Installation Instructions

Original Instructions

Allen-Bradley
by ROCKWELL AUTOMATION

1442 Eddy Current Probe Systems

Catalog Numbers 1442-PS series, 1442-PR series, 1442-EC series, 1442-DR series

The 1442 Series Eddy Current Probe System performs non-contact measurement of the distance between the probe and a measured target and outputs a proportional voltage signal. Used in combination with an Allen-Bradley® 1440 or 1444 series measurement module, an eddy probe system can also provide continuous measurement of shaft vibration, eccentricity, thrust position, and rotating speed.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and isn't intended to reflect all changes.

Topic	Page
Updated European Hazardous Location Approval	3
Added Parameters to Hazardous Location Installation (ETK51271-HAZ)	7
Added Parameters to ATEX/UKEX/IECEx/CCCEx Installation (ETK51270-HAZ)	8

Rockwell Automation

ATTENTION: Read this document and the documents listed in the Additional Resources section about installation, configuration and operation of this equipment before you install, configure, operate or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice. If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

注意：在安装、配置、操作和维护本产品前，请阅读本文档以及 “其他资源” 部分列出的有关设备安装、配置和操作的相应文档。除了所有适用规范、法律和标准的相关要求之外，用户还必须熟悉安装和接线说明。

安装、调整、投运、使用、组装、拆卸和维护等各项操作必须由经过适当训练的专业人员按照适用的操作规范实施。

如果未按照制造商指定的方式使用该设备，则可能会损害设备提供的保护。

ATENCIÓN: Antes de instalar, configurar, poner en funcionamiento o realizar el mantenimiento de este producto, lea este documento y los documentos listados en la sección Recursos adicionales acerca de la instalación, configuración y operación de este equipo. Los usuarios deben familiarizarse con las instrucciones de instalación y cableado y con los requisitos de todos los códigos, leyes y estándares vigentes.

El personal debidamente capacitado debe realizar las actividades relacionadas a la instalación, ajustes, puesta en servicio, uso, ensamblaje, desensamblaje y mantenimiento de conformidad con el código de práctica aplicable. Si este equipo se usa de una manera no especificada por el fabricante, la protección provista por el equipo puede resultar afectada.

ATENÇÃO: Leia este e os demais documentos sobre instalação, configuração e operação do equipamento que estão na seção Recursos adicionais antes de instalar, configurar, operar ou manter este produto. Os usuários devem se familiarizar com as instruções de instalação e fiação além das especificações para todos os códigos, leis e normas aplicáveis.

É necessário que as atividades, incluindo instalação, ajustes, colocação em serviço, utilização, montagem, desmontagem e manutenção sejam realizadas por pessoal qualificado e especializado, de acordo com o código de prática aplicável.

Caso este equipamento seja utilizado de maneira não estabelecida pelo fabricante, a proteção fornecida pelo equipamento pode ficar prejudicada.

ВНИМАНИЕ: Перед тем как устанавливать, настраивать, эксплуатировать или обслуживать данное оборудование, прочитайте этот документ и документы, перечисленные в разделе «Дополнительные ресурсы». В этих документах изложены сведения об установке, настройке и эксплуатации данного оборудования. Пользователи обязаны ознакомиться с инструкциями по установке и прокладке соединений, а также с требованиями всех применимых норм, законов и стандартов.

Все действия, включая установку, наладку, ввод в эксплуатацию, использование, сборку, разборку и техническое обслуживание, должны выполняться обученным персоналом в соответствии с применимыми нормами и правилами.

Если оборудование используется не предусмотренным производителем образом, защита оборудования может быть нарушена.

注意：本製品を設置、構成、稼動または保守する前に、本書および本機器の設置、設定、操作についての参考資料の該当箇所に記載されている文書に目を通してください。ユーザは、すべての該当する条例、法律、規格の要件に加えて、設置および配線の手順に習熟している必要があります。

設置調整、運転の開始、使用、組立て、解体、保守を含む諸作業は、該当する実施規則に従って訓練を受けた適切な作業員が実行する必要があります。

本機器が製造メーカにより指定されていない方法で使用されている場合、機器により提供されている保護が損なわれる恐れがあります。

ACHTUNG: Lesen Sie dieses Dokument und die im Abschnitt „Weitere Informationen“aufgeführten Dokumente, die Informationen zu Installation, Konfiguration und Bedienung dieses Produkts enthalten, bevor Sie dieses Produkt installieren, konfigurieren, bedienen oder warten. Anwender müssen sich neben den Bestimmungen aller anwendbaren Vorschriften, Gesetze und Normen zusätzlich mit den Installations- und Verdrahtungsanweisungen vertraut machen.

Arbeiten im Rahmen der Installation, Anpassung, Inbetriebnahme, Verwendung, Montage, Demontage oder Instandhaltung dürfen nur durch ausreichend geschulte Mitarbeiter und in Übereinstimmung mit den anwendbaren Ausführungsvorschriften vorgenommen werden.

Wenn das Gerät in einer Weise verwendet wird, die vom Hersteller nicht vorgesehen ist, kann die Schutzfunktion beeinträchtigt sein.

ATTENTION : Lisez ce document et les documents listés dans la section Ressources complémentaires relatifs à l’installation, la configuration et le fonctionnement de cet équipement avant d’installer, configurer, utiliser ou entretenir ce produit. Les utilisateurs doivent se familiariser avec les instructions d’installation et de câblage en plus des exigences relatives aux codes, lois et normes en vigueur.

Les activités relatives à l’installation, le réglage, la mise en service, l’utilisation, l’assemblage, le démontage et l’entretien doivent être réalisées par des personnes formées selon le code de pratique en vigueur.

Si cet équipement est utilisé d’une façon qui n’a pas été définie par le fabricant, la protection fournie par l’équipement peut être compromise.

주의 : 본 제품 설치 , 설정 , 작동 또는 유지 보수하기 전에 본 문서를 포함하여 설치 , 설정 및 작동에 관한 참고 자료 섹션의 문서들을 반드시 읽고 숙지하십시오 . 사용자는 모든 관련 규정 , 법규 및 표준에서 요구하는 사항에 대해 반드시 설치 및 배선 지침을 숙지해야 합니다 .

설치 , 조정 , 가동 , 사용 , 조립 , 분해 , 유지보수 등 모든 작업은 관련 규정에 따라 적절한 교육을 받은 사용자를 통해서만 수행해야 합니다 .

본 장비를 제조사가 명시하지 않은 방법으로 사용하면 장비의 보호 기능이 손상될 수 있습니다 .

ATTENZIONE Prima di installare, configurare ed utilizzare il prodotto, o effettuare interventi di manutenzione su di esso, leggere il presente documento ed i documenti elencati nella sezione “Altre risorse”, riguardanti l’installazione, la configurazione ed il funzionamento dell’apparecchiatura. Gli utenti devono leggere e comprendere le istruzioni di installazione e cablaggio, oltre ai requisiti previsti dalle leggi, codici e standard applicabili.

Le attività come installazione, regolazioni, utilizzo, assemblaggio, disassemblaggio e manutenzione devono essere svolte da personale adeguatamente addestrato, nel rispetto delle procedure previste.

Qualora l’apparecchio venga utilizzato con modalità diverse da quanto previsto dal produttore, la sua funzione di protezione potrebbe venire compromessa.

DİKKAT: Bu ürünün kurulumu, yapılandırılması, işletilmesi veya bakımı öncesinde bu dokümanı ve bu ekipmanın kurulumu, yapılandırılması ve işletimi ile ilgili İlave Kaynaklar bölümünde yer listelenmiş dokümanları okuyun. Kullanıcılar yürürlükteki tüm yönetmelikler, yasalar ve standartların gereksinimlerine ek olarak kurulum ve kablolama talimatlarını da öğrenmek zorundadır.

Kurulum, ayarlama, hizmete alma, kullanma, parçaları birleştirme, parçaları sökme ve bakım gibi aktiviteler sadece uygun eğitimleri almış kişiler tarafından yürürlükteki uygulama yönetmeliklerine uygun şekilde yapılabilir.

Bu ekipman üretici tarafından belirlenmiş amacın dışında kullanılırsa, ekipman tarafından sağlanan koruma bozulabilir.

