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Find the *Particle Measuring Systems LAN-Node 200* at our website: *Click HERE*

Local Area Network Node
PMS Model LAN Node 200
Operating Manual

Particle Measuring Systems, Inc.
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Boulder, Colorado 80301
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P/N 10173-5

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These terms have specific meanings in this manual:

WARNING: information to prevent personal injury.

CAUTION: information to prevent damage to the equipment.

NOTE: important general information.

Hazard Symbols

The meaning of hazard symbols appearing on the equipment is as follows:

Symbol	Nature of Hazard	Reference in Manual
	Fire Hazard	Page v
	Dangerous High Voltage	Page iv
	Static Sensitive Components	Page v

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CAUTION

General Conditions for Use

This instrument is designed to comply with the requirements of EN 61010-1/EC 1010-1, for Class 1 portable equipment and is for use in a Pollution Degree 2 environment. The equipment is designed to operate from an Installation Category 2 supply.

Equipment should be protected from the ingress of liquids and precipitation such as rain, snow, etc. When moving the instrument from a cold to a hot environment, it is important to allow the temperature of the instrument to stabilize before it is connected to the supply to avoid condensation forming. The instrument must only be operated within the environmental conditions specified in Chapter 3.

This product is not approved for use in hazardous atmospheres. If the instrument is to be used in a safety-related application, the suitability of the product must be assessed and approved for use by a competent person.

WARNING

Electrical Hazards

AC Supply Voltage

This equipment conforms with IEC Safety Class 1, meaning that is provided with a protective grounding lead. To maintain this protection the supply lead must always be connected to the source of the supply via a socket with a grounded connection.

The AC supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight electrical shock may be felt if the plug pins are touched immediately after removal.

WARNING

Fuses

The AC supply fuses are in series with both the live (brown) and neutral (blue) conductors of the supply lead. Refer to Table 2-1 in Chapter 2 for proper fuse selection.

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WARNING

Removal of Equipment Covers

Disconnect the supply before removing the covers so as to avoid the risk of exposing high voltage parts. If any internal adjustment or servicing has to be carried out with the AC supply on, it must be only performed by a skilled person who is aware of the hazard involved.

WARNING

Fire Hazards

Make sure that only fuses of the correct rating and type are used for replacement. Reference Table 2-1 in Chapter 2.

WARNING

Toxic Hazards

Some of the components used in this equipment may include resins and other materials which give off toxic fumes if incinerated. Take appropriate precautions, therefore, in the disposal of these items.

WARNING

Lithium

Lithium is used in the construction of the non-volatile date back-up batteries used in the equipment. This material, if incorrectly handled, could cause a danger to health. Refer to local regulations on the handling and disposal of these batteries.

WARNING

NICAD

NICAD (nickel cadmium) is used in the construction of the non-volatile data back-up batteries used in the equipment. This material, if incorrectly handled, could cause a danger to health. Refer to local regulations on the handling and disposal of these batteries.

CAUTION

Static Sensitive Components

This equipment contains static sensitive components which may be damaged by handling. Refer to the equipment service manual for proper handling of these sensitive components.

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WARNING

The HeNe laser in this instrument is powered by a high voltage power supply. The laser power supply is capable of peak voltages of 7KV with low current (less than 50 microamps) and continuous voltages of 1.8KV at moderate currents (5-6 milliamps). Failure to observe the following warning labels can result in personal injury or death.

Laser Labels





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WARNING

This instrument is a Class 1 laser product.* It has an internal HeNe laser cavity which has no transmitted output power, but develops a high resonant energy density (Q) inaccessible to the user. As a general precaution, avoid exposure to bright discharges or scattered laser radiation when servicing the optical system. Use of controls or adjustments, or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

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Ces termes ont une signification particuliere dans ce manuel:

AVERTISSEMENT: information pour éviter des blessures aux personnes.

ATTENTION: information pour éviter d'endommager l'appareil.

NOTE: Information générale importante.

Symboles de risque

Des symboles représentant les risques sont placés sur l'appareil. Leur signification est la suivante :

Symbole	Nature du risque	Référence au manuel
	**Risque de feu**	**Page xi**
	**Danger Electricite**	**Page x**
	**Composants Sensibles a L'Electricite Statique**	**Page xii**

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ATTENTION

Conditions générales d'utilisation

Cet instrument est conforme aux exigences des normes EN61010-1/IEC1010-1, pour les équipements portables de Classe 1 pouvant etre utilisés en environnement pollué de degré 2. L'appareil est concu pour etre alimenté a partir d'une installation électrique de catégorie 2.

L'appareil doit etre protégé contre les infiltrations de liquides et les projections d'eau (pluie, neige, etc.). Apres un déplacement d'un environnement froid vers un environnement chaud, il est important de laisser l'appareil se stabiliser en température avant de le mettre sous tension, afin d'éviter la formation de condensation. Il ne doit etre utilisé que dans les conditions d'environnement décrites au chapitre 3.

Cet équipement n'est pas prévu pour fonctionner dans des atmospheres dangereuses. Dans le cadre d'une utilisation soumise a des regles de sécurité, la compatibilite du produit doit etre évaluée et approuvée par un personnel compétent.

AVERTISSEMENT

Risques électriques

Alimentation secteur

Cet équipement est conforme avec les regles de sécurité IEC Classe 1, ce qui signifie qu'il dispose d'une liaison de protection a la terre. Afin d'assurer cette protection, le cable d'alimentation doit toujours etre connecté sur une prise secteur possédant une mise a la terre.

Le filtre d'alimentation AC contient des condensateurs qui peuvent rester chargés apres la déconnexion du cordon secteur. Bien que l'énergie résiduelle ainsi stockée ne dépasse pas les limites de sécurité, une légere décharge électrique est perceptible si l'on touche les broches de la prise du cordon, immédiatement apres l'avoir retirée du secteur.

AVERTISSEMENT

Fusibles

Les fusibles de l'alimentation secteur sont montés en protection bipolaire, en série avec les fils de phase (marron) et de neutre (bleu). Se référer a la Table 2-1 de la chapitre 2 pour une sélection appropriée des fusibles.

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AVERTISSEMENT

Démontage des capots de l'appareil

Déconnecter l'alimentation secteur avant de retirer les capots afin d'éviter le risque d'exposition a des parties alimentées en haute tension. Si des réglages internes doivent etre faits avec l'appareil sous tension, ils ne doivent etre effectués que par du personnel forme et qualifié pour évaluer les risques encourus.

AVERTISSEMENT

Risques de feu

Lors d'un remplacement, s'assurer de l'utilisation de fusibles correspondant uniquement au type et a la evaleur indiqués dans la Table 2-1 de la section 2.

AVERTISSEMENT

Risques Toxiques

Certains des composants utilisés dans cet équipement peuvent contenir des résines et autres matériaux qui degagent des fumées toxiques lorsqu'ils sont incinérés. Par conséquent, prendre les précautions nécessaires lors du rejet ou de la destruction de ces éléments.

