VOLTECH INSTRUMENTS

DC1000A Precision DC Bias Current Source

User Manual

Voltech DC1000A
Precision DC Current Source
User Manual

Thank you for choosing the Voltech DC1000A.

This DC current source should give you many years of reliable use.

Should you experience any difficulty during the set up or use of your Voltech product, please do not hesitate to contact either your local supplier or one of our main offices.

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1. Introduction

1.1. What is the DC1000A?

The DC1000A is a DC Bias current source that can generate between 0 and 25 A. Up to twenty (20) DC1000A's can simply be joined in parallel to produce up to 500 A.

The DC1000A can be used with almost any LCR meter and with the AT-series transformer testers – these products have specific programs for testing using the DC1000A (LPBX, LSBX, and ZBX).

1.2. Why use a DC1000A for my testing?

The DC1000A is used to characterize wound components that are intended for use in high current DC power supplies and DC-to-DC converters.

It is used to apply a DC current through the component to be tested, allowing an LCR meter or Voltech AT-series product to measure the inductance of the component while the DC bias current is applied.

Unlike a regular DC power supply, the DC1000A minimizes the load (and hence any measurement errors) on the measuring instrument without the need for additional output inductors. Regular loading would cause gross errors in the measurement and severely limit the possible test signal amplitude.

It also maintains an accurate current under variable resistive loads so regular adjustments are not required.

Additionally, unlike other DC Bias sources from other manufacturers, the Voltech DC1000A can be used with almost any LCR meter, making it unique amongst all DC Bias Current Sources. Our patented technique allows the DC1000A to constantly monitor and trim the current applied, regardless of the LCR model used, making it truly universal.

This provides the fastest and most reliable DC current testing solution.

1.3. Warranty

The product is warranted free from material defects in workmanship and/or materials at the time of delivery to the Customer and that for a period of one year (12 months) from such time Voltech will repair or replace any Product which does not comply with this warranty PROVIDED ALWAYS THAT the Company's liability under this warranty shall be limited to the repair or replacement of affected Products and is conditional upon the Customer: -

1. Notifying the Company promptly of any such material defect and in any event within such period of one year.
2. Returning to the Company the affected Products properly and adequately packed, carriage or postpaid, within fourteen days of such notification.
3. Having ensured that the Products have not been tampered with, repaired, modified or altered in any way.
4. Ensuring that the Products are protected from harm or otherwise properly cared for and are retained in the possession of the Purchaser.

In the event of a failure as above Voltech will

1. At its discretion, repair or replace the faulty unit free-of-charge for a unit returned to an authorized service center
2. Pay all return shipment charges from the Voltech service center to the customer.
3. Re-calibrate the unit before dispatch. A certificate of calibration will be issued as a matter of course.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from unauthorized modification or misuse, or operation outside specification of instrument. No other warranty is expressed or implied.

Whilst every care has been taken in compiling the information in this publication Voltech Instruments cannot accept legal liability for any inaccuracies contained herein. Voltech Instruments has an intensive program of design and development which may well alter product specification and reserve the right to alter specification without notice and whenever necessary to ensure optimum performance from its product range.

It shall be deemed to exclude all other warranties and conditions whether express or implied and whether arising by common law statute or otherwise.

Voltech reserve the right to waive this benefit in any event where it is clear upon inspection that the cause of the failure is due to customer misuse.

Voltech will be the sole arbiter in these circumstances.

Because software is inherently complex and may not be completely free of errors, you are advised to verify your work. In no event will Voltech be liable for direct, indirect, special, incidental or consequential damages arising out of the use of or inability to use software or documentation, even if advised of the possibility of such damage. Voltech is not responsible for any lost profits or revenue, loss of use of software, loss of data, cost of substitute software, claims by third parties, or for other similar costs. In no case shall Voltech's liability exceed the amount of the license fee.

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1.4. Health & Safety

1.4.1. Health and Safety – English

Electrical devices can constitute a safety hazard.
It is the responsibility of the user to ensure the compliance of the installation with any local acts or bylaws in force.
Only qualified personnel should install this equipment, after reading and understanding this user's manual.
These operating instructions should be adhered to. If in any doubt, please contact your supplier.

PLEASE NOTE:

This equipment is supplied under warranty conditions in force at the time of purchase from your supplier.

Contact your supplier for details. Any attempt to disable or modify the unit will render any warranty agreement invalid.

The contents of this user manual are believed to be accurate at the time of printing. The manufacturer, however, reserves the right to change the content, product specification, and performance criteria without notice.

No liability is accepted for the inappropriate, negligent, or incorrect set-up of the instrument by the user, either by manual or automated means.

CHECK YOUR LINE INPUT VOLTAGE SETTING BEFORE CONNECTING TO SUPPLY.

A Use a flat-headed screwdriver to pull the fuse drawer out.
B: Rotate the gray voltage selector to select the correct voltage for your location

1.4.2. Hygiène et sécurité - Français

Les appareils électriques peuvent constituer un danger pour la sécurité.
Il incombe à l'utilisateur de vérifier la conformité de l'installation aux lois locales ou arrêtés municipaux en vigueur.
Seul le personnel qualifié doit installer cet équipement, après avoir lu et assimilé le manuel de l'utilisateur.
Ces consignes d'utilisation doivent être suivies. En cas de doute, veuillez contacter votre fournisseur.

REMARQUE :

Cet équipement est fourni dans les conditions de garantie en vigueur au moment de l'achat auprès de votre fournisseur.

Pour toutes précisions, contactez votre fournisseur. Toute tentative de désactiver ou de modifier l'appareil annulera le contrat de garantie.

Le contenu de ce manuel de l'utilisateur est censé être exact au moment de l'impression. Toutefois, le fabricant se réserve le droit de modifier le contenu, les caractéristiques du produit ainsi que les critères de performance sans préavis.

Voltech décline toute responsabilité quant à l'installation inappropriée, négligente ou incorrecte de l'instrument par l'utilisateur, par des moyens manuels ou automatisés.

VÉRIFIEZ LA TENSION D'ENTRÉE DE VOTRE LIGNE AVANT DE BRANCHER L'APPAREIL SUR L'ALIMENTATION.

A Utilisez un tournevis à lame plate afin de sortir le tiroir du fusible.
B: Faites tourner le sélecteur de tensions gris afin de sélectionner la tension appropriée à votre site.

1.4.3. Gesundheit und Sicherheit – Deutsch

Elektrogeräte können ein Sicherheitsrisiko darstellen.
Es obliegt dem Benutzer, dafür zu sorgen, dass das Gerät nach den aktuellen Gesetzen und Vorschriften installiert wird.
Dieses Gerät darf nur von qualifiziertem Personal installiert werden, das dieses Benutzerhandbuch gelesen und verstanden hat.
Die Anweisungen in diesem Benutzerhandbuch müssen befolgt werden. Im Zweifelsfall wenden Sie sich bitte an Ihren Lieferanten.

HINWEIS:

Dieses Gerät wird unter Garantiebedingungen geliefert, die zum Zeitpunkt des Kaufes bei Ihrem Lieferanten gelten.

Zu Details wenden Sie sich bitte an Ihren Lieferanten. Jeder Versuch der Deaktivierung oder Modifizierung des Geräts führt zum Erlöschen jeglicher Garantievereinbarungen.

Der Inhalt dieses Benutzerhandbuchs ist nach bestem Wissen zum Zeitpunkt des Drucks korrekt. Der Hersteller behält sich jedoch das Recht vor, den Inhalt, die Produktspezifikation und Leistungskriterien ohne Ankündigung zu ändern.

Für eine unsachgemäße, fahrlässige oder falsche Einrichtung des Instruments durch den Benutzer (manuell oder automatisch) wird keine Haftung übernommen.

PRÜFEN SIE VOR DEM ANSCHLUSS AN DEN NETZSTROM DIE SPANNUNGSEINSTELLUNG FÜR IHREN LEITUNGSEINGANG.

A: Die Sicherungsschublade mit einem Flachklingen-Schraubendreher herausziehen.
B: Den grauen Spannungswähler auf die richtige Spannung für Ihren Standort drehen.

1.4.4. Salud y Seguridad - Español

Los dispositivos eléctricos pueden constituir un riesgo de seguridad.
Es la responsabilidad del usuario asegurar el cumplimiento de la instalación con todos los reglamentos y leyes locales vigentes.
Este equipo tiene que ser instalado solo por personal calificado, una vez leídas y comprendidas las instrucciones en el manual del usuario.
Estas instrucciones de operación tienen que ser cumplidas. Ante cualquier duda, le rogamos consultar a su proveedor.

ADVERTENCIA:

Este equipo es suministrado bajo condiciones de garantía vigentes en el momento de la compra en su proveedor.

Contacte a su proveedor para mayores detalles. Todo intento de inhabilitar o modificar la unidad invalidará el acuerdo de garantía.

El contenido de este manual del usuario es preciso en el momento de su impresión. No obstante, el fabricante se reserva el derecho de modificar el contenido, la especificación del producto, y los criterios de rendimiento sin preaviso.

No se aceptará ninguna responsabilidad por la configuración inadecuada, incorrecta o negligente del instrumento por el usuario, ya bien sea manual o por medios automatizados.

COMPRUEBE LA SELECCIÓN DEL VOLTAJE DE ENTRADA ANTES DE CONECTAR EL EQUIPO A LA RED.

A Use un atornillador de punta plana para extraer la caja del fusible.
B: Gire el reloj gris selector de voltaje apuntando al voltaje correcto de su red local.

1.4.5. Salute e sicurezza - Italiano

I dispositivi elettrici possono costituire un pericolo per la sicurezza.
Spetta all'utilizzatore la responsabilità di garantire la conformità dell'impianto alle norme e alle direttive locali vigenti in materia.
L'installazione di questo apparecchio deve essere affidata esclusivamente a personale qualificato dopo attenta lettura e comprensione del presente manuale.
Attenersi alle istruzioni operative riportate in questo manuale. In caso di dubbi, contattare il proprio fornitore di zona.

NOTA BENE

Questo apparecchio è fornito con condizioni di garanzia valide al momento dell'acquisto presso il fornitore di zona.

Per informazioni in merito, contattare il proprio fornitore. Qualunque tentativo di disattivare o modificare l'apparecchio annulla il contratto di garanzia.

Il contenuto del presente manuale d'uso è ritenuto accurato al momento della stampa. Il produttore si riserva tuttavia il diritto di modificare il contenuto del manuale, le specifiche del prodotto e i criteri di rendimento dello stesso senza preavviso.

Il produttore declina qualunque responsabilità qualora l'istallazione del prodotto venga eseguita in modo inidoneo, negligente o non corretto dall'utilizzatore secondo procedure manuali o automatiche.

VERIFICARE IL VALORE DELLA TENSIONE DI INGRESSO DELLA PROPRIA LINEA ELETTRICA PRIMA DI COLLEGARE L'APPARECCHIO.

A. Usare un cacciavite a punta piatta per estrarre il cassettino dei fusibili.
B. Ruotare il selettore grigio della tensione per selezionare la tensione corretta in base alla linea elettrica usata.

1.4.6. Gezondheid en veiligheid - Nederlands

Elektrische apparatuur kan een gevaar voor de veiligheid vormen.
Het valt onder de verantwoordelijkheid van de gebruiker om bij de installatie de naleving van alle van kracht zijnde lokale voorschriften en wetten zeker te stellen.
Deze apparatuur dient na het lezen en begrijpen van deze handleiding voor de gebruiker alleen door gekwalificeerd personeel te worden geïnstalleerd.
Men dient zich te houden aan deze instructies voor de bediening. Bij twijfel kunt u contact opnemen met uw leverancier.

N.B.:

Deze apparatuur wordt onder garantievoorwaarden die ten tijde van de aankoop van uw leverancier van kracht zijn geleverd.

Neem contact op met uw leverancier voor bijzonderheden. Na elke poging de eenheid te deactiveren of aan te passen komt elke garantie te vervallen.

De inhoud van deze handleiding voor de gebruiker is ten tijde van het drukken naar onze mening nauwkeurig. De fabrikant behoudt echter het recht de inhoud, productspecificatie en prestatiecriteria zonder waarschuwing te veranderen.

Wij accepteren geen aansprakelijkheid voor het ongepast, nalatig of incorrect opstellen van het instrument door de gebruiker, hetzij op handmatige of automatische wijze.

CONTROLEER DE INSTELLING VAN UW LIJNINGANGSSPANNING VOORDAT DE VOEDING WORDT AANGESLOTEN.

A: Gebruik een schroevendraaier met platte kop om de zekeringlade uit te trekken.
B: Draai de grijze spanningkeuzeschakelaar om de juiste spanning voor uw locatie te selecteren.

1.4.7. Sundhed og sikkerhed - Dansk

Elektriske anordninger kan udgøre en sikkerhedsrisiko.
Det er brugerens ansvar at sikre, at installationen overholder lokale love eller bestemmelser, der er i kraft.
Kun kvalificeret personale må installere dette udstyr, efter at de har læst og forstået denne brugervejledning.
Denne driftsvejledning skal overholdes. I tvivlstilfælde bedes du kontakte din leverandør.

BEMÆRK:

Dette udstyr leveres under de garantibetingelser, der er i kraft på købstidspunktet fra leverandøren.

Kontakt din leverandør for yderligere oplysninger. Ethvert forsøg på at deaktivere eller ændre enheden vil gøre garantiaftalen ugyldig.

Indholdet i denne brugervejledning menes at være korrekt på tidspunktet for trykningen. Producenten forbeholder sig dog retten til at ændre indholdet, produktspecifikationen og ydeevnekriterierne uden varsel.

Vi påtager os intet ansvar for upassende, uagtsom eller forkert opsætning af instrumentet af brugeren, hverken manuelt eller automatisk.

KONTROLLÉR DIN LINJEUDGANGENS INDSTILLINGER FOR INDGANGSSPÆNDING FØR TILSLUTNING TIL FORSYNINGEN.

A: Brug en kærvskruetrækker til at trække sikringsskuffen ud.
B: Drej den grå spændingsvælger for at vælge den korrekte spænding for din placering

1.4.8. Hälsa och säkerhet – Svenska

Elektriska enheter kan utgöra en säkerhetsrisk.
Det är användarens ansvar att se till att installationen efterlever alla gällande lokala lagar och förordningar.
Endast behörig personal får installera utrustningen efter att ha läst och förstått den här bruksanvisningen.
De här driftanvisningarna måste följas. Kontakta återförsäljaren om du är osäker.

OBS!

Den här utrustningen levereras under de garantivillkor som gäller när den köps från återförsäljaren.

Kontakta återförsäljaren för mer information. Alla försök att inaktivera eller ändra enheten leder till att eventuella garantiavtal blir ogiltiga.

Innehållet i den här bruksanvisningen anses vara korrekt vid trycktillfället. Tillverkaren förbehåller sig däremot rätten att ändra innehållet, produktspecifikationen och prestandakriterier utan föregående meddelande.

Inget ansvar accepteras för olämplig, slarvig eller felaktig konfiguration av instrumentet av användaren, antingen det gäller manuella eller automatiska tillvägagångssätt.

KONTROLLERA SPÄNNINGSINSTÄLLNINGEN FÖR INGÅNGSLINJEN INNAN DU ANSLUTER TILL ELFÖRSÖRJNINGEN.

A: Använd en skruvmejsel för att dra ut säkringslocket.
B: Vrid den grå spänningsomkopplaren för att välja rätt spänning för din plats.

1.4.9. Terveys ja turvallisuus – suomi

Sähkölaitteet voivat muodostaa turvallisuusuhan.
Käyttäjän vastuulla on varmistaa, että asennus on kaikkien paikallisten säädösten ja sääntöjen mukainen.
Vain pätevät henkilöt saavat asentaa tämän laitteen tämän käyttöoppaan lukemisen ja sisäistämisen jälkeen.
Näitä käyttöohjeita on noudatettava. Jos jokin on epäselvää, ota yhteys tavarantoimittajaan.

HUOMAA:

Tämä laite toimitetaan takuuehdoilla, jotka ovat voimassa sillä hetkellä, kun laite ostetaan myyjältä.

Pyydä lisätietoja myyjältä. Yritykset poistaa laite käytöstä tai muokata laitetta mitätöivät kaikki takuusopimukset.

Tämän käyttöoppaan sisällön uskotaan pitävän paikkansa painohetkellä. Valmistaja pidättää kuitenkin itsellään oikeuden muuttaa sisältöä, tuotemäärityksiä ja suorituskykykriteerejä ilman erillistä ilmoitusta.

Valmistaja ei ole millään tavoin korvausvelvollinen laitteen sopimattomasta, huolimattomasta tai virheellisestä käytöstä käyttäjän toimesta manuaalisesti tai automaattisesti.