注意事項：在安裝、設定、操作或維護本產品前，請先閱讀此文件以及列於 「其他資源」章節中有關安裝、設定與操作此設備的文件。使用者必須熟悉安裝和配線指示，並符合所有法規、法律和標準要求。

包括安装、調整、交付使用、使用、組装、拆卸和維護等動作都必須交由已經過適當訓練的人員進行，以符合適用的實作法規。

如果將設備用於非製造商指定的用途時，可能會造成設備所提供的保護功能受損。

POZOR: Než začnete instalovat, konfigurovat či provozovat tento výrobek nebo provádět jeho údržbu, přečtěte si tento dokument a dokumenty uvedené v části Dodatečné zdroje ohledně instalace, konfigurace a provozu tohoto zařízení. Uživatelé se musejí vedle požadavků všech relevantních vyhlášek, zákonů a norem nutně seznámit také s pokyny pro instalaci a elektrické zapojení.

Činnosti zahrnující instalaci, nastavení, uvedení do provozu, užívání, montáž, demontáž a údržbu musí vykonávat vhodně proškolený personál v souladu s příslušnými prováděcími předpisy.

Pokud se toto zařízení používá způsobem neodpovídajícím specifikaci výrobce, může být narušena ochrana, kterou toto zařízení poskytuje.

UWAGA: Przed instalacją, konfiguracją, użytkowaniem lub konserwacją tego produktu należy przeczytać niniejszy dokument oraz wszystkie dokumenty wymienione w sekcji Dodatkowe źródła omawiające instalację, konfigurację i procedury użytkowania tego urządzenia. Użytkownicy mają obowiązek zapoznać się z instrukcjami dotyczącymi instalacji oraz oprzewodowania, jak również z obowiązującymi kodeksami, prawem i normami.

Działania obejmujące instalację, regulację, przekazanie do użytkowania, użytkowanie, montaż, demontaż oraz konserwację muszą być wykonywane przez odpowiednio przeszkolony personel zgodnie z obowiązującym kodeksem postępowania.

Jeśli urządzenie jest użytkowane w sposób inny niż określony przez producenta, zabezpieczenie zapewniane przez urządzenie może zostać ograniczone.

OBS! Läs detta dokument samt dokumentet, som står listat i avsnittet Övriga resurser, om installation, konfigurering och drift av denna utrustning innan du installerar, konfigurerar eller börjar använda eller utföra underhållsarbete på produkten. Användare måste bekanta sig med instruktioner för installation och kabeldragning, förutom krav enligt gällande koder, lagar och standarder.

Åtgärder som installation, justering, service, användning, montering, demontering och underhållsarbete måste utföras av personal med lämplig utbildning enligt lämpligt bruk.

Om denna utrustning används på ett sätt som inte anges av tillverkaren kan det hända att utrustningens skyddsanordningar försätts ur funktion.

LET OP: Lees dit document en de documenten die genoemd worden in de paragraaf Aanvullende informatie over de installatie, configuratie en bediening van deze apparatuur voordat u dit product installeert, configureert, bediend of onderhoudt. Gebruikers moeten zich vertrouwd maken met de installatie en de bedradingsinstructies, naast de vereisten van alle toepasselijke regels, wetten en normen.

Activiteiten zoals het installeren, afstellen, in gebruik stellen, gebruiken, monteren, demonteren en het uitvoeren van onderhoud mogen uitsluitend worden uitgevoerd door hiervoor opgeleid personeel en in overeenstemming met de geldende praktijkregels.

Indien de apparatuur wordt gebruikt op een wijze die niet is gespecificeerd door de fabrikant, dan bestaat het gevaar dat de beveiliging van de apparatuur niet goed werkt.

Product Advisories

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations.	**Informations sur l'utilisation de cet équipement en environnements dangereux.**
Products marked "CL I, DIV 1, GP A, B, C, D" are suitable for use in Class I, Divisions 1 and 2, Groups A, B, C, D hazardous and nonhazardous locations. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) shall be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.	Les produits marqués "CL I, DIV 1, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I, Divisions 1 et 2, Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.
WARNING: **Explosion Hazard –** • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. • Substitution of components may impair suitability for Class I, Divisions 1 and 2. • If this product contains batteries, they must only be changed in an area known to be nonhazardous.	**AVERTISSEMENT:** **Risque d'Explosion –** • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. • La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Divisions 1 et 2. • S'assurer que l'environnement est classé non dangereux avant de changer les piles.

European Hazardous Location Approval

The following applies to products marked Ⓔx II 1 G: Such modules:

- Are Equipment Group II, Equipment Category 1, and comply with the Essential Health and Safety Requirements relating to the design and construction of such equipment given in Annex II of EC Directive 2014/34/EU and Schedule 1 of UK Statutory Instrument 2016 No. 1107. See the EC and UK Declarations of Conformity at rok.auto/certifications for details.
- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are present. Such locations correspond to Zone 0 or 1 classification according to EN 60079-0.
- Comply to Standards: EN IEC 60079-0:2018, EN 60079-11:2012. Reference certificate numbers DEKRA 20ATEX0133X and DEKRA 24UKEX0104X.
- The type of protection that is used is Ex ia IIC T4 Ga according to EN 60079-11. The specific temperature code is marked on the product.

IEC Hazardous Location Approval

The following applies to products with IECEx certification:

- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are present. Such locations correspond to Zone 0 and 1 classification according to IEC 60079-0.
- The type of protection is Ex ia IIC T4 Ga according to IEC 60079-0 and IEC 60079-11.
- Comply to Standards IEC 60079-0:2017, Edition 7.0 and IEC 60079-11:2011 Edition 6.0, reference IECEx certificate number IECEx DEK 20.0078X.

ATTENTION: This equipment isn't resistant to sunlight or other sources of UV radiation.

Special Conditions for Safe Use

WARNING:

- For intrinsically safe applications, Series A probes, extension cables, and probe drivers **cannot** be mixed with Series B probes, extension cables, and probe drivers. If replacements are needed - **all** must be replaced.
- This equipment must not be installed in applications where external conditions are conducive to the build-up of electrostatic charge.
- Because the driver enclosure is made of aluminum, precautions must be taken to prevent potential ignition sources due to impact and/or friction.
- Equipment connected to associated intrinsically safe apparatus must not use or generate more than 250V AC or DC.
- This equipment shall be mounted in an Ex-rated Zone 0 or 1 certified enclosure with a minimum ingress protection rating of at least IP20 (as defined in EN 60529) and used in an environment of not more than Pollution Degree 2 (as defined in EN 60664-1) when applied in Zone 0 or 1 environments. The enclosure must be accessible only by the use of a tool.
- This equipment shall be used within its specified ratings that are defined by Rockwell Automation.
- Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
- The instructions in the user manual shall be observed.

Prevent Electrostatic Discharge

ATTENTION: This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Clean surfaces with a damp cloth only.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

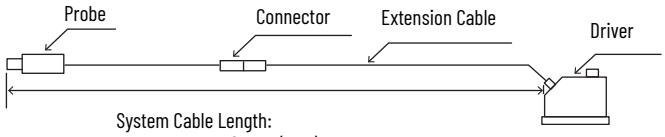
Electrical Safety Considerations

ATTENTION: Power to this equipment must be supplied from a source compliant with the following:
This equipment shall be supplied by a Class 2 supply, as defined in the Canadian Electrical Code, C22.1, rule 16-200, or National Electrical Code, NFPA 70, article 725.121, and a Limited Energy Source in accordance with CAN/CSA C22.2 No. 61010-1-1 and ANSI/UL 61010-1.