AVERTISSEMENT

Lithium

Le Lithium est utilisé dans la fabrication des batteries de sauvegarde des mémoires non volatiles. Une mauvaise manipulation de cet élément peut présenter un danger pour la santé. Se reporter aux réglementations locales en vigueur concernant la manipulation et le rejet de ces batteries.

AVERTISSEMENT

NICAD

Le NICAD (cadmium-nickel) est utilisé dans la fabrication des batteries de sauvegarde des mémoires non volatiles. Une mauvaise manipulation de cet élément peut présenter un danger pour la santé. Se reporter aux réglementations locales en vigueur concernant la manipulation et le rejet de ces batteries.

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ATTENTION

Composants sensibles a l'électricité statique

Cet appareil contient des composants sensibles a l'électricité statique, qui peuvent etre endommagés par simple manipulation. Se référer au Manuel de maintenance de l'appareil pour connaitre les regles de manipulation de ce type de composants.

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Avertissement

Le laser HeNe installé dans cet instrument est alimenté par une Haute Tension. Cette alimentation est capable de fournir des tensions de 7 KV en pointe avec un faible courant (moins de 50 microamperes) et des tensions continues de l'ordre de 1.8 KV a des courants modérés (5 a 6 milliamperes). Le non-respect des indications portées sur les étiquettes décrites ci-apres peut entrainer des blessures ou la mort.

Etiquettes de sécurité laser





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Avertissement

Cet instrument contient un laser HeNe de Classe 1.* Il possede une cavité interne qui n'a aucune puissance de sortie transmise, et qui produit une énergie résonnante de haute densité (Q) inaccessible a l'utilisateur. Comme regle de précaution générale, éviter toute exposition a la lumiere laser diffractée ou réfléchie lors des opérations de maintenance sur le systeme optique. L'usage de moyens ou procédures, ou la pratique de certains réglages autres que ceux prévus dans ce manuel peuvent entrainer des risques d'exposition aux radiations laser.

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Diese Ausdrucke haben in diesem Handbuch besondere Bedeutungen:

WARNUNG: Bei Gefahr von Personenschaden

ACHTUNG: Bei Gefahr von Sachbeschadigungen

HINWEIS: Allgemeine wichtige Informationen

Warnschilder

Die, an dem Gerat angebrachten Warnschilder haben folgende Bedeutungen:

Symbol	Gefahrenart	Referenz im Handbuch
	**Feuergefahr**	**Seite xvii**
	**Achtung Hochspannung**	**Seite xvi**
	**Statisch empfindliche Bauteile**	**Seite xvii**

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ACHTUNG

Allgemeine Gebrauchshinweise

Das Gerat entspricht den Bestimmungen EN61010-1/IEC1010-1 fur tragbare Gerate der Klasse 1 und ist bestimmt fur den Einsatz in einer Umgebung mit einem Verschmutzungsgrad 2. Es ist fur eine Stromversorgung der Kategorie 2 ausgelegt.

Gerat vor eindringender Flussigkeit, wie zum Beispiel Regen, Schnee usw.schutzen. Bei einem Standortwechsel (z.B. von kalt nach warm) muB sich die Temperatur des Gerates vor einem AnschluB an die Stromversorgung erst stabilisieren, um die Bildung von Kondensat zu vermeiden. Die in Kapitel 2 definierten Umgebungsbedingungen sind fur den Betrieb des Gerates zu beachten.

Das Produkt ist nicht fur den Gebrauch in einer gefahrlichen Umgebung geeignet. Bei sicherheitsrelevanten Anwendungen muB das Gerat durch eine zustandige Person zugelassen und genehmigt werden.

WARNUNG

Elektrische Risiken

Wechselspannung

GemaB den IEC Sicherheitsbestimmungen Klasse 1 ist das Gerat mit einem Sicherheitserdleiter ausgerustet. Stromkabel immer uber einen Stecker mit Erdungsschutz an die Stromversorgung anschlieBen.

Der Wechselstromfilter enthalt Kondensatoren, die nach Trennen des Gerates von der Stromversorgung noch unter Spannung stehen konnen. Obwohl die gespeicherte Energie innerhalb der Sicherheitsbestimmungen liegt, kann es zu einem leichten elektrischen Schlag kommen, wenn die Steckerkontakte unmittelbar nach Herausziehen des Steckers beruhrt werden.

Sicherungen

Die Wechselstromsicherungen sind mit den spannungsfuhrenden (braunen) and neutralen (blauen) Adern des Stromkabels in Serie geschaltet. Siehe Tabelle 2-1, Abschnitt 2 bzgl. der korrekten Sicherungen.

Entfernen der Sicherheitsabdeckungen

Vor Entfernen der Sicherheitsabdeckungen Gerat von der Stromversorgung trennen, um einen Kontakt mit Hochspannungsteilen zu vermeiden. MuB die Stromversorgung bei Einstellungen oder Wartungsarbeiten eingeschaltet bleiben, sind diese Arbeiten nur von einer eingewiesenen, geschulten Person durchzufuhren, die sich des Risikos bewuBt ist.

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WARNUNG

Feuerrisiken

Sicherungen nur durch Sicherungen des gleichen Typs mit der gleichen Leistung ersetzen (siehe Tabelle 2-1 dieses Abschnitts 2).

WARNUNG

Gefahr durch Giftstoffe

Einige der Baugruppen des Gerates enthalten Harze und andere Materialien, bei deren Entzundung giftige Dampfe frei werden. Bei der Entsorgung dieser Baugruppen sind entsprechende VorsichtsmaBnahmen zu treffen.

WARNUNG

Lithium

Bei den Batterien des nicht-fluchtigen Speichers wird Lithium eingesetzt. UnsachgemaBe Handhabung kann zu Gesundheitsschaden fuhren. Die ortlichen Bestimmungen bzgl. der Handhabung und Entsorgung dieser Batterien sind zu beachten.

WARNUNG

Nickel-Cadmium

Die Batterien des nicht-fluchtigen Speichers enthalten Nickel-Cadmium. UnsachgemaBe Handhabung kann zu Gesundheitsschaden fuhren. Die ortlichen Bestimmungen bzgl. der Handhabung und Entsorgung dieser Batterien sind zu beachten.

ACHTUNG

Statisch empfindliche Bauteile

Das Gerat enthalt statisch empfindliche Bauteile, die durch unsachgemaBe Handhabung beschadigt werden konnen. Die Anweisungen in dem Wartungshandbuch sind zu beachten.

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WARNUNG Der HeNe-Laser in diesem Gerat steht unter Hochspannung. Bei niedrigem Strom (unter 50 Mikroampere) konnen Spitzenspannungen bis zu kV entstehen, bei mittlerem Strom (5-6 Milliampere) Dauerspannungen von 1,8 kV. Die nachstehenden Warnschilder sind unbedingt zu beachten, um Personenschaden oder sogar todliche Verletzungen zu vermeiden.