TARKISTA LINJAN TULOLIITÄNNÄN JÄNNITEASETUS ENNEN LIITTÄMISTÄ VERKKOVIRTAAN.

A: Vedä sulakekotelo esiin käyttämällä tasapäistä ruuvitalttaa.
B: Kierrä harmaata jännitteenvalitsinta ja valitse alueella käytössä oleva jännite.

1.4.10. Zdraví a bezpecnost – cestina

Elektrická zařízení mohou představovat bezpečnostní riziko.
Zajištění souladu instalace se všemi platnými místními směrnicemi a nařízeními je povinností uživatele.
Toto zařízení smí instalovat pouze kvalifikovaní pracovníci po přečtení a pochopení této uživatelské příručky.
Je třeba dodržovat tyto provozní pokyny. V případě jakýchkoli pochybností kontaktujte svého dodavatele.

PAMATUJTE:

Toto zařízení se dodává se zárukou, jejíž podmínky jsou platné v době nákupu od dodavatele.

Podrobnosti se dozvíte od svého dodavatele. Jakýkoli pokus o deaktivaci či úpravu jednotky zruší platnost záruční smlouvy.

Obsah této uživatelské příručky je v době tisku považován za přesný. Výrobce si však vyhrazuje právo bez předchozího upozornění změnit obsah, specifikaci produktu a kritéria výkonu.

Za nevhodnou, nekvalitní či nesprávnou instalaci zařízení prováděnou uživatelem (ať již ručně či pomocí automatizovaných prostředků) neneseme žádnou odpovědnost.

PŘED PŘIPOJENÍM ZDROJE NAPÁJENÍ ZKONTROLUJTE NASTAVENÍ VSTUPNÍHO NAPĚTÍ.

A: Pomocí plochého šroubováku vytáhněte pojistkovou zásuvku.
B: Otočte šedým voličem napětí na správnou hodnotu napětí pro vaši oblast.

1.4.11. Munkavédelem - Magyar

Az elektromos eszközök biztonsági kockázatokat okozhatnak.
A felhasználó kötelezettségei közé tartozik, hogy biztosítsa, a szerelés megfelel bármilyen hatályos helyi jogszabálynak és rendelkezésnek.
Csak megfelelő szakképesítéssel rendelkező személyzet szerelheti ezt a készüléket e felhasználói kézikönyv elolvasása és megértése után.
Ezeket az üzemeltetési utasításokat be kell tartani. Bármilyen kétség felmerülése esetén, kérjük, forduljon a helyi szállítóhoz.

KÉRJÜK, NE FELEDJE:

E készülék a szállítótól való megvásárlása időpontjában érvényes jótállási feltételek szerint került átadásra.

A részletekért forduljon a helyi szállítóhoz. A készülék megrongálására vagy módosítására irányuló bármilyen kísérlet a jótállás elvesztését vonja maga után.

E felhasználói kézikönyv tartalma meggyőződésünk szerint pontos a kinyomtatása időpontjában. A gyártó azonban fenntartja magának a jogot a tartalom, a termékspecifikáció és a teljesítmény kritériumok külön értesítés nélküli módosítására.

Nem vállalunk semmilyen felelősséget a készülék nem megfelelő, hanyag vagy pontatlan összeállításáért, akár a felhasználó, akár a kézikönyv vagy automatizált eszközök hibájából.

HÁLÓZATBA VALÓ BEKÖTÉS ELŐTT ELLENŐRIZZE A HÁLÓZATI TÁPFESZÜLTSÉGET.

A: Lapos csavarhúzóval húzza ki a helyéről a biztosítót.
B: Fordítsa el a szürke feszültség választó kapcsolót a helyi megfelelő feszültség kiválasztására

1.4.12. Bezpieczenstwo i higiena pracy - Polski

Urządzenia elektryczne mogą stwarzać zagrożenie dla bezpieczeństwa. Obowiązkiem użytkownika jest zapewnienie zgodności instalacji z wszelkimi obowiązującymi lokalnymi przepisami lub regulaminami.
Niniejsze urządzenie powinno być instalowane wyłącznie przez wykwalifikowany personel po zapoznaniu się i zrozumieniu niniejszej instrukcji użytkownika.
Należy przestrzegać niniejszych instrukcji obsługi. W razie jakichkolwiek wątpliwości prosimy skontaktować się z dostawcą.

UWAGA:

Niniejsze urządzenie jest dostarczane na warunkach gwarancji obowiązujących w chwili jego nabycia u dostawcy.

W sprawie szczegółowych informacji należy skontaktować się z dostawcą. Każda próba wyłączenia lub modyfikacji urządzenia spowoduje unieważnienie umowy gwarancyjnej.

Treść niniejszej instrukcji użytkownika uważa się za dokładną w chwili druku. Producent zastrzega sobie jednak prawo do zmiany treści, specyfikacji produktu i kryteriów roboczych bez wcześniejszego powiadomienia.

Nie przyjmuje się odpowiedzialności za nieodpowiednie, niedbałe lub nieprawidłowe skonfigurowanie urządzenia przez użytkownika, niezależnie czy metodą ręczną czy automatyczną.

PRZED PODŁĄCZENIEM DO ZASILANIA NALEŻY SPRAWDZIĆ USTAWIENIE NAPIĘCIA WEJŚCIOWEGO LINII.

A: Użyć płaskiego śrubokręta do wyciągnięcia oprawy bezpiecznika.
B: Obrócić szary wybierak napięcia w celu wyboru prawidłowego napięcia dla lokalizacji użytkownika.

1.4.13. Saglık ve Guvenlik Bilgileri - Turkce

Elektrikli cihazlar güvenlik tehlikesi oluşturabilirler.
Bulunulan yerin yürürlükteki yasalarına ya da yönetmeliklerine uygun olarak kurulum yapılması kullanıcının sorumluluğundadır.
Sadece bu kullanım kılavuzunu tamamen okuyup anlamış kalifiye kişiler bu cihazı kurabilirler.
Cihazın çalıştırma talimatlarına her zaman uyulmalıdır. Emin olamadığınız şeyleri satıcınıza sorunuz.

LÜTFEN DİKKAT:

Satın almış olduğunuz bu cihazın garantisi, cihazı satıcınızdan satın almış olduğunuz tarihten itibaren geçerlidir.

Garanti şartlarını satıcınızdan öğrenebilirsiniz. Cihazın sökülmeye ya da değiştirilmeye çalışılması durumunda garanti sözleşmesi geçersiz olur.

Bu kullanım kılavuzunun içindekilerin basıldığı tarihte doğru olduğuna inanılmaktadır. Bununla birlikte imalatçı, işbu kılavuzun içeriğini, ürünün teknik özelliklerini ve performans ölçütlerini haber vermeksizin değiştirme hakkını saklı tutmaktadır.

Kullanıcının ister manüel isterse de otomatik yollarla cihazı yanlış, uygunsuz ya da eksik kurması, üretici ve satıcıya hiçbir sorumluluk doğurmayacaktır.

ELEKTRİK KAYNAĞINA BAĞLAMADAN ÖNCE HATTINIZIN GİRİŞ VOLTAJ AYARINI KONTROL EDİNİZ.

A: Düz başlı bir tornavida kullanarak sigortayı dışarı çıkarınız.
B: Gri voltaj seçiciyi kullanarak cihazınızı kullandığın yerdeki voltaja ayarlayınız.

1.5. Safety Precautions

1.5.1. Safety Precautions - English

- There are no user serviceable parts inside the DC1000A. Please return the unit to a Voltech approved service center for any repairs that may be required.
- Use fuses only of the type and rating 3.15AT 5X20 ANTISURGE (66-024)
- The DC1000A has been constructed in compliance with the requirements of EN61010-1, Pollution Degree 2, and Installation Category II: FOR INDOOR USE ONLY. This ensures the safety of the instrument and the user when normal precautions are followed.
- This product can be used with a safety system and the Voltech series of AT testers (see Chapter 5 for details). It is the responsibility of the user to ensure that satisfactory risk assessments have been carried out and that the safety equipment is fit for purpose and in good working order. If in any doubt, please consult your company safety officer.

1.5.2. Mesures de sécurité - Français

- Il n'existe aucune pièce qui puisse être entretenue par l'utilisateur à l'intérieur du DC1000A. Veuillez retourner l'appareil à un centre de service agréé Voltech pour les réparations éventuelles.
- Utilisez des fusibles uniquement de type et de calibre suivants : 3.15AT 5X20 TEMPORISÉ (66-024)
- La construction du DC1000A est conforme aux exigences de la norme EN61010-1, Degré de pollution 2 et la Catégorie d'installation II: POUR UNE UTILISATION INTÉRIEURE UNIQUEMENT. La sûreté de l'instrument et la sécurité de l'utilisateur sont ainsi assurées lorsque les précautions habituelles sont prises.
- Ce produit peut être utilisé avec un système de sécurité et les testeurs de la série des testeurs AT Voltech (pour toutes précisions, voir Chapitre 5). Il incombe à l'utilisateur de s'assurer que des évaluations de risque ont été effectuées, qu'elles sont satisfaisantes mais également que le matériel de sécurité est adapté à l'application et en bon état de marche. En cas de doute, veuillez consulter le responsable de la sécurité de votre entreprise.

1.5.3. Sicherheitsvorkehrungen – Deutsch

- Im Inneren der DC1000A befinden sich keine vom Benutzer wartbaren Teile. Im Reparaturfall bringen Sie das Gerät bitte zu einem von Voltech autorisierten Servicecenter.
- Nur träge Feinsicherungen (5 x 20 mm, 3,15 A (66-024)) verwenden
- Die DC1000A erfüllt die Anforderungen von DIN EN 61010-1 Verschmutzungsgrad 2 und Installationskategorie II: NUR FÜR INNENEINSATZ. Hierdurch wird die Sicherheit des Instruments und des Benutzers gewährleistet, solange normale Sicherheitsvorkehrungen befolgt werden.
- Dieses Produkt kann mit einem Sicherheitssystem und der Voltech-Serie an AT-Testern verwendet werden (zu Details siehe Kapitel 5). Es obliegt dem Benutzer, dafür zu sorgen, dass ausreichende Risikobeurteilungen durchgeführt wurden und dass Sicherheitsausrüstung für den Zweck geeignet und in gutem Funktionszustand ist. Im Zweifelsfall wenden Sie sich bitte an den Sicherheitsbeauftragten in Ihrem Unternehmen.

1.5.4. Precauciones de Seguridad - Español

- Dentro del DC 1000A no hay componentes que se presten a servicio o reparación por el usuario. Le rogamos enviar la unidad a un centro de servicio aprobado por Voltech para cualquier reparación necesaria.
- Use solo fusibles del tipo y potencia nominal de 3.15AT 5X20 CON PROTECCIÓN DE SOBRECARGAS (66-024)
- El DC1000A ha sido construido cumpliendo con los requisitos de EN61010-1, Grado de Contaminación 2, y Categoría II de Instalación: SOLO PARA EMPLEO EN INTERIORES. Esto asegura la seguridad del instrumento y del usuario cuando se cumplen las precauciones normales de seguridad.
- Este producto puede ser usado con un sistema de seguridad y la serie ATde comprobadores de Voltech (véanse datos en el Capítulo 5). Es la responsabilidad del usuario asegurarse haber realizado las evaluaciones satisfactorias del riesgo y que el equipo de seguridad es idóneo para su propósito y está en buenas condiciones de empleo. Ante cualquier duda, le rogamos consultarla al oficial de seguridad de su compañía.

1.5.5. Precauzioni di sicurezza - Italiano

- Il DC1000A non contiene parti soggette a manutenzione. Per qualunque riparazione, restituire l'apparecchio a un centro di assistenza autorizzato Voltech.
- Usare solo fusibili dello stesso tipo e amperaggio 3.15AT 5X20 RITARDATI (66-024)
- Il DC1000A è stato realizzato conformemente ai requisiti della norma EN61010-1, Grado di inquinamento 2, Categoria di installazione II: USARE SOLO IN AMBIENTI INTERNI. Ciò garantisce la sicurezza dell'apparecchio e degli utilizzatori a condizione che si adottino le normali precauzioni d'installazione e uso.
- Questo prodotto può essere usato con un sistema di sicurezza e con i tester Voltech Serie AT (v. Capitolo 5 per maggiori informazioni). Spetta all'utilizzatore la responsabilità di garantire che siano condotte valutazioni soddisfacenti in termini di sicurezza e idoneità dell'apparecchiatura di sicurezza allo scopo previsto, nonché di verificarne il corretto funzionamento. In caso di dubbi, consultare il responsabile della sicurezza della propria azienda.

1.5.6. Veiligheidsvoorzorgen - Nederlands

- De DC1000A bevat geen onderdelen die door de gebruiker gerepareerd kunnen worden. Breng de eenheid terug naar een door Voltech goedgekeurd servicecentrum voor eventueel noodzakelijke reparaties.
- Gebruik alleen zekeringen van het type en vermogen 3,15 AT 5X20 ANTISURGE (66-024)
- De DC1000A is gebouwd conform de vereisten van EN61010-1, Verontreinigingsgraad 2, en Installatiecategorie II: UITSLUITEND VOOR BINNENGEBRUIK. Hierdoor wordt de veiligheid van het instrument en de gebruiker wanneer men zich houdt aan normale voorzorgen gegarandeerd.
- Dit product kan worden gebruikt met een veiligheidssysteem en de Voltech-serie AT-testers (zie Hoofdstuk 5 voor bijzonderheden). Het valt onder de verantwoordelijkheid van de gebruiker om zeker te stellen dat bevredigende risicobeoordelingen zijn uitgevoerd en dat de veiligheidsuitrusting geschikt is voor het doel en in goed werkorde is. Raadpleeg bij twijfel de verantwoordelijke voor de bedrijfsveiligheid.

1.5.7. Sikkerhedsforanstaltninger - dansk

- Der er ingen dele inden i DC1000A, som kan serviceres af brugeren. Send enheden tilbage til et Voltech-godkendt servicecenter for eventuelle nødvendige reparationer.
- Brug kun sikringer af typen og effekten 3.15AT 5X20 OVERSPÆNDING (66-024)
- DC1000A er konstrueret i overensstemmelse med kravene i EN61010-1, forureningsgrad 2 og installationskategori II: KUN TIL INDENDØRS BRUG. Dette sikrer instrumentets og brugerens sikkerhed, når normale forholdsregler følges.
- Dette produkt kan bruges sammen med et sikkerhedssystem, og Voltechs serier af AT-testere (se kapitel 5 for flere oplysninger). Det er brugerens ansvar at sikre, at der er blevet foretaget tilfredsstillende risikovurderinger, og at sikkerhedsudstyret er egnet til formålet og i god driftsmæssig stand. I tvivlstilfælde skal du kontakte den sikkerhedsansvarlige i din virksomhed.

1.5.8. Säkerhetsföreskrifter – svenska

- Det finns inga delar som kan servas av användaren inuti DC1000A. Lämna in enheten till ett Voltech-godkänt servicecenter för eventuella reparationer.
- Använd enbart säkringar av typen och klassifikationen 3.15AT 5X20 ANTISURGE (66-024).
- DC1000A har tillverkats i överensstämmelse med kraven i SS-EN 61010-1, föroreningsgrad 2 och installationskategori II: ENDAST FÖR INOMHUSBRUK. På så vis säkerställs instrumentets och användarens säkerhet när normala försiktighetsåtgärder iakttas.
- Produkten kan användas med ett säkerhetssystem samt Voltech-serien med AT-testare (mer information finns i kapitel 5). Det är användarens ansvar att se till att lämpliga riskutvärderingar har genomförts, och att säkerhetsutrustningen passar för avsett syfte och är i gott fungerande skick. Kontakta företagets säkerhetsansvariga om du är osäker.

1.5.9. Varotoimenpiteet – suomi

- DC1000A:n sisällä ei ole käyttäjän huollettavissa olevia osia. Jos laite tarvitsee korjausta, palauta se Voltechin hyväksymään huoltoliikkeeseen.
- Käytä vain sulakkeita, joiden tyyppi ja luokitus on 3,15 AT 5 × 20 VIRTAPIIKKISUOJAUS (66-024)
- DC1000A on valmistettu standardin EN61010-1, saastumisaste 2 ja asennusluokka II mukaisesti: VAIN SISÄKÄYTTÖÖN. Tämä varmistaa laitteen ja käyttäjän turvallisuuden, kun normaaleja varotoimia noudatetaan.
- Tätä tuotetta voidaan käyttää yhdessä turvallisuusjärjestelmän ja Voltechin AT-testerien kanssa (lisätietoja on luvussa 5). Käyttäjän vastuulla on varmistaa, että riittävät riskienarvioinnit on tehty ja että turvalaitteet ovat tarkoituksenmukaiset ja hyvässä toimintakunnossa. Epäselvissä tilanteissa voit kääntyä yrityksesi työsuojeluvaltuutetun puoleen.

