant voltage.

The DISPLAY MODE BUTTON toggles between the current (mA), time (hour:minutes) and the voltage (V).

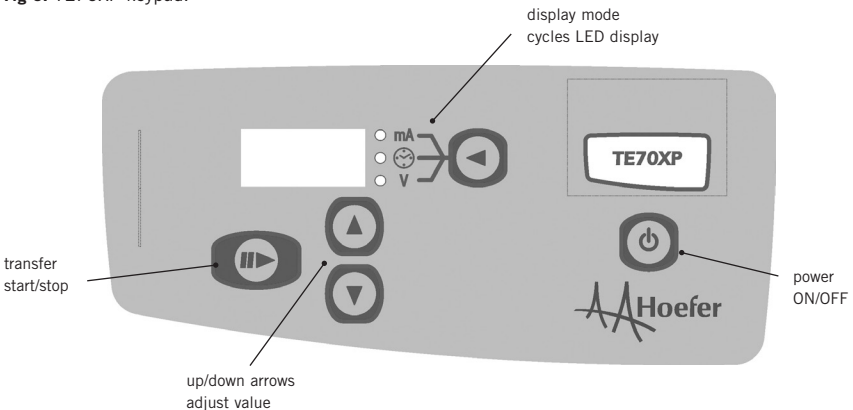
The UP and DOWN arrows to change the value for the current and time.

②

Press the START/STOP button to start the transfer.

Variable	Units	Range	Increment
Current	milliamps	1–500	1 mA
Time	hours:minutes	5 min – 4:00 hours	5 min
Voltage	volts	0–30 (read only)	1 volt

Fig 6. TE70XP keypad.

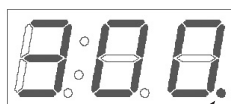


---

## During the transfer

### TE70XP and the TE77XP

A red LED will appear in the lower right corner of the Display when voltage is applied to the transfer stack.



Red LED

Both the Time and the Current can be changed as the transfer progresses. Select mA or time using the DISPLAY MODE button, and the UP and DOWN to change the value. While the value is being changed, the LED will blink. After about 10 seconds the LED will stop flashing and show the real time run parameters.

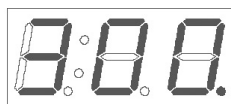
### Buffer Depletion

One of the more common failure modes for a Western transfer is buffer depletion. Buffer depletion leads to changes in pH and overheating, both of which are detrimental to the transfer.

The TE70XP and the TE77XP instruments monitor the transfer stack resistance. Large changes in this resistance indicate the depletion of the buffer system. The instrument can stop a transfer before these changes lead to further problems, like burning of the transfer stack.

If this condition happens, the error message “dry” will be on the display. The instrument has stopped the transfer. If desired, the cover can be removed, and buffer can be added to the transfer stack. Replace cover, and press any key (except Power ON/OFF) to continue.

For future transfers, add more layers of buffer soaked blot paper.



Dry error message.

## After the transfer is complete

### TE70X and TE77X

Turn off the power supply and disconnect the leads from the power supply.

### TE70XP and TE77XP

After a transfer is complete, the unit will beep for 5 seconds. The LED display will blink and cycle between the values for the current, time and voltage at the time the transfer was stopped. These can be recorded into a notebook, if desired. Pushing any button will clear the display.

①

---

Remove the cover slowly because the stack may adhere to it.

②

---

Remove and dispose of the upper blot papers.

③

---

Remove the gel(s).

*Optional:* Stain gel to check for residual protein left in the gel.

④

---

If desired, label the gel contact side of the membrane with a soft pencil.

⑤

---

Remove the membrane(s) from the stack with blunt forceps. Process the membrane according to your protocol or allow the membrane to air dry prior to storage.

⑥

---

Remove the remaining blot papers and dispose.

⑦

---

Rinse the unit according to the Care and maintenance instructions (next page).

**Note:** Staining the gel(s) for residual protein gives an indication of the completeness of transfer.

**Note:** Rewet dried membranes in the appropriate wetting buffer prior to processing.

---

### 3. Care and maintenance

- Do not autoclave or wash the unit in a dishwasher.
- Do not immerse the unit in water!