Laserschilder





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WARNUNG

Das Gerat ist ein Laser der Klasse 1*. Es hat einen internen HeNe Laser, der keine Ausgangsleitung erzeugt, jedoch eine Energiedichte mit hoher Resonanz (Q), die fur den Bediener nicht zuganglich ist. Bei Wartung des optischen Systems nicht in den hellen oder gestreuten Laserstrahl schauen. Werden Einstellungen vorgenommen oder Verfahren eingesetzt, die nicht in dieser Bedienungsanleitung beschrieben sind, kann es zu gefahrlicher Strahlung kommen.

*** Nationales Zentrum fur Gesundheit und Strahlensicherheit (ehemals BRH).**

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Qusti termini hanno significati precisi in questo manuale:

ATTENZIONE: informazione per prevenire pericoli personali

AVVERTENZA: informazione per prevenire danneggiamenti agli strumenti

NOTA: informazione generale importante

Simboli di pericolo

Il significato dei simboli di pericolo che appaiono sugli strumenti il seguente:

Simbolo	Natura del pericolo	Riferimento nel anuale
	**Pericolo di incendio**	**Pagina xxiii**
	**Tensione Pericolosa**	**Pagina xxii**
	**Componenti sensibili a campi elettrostatici**	**Pagina xxiv**

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AVVERTENZE

Condizioni Generali per lutilizzo

Questo strumento e progettato per soddisfare le richieste delle norme UNI EN 61010-1 relative alla classe I degli strumenti pertatili e per essere usati in classe 2 del grado di inquinamento L' apparecchio e progettato per funzionare nella categoria di installazione (categoria di sovratensione) II

L' apparecchio dovrebbe essere protetto contro l' ingresso di liquidi e contro le precipitazioni come quelle della pioggia, della neve ecc. Quando lo strumento viene spostato da un ambientefreddo ad uno caldo e importante permettere alla temperatura dello strumento di equilibrarsi prima di alimentarlo per evitare che si formi condensa. Lo strumento deve operare solamente all' interno delle condizioni ambientali specificate nel capitolo 3.

Questo prodotto non pu essere utilizzato in ambiente pericoloso. Se lo strumento deve essere usato in condizioni di sicurezza ambientale, deve essere valutata l opprtunit del suo utilizzo mediante una persona esperta

ATTENZIONE

Pericoli elettrici

Corrente alternata

Questo apparecchio e conforme alla classe 1 delle norme di sicurezza IEC ci significa che e fornito di terra di protezione. Per mantenere questa protezione il cavo di alimentazione dello strumento deve essere collegato alla presa di corrente con connessione a terra.

Il filtro di alimentazione AC contiene condensatori che possono rimanere carichi anche dopo che lo strumento viene sconnesso dalla rete. Sebbene l' energia immagazzinata e dentro i valori di sicurezza stabiliti, pu essere avvertita una scarica elettrica se vengono toccati i capi della spina di alimentazione subito dopo averli staccati.

ATTENZIONE

Fusibili

I fusibili di alimentazione AC sono in serie alla fase (marrone) e al neutro (blu) della linea di alimentazione. Riferirsi alla tabella 2-1 della sezione 2 per la selezione corretta dei fusibili

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ATTENZIONE:

Rimozione dei coperchi dell apparecchio

Staccare l' alimentazione prima di rimuovere i coperchi per evitare il rischio di esposizione alle parti sotto tensione. Se devono essere effettuate operazioni di servizio o calibrazioni interne all' apparecchio per cui e richiesta l' alimentazione AC, queste devono essere effettuate da persone specializzate e consapevoli del pericolo

ATTENZIONE

Pericolo di incendio

Assicurarsi che i fusibili utilizzati per la sostituzione siano dello stesso tipo e abbiano gli stessi dati di targa. Rif. tavola 2-1 della sezione 2

ATTENZIONE

Pericolo di intossicazione

Alcuni componenti utilizzati in questa apparecchiatura possono includere resine o altri materiali che, se bruciati, emettono fumi tossici. Prendere le opportune precauzioni per lo smaltimento di questi prodotti.

ATTENZIONE

Litio

Il litio e utilizzato nella costruzione delle batterie che vengono montate nell apparecchio per mantenere i dati in memoria.Questo materiale, se non viene maneggiato correttamente, puo causare danni alla salute. Fare riferimento ai regolamenti locali per lo smaltimentodi queste batterie.

ATTENZIONE

NICAD

NICAD (nickel cadmio) e utilizzato nella costruzione delle batterie che vengono montate nell' apparecchio per mantenere i dati in memoria. Questo materiale se non viene maneggiato correttamente puo causare danni alla salute. Fare riferimento ai regolamenti locali per lo smaltimento di queste batterie.

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AVVERTENZA

Componenti sensibili al campo elettrostatico

Questo apparecchio contiene componenti sensibili al campo elettrostatico che si possono danneggiare durante la manipolazione. Fare riferimento al manuale di servizio dello strumento per manipolare in modo appropriato questi componenti

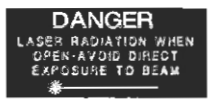
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ATTENZIONE

Il laser HeNe montato in questo strumento e alimentato con alta tensione. La tensione di alimentazione del laser puo raggiungere picchi di 7KV con bassa corrente (intorno a 50 microampers) e un valore di esercizio di 1,8 KV a corrente moderata (5-6 milliampers). Non osservare le precauzioni scritte nelle seguenti etichette puo rivelarsi un danno o provocare un fatale incidente alla persona.

Etichetta del Laser





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ATTENZIONE

Questo strumento e nella classe 1 dei prodotti laser* . Esso fornito di una cavit laser interna HeNe che non trasmette potenza in uscita, ma sviluppa un alto fattore (Q) di energia risonante non accessibile all' utilizzatore. Come generale misura precauzionale, evitare l' esposizione ai raggi laser dispersi e alle scariche luminose quando si fa manutenzione o assistenza al banco ottico. Fare controlli o calibrazioni e seguire procedure diverse da quelle specificate in questo manuale, pu provocare esposizione a radiazioni pericolose.

*** Questo secondo il Centro Nazionale per dispositivi e applicazione di cure basate sulle radiazioni (formalmente BRH)**

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Deze aanduidingen hebben elk een specifieke betekenis in deze handleiding:

WAARSCHUWING: informatie om te beschermen tegen persoonlijke verwondingen

VOORZICHTIG: informatie om schade aan het toestel te voorkomen

NOTA: belangrijke algemene informatie

Gevarensymbolen

Betekenis van de gevarensymbolen welke op de toestellen vermeld worden :

Symbool	Aard van het gevaar	Referentie
	**Brandgevaar**	**Pagina xxix**
	**Gevaarlijke spanning**	**Pagina xxviii**
	**Statisch gevoelige componenten**	**Pagina xxx**

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VOORZICHTIG

Algemene gebruiksaanwijzingen

Dit instrument voldoet aan de eisen van EN61010-1/IEC1010-1, aan Klasse 1 voor draagbare apparatuur en kan gebruikt worden in een omgeving met vervuilingsgraad 2. Het toestel werd ontworpen om te werken op de voeding van een installatie categorie 2.