1.5.10. Bezpecnostni opatreni – cestina

- Zařízení DC1000A neobsahuje žádné části, jejichž servis by mohl provádět uživatel. Pokud bude potřeba provést jakoukoli opravu, vraťte jednotku do schváleného servisního centra společnosti Voltech.
- Používejte pouze pojistky tohoto typu a jmenovité hodnoty: 3.15AT 5X20 ANTISURGE (66-024)
- Jednotka DC1000A byla vyrobena v souladu s požadavky směrnice EN 61010-1, stupněm znečištění 2 a kategorií instalace II: PRO POUŽITÍ POUZE V INTERIÉRECH. Tím se při dodržování běžných bezpečnostních opatření zajistí bezpečnost zařízení a uživatele.
- Tento produkt lze používat s bezpečnostním systémem a řadou testerů AT od společnosti Voltech (podrobnosti naleznete v kapitole 5). Uživatel musí provést uspokojivé hodnocení rizik a musí určit, zda je bezpečnostní zařízení vhodné pro daný účel a správně funguje. V případě jakýchkoli pochybností se obraťte na pracovníka odpovědného za bezpečnost ve vaší společnosti.

1.5.11. Biztonsági óvintézkedések - Magyar

- A DC1000A készülékben nincsenek felhasználói szervizt igénylő alkatrészek. Kérjük, küldje vissza a készüléket a Voltech által megbízott szerviz központba, ha bármilyen javításra lenne szüksége.
- Kizárólag 3.15AT 5X20 ANTISURGE (66-024) típusú biztosítókat használjon.
- A DC1000A megfelel az EN61010-1, 2. szennyezési fokozat követelményeinek, valamint a II. szerelési kategóriának: CSAK BELTÉRI HASZNÁLATRA szolgál. Ez biztosítja a berendezés és a felhasználó biztonságát a szokásos óvintézkedések betartása mellett.
- E termék együtt használható a biztonsági rendszerrel és a Voltech AT sorozatú vizsgálókészülékekkel (lásd a részleteket az 5. fejezetben). A felhasználónak kell biztosítania a megfelelő kockázatértékelések elvégzését és azt, hogy a biztonsági berendezés megfeleljen a rendeltetésének és jó üzemállapotban legyen. Bármilyen kétség esetén, kérjük, forduljon a helyi munkavédelmi megbízotthoz.

1.5.12. Srodki ostroznosci BHP - Polski

- Wewnątrz urządzenia DC1000A nie ma części przeznaczonych do samodzielnej naprawy przez użytkownika. Urządzenie należy przekazać do autoryzowanego punktu serwisowego firmy Voltech celem dokonania wszelkich wymaganych napraw.
- Należy stosować wyłącznie bezpieczniki podanego typu o następujących parametrach: 3.15AT 5X20 ANTISURGE (66-024).
- Urządzenie DC1000A zostało zbudowane zgodnie z wymogami normy EN61010-1, stopień zanieczyszczenia 2 i kategoria instalacji II: WYŁĄCZNIE DO UŻYTKU WEWNĄTRZ POMIESZCZEŃ. Stosowanie właściwych środków bezpieczeństwa zapewni bezpieczeństwo urządzenia i użytkownika.
- Niniejszy produkt można stosować z systemem bezpieczeństwa i serią Voltech testerów AT (szczegółowe informacje przedstawiono w rozdziale 5). Użytkownik ponosi odpowiedzialność za zapewnienie przeprowadzenia odpowiednich ocen ryzyka oraz stosowanie urządzeń bezpieczeństwa przeznaczonych do określonego celu i w należytym stanie technicznym. W razie jakichkolwiek wątpliwości należy skonsultować się z zakładowym inspektorem BHP.

1.5.13. Guvenlik Tedbirleri - Turkce

- DC 1000A cihazının içerisinde kullanıcının müdahale edebileceği herhangi bir parça yoktur. Herhangi bir onarım gerektiğinde cihazı lütfen Voltech onaylı bir servis merkezine gönderiniz.
- Aynı tür ve 3.15AT 5X20 ANTISURGE (66-024) sınıfında sigorta kullanınız.
- DC1000A cihazı, EN61010-1, Pollution Degree 2 (2. Kirlilik Derecesi) ve Installation Category II: FOR INDOOR USE ONLY (II. Kurulum Kategorisi: SADECE İÇERİDE KULLANILAN CİHAZLAR) standardının gerekliklerine uygun olarak imal edilmiştir.Bu standart, normal güvenlik tedbirlerine uyulması koşuluyla cihazın ve kullanıcının güvenliğini garantiye alır.
- Bu ürün, bir güvenlik sistemiyle ve Voltech serisi AT test cihazlarıyla (ayrıntılı bilgi için 5. Bölüme bakınız) birlikte kullanılabilir. Gerekli ve yeterli risk değerlendirmelerini yapmak ve güvenlik cihazının iş görür ve çalışır durumda olduğunu tespit etmek kullanıcının sorumluluğundadır. Emin olmadığınızı şeyleri lütfen şirket güvenlik görevlisine sorunuz.

1.6. Package Contents

When you receive your DC1000A, the following accessories will also be in the packing box with your new instrument. Also given are the Voltech part numbers (xx-xxx), in case you'd like to order spares.

- **1 x 30A Test Lead set** (78-114) – One yellow and one black, with clips. Each lead is 1.5 meters long.
- **1 x 9-Way Straight Through Male-Female RS232 Lead** (77-046) – This is for connection between your DC1000A and an AT series transformer tester or between multiple DC1000A units to synchronize their operation.
- **1 x 9-Way Null Modem Male-Female RS232 Lead** (77-045) – This is for connection between your DC1000A RS232 "IN" and a controlling computer.
- **1 x Handle Assembly** (74-027) – This includes two handles, and the fixing hardware needed to attach them to your DC1000A.
- **1 x Safety Interlock Override Plug** (91-265) – This can be used in place of a safety system where there is no risk of dangerous voltages. This is only for use when not testing with high currents or voltages. We always recommend using an approved Safety System. Please consult your safety officer.
- **1 x Power Cord**

If there is anything missing from this list when you first unpack your new DC1000A, then please contact your supplier for an immediate replacement.

1.7. Accessories

If you require any cables, safety override plugs or fuses, in addition to those supplied with your DC1000A. Please contact your local Voltech supplier. The part numbers for the parts supplied with your unit are given in the Section 1.4 "Package Content" above.

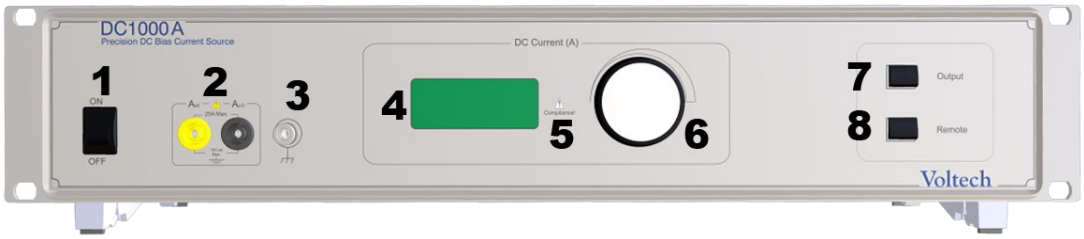
The Voltech Part number for the RS232 cable supplied with your AT Product that is used to interface with your DC1000A is 77-015 (9way-9way F-F Editor Cable).

If you are using the DC1000A with a Voltech AT5600 then please contact Voltech for a “Y” cable (250-031) for easy connection to Safety System and AT5600.

2. Getting Started

The DC1000A is designed with ease of use and speed of testing in mind. The following is a description of the functions on both the front and rear panels of the DC1000A, to help you familiarize yourself with the basic operation of the instrument.

2.1. Front Panel Description



1. Power Switch

Switches the unit on and off by breaking the mains power to the unit.
No power is drawn from the supply when switched off.

2. Output Terminals

4mm safety sockets for connection to appropriate cables (30A test leads supplied).

3. Earth Terminal

4mm socket and screw terminal for connecting to the earth of the LCR meter or AT5600 for optimum accuracy. Use an earth lead 600 mm or shorter for the best performance.

This is especially important at high frequencies (>100 kHz), where the earth path though the standard mains from the DC1000A to the LCR Meter can be very long, and thus be prone to noise pick up. Most LCR meters have a similar earth connection on their front panel to connect to the DC1000A earth terminal, using any standard 4mm banana lead.

4. Display

The display is a 4-character LED display to indicate operating status codes or the output current in Amps. See section 8, Status Codes, for details.

5. Compliance LED

This LED lights up to indicate that the programmed current cannot be supplied because the output voltage has reached its maximum. This state is described as in over compliance.

6. Rotary Dial

Rotate to set the output current of the DC1000A.

7. Output Enable Button/LED

Momentary button used to enable or disable the output current of the DC1000A. A green LED indicates the status of the output. The LED lights to indicate that the output is turned on.

8. Remote Button

Momentary button used to take the DC1000A out of 'Remote' mode after another system has been remotely controlling it. A yellow LED indicates when 'Remote' mode is turned on.

2.2. Rear Panel Description

1. RS232 IN

This serial port is used to receive control commands and connects either to an AT series transformer tester or to the **RS232 OUT** port of another DC1000A.

2. RS232 OUT

This serial port is used to connect to the **RS232 IN** port of another DC1000A, or a PC used for controlling an AT series transformer tester and DC1000A combination.

3. Fan Outlet

When generating high currents from the DC1000A for an extended period, internal parts can reach high temperatures and require forced air cooling. Please keep this air outlet clear of obstruction to allow the instrument to automatically regulate its internal temperature.

4. Safety Interlock IN

This connects to a safety device, such as a light curtain. When the connection is broken the DC1000A will not produce any current.

5. Safety Interlock OUT

This connects to another DC1000A's **Safety Interlock IN** port. If you are using more than one DC1000A in parallel, then a single safety device can control each of the units in the chain.

6. Power Entry Module

Connect this socket to the mains power outlet.

7. Fuse drawer and line voltage setting

Use a flat-headed screwdriver to pull the fuse drawer out. Rotate the gray voltage selector to select the correct voltage for your location. Contained within the module are two fuses which must always be replaced when necessary with the same type and rating (3.15AT 5X20 ANTISURGE)

3. Using the DC1000A with an LCR Meter

The high output impedance of the DC1000A allows it to be used with almost any manufacturer's LCR meter that has a bias compensation system or bias connection fixture.

Using the test leads that were supplied with your DC1000A and with your LCR meter, it is fast and easy to setup your environment for testing an inductor.

3.1. Compensation and Measurement with an LCR Meter

It is important to follow the compensation steps below before making any measurements.

A Power up your DC1000A and turn the output **ON**, making sure that the current output is set to **ZERO**.

B Ensure that the front panel earth connections are made, using the shortest and most direct connection. Ideally the DC1000A(s) and LCR meter should be directly adjacent or stacked, so that earth connections under 300mm are possible.

Where multiple DC1000A units are connected, Earth connections should either be summed at the LCR meter connection, or connected to a bus bar, and then to the LCR.
In any event the earth path length should be kept as physically short as possible, and use a very low resistance cable, the thicker the better. AWG16 would be appropriate. The earth connections should never be daisy chained across the DC1000A units.

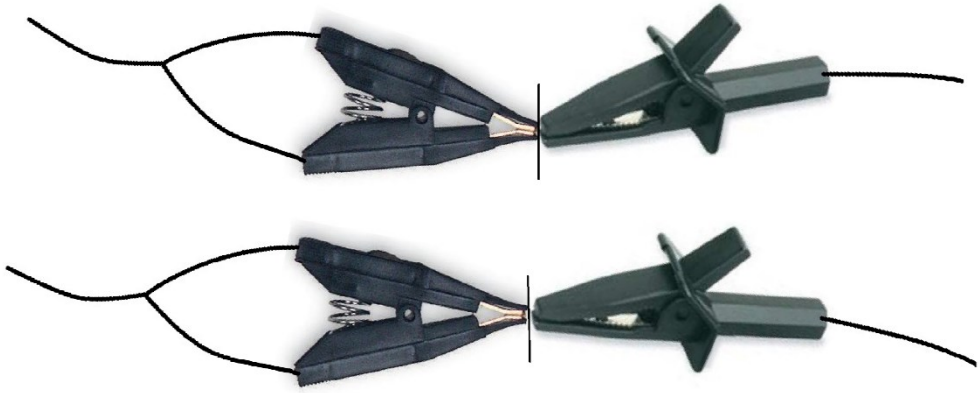
C Perform compensation on your LCR meter. It is important to compensate at the frequency you will be testing. Refer to the user manual of the LCR meter you are testing with for instructions on compensation.

NOTE
It is important to compensate at the specific frequencies you will be testing your part at. The "Compensate ALL frequencies" method cannot be used, as measurement errors may occur. Compensation MUST be performed at a specific frequency.

It can also be helpful to maximize the test signal voltage during compensation to improve stability by increasing the signal to noise ratio.
Certain modern LCR meters are more susceptible to noise than some common older models, as their maximum test signals are lower, and the source impedance is higher.
In general, it is advised that Auto level control systems (ALC) are disabled, and that any DC isolation features are enabled during compensation.
Compensate ALL frequency method cannot be used, measurement errors may occur. Compensation MUST be performed at a specific frequency.

Open circuit (OC) compensation:

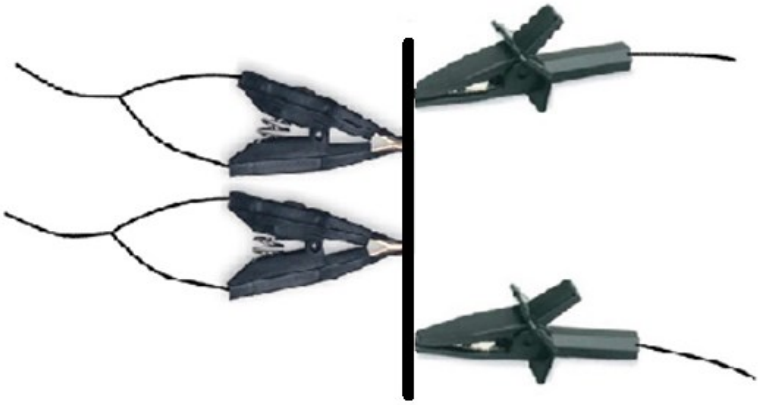
i) Short Amp Hi from the DC1000A with the LCR Hi.
Short Amp Lo from the DC1000A with the LCR Lo.
These are shorted separately. See below.



ii) Perform OC compensation on the LCR meter.

Short circuit (SC) compensation:

i) Short the clips from LCR Hi to LCR Lo to both DC1000 Leads See below



ii) Perform SC compensation on the LCR meter.

D. Turn the DC1000A output **OFF**.

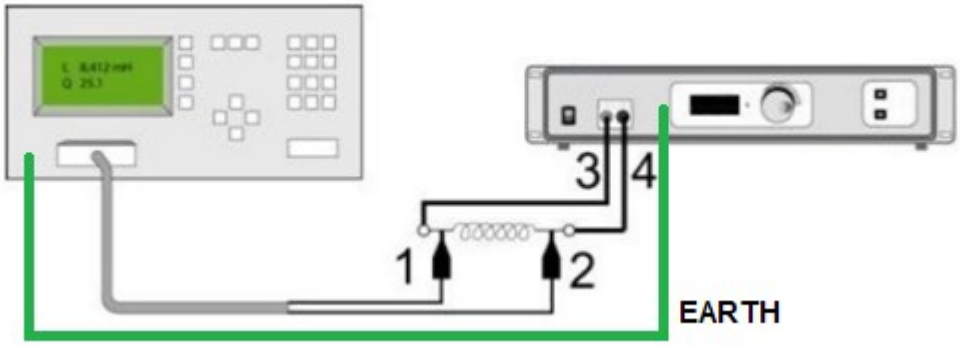
E. Make sure all the connections are made as indicated below.

When connecting an LCR meter and DC1000A to the device under test, be sure HI side of DC1000A (**3)** is connected to Hi side of LCR meter (**1)**

For the opposite side of device under test connect Lo side of DC1000A (**4)** to Lo side of LCR meter (**2)**.

F. Connect the (**Earth)** from the DC1000A (Front Panel) to the LCR meter earth terminal with a cable length of 600 mm or shorter.

Make sure the Safety Interlock Override plug (VPN 91-265) is inserted into the Safety Interlock port on back of DC1000A.