Rinse the cathode in the cover and the anode in the base with distilled water. Let the unit air dry completely. If using radioactive reagents, decontaminate the unit with a cleaning agent such as Contrad® 70. Never use abrasive cleansers.

---

## 4. Troubleshooting

**problem**

**solution**

---

**Incomplete transfer**

*Blank or faint areas on the membrane*

Remove trapped air pockets between the gel and membrane during stack assembly.

Use buffer with a lower ionic strength.

*Molecules do not migrate out of gel*

Check all electrical connections. Confirm that current is flowing through the transfer stack.

Check that the buffer pH is close to the intended pH. Most buffers should not be titrated. Make fresh buffer.

Use 3.5 mM SDS (0.1%) in the transfer buffer.

Add several more sheets of buffer-saturated blotting paper to each side of the gel sandwich so that more buffer is present during the transfer.

Increase the transfer period. Large fragments may require an additional hour.

Do not use staining or fixing agents on the gel before transfer.

Use a thinner gel.

Reduce the gel acrylamide concentration.

If using a non-nitrocellulose membrane, avoid including methanol in the transfer buffer or reduce the amount to the minimum possible.

Use reagent-grade chemicals.

Increase the net charge on the protein by using a transfer buffer with a different pH. Lower pH (<6–7) increases the positive charge on proteins; higher pH (>6–7) increases the negative charge on proteins.

---

**problem****solution**

---

**Open circuit or no output current for TE70X or TE77X**

Push circuit protection reset button located next to the input leads. To prevent recurrence limit the input voltage to 30 V and the current to 500 mA.

Early models: Blown fuse in protection circuit. Replace 1.6 A micro fuse. (See Accessories in Ordering information.)

---

**Smearred or diffuse band patterns**

If equilibrating before the transfer, shorten or eliminate the equilibration time and/or equilibrate under coldroom conditions.

If the transfer buffer contains  $\geq 10\%$  methanol, equilibrate the gel in transfer buffer for 30 minutes to allow it to shrink before assembling the stack.

**Note:** Large proteins may not migrate as readily once the pore size is slightly reduced.

---

Take care that the gel does not shift once it contacts the membrane.

---

Buffer depletion can change the pH in the transfer stack, and have a negative effect on the transfer. On subsequent transfers, either shorten the transfer time, reduce the current, or increase the number of buffer-soaked blotting papers in the stack.

---

Check that the preferred binding surface of the membrane (if any) contacts the gel.

---

**Uneven band transfer**

The blotting paper and membrane must be the same size as the gel or 1–2 mm smaller. Larger sizes will provide an electrical path for current to bypass the gel solution.

---

Different proteins will transfer at different rates depending on size and net charge.

---

**problem****solution**

---

**Inefficient binding to membrane***Chemical parameters*

Prepare transfer buffer without SDS. (SDS can improve transfer efficiency but can interfere with protein binding to a PVDF membrane.)

Add 10–20% methanol to the transfer buffer to enhance binding to nitrocellulose or PVDF.

*Membrane parameters*

Use a membrane with a smaller pore size (0.20  $\mu\text{m}$ ) if proteins pass through the membrane.

Place a membrane both over and under the gel to capture any proteins migrating in the opposite direction.

Check if too much sample is available for the binding surface area by placing two membranes instead of one. If “blow through” occurs, reduce the sample load.

Wear gloves when handling membranes.

Store membranes at ambient temperature and out of direct sunlight.

Check shelf life of nitrocellulose membrane, replace if necessary.

---

**TE70XP, TE77XP***Current reading lower than setting*

Maximum voltage (30 V) has been reached.  
Buffer may be depleted.

*No output current*

Transfer stack is not making contact with the upper electrode. Add buffer soaked blot papers.

*“dry” error message*

Instrument has detected large changes in transfer stack resistance.

Add more buffer soaked blot papers in future transfers.

*No output voltage*

Transfer stack is being short circuited.