Het toestel moet beschermd worden tegen insijpeling van vloeistoffen en precipitatie van regen, sneeuw, enz.... Indien het toestel verplaatst wordt van een koude omgeving naar een warmere omgeving, is het belangrijk om de temperatuur van het apparaat eerst te laten stabiliseren, voor men het opnieuw aansluit op het net, om condensatie te voorkomen. Het toestel mag enkel gebruikt worden volgens de milieucondities bepaald in hoofdstuk 3.

Dit produkt werd niet goedgekeurd voor gebruik in gevaarlijke omgevingen.Indien het toestel toch gebruikt moet worden in een te beveiligen toepassing, dan moet de geschiktheid van het toestel ingeschat en goedgekeurd worden door een competent persoon.

WAARSCHUWING

Elektrische gevaren

AC voedingsspanning

Dit toestel voldoet aan de eisen van IEC Veiligheidsklasse 1, wat betekent dat het voorzien is van een geaarde stekker. Om deze bescherming te kunnen handhaven moet het netsnoer steeds aangesloten worden op een netvoeding via een stopcontact met aardingspin.

Het AC voedingsfilter bevat condensatoren die nog geladen kunnen zijn nadat het toestel werd uitgeschakeld. Hoewel de opgeslagen energie binnen de veiligheidseisen valt, kan een lichte elektrische schok ervaren worden wanneer de stekkerpinnen aangeraakt worden onmiddellijk nadat de verbinding met het net werd verbroken.

Zekeringen

De AC voedingszekeringen staan in serie met zowel de geladen (bruine) als met de neutrale (blauwe) geleiders van het netsnoer. Zie tabel 2-1 in sectie 2 voor correcte keuze van de zekeringen.

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WAARSCHUWING

Verwijderen van de afdekkap

Verwijder de stekker uit het stopcontact voor u de kap van het toestel verwijdert om gevaar van blootstelling aan onderdelen op hoge spanning uit te sluiten. Alle interne afstellingen of reparaties die moeten worden uitgevoerd terwijl het toestel op het net is aangesloten, mogen enkel uitgevoerd worden door opgeleide personen die zich bewust zijn van het gevaar.

WAARSCHUWING

Brandgevaar

Vergewis u ervan dat u enkel zekeringen vervangt van het correcte type. Zie hiervoor tabel 2-1 in sectie 2.

WAARSCHUWING

Toxisch gevaar

Bepaalde componenten die in het toestel gebruikt werden, kunnen harsen en andere materialen bevatten die bij verbranding toxische gassen afgeven. Neem daarom de nodige voorzorgen bij de afvalverwijdering van deze elementen.

WAARSCHUWING

Lithium

Lithium wordt gebruikt bij de vervaardiging van de niet-vluchtige data back-up batterijen. Bij onoordeelkundig gebruik kan dit materiaal een gevaar zijn voor de gezondheid. Raadpleeg de locale reglementeringen om de batterijen als afval te verwijderen.

WAARSCHUWING

NiCad

NiCad (nikkel cadmium) wordt gebruikt bij de vervaardiging van de niet-vluchtige data back-up batterijen. Bij onoordeelkundig gebruik kan dit materiaal een gevaar zijn voor de gezondheid. Raadpleeg de locale reglementeringen om de batterijen als afval te verwijderen.

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VOORZICHTIG

Statisch gevoelige componenten

Dit toestel bevat statisch gevoelige componenten. Raadpleeg de onderhouds- en reparatiehandleiding voor correcte behandeling van deze gevoelige componenten.

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WAARSCHUWING De HeNe laser in dit instrument wordt gevoed door een hoogspanningsvoeding. De laservoedingsspanning is geschikt voor piekspanningen van 7 kV bij lage stromen (kleiner dan 50 A) en continue spanningen van 1.8 kV bij gemiddelde stromen (5-6 mA). Negeren van volgende waarschuwingslabels kan ernstige persoonlijke verwondingen veroorzaken of de dood tot gevolg hebben.

Laser Labels





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WAARSCHUWING

Dit toestel is een Klasse I laser produkt.* Het heeft een interne HeNe laser caviteit welke geen overgebrachte uitgangsvoeding heeft, maar ontwikkelt een hoge resonante energiedichtheid (Q) ontoegankelijk voor de gebruiker. Als een algemene veiligheidsvoorzorg dient blootstelling aan heldere ontladingen of verstrooide laser radiatie bij onderhoud en reparatie van het optisch systeem, vermeden te worden. Controles of instellingen, vermogens of procedures andere dan deze gespecifieerd in deze handleiding kunnen gevaarlijke radiatiestralingen veroorzaken.

*** National Center for Device and Radiological Health (formerly BRH)**

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Introduction

The Local Area Network Node, PMS Model LAN Node 200, allows large facility monitoring systems to be implemented with a minimum amount of wiring and labor. The LAN Node 200 is a small intelligent controller. It connects eight channels of frequency information (usually two LPS-A sensors) and up to 16 analog inputs (usually environmental sensors) to a PMS Facility Monitoring System. Refer to Figure 1-1. It has the ability to share the same physical FMS communication port and wiring with as many as 15 LAN Nodes which simplifies installation.

The LAN Node 200 has two asychronous serial ports: one conforming to RS-232 specifications and one meeting the RS-485 multi-drop standard.

When operated as a node on the PMS local-area-network, it can buffer up to 40 data reports for transmission to the network controller.

A real-time clock stamps the data with time and date. This clock must be set each time power is turned on as battery-powered time keeping is not provided. FMS software does this automatically.