System Description

Probe	Extension Cable	Driver
1442-PS-05 1442-PS-08 1442-PR-08	1442-EC-58	1442-DR-58
1442-PS-11	1442-EC-1140 1442-EC-1180	1442-DR-11
1442-PS-18	1442-EC-1840 1442-EC-1880	1442-DR-18
1442-PS-25	1442-EC-2540 1442-EC-2580	1442-DR-25
1442-PS-50	1442-EC-5040 1442-EC-5080	1442-DR-50

System Configuration



System Cable Length:
- 1442-DR-xx50: 5 m (16 ft)
- 1442-DR-xx90: 9 m (29 ft)

Installation Environment

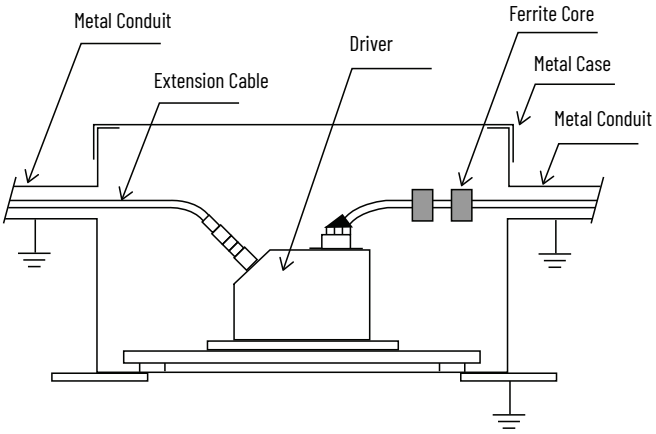
WARNING: Installation work, wiring, and connections must be performed by a person with knowledge in instrumentation. Always ground the system. Never apply power until all wiring work and connection work has been completed. If this isn't followed, there's a possibility of electrocution.

WARNING: Be sure to adhere to the following guidelines:
- Before touching this unit, be sure to touch a metal section near by to discharge any static electricity. The device may be damaged if exposed to static electricity from your body.
- Before applying power, make sure that all wiring is properly connected. There's a possibility of damage to the unit and fire if improperly connected.
- Install this unit away from motors and relays.
- Install the input/output signal cables away from power and control system cables. Noise occurring from the motor or relay can adversely affect the measurement value. We recommend using separate wiring ducts.
- After completing the installation, verify that all connections are correct and tight before powering the system.

Electromagnetic Interference Protection

To protect the 1442 Eddy Current Probe System from electromagnetic interference, install the driver and extension cables as shown.

Electromagnetic Compatibility (EMC) Installation



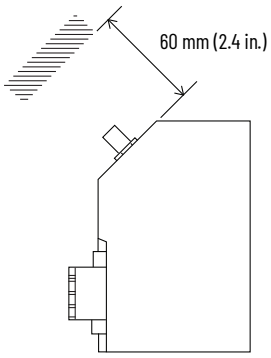
Item	Material	Remark
Metal Conduit	Steel	Thickness: 1.6 mm (0.063 in.) or more
Metal Case	Steel	Thickness: 1.6 mm (0.063 in.) or more
Ferrite Core[1]	–	Model: ZCAT3035-1330 equivalent (TDK Corporation)

(1) Ferrite cores are only required for the 1442-DR-58 and 1442-DR-11 driver models.

ATTENTION:
- Do not locate above heat emitting objects.
- The allowable tension for probe and extension cables is 98.1 N•m (10 kgf•m).
- Take care not to bend probe and extension cables beyond an allowable bend radius of:
  - Without armored cable: 30 mm (1.18 in.)
  - With armored cable: 50 mm (1.97 in.)

Cable Connection Spacing

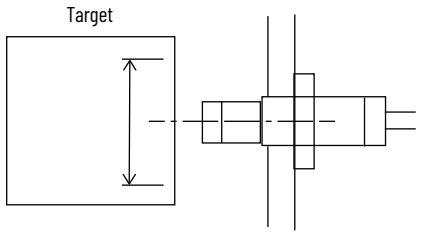
Provide adequate spacing between walls or other obstacles and the cable connection surface of the driver.



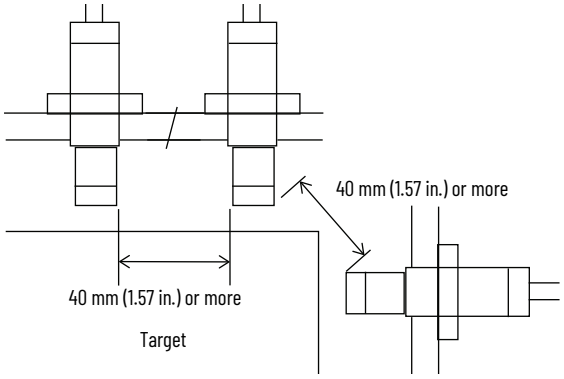
Probe Spacing and Target Dimensions

ATTENTION:
- Do not install the probe in at a location exposed to rain or other moisture. Moisture can lead to reduced sensitivity of the probe and reduced insulation.
- The probe must be installed on a surface with adequate rigidity that is not affected by an outside vibration. If the probe vibrates, an accurate measurement cannot be taken.
- If a piece of metal other than the target is near the probe, an accurate reading cannot be taken.

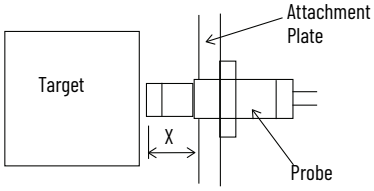
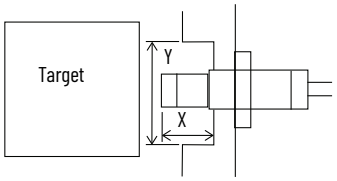
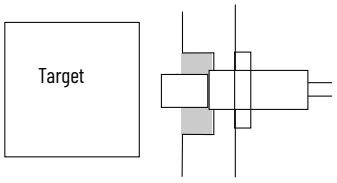
Center the probe tip with the target. The target surface area should be no less than three times the probe tip diameter.



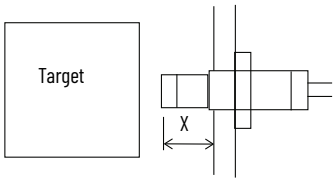
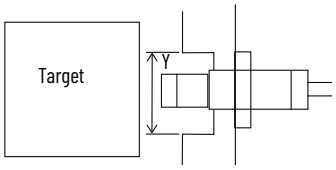
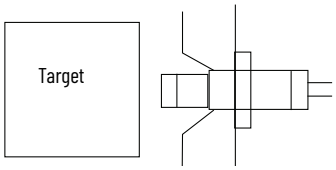
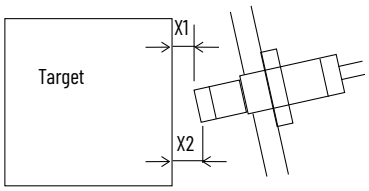
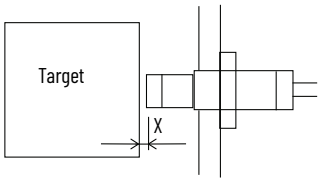
When placing multiple probes next to each other, separate the probe tips by no less than 10 times the probe tip diameter to prevent interference.



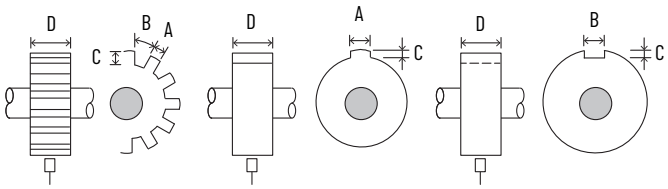
Recommended Probe Installation Spacing

Example	Description
	• Most recommended • Dimension X is no less than 1.2 times the tip diameter
	• Recommended • Dimension X is no less than 1.2 times the tip diameter • Dimension Y is no less than 3 times the tip diameter
	• Recommended • Dimensions X and Y are as above • Fill the shaded area, as indicated in the illustration, with resin or other insulating material

Non-recommended Probe Installation Spacing

Example	Description
	If dimension X is less than 1.2 times the tip diameter, the measurement is affected by the attachment plate.
	If dimension Y is less than 3 times the tip diameter, the measurement is affected by the attachment plate.
	If the attachment plate around the probe top is chamfered, the measurement is affected by the attachment plate.
	If the target and the probe top are not parallel (dimension X1 and X2 are not the same), it affects the reading.
	If dimension X is less than the minimum linear range from the probe tip specification for the probe, the measurement is not accurate.