G. Using the rotary encoder set your DC1000A output to the desired current.

H. Turn the DC1000A output on.

I. Adjustments can be made to the DC1000A current while the output is enabled, using the rotary encoder.

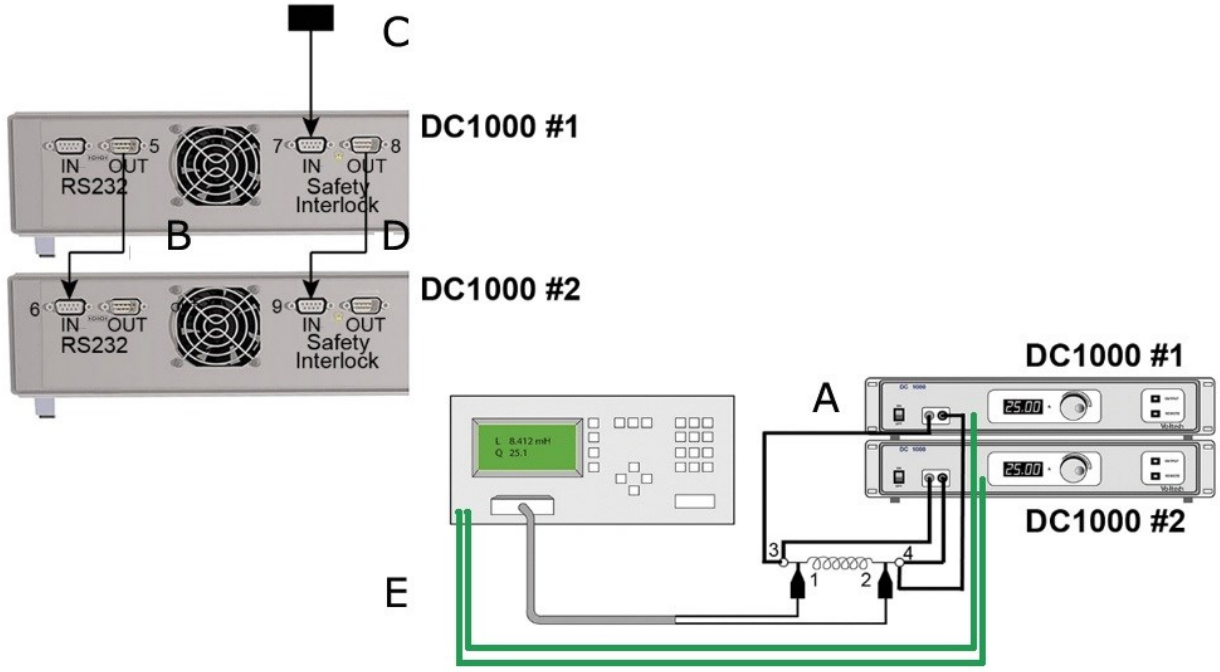
It is also important to note that you should not disconnect the energized device under test. Disconnection while energized could cause damage.

3.2. Connecting Multiple DC1000As with an LCR Meter

You can generate up to 500 A as a maximum by connecting to 20 DC1000As together in parallel. Either the first DC1000A or a PC can be used to control all the other DC1000As in the chain – automatically adjusting their output current to allow you to easily achieve the results you require.

Everything you need to hookup multiple DC1000As is provided with the units themselves. See below for connections required.

Ensure that the each of the DC1000A Earth terminals (Front Panel) is connected to the LCR meter earth terminal by as short a path as possible



A. When connecting an LCR meter and DC1000A to the device under test, be sure Hi side of DC1000A **3** is connected with Hi side of LCR meter **1** and use opposite side of device under test to connect Lo side of DC1000A **4** to Lo side of LCR meter **2**.

B. Use a 9Way-9Way M-F straight-through lead (77-046) to connect from RS232 OUT port **5** of DC1000A #1 to RS232 IN port **6** of DC1000A #2.

C. Insert Safety Interlock Override Plug (91-265) into Safety Interlock In port **7** on back of DC1000A #1.

D. Use a 9Way-9Way M-F straight-through lead (77-046) to connect Safety Interlock OUT port **8** of DC1000A #1 to Safety Interlock IN port **9** of DC1000A. #2.

E. Ensure the Earths are connected from the DC1000A to the LCR meter.

Then, if you have more than two DC1000A's, connect the **RS232 OUT** of the second DC1000A in your chain to the **RS232 IN** of the third.

Follow the same pattern for any remaining DC1000A's you wish to connect in parallel.

Always connect directly from **EACH** DC1000A in your chain to the inductor.

NEVER connect one DC1000A to another using 4mm socket on front of DC1000A's.

If you try to carry more than 30A through each DC cable then the accumulated current could exceed the rating for the supplied cable, and cause fire and injury.

Be sure to follow compensation steps (A) through (C) from Section 3 to obtain accurate measurements.

When compensating your LCR meter for use with the DC1000As, always set the current to '0.00' and turn the output ON. It is also important to compensate LCR meter at frequency your will be testing at.

3.3. Hints and Tips when using DC1000A with LCR Meter

Compensation

To obtain accurate measurements with an LCR meter, measurement compensation must always be performed to reduce the effects of adding the DC1000A and cabling in parallel with the part under test. With most LCR meters there are two different types of compensation: Open Circuit and Short Circuit.

The DC1000A must be connected to the LCR meter for all forms of compensation to ensure that any effects are compensated out.

Connect the system as shown in 3.1 (single unit) or 3.2 (multiple units), preferably using a fixture and restrained cabling, and replace the part under test with either a short circuit, open circuit (nothing fitted)

Please reference your LCR user manual for details on how to perform compensation.

Cabling considerations.

It is important to minimize the potential for variation to be introduced through all paths of connection.

TEST CABLES
Cable lengths from LCR and DC bias sources should be kept to a practical minimum and be constrained to avoid movement. Cables should not be looped, and pairs should be gently twisted about each other to help common mode rejection.

EARTH LEADS
Care should especially be taken in the case of earth connections.
It is advisable to ensure that the earth connection between devices is as direct and effective as possible, and this applies to mains power connections as well as front panel “reference” earths.
Minimizing the overall “Loop area” also helps reduce the tendency for the earth network to act as an antenna and minimizes potential noise pickup.

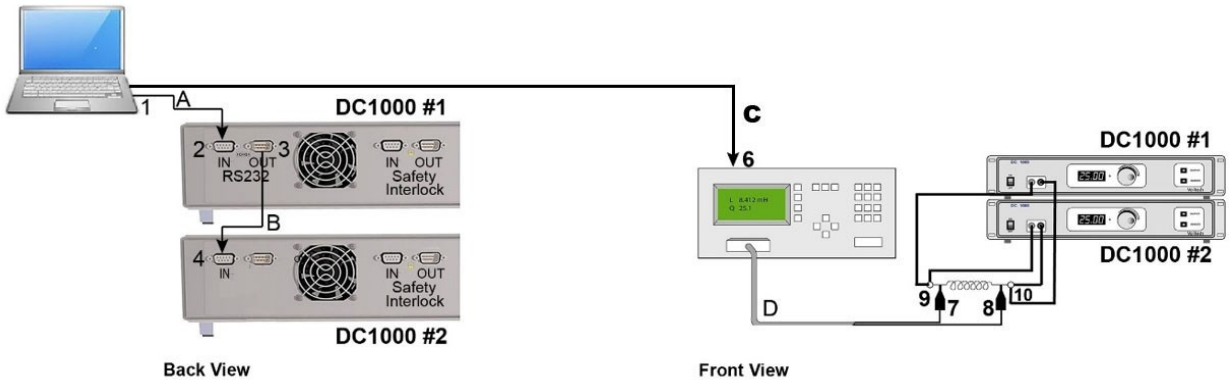
MAINS SUPPLY LEADS
Mains power connections for the LCR and the DC1000A(s) should be as close together as possible, ideally from a single distribution point, and use the minimum length of cable practical
It is advisable to periodically disconnect and clean the earth connections for long term fixed installations

In any such system, the effect of noise is cumulative, and strategies to minimize it should be applied at every opportunity, especially when dealing with precision measurements at low impedances.

3.4. Connecting PC to Control DC1000A and LCR Meter - RS232

To use your PC to control your DC1000As, and an LCR meter with RS232 communications capability, follow the setup below (Earth connections not shown for simplicity)

Please see Chapter 7 for information on using a USB-RS232 converter if your PC does not have an RS232 port.



A. Use a 9way-9way M-F null modem lead (77-045) to connect PC RS232 port **1** to RS232 IN port **2** of DC1000A #1.

B. Use a 9way-9way M-F straight-through lead (77-046) to connect from RS232 OUT port **3** of DC1000A #1 to RS232 IN port **4** of DC1000A #2.

C. Use the LCR RS232 lead to connect PC to LCR meter RS232 port **6**.

D. When connecting an LCR meter and DC1000A to the device under test, be sure the Hi side of DC1000A **9** is connected with Hi side of LCR meter **7** and use the opposite side of device under test to connect Lo side of DC1000A **10** to Lo side of LCR meter **8**.

E. Ensure the Earths are connected from the DC1000A to the LCR meter.

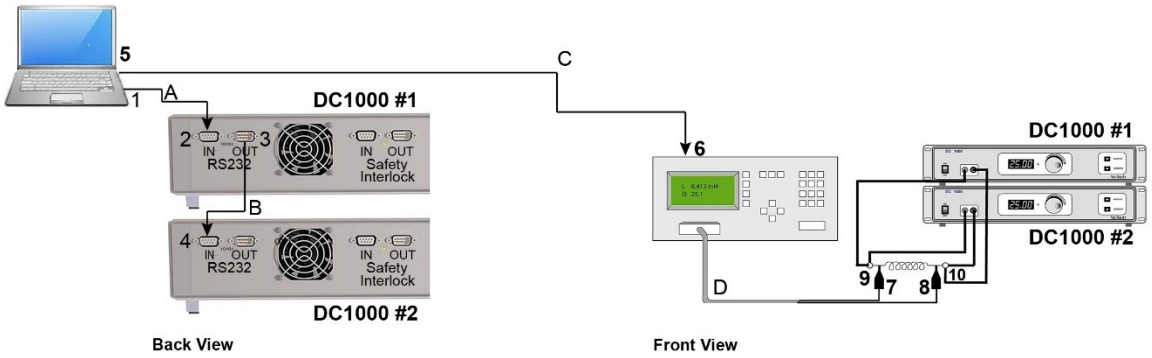
When using an LCR meter with RS232 communications capability, connect the RS232 port of the LCR meter to the **RS232 OUT** port of the last DC1000A '(DC1000A # 2' in the diagram) in your chain, using a null modem cable (see the *Accessories* section of this user manual for details on a null modem cable available from Voltech)

NOTE: the type of cable required will depend on the type of RS232 connector on your LCR meter. See the RS232 Communications - Pinning Section 7.1 of this user manual for details if a custom cable is required).

3.5. Connecting PC to Control LCR with GPIB and DC1000A with RS232

To use your PC to control your DC1000As with RS232, and an LCR meter with IEEE-488 communications capability, follow the setup below (Earth connections not shown for simplicity)

Please see Chapter 7 for information on using a USB-RS232 converter if your PC does not have an RS232 port.



A. Use a 9way-9way M-F null modem lead (77-045) to connect PC RS232 port **1** to RS232 IN port **2** of DC1000A #1.

B. Use a straight-through lead (77-046) to connect from RS232 OUT port **3** of DC1000A #1 to RS232 IN port **4** of DC1000A #2.

C. Use the IEEE-488 cable to connect PC IEEE-488 port **5** to LCR meter IEEE-488 port **6**.

D. When connecting an LCR meter and DC1000A to the device under test, be sure Hi side of DC1000A **9** is connected with Hi side of LCR meter **7** and use opposite side of device under test to connect Lo side of DC1000A **10** to Lo side of LCR meter **8**.

E. Ensure the Earths are connected from the DC1000A to the LCR meter.

When using an LCR meter without RS232 communications capability, the PC you are using must have both an RS232 port (to control the DC1000As) and an IEEE-488 port (to control the LCR meter directly).

Connect the PC directly to the IEEE port of the LCR meter, as illustrated in diagram

3.6. Hints and Tips for specific LCR meters

ALL LCR METERS

POLARITY
For all LCR meters, it is important to have the HI/LO polarity of the DC1000 leads connected to your UUT with the same HI/LO polarity of the LCR leads.

TEST SIGNAL
Most common LCR meters will allow a test voltage of 0-5V AC.
As with any measurement, the higher the voltage, the higher the current, and hence the more stable and reliable the reading.
It is always best practice to test using the largest AC Voltage that your LCR will supply (given the specific L of the load you are measuring – the matching of the load to the impedance of the LCR may limit the actual applied LCR Voltage).
This same rule applies when using the DC1000 where the LCR AC Current being measured sits on top of the DC Current supplied by the DC1000

KEYSIGHT E4980AL

It is also critical that on the E4980AL, under the menu option MEASURE SET UP, that you have set DCI-ISO to ON.

ALC should also be disabled during compensation but can be enabled if you wish during measurement.

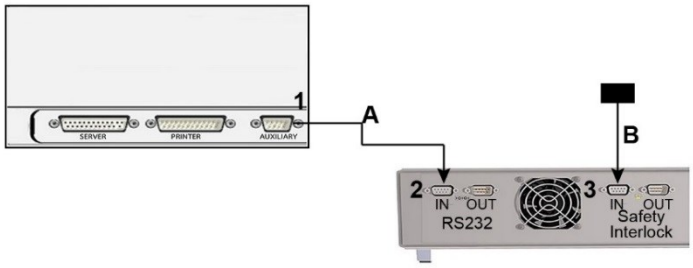
4. Using the DC1000A with an ATi Transformer Tester

4.1. Connecting the DC1000A with an ATi (no PC)

When an ATi and DC1000A are used in combination this easily allows you to automate your production testing.

Setup with an ATi and DC1000A is quick and easy.

Please reference below.



A. Use 9way-9way M-F straight-through lead (77-046) to connect ATi Aux Port **1** to RS232 Port **2** of DC1000A.

B. Insert Safety Interlock Override Plug (91-265) in to RS232 Safety Interlock Port **3**.

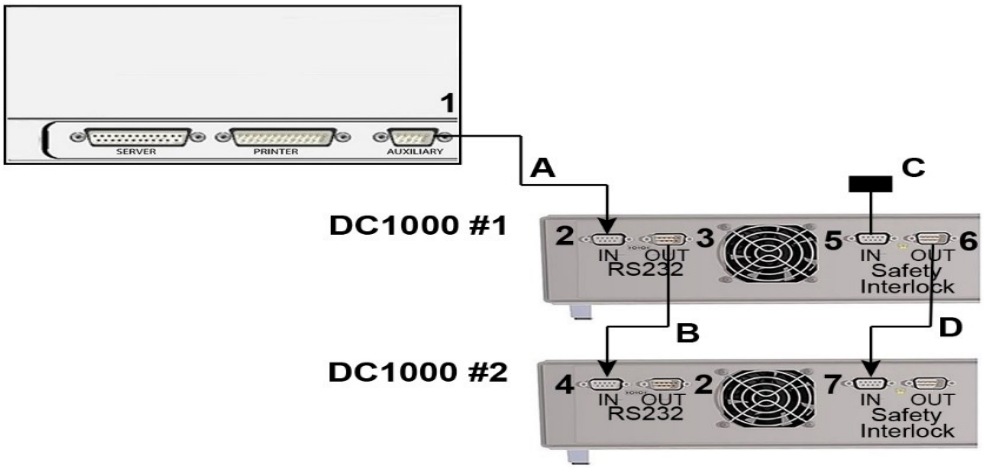
C. Ensure the Earths are connected from the DC1000A to the ATi.

4.2. Connecting Multiple DC1000As with an ATi (No PC)

You can connect up to 20 DC1000A(s) in parallel to able to test up to 500 Amps DC.

Everything you need to connect multiple DC1000As is provided in the box.

Please reference below for connection details.



A. Use a 9way-9way M-F straight-through lead (77-046) to connect AT Aux Port **1** to RS232 IN port **2** of DC1000A #1.

B. Use a 9way-9way M-F straight-through lead (77-046) to connect RS232 OUT **3** of DC1000A #1 to RS232 IN **4** DC1000A #2.

C. Insert Safety Interlock Override Plug (91-265) into RS232 Safety Interlock IN Port **5**.

D. Use a 9way-9way M-F straight-through lead (77-046) to connect Safety Interlock OUT port **6** of DC1000A # 1 to the Safety Interlock IN port **7** of DC1000A #2.