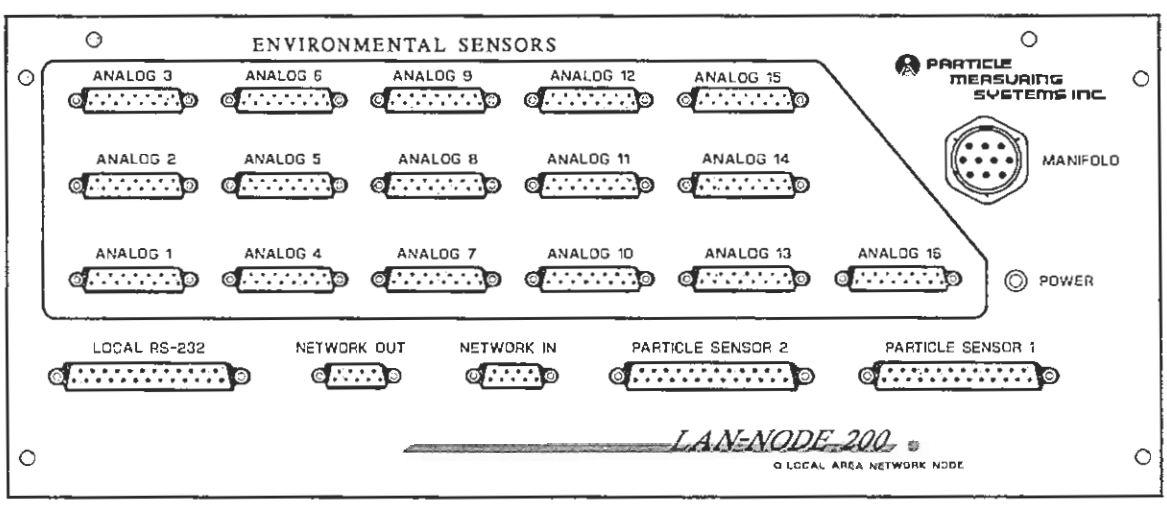


Figure 1-1. Connector Panel

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Installation

Planning the Installation

The preferred orientation of the LAN Node 200 is with the pre-drilled back panel mounted on a wall or other vertical surface (see Figure 2-1). This orientation allows all sensor wires to hang straight down from the connector panel. This arrangement also permits greater ease in arranging the wires neatly.

When choosing the mounting location, avoid interference with existing or proposed cleanroom equipment. Install the LAN Node 200 (and all other FMS equipment and cabling) as far as practical from any cleanroom equipment that generates powerful electromagnetic fields. Be sure that all FMS sensor and aerosol manifold cables can reach their connectors without straining the wires. Refer to AM 12/24/30 Installation and Service Manual.

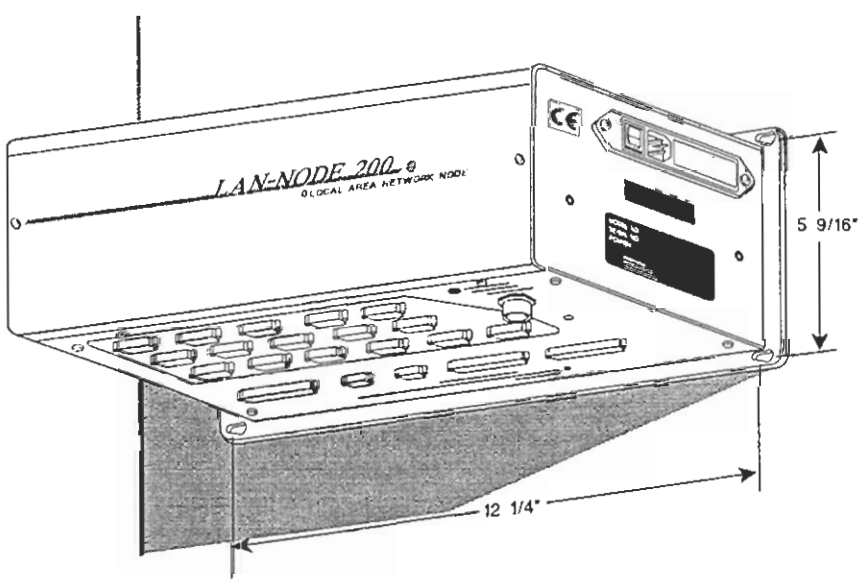


Figure 2-1. Installed LAN Node 200

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Installing the LAN Node 200

To mount the LAN Node 200 and connect the sensors and power, follow this procedure. All referenced Wiring Diagrams are located in Chapter 7.

1. Mount the LAN Node 200 using the mounting holes on the back panel and appropriate fasteners (# 10 screws).

2. Group all of the sensor wires together.

3. Connect frequency input instruments such as an LPS-A to Particle Sensor #1 and Particle Sensor #2 as needed. Refer to WD-986.

4. If using a local RS-232 device, connect it to Local RS-232. Refer to WD-987.

5. The Network In port can be used to convert an RS-232 instrument to an RS-485 by connecting it to pins 7 and 8 and connecting Pin 9 to DSR of the instrument. Refer to WD-988. It can be connected to an RS-485 device by not connecting DSR.

6. The Network Out connector is used to daisy-chain the RS-485 to another device.

7. The LAN Node 200 can be used with a variety of analog and/or environmental sensors. Three basic types of sensors can be used:

   4-20 mA, two-wire grounded
   4-20 mA, isolated ground
   0-5 VDC, grounded

   Refer to the examples in Figures 2-2, 2-3 and 2-4.

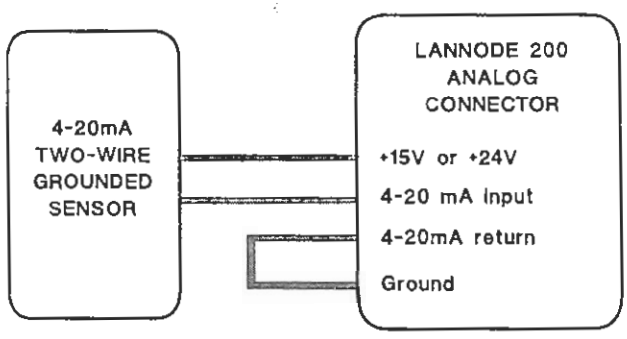


Figure 2-2. 4-20 mA Two-Wire, Grounded Sensor

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For any device using 4-20 mA, the 4-20 mA return pin must be connected to the sensor or jumpered to ground on the LAN Node 200. If the LAN Node 200 supplies power (+15 VDC or +24 VDC) to a two-wire 4-20 mA sensor, the 4-20 mA return must be grounded (refer to Figure 2-2). Otherwise, the return pin must be tied directly to the sensor (refer to Figure 2-3).

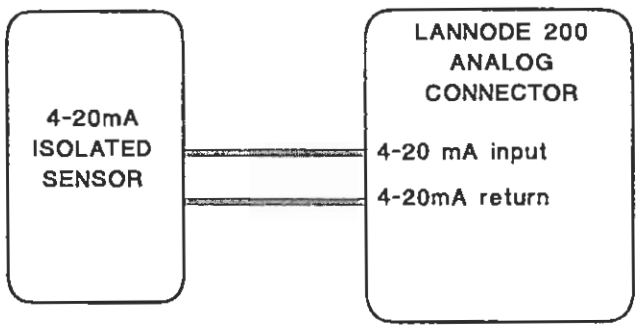


Figure 2-3. 4-20 mA Isolated Sensor

0-5 VDC sensors can also be used with the LAN Node 200 if they can tolerate a common ground. In order to use a 0-5 VDC instrument, the jumper corresponding to the sensor number must be removed from the PCB 1208 board, because it uses part of the same circuitry that the 4-20 mA sensor uses. Refer to Chapter 2 section on Converting from 4-20 mA to 0-5 VDC.

WARNING

Never connect a 4-20 mA sensor and a 0-5 VDC sensor to the same number.