Recommended Target Dimensions for Rotational Speed Measurement



Recommendation		mm	Mils
Dimensions of target	A	≥ 6	≥ 236
	B	≥ 7	≥ 275
	C	≥ 2.5	≥ 98
	D	≥ 15	≥ 590
Set gap		1.0...1.5	39...59

Hazardous Location Installation (ETK51271-HAZ)

Use this information as a guide when installing a 1442 Eddy Probe in a hazardous location that meets the following criteria:

- Ex ia IIc T4 Ga : AEx ia IIc T4 Ga : Class 1 Zone 0
- Class 1, Division 1 Groups A, B, C, D T4
- Class 1, Division 2 Groups A, B, C, D T4

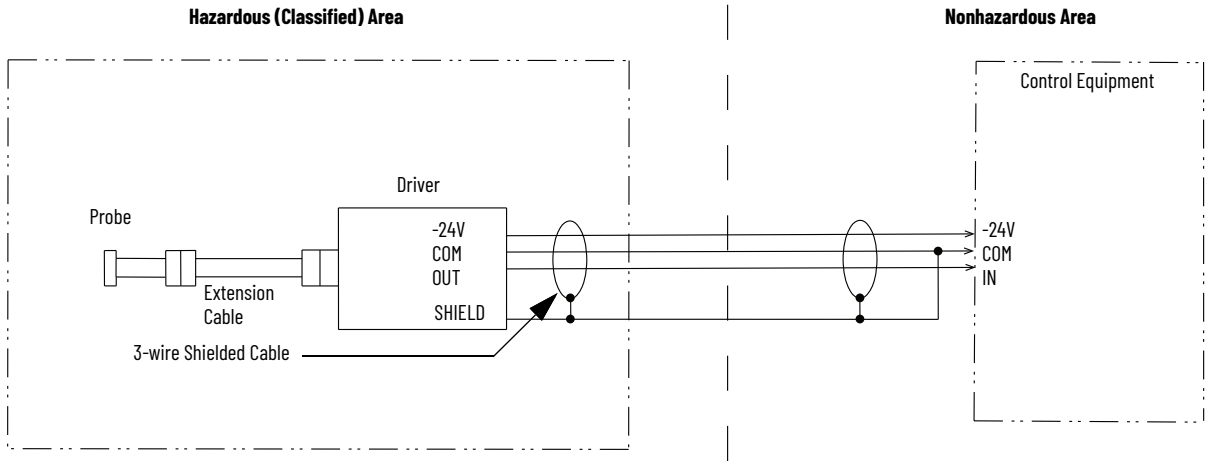
North American Installation

Cable Parameters	
Capacitance	Less than 0.044 µF
Inductance	Less than 1.94 mH

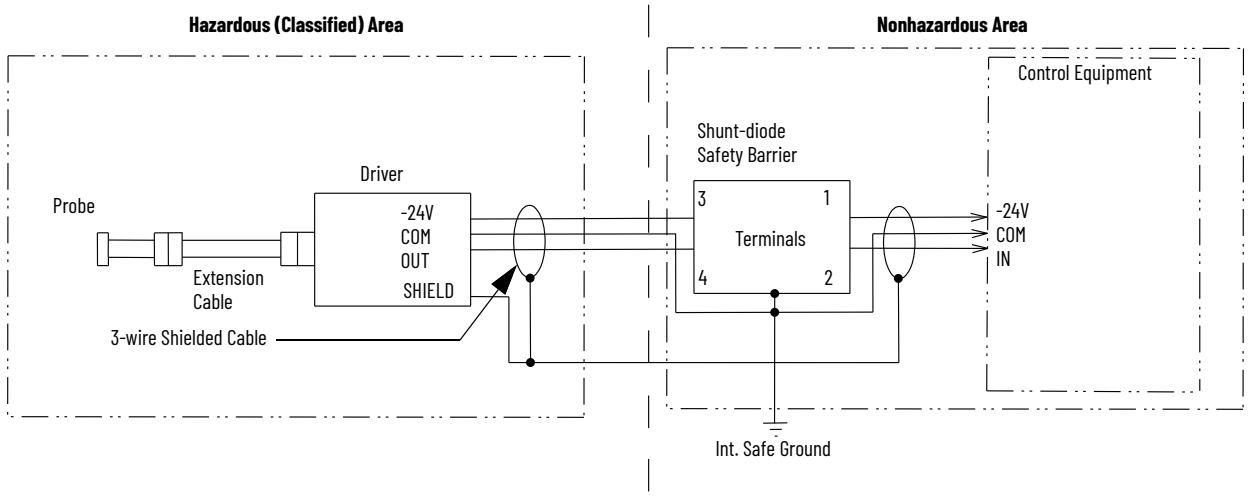
Driver Parameters	
Vi	26.6VCD
Ii	138 mA
Pi	0.824 W
Ci	52 nF
Li	0 mH (0.22 µH)

Associated Device Parameters	
Any CSA Certified Barrier Having Listed These Combined Output Parameters of the Two Channels	Vo ≤ 26.6V
	Io ≤ 138 mA
	Po ≤ 0.824 W
	Co ≤ 52 nF + Ccable
	Lo ≤ 0 mH (0.22 µH) + Lcable

1442 Series Installation - Entity Approach



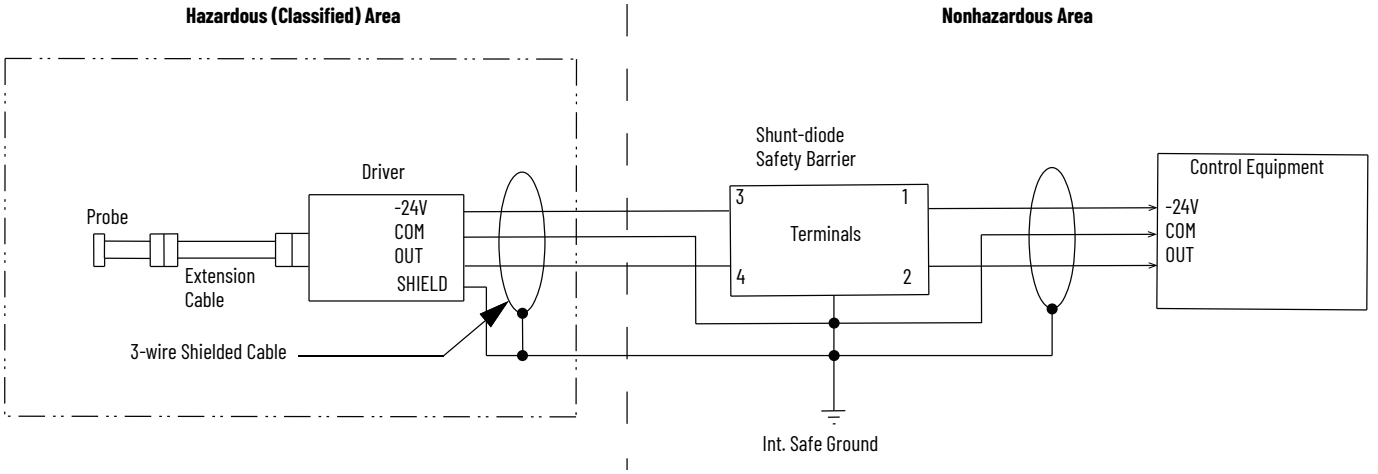
1442 Series Installation - System Approach