**Note:** For more troubleshooting ideas, refer to Bjerrum, O.J. *et al.* (1988).



## 5. Electrotransfer notes

- Run the transfer as soon as possible after electrophoresis to minimize protein diffusion within the gel.
- Stacked gels must all be the same size.
- Limit transfers to two hours or less.
- The recommended methanol concentration for different membrane types are:

membrane type	methanol %
Charged nylon	0
Nitrocellulose	10–20
PVDF	10–20

- Use a buffer with low ionic strength such as one of the two listed below to prevent over-heating. Use the CAPS buffer when Tris cannot be used (*e.g.*, peptide sequencing). CAPS can improve transfer because of its effect on the charge of the protein (see Matsudaira, 1987).

### Towbin buffer

(25 mM Tris, 192 mM glycine, 20% v/v methanol, pH 8.3, 1 liter)

Tris (FW 121.1)	25 mM	3.0 g
Glycine (FW 75.07)	192 mM	14.4 g
SDS* (FW 288.4)	0.1% (3.5 mM)	1.0 g

Dissolve in 600 ml distilled water.

Add methanol as required<sup>†</sup>.

Bring to 1 liter with distilled water. Do not adjust the pH, which should be between 8.2–8.4.

*Optional:* Chill before use.

\**Optional:* Adding SDS can improve transfer efficiency.

<sup>†</sup>Depending on the membrane type selected (see table above), adding methanol can improve transfer results.

**Note:** Buffers containing methanol may deteriorate if stored for long periods — add methanol just prior to transfer.

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**CAPS buffer, 1X**

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*(10 mM CAPS, pH 11.0, 1 liter)*

CAPS (FW 221.3)	10 mM	2.2 g
[3-(cyclohexylamino)-1-propanesulfonic acid]		

---

Dissolve in 600 ml distilled water, adjust to pH 11.0 with conc. NaOH.

Adjust volume to 1.0 liter.

- For a 3-buffer system, refer to Kyhse-Anderson, J. (1984).
- Transfer efficiency varies depending on the gel concentration, which can be optimized. For more information, refer to Smejkal and Gallagher (1994).

---

## 6. Bibliography

- Bjerrum, O.J., Larsen, K., and Heegaard, N., *CRC Handbook of Immunoblotting of Proteins 1*, Section 7. CRC Press (1988).
- Gallagher, S., Winston, S.E., Fuller, S.A. and Hurrell, J.G.R., Immunoblotting and Immunodetection. In *Current Protocols in Molecular Biology*. 10.8.1–10.8.17. Greene Publishing and Wiley-Interscience, NY (1993).
- Hancock, K. and Tsang, V., India ink staining of proteins on nitrocellulose paper. *Anal. Biochem.* **133**, 157–162 (1983).
- Kyhse-Anderson, J., Electroblotting of multiple gels: A simple apparatus without buffer tank for rapid transfer of proteins from polyacrylamide to nitrocellulose. *J. Biochem. and Biophys. Meth.* **10**, 203–209 (1984).
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- Sasse, J. and Gallagher, S., Detection of Proteins on Blot Transfer Membranes. In *Current Protocols in Molecular Biology*. 10.7.1–10.7.3. Greene Publishing and Wiley-Interscience, NY (1991).
- Smejkal, G., and Gallagher, S., Determination of Semidry Protein Transfer Efficiency with Transverse Gradient Gel Electrophoresis. *Biotechniques.* **16**, 196–202 (1994).
- Tovey, E. and Baldo, B., Comparison of semi-dry and conventional tank-buffer electrotransfer of proteins from polyacrylamide gels to nitrocellulose membranes. *Electrophoresis* **8**, 384–387 (1987).

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## 7. Customer service information

### Technical service and repair

Hoefler, Inc. offers complete technical support for all of our products. If you have any questions about how to use this product, or would like to arrange to repair it, please call or fax your local Hoefler, Inc. representative.