Figure 2-4. 0-5 VDC Input Sensor

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The pinouts of the analog connectors are given in WD-989. The odd numbered sensors are different from the even-numbered sensors to accommodate an often used Temperature, Relative Humidity (TRH) environmental sensor. If a two output device such as a TRH is connected, only the odd numbered connectors may be used (i.e., 1, 3, 5). Refer to WD-989. Each **even** numbered sensor (i.e., 2, 4, 6) is a duplicate input for the second 4-20 mA input on the previous **odd** connector. If single-output devices are used, they can be connected to all 16 connectors using the same cable configuration. Refer to WD-989.

8. Label each cable's sensor designation.

9. Test the cable for shorts and continuity.

10. Test the AC power source for correct polarity and ground integrity.

    The LAN Node 200 power requirements have been configured according to the customer purchase order. Unless otherwise ordered, the power requirements are 120 VAC, three wire (grounded) at two amperes. Otherwise, the power requirements are specified on the LAN Node 200 warning label. The LAN Node 200 can be reconfigured for other AC input (refer to Changing Voltage Selector Settings).

11. If an aerosol manifold is to be connected to the LAN Node 200, plug the appropriate connector into the socket labeled Manifold.

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Changing Voltage Selector Settings

WARNING

The LAN Node 200 is pre-configured per customer order and should not have to be changed, but if it needs to be connected to a different voltage use the following procedure:

1. Remove the power cord from the power entry module.
2. Carefully pry out the fuse holder assembly.
3. Remove the voltage selector board.
4. Move the white plastic pointer around until it is on the side of the selector board for the correct voltage. The plastic pointer should seat into the plate. Refer to Figure 2-5.
5. Reinstall the selector board.

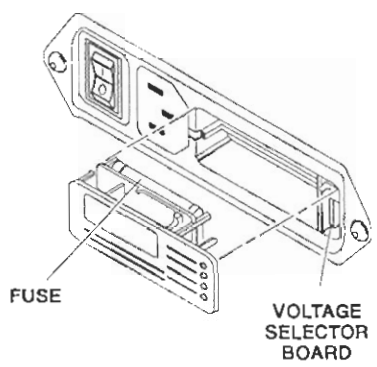


Figure 2-5. Power Entry Module

6. Change the fuse(s) per Table 2-1. Fuse Chart.
7. Reinstall the fuse holder assembly.
8. Make sure the plastic pointer is indicating the correct voltage.

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Table 2-1. Fuse Chart

Voltage	Fuse	Quantity	Type
100 VAC	2.5 A	2	5 x 20 mm Slo-Blo
115 VAC	2.5 A	1	3AG Slo-Blo
220 VAC	1.25 A	2	5 x 20 mm Slo-Blo
240 VAC	1.25 A	2	5 x 20 mm Slo- Blo

Opening the LAN Node 200

WARNING

The LAN Node 200 is usually internally configured specifically for the customer. The LAN Node 200 case would need to be opened only if changing the node address, changing the baud rates or converting from 4-20 mA to 0-5 VDC inputs for analog sensors. If this is necessary use the following procedure:

1. Remove six screws holding the connector panel (refer to Figure 2-6).
2. Carefully angle the connector panel and move it away from the main assembly.

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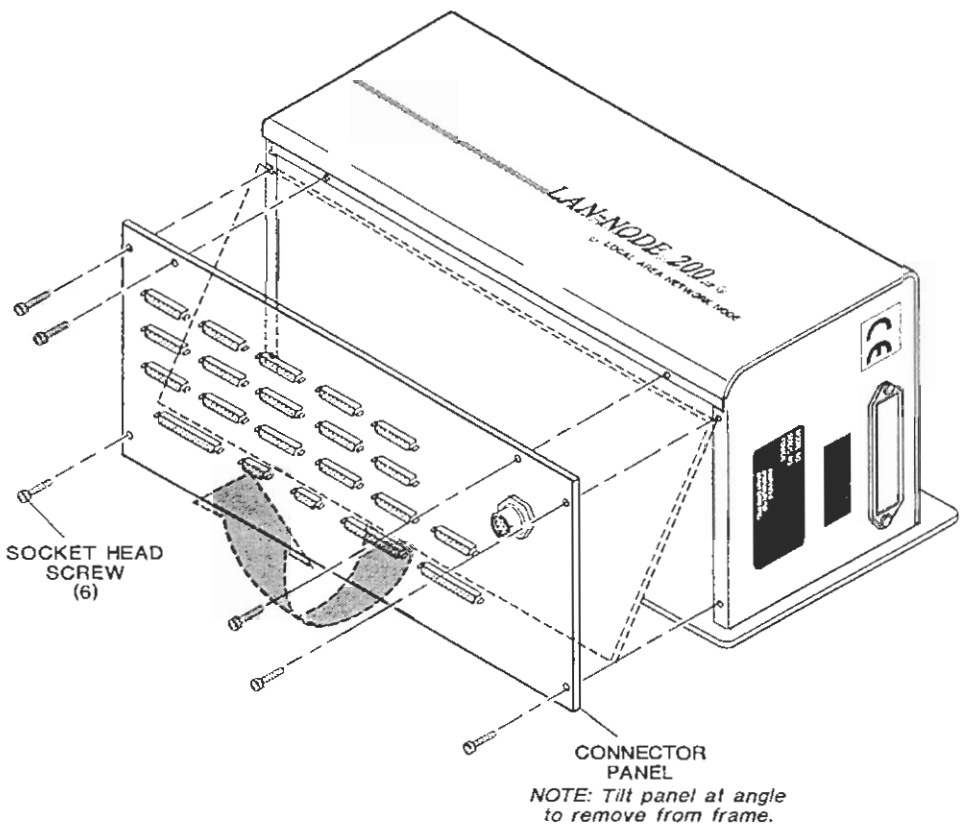


Figure 2-6. Removing Screws from the Connector Panel

The PCB 1431 board is mounted on the connector panel of the LAN Node 200. The PCB 1212 board is on the main assembly. Refer to Figure 2-7.