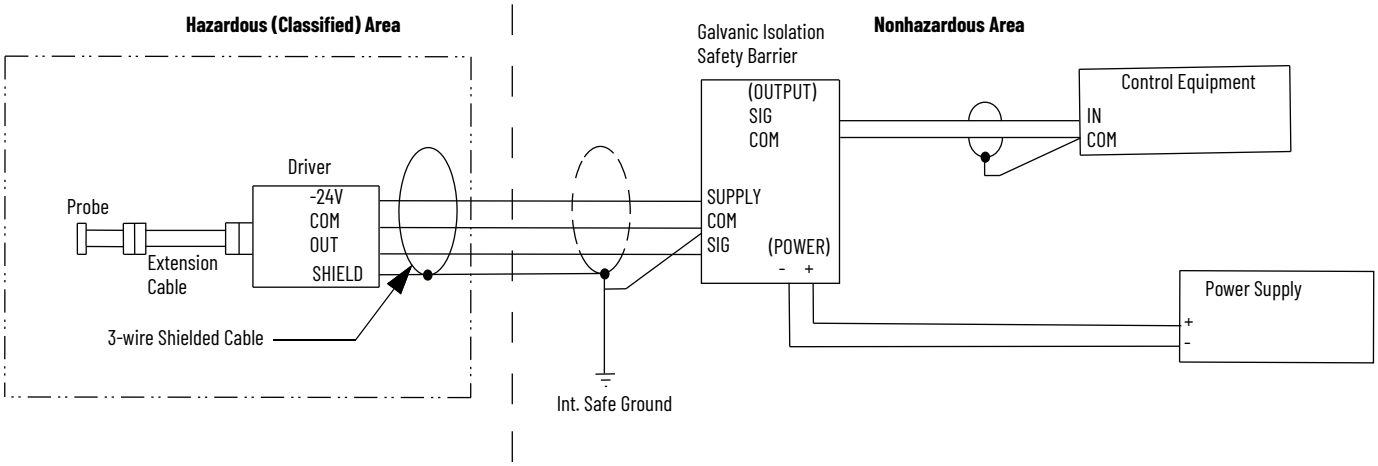


ATTENTION:

- Installation should be in accordance with ANSI/ISA RP12.6 and the NEC and CEC.
- Equipment connected to an associated intrinsically safe apparatus must not use or generate more than 250V AD or 250V DC.
- The cable must not exceed the allowable limits of the parameters listed in the Cable Parameters table.
- The control equipment manufacturer's installation instructions must be followed when installed in Class 1 Division 2 without barriers. Specific wiring methods shall be used as directed by applicable installation code (conduit connection).
- The product may be installed in Class 1 Division 2 without barriers, in a suitable enclosure accepted by authority having jurisdiction.
- MTL 7796 - or any CSA certified two channel DC grounded shout zener barriers having 26V DC or less, 300 OHM or more, on one channel and 20V DC or less, 390 OHM or more, on the other channel. Both channels shall have the same polarity.
- Substitution of components may impair suitability for Class 1, Division 2.
- Do not disconnect the equipment unless power has been removed or the area is known to be non-hazardous.

ATEX/UKEX/IECEx/CCCEx Installation (ETK51270-HAZ)





Driver Parameters	
Vi	26.6VCD
Ii	138 mA
Pi	0.824 W
Ci	52 nF
Li	0 mH (0.22 µH)

Associated Device Parameters	
ATEX/UKEX/IECEx/ CCCEx Certified Barrier having Listed These Following Combined Output Parameters	Vo ≤ 26.6V
	Io ≤ 138 mA
	Po ≤ 0.824 W
	Co ≤ 52 nF + Ccable
	Lo ≤ 0 mH (0.22 µH) + Lcable

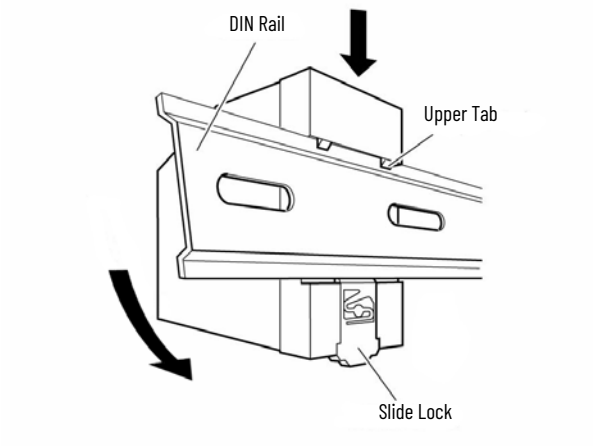
ATTENTION:

- The electrical circuit in the hazardous area must withstand an A.C test voltage of 500 volts RMS to earth/ground (frame of the apparatus) for one minute.
- Do not disconnect the equipment unless power has been removed when there is an explosive gas atmosphere present.
- The installation, including the barrier earthing arrangements, must comply with installation requirements of the country of use.
- The 1442 driver must be installed in an enclosure that provides a minimum degree of protection of IP20. The driver must be isolation from the enclosure.
- The safety barrier must comply with the associated device parameters.
- Nonhazardous area apparatus is not specified, except that it must not be supplied from a source of potential in excess of 250 volts RMS or 250 volts DC under normal or abnormal conditions.
- The 1442 series drivers are only certified for use in ambient temperatures in the range of -40C to +80C.
- The 1442 driver case contains aluminum. If the driver is installed in zone 0, the driver case must be protected from any sources of impact an/or static electricity.
- The probe tip, driver terminal block, and driver mounting plate are able to conduct static electricity. Do not touch these parts when there is an explosive atmosphere present.
- When installing in a hazardous area, the probe body must be earthed/grounded.

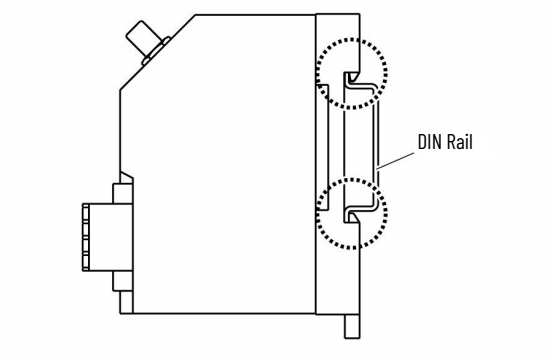
Install the Driver

Mount the driver to a 35 mm DIN rail.

1. Hook the upper tabs on the back of the driver onto the DIN rail.



2. Push the driver into the DIN rail until a click is heard from the slide lock.
3. Check that the upper tabs and the slide lock are securely fastened to the DIN rail.



To remove the driver, push down on the slide lock with a screwdriver.

Mount the Probe

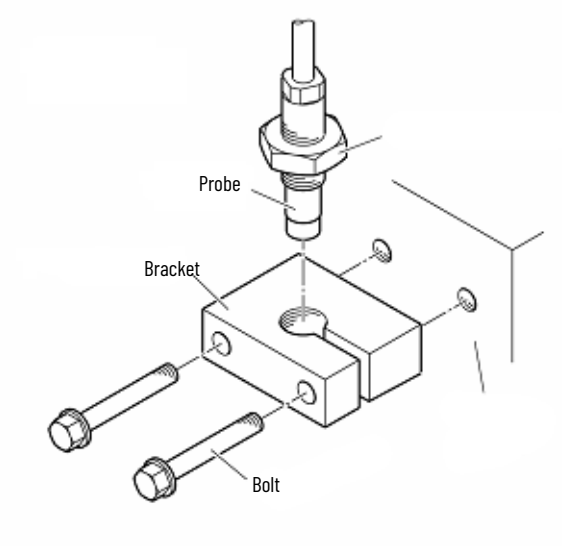
Use a Probe Mounting Bracket

ATTENTION: Do not drop or otherwise subject the probe to shock.

If desired, a probe mounting bracket can be readily machined at your site. The bracket must provide a stable, secure, platform that satisfies the conditions described in Probe Spacing and Target Dimensions.

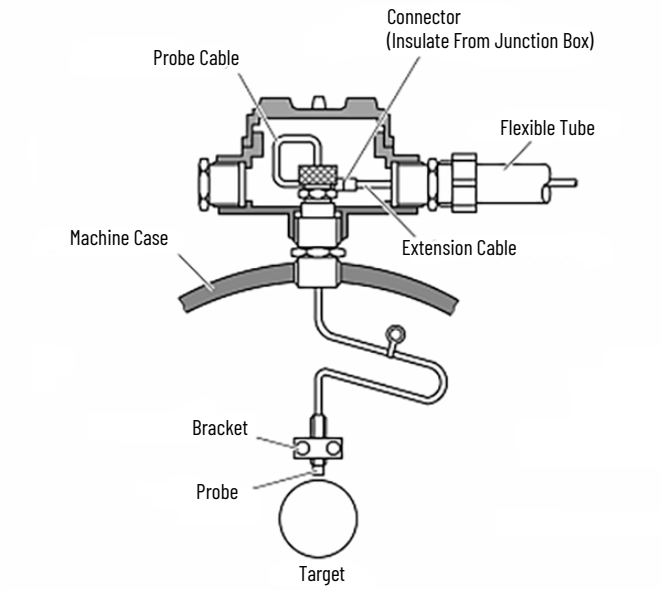
When using a probe mounting bracket, follow these steps to install the probe.