E. Ensure the Earths are connected from the DC1000A to the ATi.

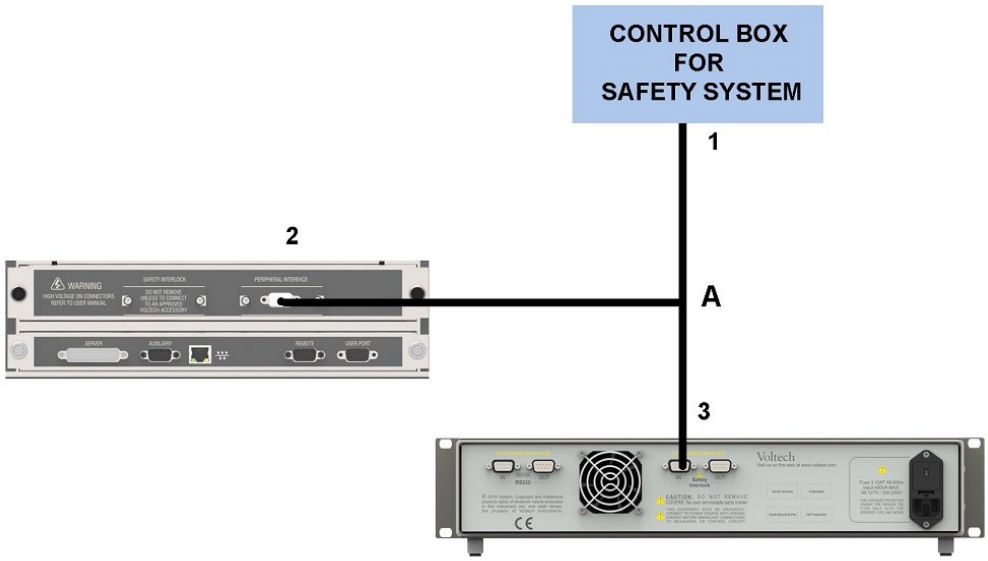
5. Using the DC1000A with a Voltech AT Tester + Safety System

5.1. Connecting the DC1000A with an AT5600 and Safety System

The following describes ONLY the interlock system.
For details on COMMS connections please see chapter 6

When using your DC1000A with a Voltech AT5600 series transformer tester, a Safety Interlock Y splitter lead (**250-031**) must be used on the safety system to integrate the DC1000, AT and your safety system

Both DC1000A and AT5600 must be positioned inside the Light Curtain Safety System Enclosure.



Use the Safety Device “Y” lead labelled A (250-031).

The end labeled **SD** connects to Control Box (1**)**.
The end labeled **AT** connects to the AT5600 Safety Interlock (**2)**
The end labeled **DC** connects to Safety Interlock IN (**3)** of DC1000A.

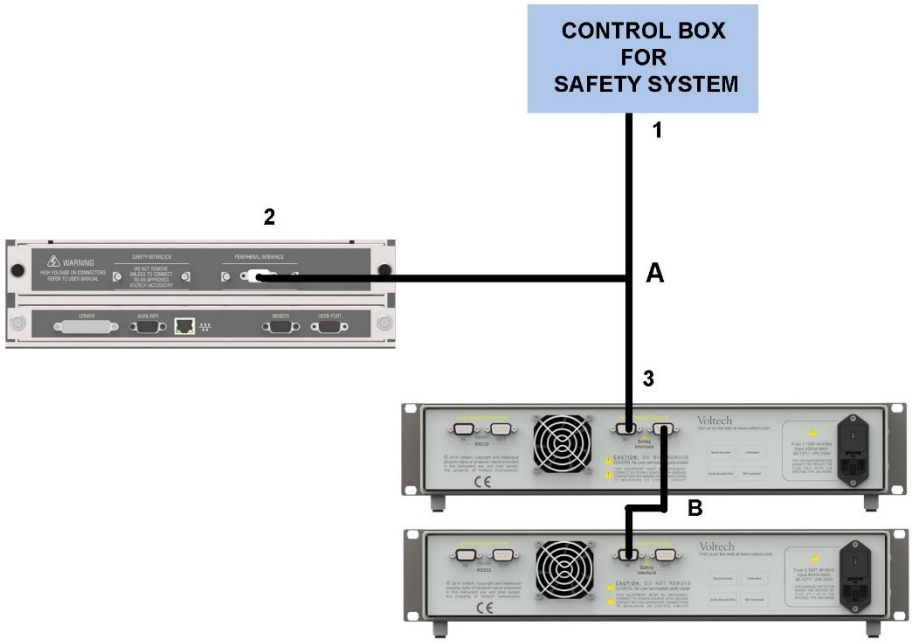
5.2. Connecting Multiple DC1000A's with an AT5600 and Safety System

You can generate up to 500 Amps by connecting up to twenty DC1000A's in parallel.

The Interlock system can be simply chained though the units. This applies in all cases.

A, with an AT tester to control the multiple units
B, Using RS232 comms to control the multiple DC1000s with your own code.
C, Using the units manually (The first DC1000 will then control all the others)

Everything you need to connect multiple DC1000A's is provided out of the box. Both DC1000A(s) and AT5600 must be positioned inside the Light Curtain Safety System Enclosure.



Use the Safety Device "Y" lead "A" (250-031)

The end labeled **SD** is connected to Control Box (1**)**
The end labeled **AT** is connected to the AT Safety Interlock (**2)**
The end labeled **DC** is connected to Safety Interlock IN (**3)** of DC1000A #1.

Use a 9way-9way M-F straight-through lead **(B)** (77-046) to connect Safety Interlock OUT of DC1000A # 1 to the Safety Interlock IN of DC1000A #2.

Additional DC1000 units can then be interlocked in the same manner.

For optimum safety, ease of use and test speed, Voltech recommends the use of a safety light curtain.

Voltech can provide a “Y” cable (250-031) for connection between a light curtain and the DC1000A and the AT5600 transformer tester.
The cable has been optimized for use with the safety light curtain.

It is the responsibility of the user to ensure that satisfactory risk assessments have been carried out and that the safety equipment is fit for purpose and in good working order.

Please check the Voltech website (http://www.voltech.com) for up to date information.

Your DC1000A shipped with a Safety Interlock Override Plug (91-265) which can be inserted into the **Safety Interlock IN** port in the place of a safety device.

DO NOT USE THE SAFETY INTERLOCK OVERRIDE PLUG WITH DANGEROUS CURRENTS OR VOLTAGES ON THE FIXTURE

It is the responsibility of the user to ensure that satisfactory risk assessments have been carried out before using the Safety Interlock Override Plug.

6. Using the DC1000A with a Voltech AT Tester + PC

The following describes ONLY the COMMS connections.
For details on interlock system connections please see chapter 5

IMPORTANT; When using these DC1000 tests (LSBX LPBX ZBX), ensure that the terminal you pick as HIGH in the editor program is also the node that is connected to the AHi output of the DC1000.

Similarly, the node you specify as LOW should also be the node that is connected to the ALo output of the DC1000.

To use any Voltech software with an AT series product, specific DC1000A tests **(LPBX, LSBX, and ZBX**) must be installed on the AT being used.

As with all Voltech AT tests, these are provided on a per AT basis – so no matter how many DC1000As you have connected, one test purchase will cover all DC1000As attached to your AT.

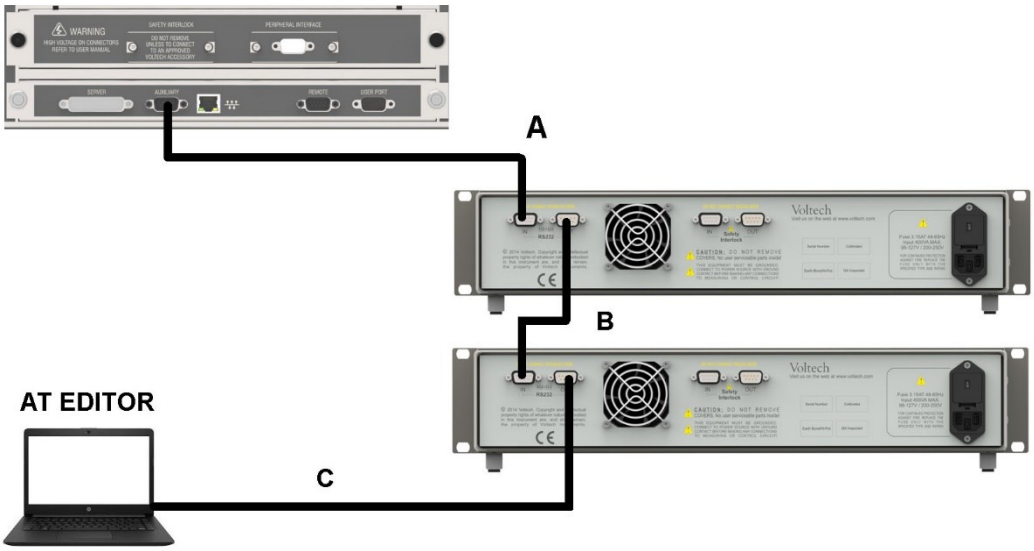
Contact your local Voltech supplier for details on attaining these tests.

6.1. Connecting the DC1000A with an AT and PC

6.1.1. AT Editor using RS232

Please see Chapter 7 for information on using a USB-RS232 converter if your PC does not have an RS232 port.

For controlling the AT + DC's using the AT Editor software, the setup is as follows.



CABLE A Use a 9way-9way M-F straight-through lead (77-046) to connect AT Auxiliary Port to RS232 IN of DC1000A #1.

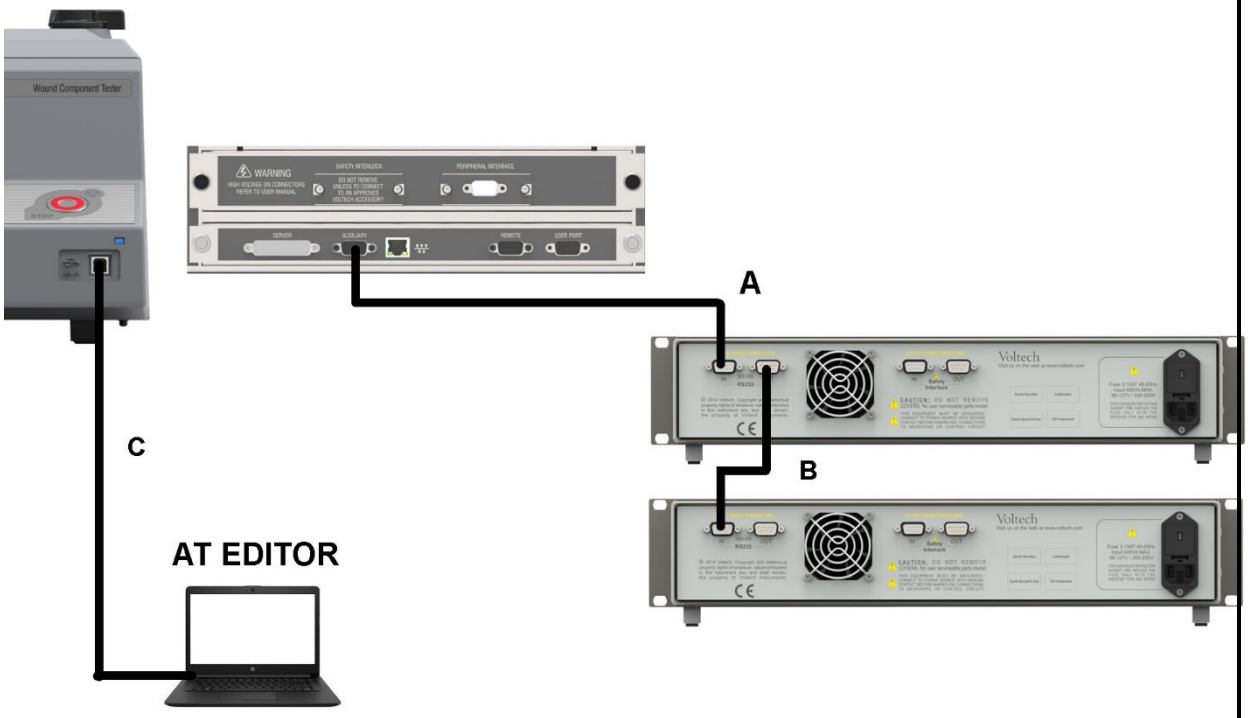
CABLE B (**ONLY required if using multiple DC1000A's)** Use a 9way-9way M-F straight-through lead (77-046) to connect RS232 OUT of DC1000A #1 to RS232 IN DC1000A #2.

CABLE C Use 9way-9way F-F RS232 lead (77-015 AT Editor Cable) to connect RS232 OUT of the last DC in the chain (here DC1000A #2) to PC RS232

6.1.2. AT Editor using USB (AT5600 ONLY)

The AT5600 allows use of the AT Editor over direct USB connection.

In this case the DC1000s are still controlled via the AT Aux port using RS232 cables



CABLE A Use a 9way-9way M-F straight-through lead (77-046) to connect AT Auxiliary Port to RS232 IN of DC1000A #1.

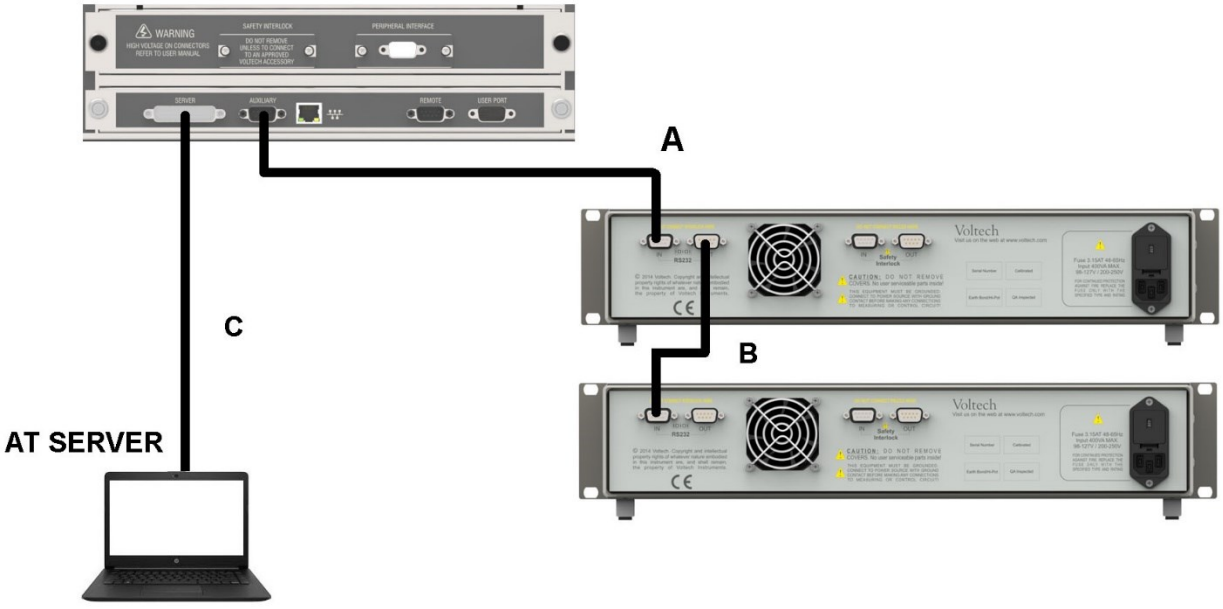
CABLE B – **ONLY required if using multiple DC1000A's)** Use a 9way-9way M-F straight-through lead (77-046) to connect RS232 OUT of DC1000A #1 to RS232 IN DC1000A #2.

CABLE C Use standard USB-A to USB-B cable to connect PC to the front panel of the AT5600 (USB-B port only as shown)

6.1.3. AT Server using RS232

Please see Chapter 7 for information on using a USB-RS232 converter if your PC does not have an RS232 port.

If you are using the AT server to send test programs to the AT (and record test results) the configuration is as follows.