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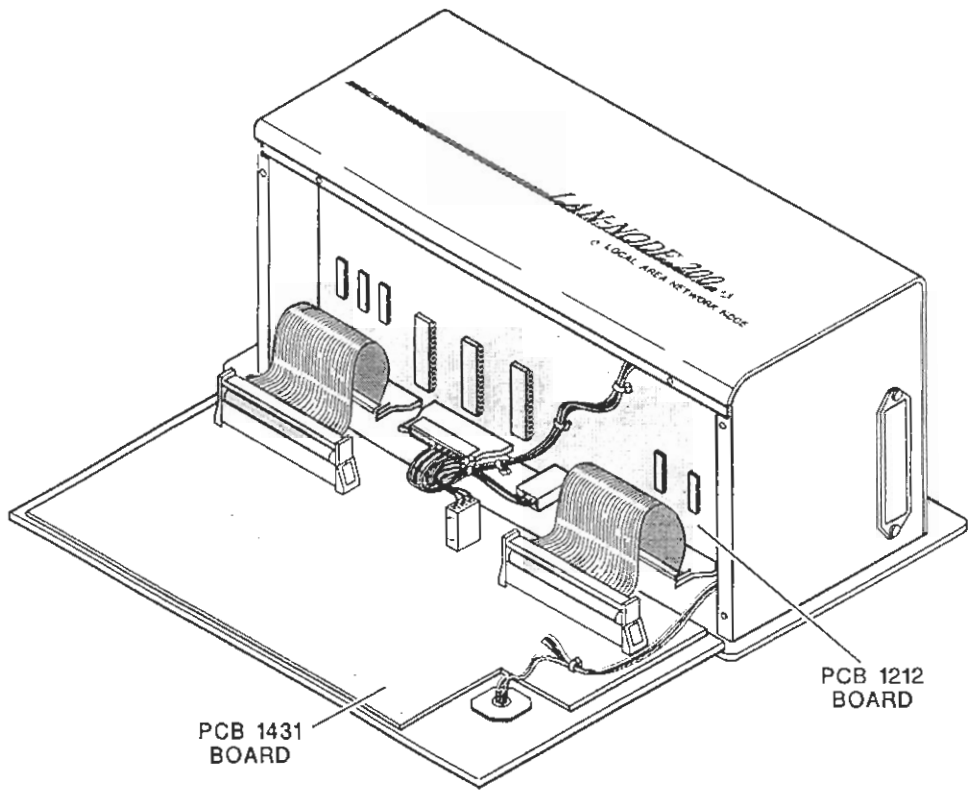


Figure 2-7. Locating the PCB 1212 and the PCB 1431

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Changing the Node Address or Baud Rate

Addressing and baud rate are changed on the PCB 1212 board. Four Binary Coded Decimal (BCD) switches, SW1-SW4 are used to change the addressing and baud rate. Refer to Figure 2-8.

Switch Settings

The LAN Node 200 uses the PCB 1212 digital board. The baud rates for the network and the Local serial port (RS-232) are set by SW1.



Figure 2-8. Example of SW1 - SW4

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SW1 is set as follows:

SW1	Network Baud	Local Baud	Uses Extensions
4	9600	9600	Yes (Default)
5	9600	1200	Yes
6	4800	9600	Yes
7	4800	1200	Yes

SW2 is for factory use and should not be changed. The NODE address is set by SW3 and SW4, not by the LOCAL port. NODE addresses are from 1 to 99. SW3 is the most significant digit of the address; SW4 is the least significant digit.

Converting from 4-20 mA to 0-5 VDC

Unless specified at the time of purchase, all analog inputs are 4-20 mA. However, the inputs can be individually changed to 0-5 VDC inputs by the following:

1. Determine which input # needs to be 0-5 VDC.

2. With a jumper installed, the LAN Node 200 uses a 4-20 mA input. With the jumper removed, the LAN Node 200 uses 0-5 VDC input. Locate and carefully cut the appropriate jumpers on the PCB 1208.

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Specifications

Frequency Inputs (LPS)	Eight channels of pulse input with a maximum rate of 5 kHz. Signals must be differential.
Analog Environmental Sensors Inputs	Sixteen channels of analog input having a maximum of 5 V, in voltage mode, or a maximum of 20 mA when in current mode. When used in current mode the source must be capable of driving a load of 75 ohms.
Status Inputs	4 channels of differential status inputs. These inputs are typically used for laser reference information.
Analog Conversion Accuracy	Resolution - 0.1% full scale Absolute Accuracy including non-linearity, hysteresis and repeatability - 0.5% full scale
Manifold Control	Control for either a PMS AM-12, AM-24, or an AM-30 manifold.
Serial Communication	One channel of RS-232 One channel of RS-485 with multi-drop capability
Sample Interval	Selectable by commands sent across the RS-232 or RS-485 communication interfaces Minimum sample interval is 18 seconds plus 2 second delay
Power	100/115 VAC, 2.5 A 220/240 VAC, 1.25 A

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Dimensions	14 in. x 6 in. x 7 in.
Weight	13.5 lbs
Environment	Temperature: Operation 0 to 40° C Storage -20 to + 70°C Altitude: 0 - 2000 meters Humidity: 0 - 95% noncondensing

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Analog Sensor Connection

Introduction

Particle Measuring Systems offers three analog environmental sensors which can be connected to the LAN Node: the TRH-C temperature and relative humidity sensor, the DAP-C differential pressure sensor and the AFV-C air velocity sensor. The sensors and the LAN Node 200 are connected via twisted pair, shielded wires. The sensor end of the interconnection cable uses a DE-9S which mates with the sensor's DE-9P connector. The LAN Node 200 end of the cable uses a DA-15P connector which plugs into the DA-15S on the LAN Node 200's front panel. Diagrams in Chapter 7 show sensor-to-LAN Node 200 cable pinouts.

TRH-C Temperature/RH Sensor

The TRH-C sensor produces two 4 to 20 mA signals, one which is linearly proportional to the temperature at the sensor, and one which is linearly proportional to the relative humidity. The range of the temperature sensor is typically 0° to 100°F and the relative humidity is 0% to 100%. Each sensor requires 24 volts DC which is supplied by the LAN Node 200.

The LAN Node 200 accepts input from dual-signal sensors on the odd-numbered input connectors. The second signal of the pair is internally connected to a secondary input connector which is the next even numbered input. Plug the TRH-C into any one of the odd-numbered inputs.

Caution

If dual-signal sensors such as TRH-Cs are being used, do not plug another sensor into the corresponding secondary input connector.

For example, if a TRH-C is plugged into input connector #1 of a LAN Node 200, do not plug another sensor into input connector #2. Temperature sensor data will display in data report item 8 and relative humidity data will report in item 9.

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DAP-C Differential Pressure Sensor

The DAP-C sensor produces a 4 to 20 mA current which is proportional to the difference in pressure across the sensor's two ports. The LAN Node 200 supplies the sensor with 24 volts DC.

Plug the sensor into any LAN Node 200 input connector except one which is currently being used as a secondary input for a dual-signal sensor. Thus, if a dual-signal sensor was plugged into connector #1, the DAP-C could be plugged into any position except 1 or 2.

AFV-C Air Velocity Sensor

The AFV-C sensor produces a 4 to 20 mA current which is proportional to the air velocity flowing across the sensor. The LAN Node 200 supplies the sensor with 15 volts DC. The LAN Node 200 can power up to four air velocity sensors.

Plug the sensor into any LAN Node 200 input connector except one which is currently being used as a secondary input for a dual-signal sensor. Thus, if a dual-signal sensor was plugged into connector #1, the AFV-C could be plugged into any position except 1 or 2.

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Command Summary

Commands can be transmitted to the LAN Node 200 in two ways. They can be entered using the local RS-232 port, or they can be transmitted across the multi-drop RS-485 network. The formats of the commands and their associated responses are similar when transmitted through these two serial ports, but are not identical. Some commands that are available when using one port are not available on the other.