1. Attach the probe mounting bracket to the mount (body), without fully tightening the bolts.



2. Insert the probe into the hole of the probe mounting bracket.
3. Loosen the jam nut and adjust the gap between the probe and the target. For more information, see Set the Gap.
4. Tighten the bolts to secure the probe mounting bracket.
5. Tighten the jam nut at the specified Torque Requirements.

Probe Mounting Bracket Installation Example



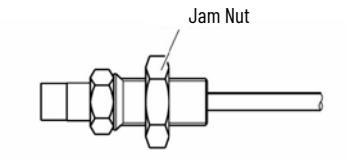
Use a Stinger or Probe Sleeve

1442 Series 8 mm reverse mount probes can be used with commonly available probe holders. Stingers (also known as probe sleeves) are provided with the probe holder. Stingers can also be purchased from probe holder suppliers or can often be machined locally.

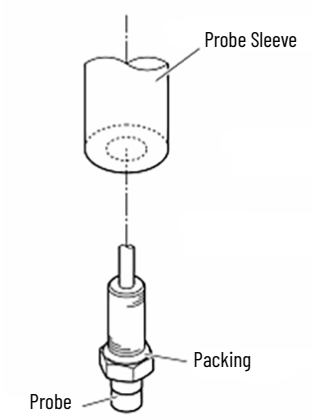
The following is a general guide that is based on common probe holder designs. Consult your specific probe holder installation instructions for additional details.

Install the probe holder and stinger assembly per any included installation instructions before mounting the probe onto the stinger.

1. Remove the jam nut from the reverse-mount probe.

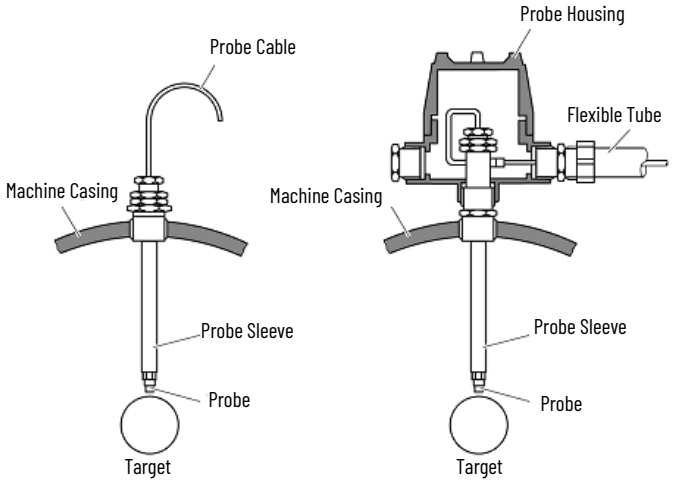


2. Thread the probe into the probe sleeve.



3. Attach the probe sleeve to the mounting (machine casing).

Probe Sleeve Installation Examples

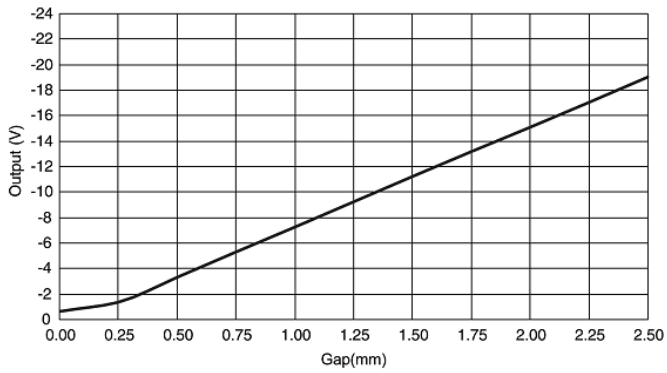


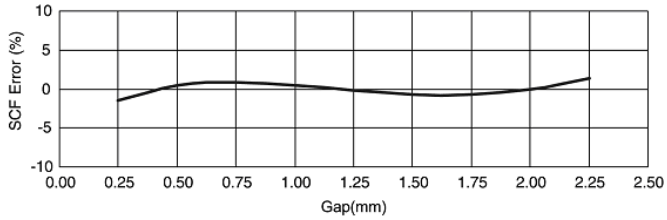
Set the Gap

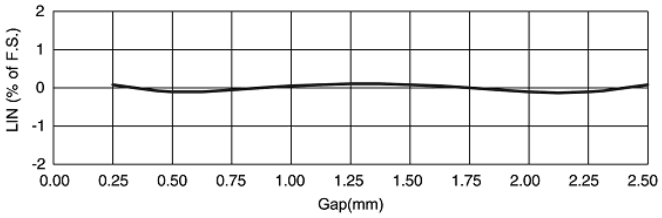
Set the distance between the probe tip and the target, as follows:

1. Prepare a gap gage that matches the desired gap using these standard static characteristics as a guide:

Standard Static Characteristics





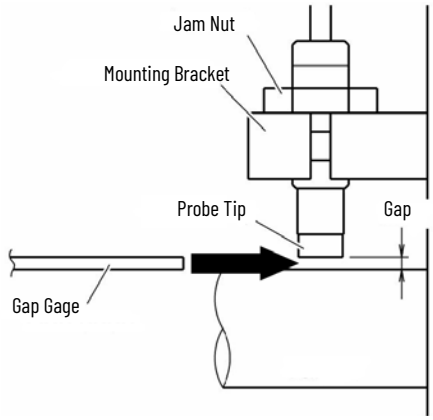


ATTENTION: The data featured in the Standard Static Characteristics table is measured for an SCM440 flat target (diameter more than 33 mm). When the target material or shapes differ, the output characteristics (gain) differ, making it necessary to compensate with later equipment.

For temperature, target material, and other characteristic data that can affect the linear range characteristics that are referenced when setting the gap, see the *1442 Series Eddy Current Probe System User Manual*, publication ICM-UM004.

ATTENTION:
- Even when the target is nearest to the probe, it shouldn't come into direct contact with the probe.
- The gap shouldn't go beyond the linear range of the connection monitor.

2. Insert the gap gage between the probe tip and target, taking care not to scratch the probe tip and target surface.



3. Adjust the probe to a position where the gap gage is just able to move freely, and affix in place with the jam nut.
4. Tighten the jam nut using these torque requirements:

Torque Requirements

Probe	Example	Torque		
		N•m	kgf-cm	lb•in
1442-PS-05xxM (5 mm metric)	1442-PS-0503M0010N	4	41	35.4
1442-PS-05xxE (5 mm English)	1442-PS-0512E0010N	1.4	15	12.4
1442-PS-08xxM (8 mm metric)	1442-PS-0803M0010N	8.5	87	75.2
1442-PS-08xxE (8 mm English)	1442-PS-0812E0010N	6.8	69	60.2
1442-PS-11xxM (11 mm metric)	1442-PS-1104M0510N	26.1	266	231
1442-PS-11xxE (11 mm English)	1442-PS-1116E0510N	18.6	190	164
1442-PS-18xxM (18 mm metric)	1442-PS-1805M0510A	58.8	600	520
1442-PS-18xxE (18 mm English)	1442-PS-1820E0510A	88.2	900	780
1442-PS-25xxM (25 mm metric)	1442-PS-2505M0510A	176	1800	1557
1442-PS-25xxE (25 mm English)	1442-PS-2520E0510A	196	2000	1734
1442-PS-50xxM (50 mm metric)	1442-PS-5005M0010A	176	1800	1557
1442-PS-50xxE (50 mm English)	1442-PS-5020E0010A	196	2000	1734
1442-PR-08xxM (8 mm reverse mount metric)	1442-PR-0803M0505N	8.5	87	75.2
1442-PR-08xxE (8 mm reverse mount English)	1442-PR-0812E0205N	6.8	69	60.2

ATTENTION: Tighten the jam nut at the specified torque.
If tightened with excessive torque, the probe can be damaged.
If tightened with insufficient torque, it can come loose.