Check the Hoefler, Inc. website at [www.hoeflerinc.com](http://www.hoeflerinc.com) for the distributor in your area. Or contact us directly at:

#### **Hoefler, Inc.**

84 October Hill Road  
Holliston, MA 01746

Toll Free: 1-800-227-4750

Phone: 1-508-893-8999

Fax: 1-508-893-0176

[support@hoeflerinc.com](mailto:support@hoeflerinc.com)

[www.hoeflerinc.com](http://www.hoeflerinc.com)

**Important!** Request a copy of the Hoefler, Inc. "Health and Safety Declaration" form before returning the item. No items can be accepted for servicing or return unless this form is properly completed.

**Note:** A Return Authorization (RA) number must be obtained from Hoefler, Inc. before returning any item to Hoefler, Inc.

## 8. Ordering information

product	qty.	code no.
<b>TE70X Semi-dry Transfer Unit, 14 × 16 cm</b> Includes 25 sheets of blotting paper, 50 sheets of cellophane and 2 solid masks.	1	TE70X
<b>TE77X Semi-dry Transfer Unit, 21 × 26 cm</b> Includes 25 sheets of blotting paper, 50 sheets of cellophane and 2 solid masks.	1	TE77X
<b>TE70XP Semi-dry Transfer Unit, 14 × 16 cm</b> Includes 25 sheets of blotting paper, 50 sheets of cellophane and 2 solid masks.	1	TE70XP
<b>TE77XP Semi-dry Transfer Unit, 21 × 26 cm</b> Includes 25 sheets of blotting paper, 50 sheets of cellophane and 2 solid masks.	1	TE77XP

### Accessories

#### TE70X and TE70XP

Solid masks, 16.5 × 18.5 cm	4	TE74
Porous cellophane, 20 × 35.5 cm	50	TE73
Blotting paper, precut, 14 × 16 cm	25	TE76-1416

#### TE77X and TE77XP

Solid masks, 23 × 27.5 cm	4	TE78
Porous cellophane, 35 × 44 cm	50	SE1142
Blotting paper, precut, 21 × 26 cm	25	TE76

Power Cord Kit	1 set	PS36-24
Fuse, Micro, 1.6 A, 250 V	5	PSF1.6A-MICRO

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## Related products

product	code no.
SE600 Chroma	SE600X-15-1.5
MiniVE Vertical Electrophoresis system	SE300-10A-1.0
PBS300B Power Supply, 300 V, 500 mA, 90 W	PBS300B

## Transfer Membranes

### Pure Nitrocellulose, sheets and roll

#### *0.45 µm pore size*

8 × 9.5 cm, 10 sheets	GM-NC45-89
16 × 16 cm, 10 sheets	GM-NC45-1616
20 × 23.5 cm, 10 sheets	GM-NC45-2320
30 cm × 3 m, 1 roll	GM-NC45

#### *0.2 µm pore size*

30 cm × 3 m, 1 roll	GM-NC22
---------------------	---------

### PVDF membrane

#### *0.45 µm pore size*

10 × 10 cm, 10 sheets	GM-PV45-1010
15 × 15 cm, 5 sheets	GM-PV45-1515
30 cm × 3 m, 1 roll	GM-PV45

## Hoefer Electrophoresis Reagents

Tris, 1 kg	GR132-1
Glycine, 1 kg	GR125-1
SDS, 500 g	GR126-500
Tween® 20, 500 ml	GR128-500
DTT, 5 g	GR122-5
Glycerol, 1 L	GR124-1
Bromophenol Blue (BPB), 10 g	GR120-10
Protein Determination Reagent, 500 standard assays	GR133-500
Coomassie® Brilliant Blue G-250, 25 g	GR134-25
Coomassie Brilliant Blue R-250, 25 g	GR135-25



**Hoefer, Inc.**

84 October Hill Road  
Holliston, MA 01746

Toll Free: 1-800-227-4750

Phone: 1-508-893-8999

Fax: 1-508-893-0176

E-mail: [support@hoeferinc.com](mailto:support@hoeferinc.com)

Web: [www.hoeferinc.com](http://www.hoeferinc.com)

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