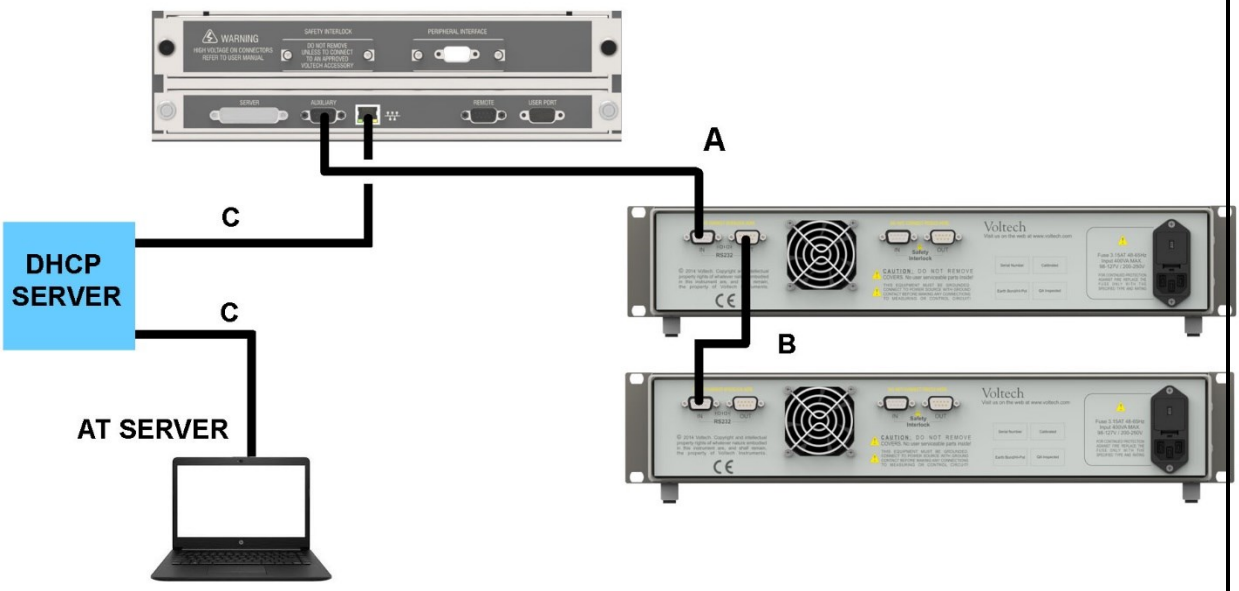
CABLE A Use a 9way-9way M-F straight-through lead (77-046) to connect AT Auxiliary Port to RS232 IN of DC1000A #1.

CABLE B (**ONLY required if using multiple DC1000A's)** Use a 9way-9way M-F straight-through lead (77-046) to connect RS232 OUT of DC1000A #1 to RS232 IN DC1000A #2.

CABLE C Use RS232 Cable - 9W-25W F/F S/Thru AT Server Lead (77-016) to connect PC COM port to the 25W SERVER port of the AT

6.1.4. AT Server using Ethernet (AT5600 ONLY)

If you are using the AT server to send test programs to the AT over Ethernet (and record test results) the configuration is as follows.



CABLE A Use a 9way-9way M-F straight-through lead (77-046) to connect AT Auxiliary Port to RS232 IN of DC1000A #1.

CABLE B (**ONLY required if using multiple DC1000A's)** Use a 9way-9way M-F straight-through lead (77-046) to connect RS232 OUT of DC1000A #1 to RS232 IN DC1000A #2.

CABLE C Use standard Ethernet cables to connect

A, the AT5600 Ethernet port to your DHCP server/ router

B, The PC running the AT SERVER to the same network.

6.2. AT Compensation

To obtain accurate results, measurement compensation must always be performed. When compensating your Voltech AT product for use with the DC1000A(s) please follow short circuit and open circuit instructions on AT5600 display.

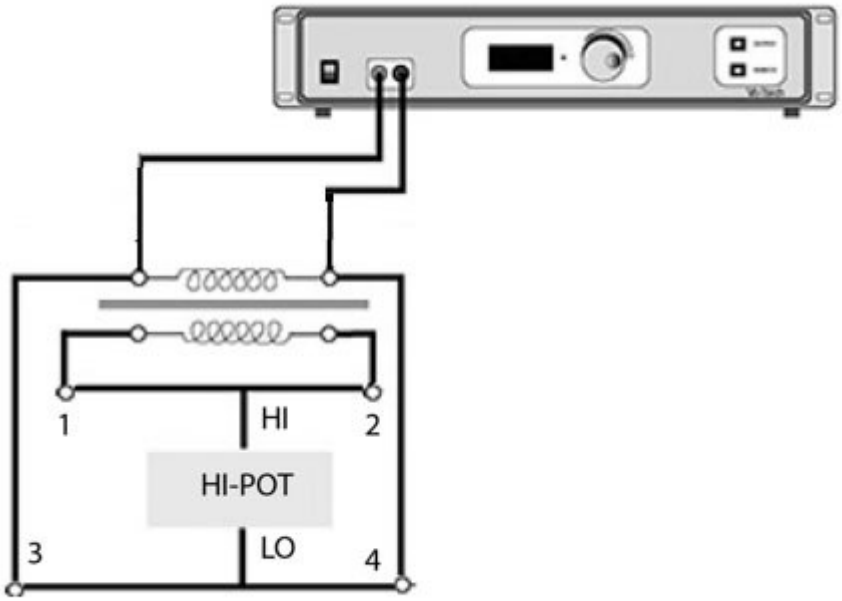
If running program or performing a measurement from your AT5600 or ATi or if running program from Editor follow compensation instructions on screen by selecting “Tester” from menu and then choose “Compensation”.

6.3. Using IR, HPDC, HPAC, DCRT, ACRT, DCVB, ACVB Tests

IMPORTANT: Voltech AT5600 / AT3600 programs that include any of these tests should be written such that the HIGH POTENTIAL LO winding is the one that is connected to the DC1000A output.

This is so that the DC1000 unit is always kept at low potential with respect to Earth.

The diagram below illustrates this setup. In this example the fixture and test program should be constructed so that the Ahi and ALo connections from the DC1000A are hard wired to Nodes 3 & 4, which are then used as LO in Hi Pot testing.



6.4. Using ILK, SURG, MAGI, STRW, WATT, VOC Tests

<u>These tests must not be used on any winding on a component to which a DC1000A is attached.</u>

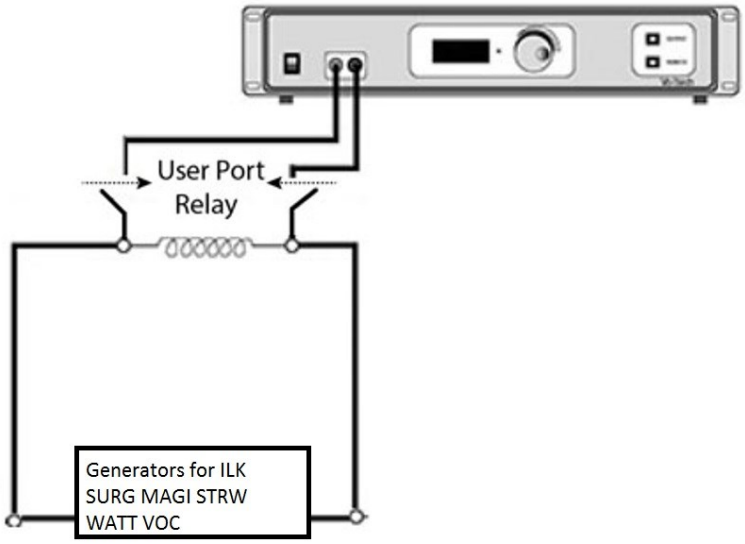
Before performing any SURG, MAGI, STRW, WATT, VOC tests, the DC1000A must be isolated from the windings under test with a 2-pole safety isolation relay, controlled by the User Port. The relays should be selected with suitable isolation to safely isolate the DC1000A from any voltages you wish to apply using these tests.

This is to prevent voltages induced across the winding being transferred to the DC1000, which by its design is limited to a potential difference of 5V

If these tests are required, then additional relays can be added to the test fixtures that switch out the DC1000A connections so that they are isolated. These can then be controlled by the **User Port** (and OUT test) on the AT before and after the application of the above tests

See the **OUT test** in the AT series user manual for details on how to control relays for mid-test switching.

Below illustrates this setup.

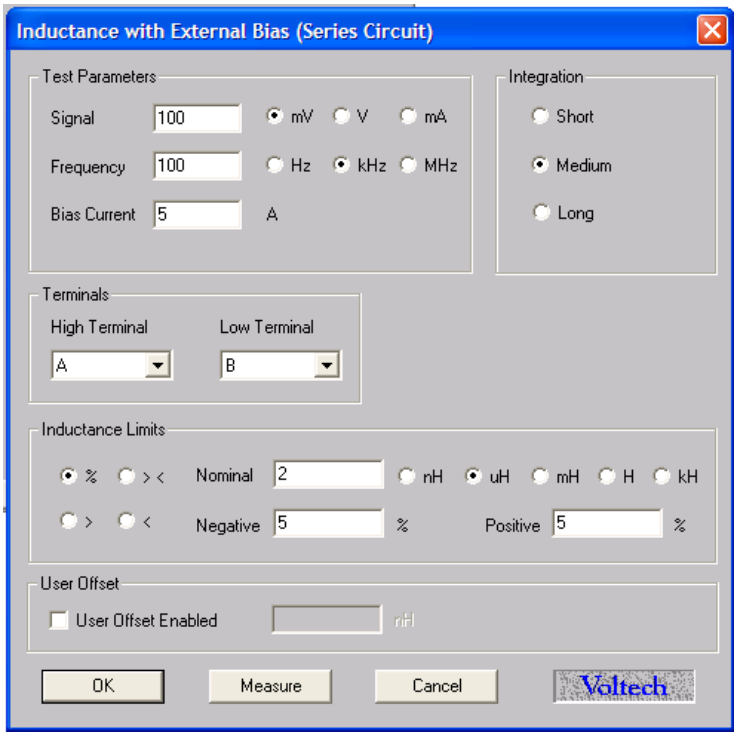


6.5. Programming the AT Tests using the AT Editor

6.5.1. LSBX – Inductance with External Bias (Series Circuit)

The inductance of a transformer winding, while an external bias current is flowing through it, may be tested using series equivalent circuit models.
Initially the DC bias current is set up and allowed to stabilize.
An AC voltage is applied across the selected winding; the voltage across, and current through, the winding is then measured using harmonic analysis.
The measured voltage is divided by the current to obtain a complex impedance and the inductance is calculated.

On selecting 'LSBX Inductance with External Bias (Series Circuit)' from the 'Available Tests' window, a dialogue box will be displayed.



To program the test:

1. Enter the signal, frequency and bias current required for the test.

   Note that the signal is normally entered as a voltage by selecting the ‘mV’ or ‘V’ button; but you may optionally enter it as a current by selecting the ‘mA’ button. (If in doubt refer to the ‘Test Conditions’ chapter of your AT user manual.)

   Note also that the measure button may be used here, as outlined in your AT user manual.

2. Select (mouse click the button) the integration time you require.

   ‘Medium’ is the default setting. ‘Long’ will give you more stable readings (for tighter limits) at the expense of test time, and ‘Short’ will test at the maximum speed but may give slightly noisier readings.

3. Enter the terminal names between which the inductance will be measured. By pulling down the menu alongside the fill-in box, you may select the high and low terminals for each test.

IMPORTANT; When using this test, ensure that the terminal you pick as HIGH in the editor program is also the node that is connected to the AHi output of the DC1000. Similarly, the node you specify as LOW should also be the node that is connected to the ALo output of the DC1000.

4. Select (mouse click the button) the type of limits you require and enter the values.

   % Enter a nominal value and then the limits as negative and positive values.

   >< Enter minimum and maximum values.

   > Enter just a minimum value.

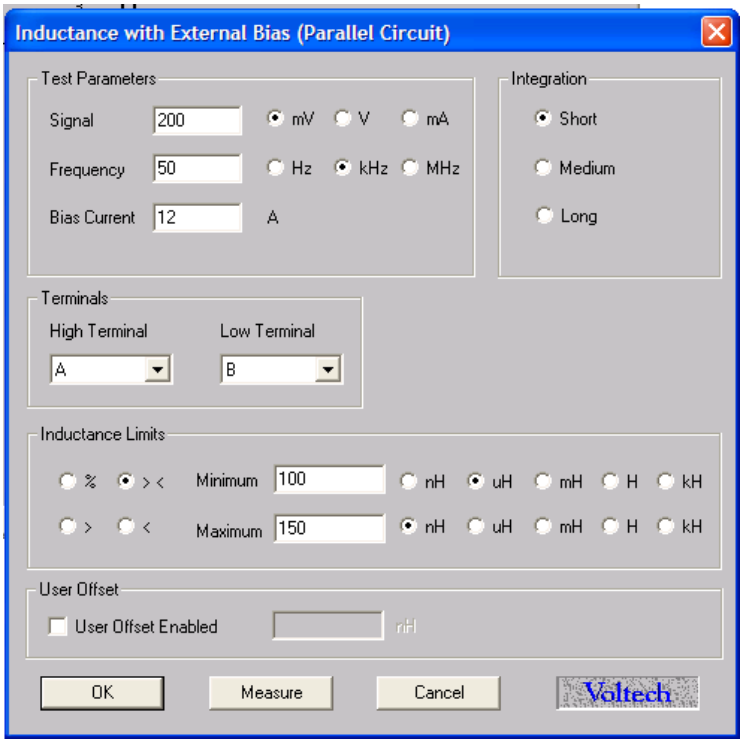
   < Enter just a maximum value.

   Select OK. The test specification will then be displayed in the program window.

6.5.2. LPBX – Inductance with External Bias (Parallel Circuit)

The inductance of a transformer winding, while an external bias current is flowing through it, may be tested using parallel equivalent circuit models.
Initially the DC bias current is set up and allowed to stabilize.
An AC voltage is applied across the selected winding; the voltage across and current through the winding are then measured using harmonic analysis.
The measured voltage is divided by the current to obtain a complex impedance and the inductance is calculated.

On selecting 'LPBX Inductance with External Bias (Parallel Circuit) from the 'Available Tests' window, a dialogue box will be displayed.



To program the test:

1. Enter the signal, frequency and bias current required for the test.

   Note that the signal is normally entered as a voltage by selecting the ‘mV’ or ‘V’ button; but you may optionally enter it as a current by selecting the ‘mA’ button. (If in doubt refer to the ‘Test Conditions’ chapter of your AT user manual.)

   Note also that the measure button may be used here, as outlined in your AT user manual.

2. Select (mouse click the button) the integration time you require.

   ‘Medium’ is the default setting. ‘Long’ will give you more stable readings (for tighter limits) at the expense of test time, and ‘Short’ will test at the maximum speed but may give slightly noisier readings.

3. Enter the terminal names between which the inductance will be measured. By pulling down the menu alongside the fill-in box, you may select the high and low terminals for each test.

IMPORTANT; When using this test, ensure that the terminal you pick as HIGH in the editor program is also the node that is connected to the AHi output of the DC1000. Similarly, the node you specify as LOW should also be the node that is connected to the ALo output of the DC1000.

4. Select (mouse click the button) the type of limits you require and enter the values.

   % Enter a nominal value and then the limits as negative and positive values.

   >< Enter minimum and maximum values.

   > Enter just a minimum value.

   < Enter just a maximum value.

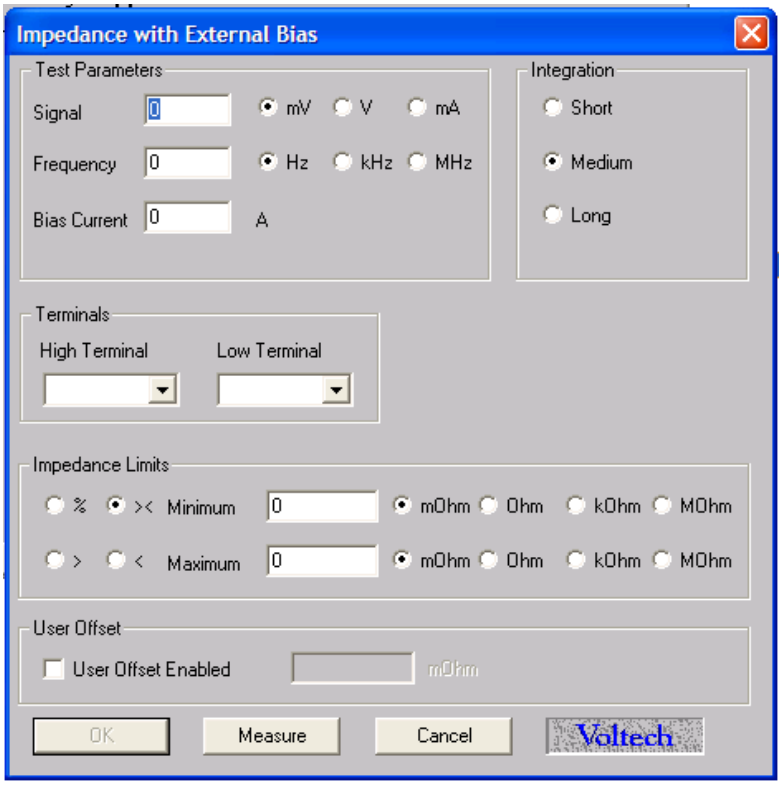
   Select OK. The test specification will then be displayed in the program window.

6.5.3. ZBX – Impedance with External Bias

The Winding Impedance with External Bias test measures the impedance of a selected winding while applying a DC current from the DC1000A through the winding. An AC voltage is also applied across the winding from the AT.

This test can be used with inductors to measure the change in impedance with a bias current.

On selecting “ZBX Impedance with External Bias” from the ‘available tests’ window, the following dialog box is displayed:



To program the test:

1. Enter the value of a voltage (or current) for the signal and the required frequency of the test.
   Also enter the DC bias current you would like to apply.