Connect the Wiring

This section describes the wiring connections for the 1442 Series Eddy Current Probe system.

The 1442 Series includes color-coded bands on the ends of each component. The color-coded bands help you identify the length of the extension cable and the length of the probe and probe cable so that the total system length (5 meters or 9 meters) can be matched to the appropriate driver. When the system is properly "sized," the color bands for the probe, extension cable, and driver match.

1442 Series Color Band Table

Probe and Probe Cable		Extension Cable			Driver	
Length	Color Band	Length	Probe End Color Band	Driver End Color Band	System Cable Length	Color Band
0.5 m	Yellow	4.0 m	Black	Blue	5.0 m	Blue
1.0 m	Black	4.5 m	Yellow	Blue	9.0 m	Red
5.0 m	Blue	8.0 m	Black	Red		
9.0 m	Red	8.5 m	Yellow	Red		

WARNING: Confirm that the system is properly grounded. To avoid an electric shock hazard, confirm that all power to the system has been removed before performing the following. Failure to do so can result in electrical shock, causing severe burns, injury, or death.
Installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel.

ATTENTION: Make sure to tighten the collar of the connector by hand. Using a tool to tighten the collar can damage the connector. If the installation environment does not allow proper tightening by hand and there is a possibility that it can come loose, tighten an additional 1/4 turn using pliers after tightening by hand:

- Do not apply excessive force on the screws of the connector. The connector can be damaged
- Do not cut the probe or extension cables shorter. It can cause problems, such as not being able to perform up to specifications.

Make sure that the cable is not twisted when connecting the connectors. Stress on the cable, caused by twisting, can slowly loosen the connection.

If a twisting force is applied to the direction where the collar is loosened, twist the extension cable slightly to the opposite direction used to tighten the collar before connecting. Then connect the connector and tighten the collar.

We recommend that excessive extension cables be stored in the cable storage box. If it is unavoidable to store inside the driver housing, do not force excessive cables into the housing.

Connect the Extension Cable

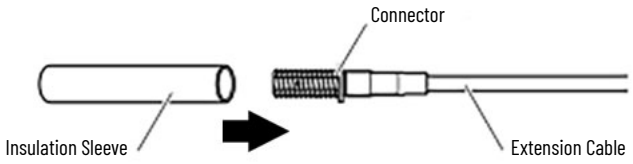
To connect the probe to the extension cable, follow these steps:

The connection area of the connector must not be exposed to water or oil. If water or oil enters the connector, the cable capacity increases, and causes a loss in sensitivity.

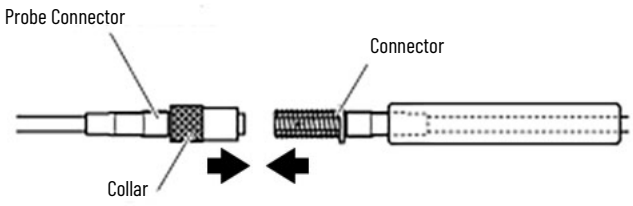
Make sure that the color band on the probe cable matches the color band on the probe end of the extension cable. See the 1442 Series Color Band Table.

1. Confirm that there are no foreign objects in the probe and extension cable connectors.

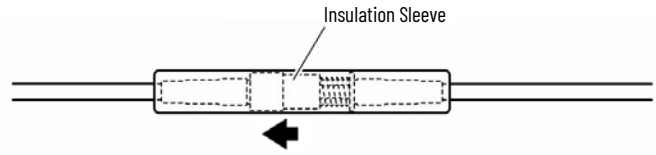
   Foreign objects in the connector cause faulty connections or faulty characteristics.
2. Insert the extension cable through the provided insulation sleeve (clear heat shrink tube).



3. Connect the probe connector and extension cable connectors, and tighten the collar by hand.



4. Cover the insulation sleeve over the connector.



5. To shrink the insulation sleeve, apply hot air on the insulation sleeve.

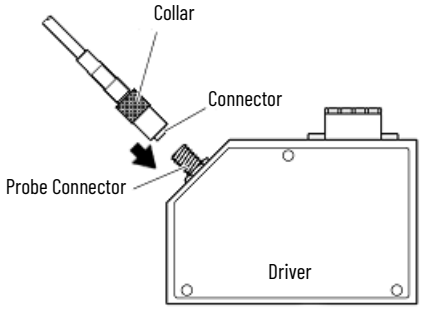
ATTENTION: Never use vinyl tape to insulate.
- During extended periods of use or when the connector temperature exceeds 80 °C (176 °F), vinyl electrical tape can harden or the adhesive can deteriorate, leading to a dirty connector and faulty insulation.
- If there isn't a spare insulation sleeve available, protect the connector with a fluorine resin tape. Recommended insulation tape is:
  - Manufacturer: Nitto Denko Corporation
  - Product Name: Nitoflon adhesive tape (Model Number: No.903UL)
  - Temperature spec: -60...+180 °C (-76...+356 °F) 0.08 mm thickness.

Connect the Probe

To connect the probe to the driver, with or without an extension cable, follow these steps:

Make sure that the color band on the extension cable matches the color band on the probe driver. See the 1442 Series Color Band Table.

1. Confirm that there are no foreign objects in the probe and extension cable) and in the driver probe input connector.
2. Connect the probe (or extension cable) connector and the probe input connector, and tighten the collar by hand.



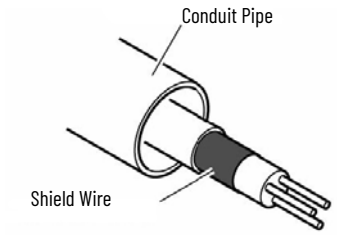
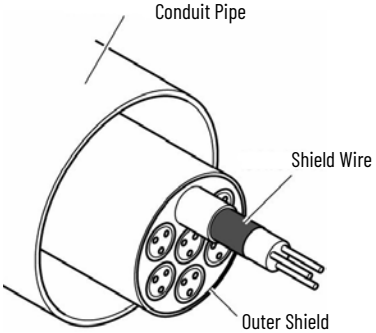
Wire the Unit to a Monitoring System

The 1442 probes can be connected to many different Allen-Bradley® 1440 XM® Series or 1444 Dynamix™ Series measurement modules to help you monitor and protect the components of your Integrated Architecture® system.

The 1442 Series Probe System is designed to satisfy the API-670 standard. Any monitor designed to connect API-670 probes can be used with these probes.

Use a commercially sold cable to connect the probe driver to the monitor. A CVVS 3 core shielded cable (straight) is recommended, but if it is not available, a 3 line, multiple-core cable for light electrical instruments (individually shielded) can be used. Use 0.75 mm^2...1.25 mm^2 (18...16 AWG) cables.