   Please note that the **Measure** button may be used here.
   For information, refer to the 'Test Program Editor' of your AT manual

2. Select the integration time required. 'Medium' is the default setting. 'Long' will give more stable readings (for tighter limits) at the expense of time, and 'Short' will test at the maximum speed but may give slightly noisier readings.

3. Enter the terminal names between which the impedance is to be measured.

   IMPORTANT; When using this test, ensure that the terminal you pick as HIGH in the editor program is also the node that is connected to the AHi output of the DC1000. Similarly, the node you specify as LOW should also be the node that is connected to the ALo output of the DC1000.

4. Set the impedance limits.

   +/- Enter a nominal value and then the limits as negative and positive values.

   >< Enter minimum and maximum values.

   > Enter just a minimum value.

   < Enter just a maximum value.

5. Select OK. The test specification will then be displayed in the program window.

6.5.4. Editor – High Terminal Conflict

The DC1000 can be easily integrated with the AT series testers to give automated and integrated DC Bias testing, combined with the wide range of tests provided by the AT Series.

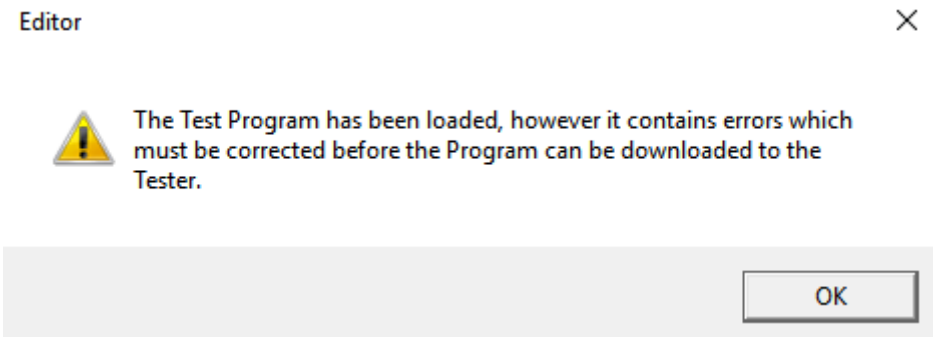
If you are integrating the DC1000 with any of the high voltage AT tests (IR, HPAC, HPDC, DCRT, ACRT, DCVB & ACBV) it is important that the DC1000 is ONLY connected to nodes used as the LO terminals in these high voltage tests.

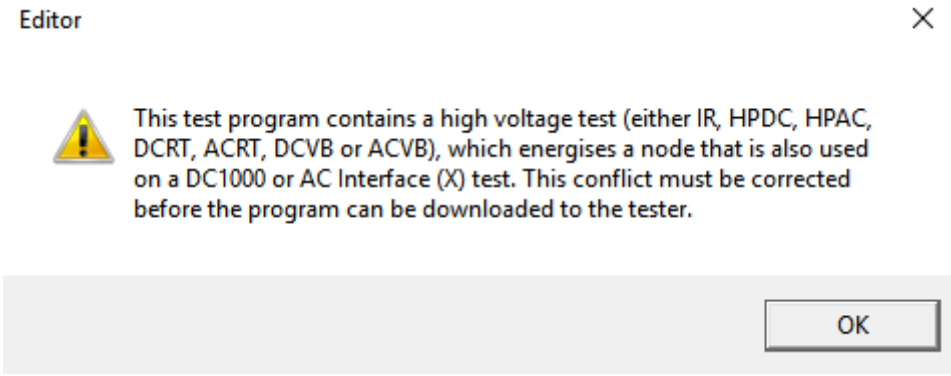
This will prevent damage to the DC1000.

Any terminals used for LSBX, LPBX & ZBX, **cannot** be used as "HI" terminals for IR HPAC, HPDC, DCRT, ACRT, DCVB or ACBV in the same program.

The AT Editor will check for this and warn you if you are attempting to do this.

Any program downloaded with this configuration will be cancelled, and error message will appear: -





To correct this, the ATP test program should be changed so that the DC tests (LSBX, LPBX and ZBX) are always on the LO side of any HV tests.

7. RS232 Communication

Many PCs today do not come with an RS232 as standard. To add an RS232 port to your PC, Voltech recommend the use of one of the following USB to RS232 converters:

USB Gear (www.usbgear.com) part number USBG-RS232-F12.

Cables to Go (www.cablestogo.com) part number 26886 or part number 26887

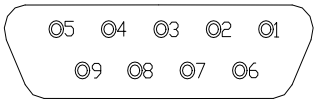
Both cables have been verified with the DC1000 software.

7.1. Pin Out

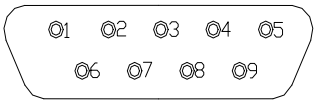
The pinning of the 2 RS232 ports is as follows:

RS232 IN		RS232 OUT	
TX	PIN 3	TX	PIN 2
RX	PIN 2	RX	PIN 3
CTS	PIN 8	CTS	PIN 7
RTS	PIN 7	RTS	PIN 8
0V	PIN 5	0V	PIN 5

RS232 IN (Female)



RS232 OUT (Male)



7.2. Commands

For your convenience, listed below are the RS232 commands you can use to control the DC1000A remotely.

The baud rate that you should use to communicate with the DC1000A is 9600, with 8 data bits, parity is none, 1 stop bit, and there is hardware flow control.

Please note that depending on the software that you are using to send these commands to the DC1000A, the way carriage returns, and line feeds are sent differs.

In the below commands <cr> and <lf> are used to indicate the need for a carriage return, or a line feed respectively.

A line feed can be sent via a terminal emulator by pressing <ctrl> and j simultaneously.

Turn the Output ON or OFF

Command

"D_POWER,*x* <lf>" - This command will act in the same way as pressing the Output Enable button on the front panel.

If x = 0, then the Output Enable is turned off.
If x = 1, then the Output Enable is turned on.

Messages returned

The following messages will be returned.

Within 100ms, an attached unit will respond with:
"D_COUNT,xx <cr> <lf>"
where *xx* is the number of units in the chain.

Within 2 seconds, the unit will respond with:
D_STAT,0,result <cr> <lf>""
where result is a single integer indicating the status of the unit and any other unit attached.
If everything is OK, 0 or 1 will be returned.
If not, then a status number will be returned

Set DC1000A Output Current

Command

"D_SET,*level* <lf>", where *level* is the demand in milli-Amps and can range from 100 to 25000.
If multiple units are connected, then the same current will be sent to each unit.

Messages returned

The following messages will be returned.

Within 100ms, an attached unit will respond with
"D_COUNT,xx <cr> <lf>"
where *xx* is the number of units in the chain.

Within 2 seconds, the unit will respond with:
"D_STAT,0,status <cr> <lf>"
where status is a single integer indicating the status of the unit and any other unit attached.
If everything is OK, 0 or 1 will be returned.
If not, then a status number will be returned.

Get the status of the unit

Command

"D_STAT? <lf>" - This command will return the status of the attached DC Bias unit

Messages returned

The following messages will be returned.

The unit will respond with "D_STAT,0, *status* <cr> <lf>" where *status* is a single integer indicating the status of the unit and any other unit attached.

If everything is OK, 0 or 1 will be returned. If not, then a status number will be returned.

Read the Serial Number

Command

"D_SER? <lf> " – This command return the Serial Number.

Messages returned

The following will be returned.
serialnumber <cr> <lf> where *serialnumber* is the serial number of the DC1000A (Serial number returned will always be 12 digits, if the queried unit's serial number has less characters, then spaces will fill it out to 12.

Get the number of units attached

Command

"D_COUNT? <lf> - This command returns the number of units attached.

Messages returned

The following will be returned within 5 seconds.
"D_COUNT,xx <cr> <lf>" where *xx* is the number of DC1000As in the chain

8. Status Codes

8.1. Error Codes

The DC1000A shall return status numbers, either on the front panel display if there is an error, or via RS232 if it is requested.
If the status is an error that is indicated in table below, as needing to *turn off the output*, then in order to clear the error, and try again, the output must first be turned off. If multiple errors occur, either on the same unit, or on other units in the chain, then a combination of the status numbers will be returned.

Status	Meaning	Turn Off Output
0	Off	-
1	On and all OK	-
2	Compliance circuit error	-
4	Trim error	✓
8	Safety interlock error	✓
16	Temperature error	✓
32	Ramp Up	✓
64	Ramp Down	✓
128	Current ADC Over range	✓
256	Compliance circuit error open circuit	✓

8.2. Correcting Status Code Errors

Status Code Example

You enable the output of the DC1000A and the number E257 is shown on the display.
The only combination to create this number is 256 + 1 (bits 8 and 0) so this number is signally “on and all OK” plus “Compliance circuit error open circuit”.

Correcting Errors

Most of the status numbers shown will indicate errors that can be corrected by the operator. The explanation of this error bits is shown below. If any other error bits become active, then please contact Voltech for servicing information.

Safety Interlock errors

A safety interlock bit code is shown whenever an output current is requested without the correct signals present on the safety interlock in connector. This error may be due to the safety interlock being opened by an operator and therefore halting the generation of current, or if the problem persists when the interlock is closed, a fault in the safety system.

Temperature errors

A temperature error bit code indicates that the main current generator circuitry has got too hot and automatically shut down to prevent damage. If this code is shown, then check the operation of the fan (it should be blowing loudly at high temperatures) and that all ventilation areas are free from obstructions. The DC1000A must not be operated in ambient temperatures above 40°C. If the problem persists then contact Voltech for servicing information.

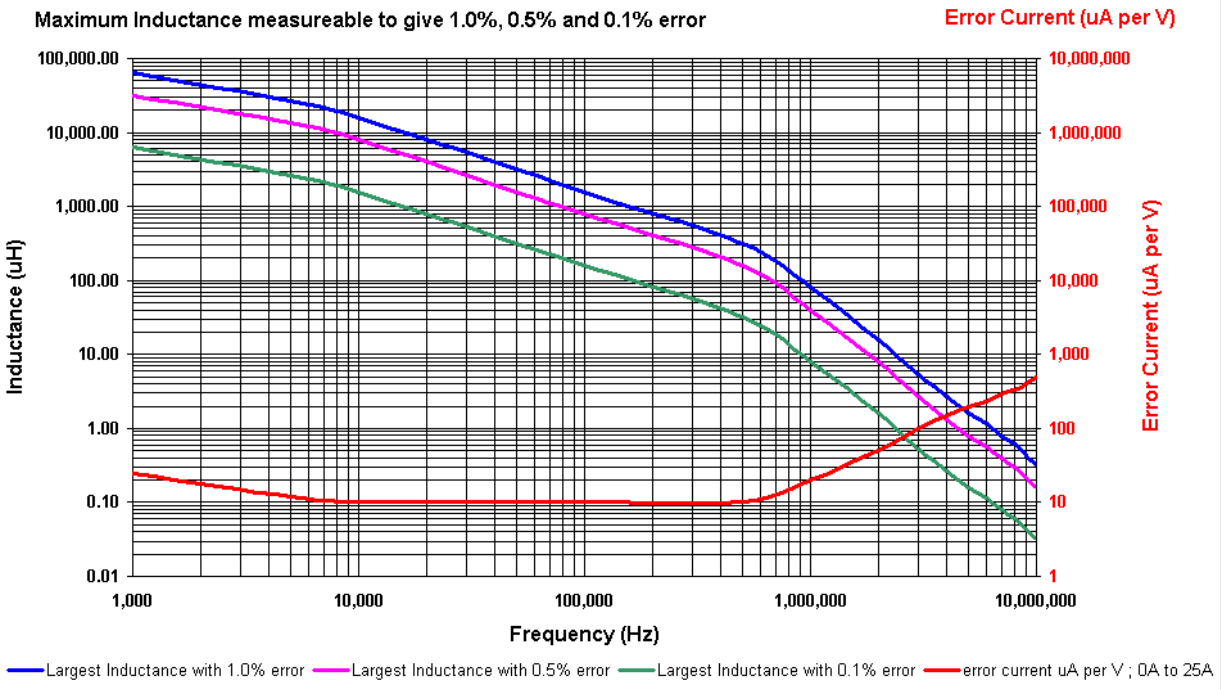
Compliance circuit error open circuit

A compliance error open circuit bit is set whenever the output voltage gets too high so that the required current cannot be generated. The load impedance must be low enough that the requested current does not generate a voltage above the compliance voltage (see section 10 Specification). If the error occurs intermittently then it is indicative of bad contact resistance to the part under test or accidentally not making connections properly.

9. Specifications

9.1. Accuracy

Output Capability: 0 to 25 A; in 10mA steps.
Accuracy on Supplied Current: ±0.5% of reading ±25 mA**.**
Compliance voltage: 5V pk.



The above graph (red line) shows the error current expected per DC1000A, per Volt applied by the LCR meter.
This assumes the LCR meter has been compensated to remove any errors caused by connections and fixturing.
This small residual error current will then cause an error in the LCR reading, on top of your LCR specification.

For your ease of use we also provide 3 lines, showing the same data, but expressed as the practical maximum Inductance that can be measured if you wish to keep this error below 1.0%, 0.5% and 0.1%
As an example, consider an LCR measuring at 1V and 100,000 Hz.
The maximum inductance measurable, to keep the error caused by the DC1000A to less than 0.5%, is 790 uH

9.2. Power Supply Voltage

Input Voltage : 100-125 V / 200-250 V AC 48-65 Hz
Input Power : 400 VA Max
Fuse : 3.15 AT

9.3. Environmental Specifications

Temperature: +5° to 40°C operating
Humidity: 10% to 80% RH non-condensing.
Power Supply to Case: 2.9 kV DC for 1 minute
Power Requirement: 100-125 V / 200-250 V AC 48-65 Hz. 400 VA Max.

9.4. Dimensions

Height: 88 mm
Width: 475 mm
Length: 255 mm
Weight: 10 kg

9.5. RS232 Interfaces

RS232 for PC connection and automatic control. eg for PC control of a LCR and DC1000A simultaneously.
See section 7 for commands.

Can also be used to integrate with AT5600/AT3600/Ati Transformer Testers. In this case the AT56/ AT36 /ATi test program controlls the D1000, so no programming skill needed.

If you wish to use multiple DC1000s in parallel, then the RS232 can be daisy chained using a M-F 9w-9w cable.
See Voltech document 104-174 for a fuller description.

In this configuration, one unit will become the master and control all the other units.
This is true if using the units either manually or via RS232.

If using manually, then turning the rotary knob on the mater unit will also increase the current on any other slave units connec4ted.
The Output Enable button on the master will also control all the other slave units

9.6. Safety Interlock

The interlock port is used to provide user safety when connected to an external safety device.

Possible use cases
1, to interface with a light curtain that protects the user should they attempt to touch a UUT with the DC1000 enabled.
2, to interface with micro switches connected to a covering lid so that the DC1000 can only be enabled with the lid closed.

An override plug (91-256) is provided in the box and this can be connected into the INTERLOCK IN port on the rear of the unit to enable the unit

Should the user (or software over RS232 control) attempt to enable the unit with the interlock OPEN, then the output will NOT be enabled, and the front panel will report error code E009

Any interlock system you wish to employ must satisfy the following conditions to allow the DC1000 output to be enabled

Pin 5 + 6 Should be shorted

Pin 9 + 2 Should be shorted though a 6k8 0.5W resistor

If you wish to use multiple DC1000s in parallel, then the interlocks ports can be daisy chained using a M-F 9w-9w cable.
See Voltech document 104-174 for a fuller description.
In this case you will still only need one interlock device (e.g. override plug, or your own system), and all the DC1000s connected will be controlled by the one interlock.

9.7. Variable Speed Cooling Fan

Runs fan at variable speed dependent on load and temperature for minimal noise.

10. Service and Calibration

To confirm the accuracy of your product, a calibration check should be carried out every 12 months.

Calibration adjustment is carried out using OEM Test Equipment and DC1000A Calibration Software.
Adjustment can only be performed by an authorized Voltech service center.

For details of calibration facilities and any other service request, please contact your supplier.

Voltech strongly recommends that you discuss your service requirements with your supplier before service is needed.

11. Appendix

11.1. HP4284A Measurement compensation with a DC1000A

Below is an example of the steps to perform compensation on a HP4284A.

For this example, the LS-Q function was selected, and frequency was set to 50 kHz.

1. Press the “Display Format” button.

2. To set LS-Q function, move cursor using arrow button to highlight “FUNC”, then using the bottom soft key press to you see LS-Q and select using soft key.

3. To set the Frequency, move cursor using arrow button to highlight “FREQ”, then using numeric pad enter the frequency 50 and then use soft key to select kHz (in this example 50 kHz).