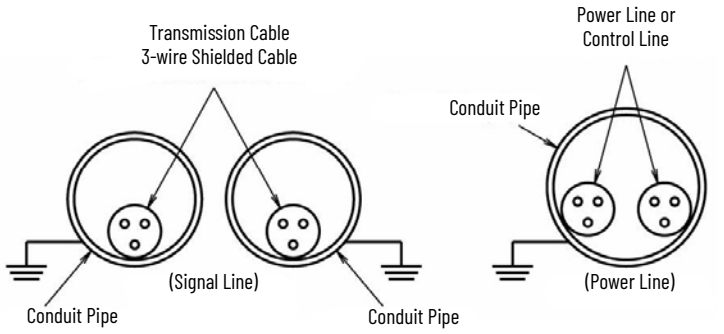
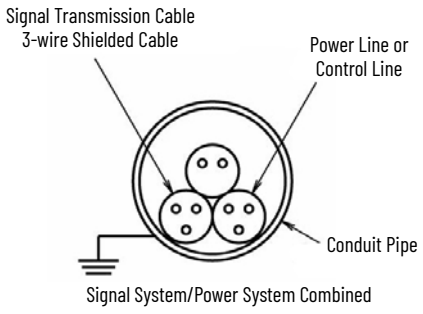
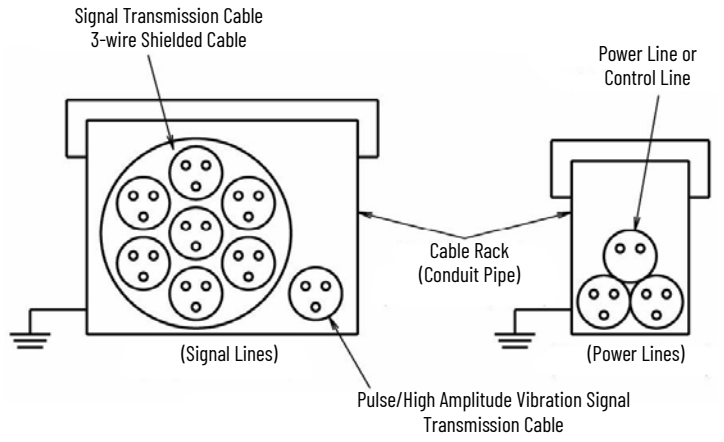
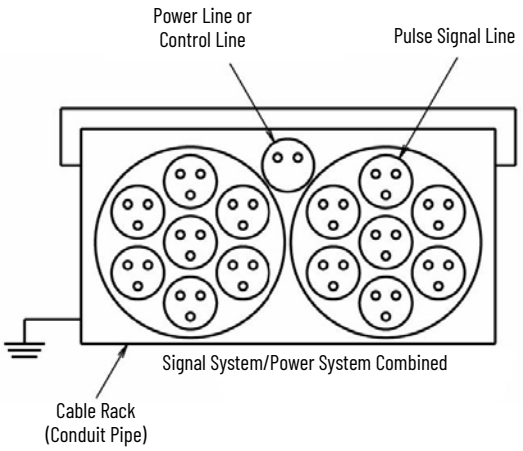
Recommended Specifications for the Monitor Cable

Cable Name	Note
CVVS 3 core shielded cable (straight) 	The CVVS 3 core shield is also recommended in the API Standard 670. **Recommendation:** • Copper tape shield (core wire; soft copper wire); (Normally, silver plated braid) • Use conduit pipe (cable rack) for wiring.
3 line, multiple-core cable for light electrical instruments (individually shielded) 	**Recommendation:** • Outer shield is aluminum tape, copper tape shield. • The multiple-core cable can contain a mixture of vibration signals and displacement signals. However, vibration signals for a high amplitude vibration can affect other vibration signals and displacement signals negatively; and they must be wired on a separate cable.

Consider the following recommendations when wiring the probe driver to a monitor:

- Use a good quality instrumentation cable with three-conductor stranded wire and shield.
  - Wire must be rated with a maximum capacitance of 60 pF/ft
  - (197 pF/m) and inductance of 0.3 µH/ft (1 µH/m).
  - Use wire with insulation suitable for the environment and with adequate tensile strength and flexibility for the application.
  - Use wire with a foil shield for use in environments where radio frequency interference (RFI) is present. Use a wire with a braid shield for environments where electromagnetic interference (EMI) is present.
  - Use 0.75…1.25 mm^2 (18…16 AWG) gauge wire.
- Make sure that the wire is isolated from power cables and any other wiring that is transmitting high-voltage power or control signals.
- Any cable transmitting pulse-type vibration signals such as a phase marker or speed pulse must be isolated from any displacement and vibration signals.
- Run wire within conduit and cable trays and as per any local electrical codes.
- Do not exceed a wire length of 500 m (546.81 yd). However, if the length is limited to 300 m (328.08 yd), vibration signals in the 0…10 kHz frequency range are transmitted with minimal attenuation. When longer lengths are needed the capacitance of the cable and the desired frequency response of the system must be considered.
- In most cases, ground the cable shield at only one point, generally at the monitor.

These illustrations provide examples on how to wire and lay the cable:

Good Example	Bad Example
	
	

Verify the Connections

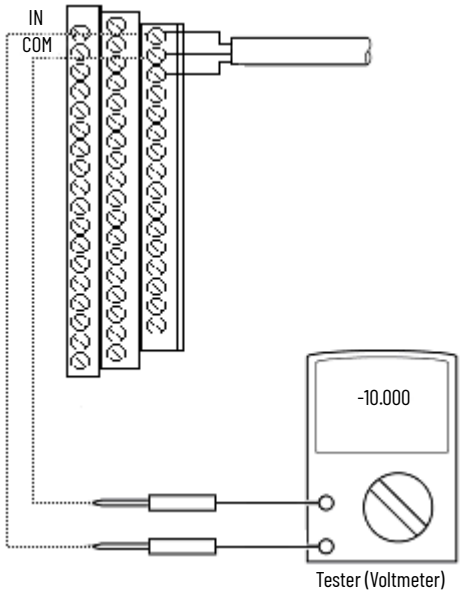
Before turning on the power, verify the following connections:

- Be sure that there are no loose terminals, and that all wiring is properly connected.
- Check that the power line for the power source is connected to NEGATIVE PWR (-24V) on the measurement module or its terminal base.
- Be sure that the driver and probe are installed at locations where the installation environmental conditions are satisfied.
- Be sure that there are no problems with the driver and probe installation, and they are **not** installed at the following types of locations:
  - Locations with high temperatures and high humidity.
  - Locations with dust.
  - Location that is exposed to vibration.
  - Locations where there are metal objects, other than the target, near the probe.

Set Gap Voltage

To check the set gap voltage, follow these steps:

1. Supply power to the unit.
2. Allow the unit to warm up for 5 minutes to stabilize the output.
   Warm-up is necessary to collect accurate data.
3. Connect the tester (voltmeter) across the Input Signal and Input Common terminals on the measurement module base and read the voltage.



4. Confirm that the tester indicates the desired set gap voltage that is identified in the Standard Static Characteristics.
5. If the desired set gap voltage is not attained, readjust the probe position by using the following procedure:
   a. Loosen the jam nut and adjust the gap between the probe and the target. For more information, see Set the Gap.
   b. Tighten the bolts to secure the probe mounting bracket.
   c. Tighten the jam nut at the specified Torque Requirements.

ATTENTION: Always tighten the jam nut at the specified torque.

The measurement precision that's described in the Specifications will be satisfied approximately 5 minutes after you supply power to the unit.

Specifications

Attribute	1442 Eddy Probe Systems
Standard calibration	AISI 4140 (JIS SCM440) steel flat surface
Maximum output voltage, approx(1)	-23V DC
Probe/sensor abnormal output voltage, approx(1)	-0.6V DC (probe/sensor OPEN or SHORT)
Current consumption (10 kΩ load), max	-15 mA
Output noise, approx(1)	20 mV peak-to-peak + power supply noise
Power supply	-24V DC, 20 mA
Driver insulation resistance	Between terminals and mounting plate: ≥ 100 MΩ @ 500V DC
Terminal block	Spring-lock terminal
Isolation voltage (driver)	50V (continuous), Basic Insulation Type, terminals to mounting plate Type tested at 500V AC for 60 s
Wiring category(2)	2 - on signal ports
Wire size (driver)	0.75…1.25 mm^2 (18…16 AWG) shielded stranded copper wire that is rated at 90 °C (194 °F), or greater, 1.2 mm (3/64 in.) insulation max

(1) Applies at 25 °C (77 °F) with -24V DC power supply, load resistance 10 kΩ, and AISI 4140 (JIS SCM440) steel flat surface target (thickness ≥ 5 mm).
(2) Use this Conductor Category information for planning the conductor routing. See *Industrial Automation Wiring and Grounding Guidelines*, publication 1770-4.1.

Operating Temperature

Component	Operating Temperature Range
1442-Px probe	-40…+80 °C (-40…+176 °F)
1442-ECx extension cable	
1442-DRx driver	

Additional Resources

These resources contain information about related products from Rockwell Automation.

Resource	Description
1442 Eddy Current Probe Systems Specifications Technical Data, publication 1442-TD001	Provides specifications for the components in 1442 Eddy probe systems
1442 Series Eddy Current Probe System User Manual, publication ICM-UM004	Describes how to use the 1442 Eddy probe systems
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

Documentation Feedback

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Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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