Open Circuit compensation (see Section 3, for connections):

1. Press “Measure Setup”, using soft key select “Correction”.

2. Move the cursor using the arrow button to highlight “Open”

3. Press the soft key to turn on.

4. To set frequency move cursor using arrow button to highlight “FREQ”, then using numeric pad enter the frequency 50 and then use soft key to select kHz (in this example 50 kHz).

5. After setting frequency you will need to run the compensation.
   Press the “Meas Open” short key. At bottom of screen you will see message that says, “measurement in progress” followed by “completed”.

Short Circuit compensation (see Section 3, for connections):

1. Press “Measure Setup”, using soft key select “Correction”.

2. Move the cursor using the arrow button to highlight “Short”

3. Press the soft key to turn on.

4. To set frequency move cursor by using arrow button to highlight “FREQ1”, then using numeric pad enter the frequency 50 and then use soft key to select kHz (in this example 50 kHz).

5. After setting frequency you will need to run the compensation.
   Press the “Meas Short” short key. At bottom of screen you will see message that says, “measurement in progress” followed by “completed”.

After short circuit compensation is completed press “Display Format” button to return to the main results display screen.

Proper connection to parts under test is required.
Be sure to always restrain all wiring as much as possible to prevent movement.
Preferably use a fixture system where the part under test can be inserted and removed without moving any cabling.
Any movement in the wiring will affect the measured values due to changes in the capacitance and mutual inductance between the cables

11.2. The DC1000A - How It Works

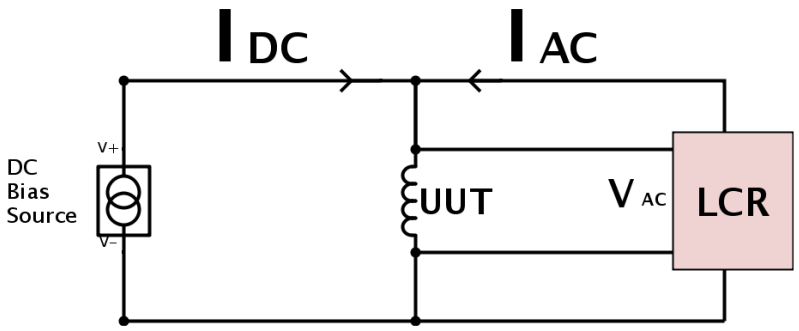
In most power electronics circuits, wound components such as inductors, chokes and transformers must function properly in the presence of high levels of DC current. If an inductive component is faulty then the whole power supply or inverter will not work properly and will have to be reworked or scrapped.

To guarantee the quality and performance of such a component it must be tested at real working conditions, including DC bias current, during manufacture. The revolutionary design of the DC1000A eliminates the need for bulky and inflexible DC Bias Supplies that are tied to an LCR meter and restrict test performance.

11.2.1. Basic Theory

Measuring inductance in the presence of a DC Bias Current, the DC Current Supply and the LCR meter is connected in parallel with the inductor.

DC bias current, IDC flows in the left-hand side of the circuit and AC test current from the LCR meter flow in the right-hand side of the circuit.



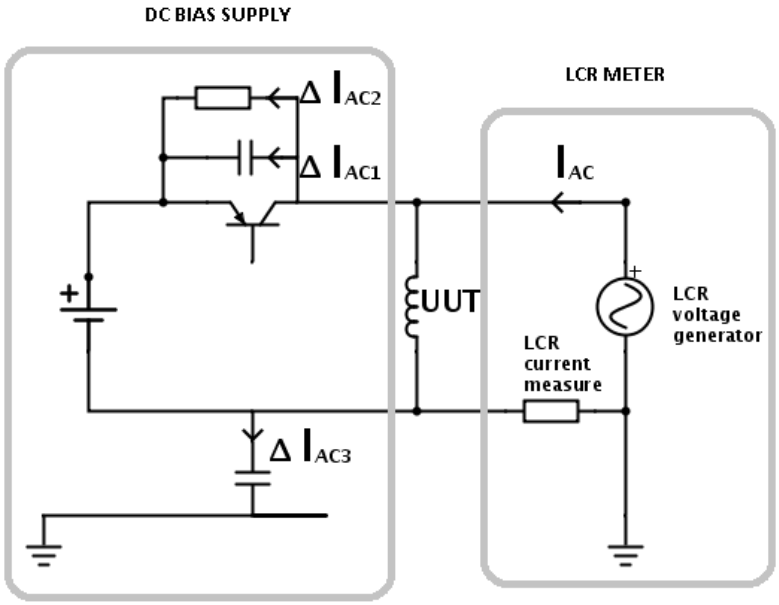
Basic circuit showing measuring of inductance in the presence of a DC bias current

The LCR meter AC current (I AC), and the AC test voltage are used to provide the desired inductance measurement. A conventional DC Bias Current supply is built using series transistors to regulate the DC current and isolate the LCR meter from the low impedance of the DC supply.

The collector current of the transistor (Ic) is the DC current (IDC) supplied to the inductor under test. Any AC test current that strays into the DC circuit on the left-hand side is an error current and will create inaccuracies in the AC measurement of inductance

11.2.2. Causes of Error

There are multiple paths for AC error current as shown below:



Circuit with paths for AC error current

There are three main sources of error (dIAC)

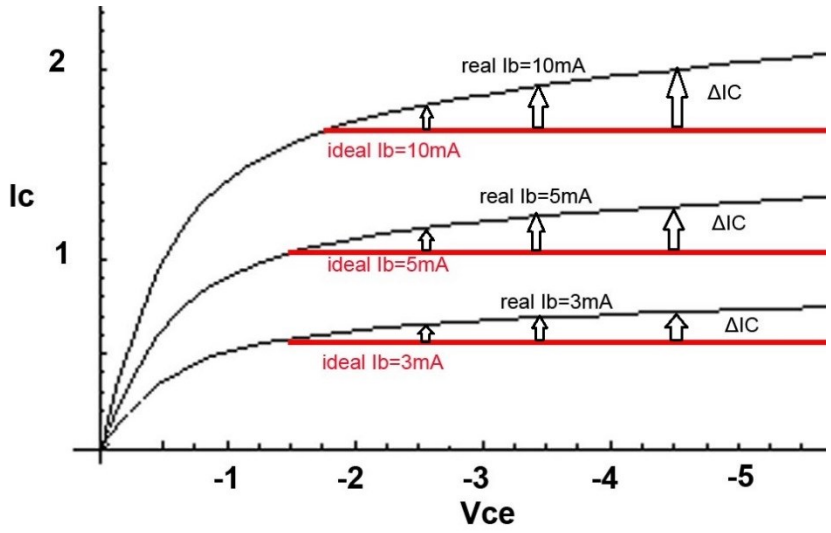
a. dIAC1

The Collector-Emitter capacitance of the regulating transistors. Changes in the collector-emitter voltage of the transistor due to the LCR meter's test signal create changes in the transistors' capacitance

b) dIAC2

AC Variation in the DC current because of the imperfect load line of the transistor. In an ideal transistor, the relationship between collector current and collector emitter voltage is flat above the activation point.
In practice all transistors show a slope of the shown “real” characteristic.

Even with constant base current, the collector current will tend to change with changing collector-emitter voltage. (See *Circuit with paths for AC error current*).



Transistor ideal and real characteristics

As a result, the AC voltage from the LCR meter will cause error currents to flow in the transistors. The magnitude of this error current will change for different settings of DC bias current.

This is because the slope of the load line increases at higher DC currents.

(Compare the magnitude of delta IC between Ib = 10mA, 5mA & 3 mA)

This makes it very difficult to accurately model this effect and hence remove the error.

c) dIAC3

Capacitance between the DC signal path and chassis ground. This inherent capacitance in the DC source will cause a reduction in the current seen by the LCR current measure circuit, and hence produce and error in the LCR measurement.

Compensating accurately for all three of these errors at all combinations of test impedance, DC current and LCR meter signal level is very difficult if not impossible.

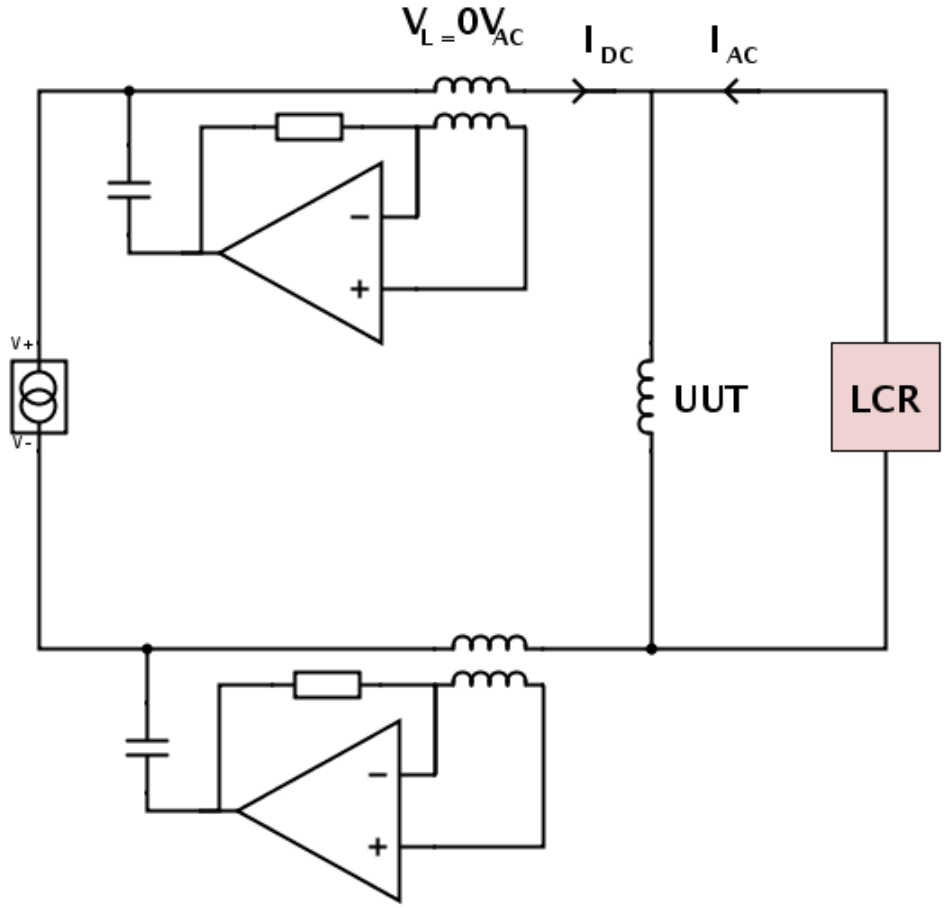
Until now, DC Bias supplies were restricted to a manufacturer's LCR model number to minimize these errors.

11.2.3. The Solution

With the DC1000A's correction circuit, these errors are essentially eliminated using an inductor placed inside an AC control loop.

A sense winding on the inductor produces a voltage proportional to the AC voltage across it.

A high gain control loop (shown greatly simplified here) injects an AC signal across the inductor to drive the AC voltage across the inductor towards zero.



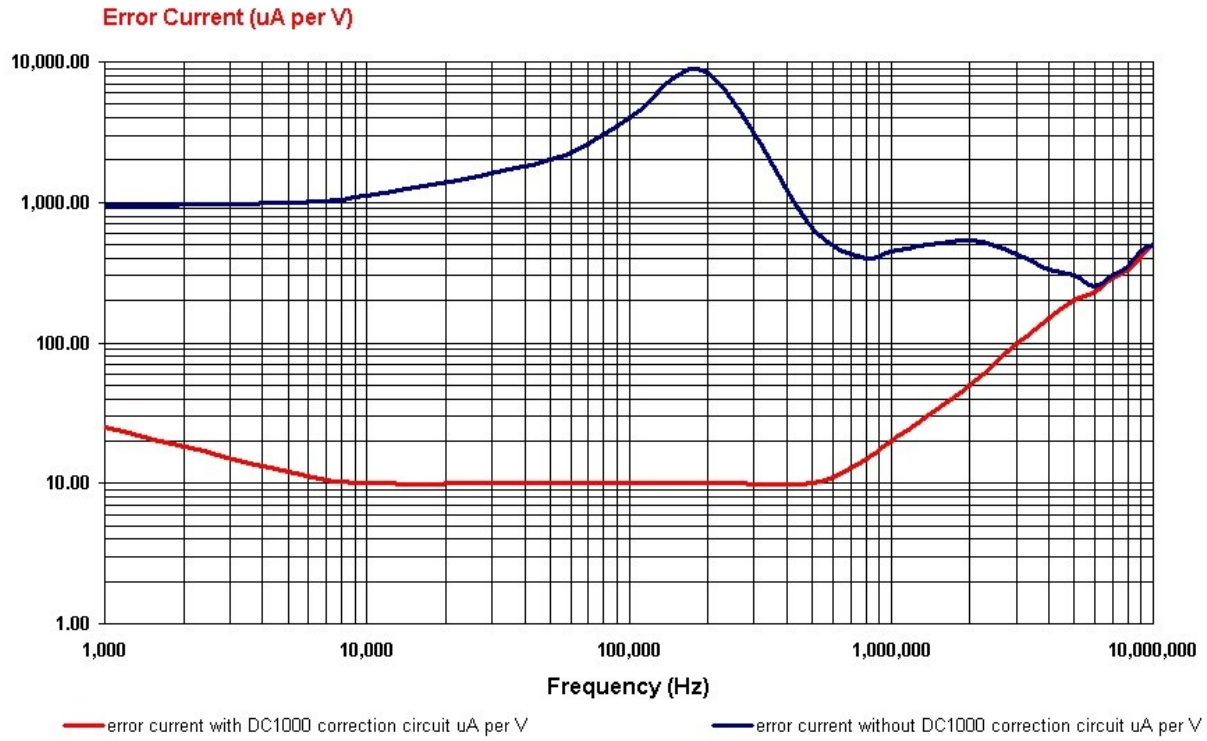
Improved method using AC correction method on both high and low lines.

This circuit responds with high gain (up to 10,000 x) and high frequencies (10 MHz) so that the AC input impedance of the DC Bias unit, as seen by the LCR meter, is very high.

A similar circuit is used in the DC bias supply return path to eliminate errors due to the capacitance to chassis ground.

The typical error current for this circuit at 100 kHz is less than 100 uA, compared to 10's of mA using conventional methods.

The below graph demonstrates the massive reduction in error current, by comparing the error current caused by the DC1000A both with and without the correction circuit operating.



Effect of DC1000A correction circuit on error current.

11.2.4. Advantages

The user advantages of the circuit are many and significant:

1. The AC error current drawn by the DC bias supply is reduced by a factor of 100 (typical). This instantly produces a more accurate result from the LCR meter.

2. Any residual error is constant and independent of the DC bias current, so can easily be compensated out by traditional LCR methods.

3. Now open and short compensation can be applied by the LCR meter as usual to make measurements free from all stray effects.

4. The DC1000A requires no special connection to the LCR meter, or knowledge of its settings, making it suitable for use with any LCR meter.

5. Multiple DC1000A's can be easily connected in parallel for testing with bias up to 500 A (20 x DC1000A).

6. The DC1000A is smaller and lighter than any other high current DC Current Bias Supply.

12. Safety and EMC Compliance

DECLARATION OF CONFORMITY

Manufacturer's Name:	Voltech Instruments, Ltd
Manufacturer's Address:	66 Innovation Drive Milton Mark Abingdon Oxfordshire OX14 4RQ UK

Declares, that the following product

Product Name:	Precision DC Bias Current Source
Model Number:	DC1000A

Conforms to the following Product Specifications

Safety:	**IEC** 61010-1:2010 (3rd Edition)
EMC:	**IEC** 61326-1:2012, Class A, Table 1

Supplementary Information:	The product herewith complies with the requirements of the EMC Directives 2004/108/EC and the Low Voltage Directive 2006/95/EC

Signed for on behalf of Voltech Instruments Ltd.

Dr John Ford, Managing Director 16 June 2016

User Manual Change Log

Issue 3
Initial Release

Issue 4
Updated 3.1 S/C compensation diagram to correct error. All 4 should be shorted.
Added best practice notes for cabling and earth leads in section 3

Issue 5
Added 3.6 LCR specific hints and tips section for E4890AL

Issue 6
Updated Ch 5 and Ch 6 to separate COMS from INTERLOCK and provide clarity of AT Server and AT Editor use over RS232 + USB + Ethernet.
Updated 3.6 for best practice on LCR signal levels.

Issue 7
Updated interlock section 9.6 for better description for users wishing to make their own interlock system.

Issue 8
Updated RS232 commands 7.2 to correct missing info.

Voltech Instruments, Inc. has an intensive program of design and development that may alter product specification.

Voltech Instruments, Inc. reserves the right to change the product specification at any time, and without notice.

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