Local Control Port

The Local RS-232 Port is a DTE type RS-232 serial port operating at 1200 or 9600 baud. The rate is determined by switch settings on the PCB 1212 Board. The factory setting is 9600 baud. This port can be used as a setup and diagnostic port, and as a local operational port. In the latter mode much of the network protocol, unnecessary when only one LAN Node 200 is being used, is disabled.

Local Commands

Local Commands must be entered in lower case. Terminate a command with an ASCII carriage return character, (a line feed/carriage return pair is acceptable). There is no backspace character; if you make a mistake, issue a CR and try again.

In the following list of local commands, n represents an ASCII representation of a number. For example, the number 150 would be entered as three ASCII characters: "1", "5", "0".

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si n	Sets sample interval to n seconds
local	Directs data reports to the local port. These data reports are not buffered, but are automatically transmitted at the end of an interval.[1]
online	The opposite of local. Data reports will go to the network when requested.
ms abc...	Selects the manifold sampling sequence. The positions are identified by letters starting at 'a' and ending at either 'l', 'x', or '4' depending on the manifold type. Positions can be repeated in the sequence, and the sequence can be up to 79 positions long. When the sequence is exhausted, it repeats from the beginning. 'a-z' represents 1-26 and 1-4 represents 27-30.
sr	Software reset. Returns LAN Node 200 to power-up condition.
ss	Starts sampling.
dt nn nn nn nn nn nn	Sets the clock to the specified value. The numbers must be two digits long and specified from left to right: year, month, day, hour, minute, second (e.g., DT 87 01 02 03 04 05 sets the clock to January 2, 1987 at 03:04:05).
set_id abcd...	Sets the id string to the specified ASCII characters.
debug-ad n	Displays rapid updates of A/D converter channel n
debug - sw	Displays current position of the four rotary switches

[1] If the LAN Node 200 is connected to an FMS computer, when local mode is used for longer than one-half of a sample interval a software reset from FMS returns the LAN Node 200 to a power-up condition. Disconnect the network if local operation is desired for long periods.

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sw	Information about the switches
?	Listing of local port commands
status	Returns the machine status. Refer to Local Port Responses for more information.
dead_time n	Waits n seconds after selecting a new manifold position before starting to sample.
es	Ends the current sample.
ks	Ends the current sample, but does not display any data.
debug	Displays information useful in debugging a network on the local terminal.
nodebug	Turns off the debug mode.

The following commands do not take effect unless a manifold is connected. The LAN Node 200 must be able to test the manifold type to assure that the manifold will not be damaged by receiving commands for the incorrect type of manifold.

am24	The manifold attached to the LAN Node 200 is an AM-24.
am12	The manifold is an AM-12.
am30	The manifold is an AM-30.

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Local Port Responses

Normally the local port does not respond to commands. One exception is status, which returns a report similiar to this:

```
87/01/02 03:04:53
Software version = 4.30
Online
Id string = i am a lan node
Sample interval=12
dead time=2
Manifold type= AM12
manifold sequence= abcdefghijkl
network baud rate = 4800
Node address=2
Queued reports=-1
Sampling status = 0
```

At the end of a sample interval the following report is transmitted if the LAN Node 200 has been put into the local mode:

91/08/01 00:01:16

Sample Interval = 10.0 seconds.

Laser status for sensor 1 = 0	Aux status for sensor 1 = 0
Laser status for sensor 2 = 0	Aux status for sensor 2 = 0
Manifold Flow flag = 1	Manifold flow is bad or disconnected.

0: 0	1: 0	2: 0	3: 0
4: 0	5: 0	6: 0	7: 0

The following are scaled assuming 20 mA full-scale:

8: 4.00	9: 4.00	10: 4.00	11: 4.00
12: 4.00	13: 4.00	14: 4.00	15: 4.00
16: 4.00	17: 4.00	18: 4.00	19: 4.00
20: 4.00	21: 4.00	22: 4.00	23: 4.00

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Network Port

The network port allows up to 15 LAN Node 200s to be connected to a single RS-485 network. When operating in this mode, all nodes receive commands from the network controller on a common command pair. Nodes always listen to all commands, but respond only when the command is addressed specifically to them.

Network Protocol

Commands issued to a LAN Node 200 and responses received from a LAN Node 200 must conform to the following protocol:

Packeting:

The packeting scheme used by the LAN Node 200s adds address and checksum information to the message.

The following gives the format of the packeted data:

Address High Byte/Address Low Byte/First Data Byte/.../
Last Data Byte/Check Sum High Byte/Check Sum Low Byte
Address high byte and address low byte form a 16-bit number used to identify the LAN Node 200 involved in the data transfer. The check sum is an unsigned 16-bit summation of all data bytes and the address bytes. No special action is taken on overflow. The data need not be printable ASCII.

Conditioning: In order to minimize difficulties when the network includes devices such as modems, all bytes are converted to printable ASCII characters after the packet is formed, but before the packet is transmitted. The following table describes the transformation.

Condition	**Character(s) Transmitted**
byte <32	123, byte +32 (123 = {)
123<=byte<128	124, byte -91 (124=vertical bar)
128<=byte<192	125, byte -96 (125 = })
192<=byte	126, byte -160 (126 = ~)
Otherwise	Byte

Packet Delimiters:

After conditioning, the packet is prefaced with an ASCII STX and is followed with an ASCII ETX (STX = 2, ETX = 3).

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Network Port Electrical

The LAN Node 200 Network Port complies fully with the specifications of the EIA RS-485 standard.

Network Commands

These commands can be transmitted to the LAN Node 200 using the RS-485 port. They must be processed as described in the Network Protocol section before transmission. The following is a list of commands for the data portion of the packet and the response returned by the LAN Node 200. All commands generate a response.

Command	Response	Description
CSI n	RSI	n = sample interval
CAM12	RAM12	Set manifold type to AM12
CAM24	RAM24	Set manifold type to AM24
CAM30	RAM30	Set manifold type to AM30
CMS abc...	RMS	Define manifold sequence
CSS	RSS	Start sampling
CSR	RSR	Software reset
CDEAD_TIME n	RDEAD_TIME	n = manifold dead time
CES	RES	End sample; results are transmitted
CKS	RKS	Kill sample; results are discarded
CFQ	RFQ	Delete all untransmitted data reports
CQC	RQC n	Transmits number of untransmitted reports
CTD	(see Table 6-1)	Transmits data
CPQ	RPQ	POP Queue - acknowledge receipt of last data report
CDT YY MM DD HH MM SS	RD	Set date and time
CVER	RVER ver date	Get firmware version and date
CBID	RBID board	Get board Id

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Report Format

After the NODE has been sampling for the period of time specified by the sample interval command, or after an ES command has been received, the following report is produced. In the following the underscore character indicates one or more spaces and n indicates a string of ASCII characters representing a number. The report is begun with an ASCII STX character and is ended with an ASCII ETX character.

Table 6-1. Report Format

RTD TI 14:29:05 DA 1995/10/04	Time of data packet Date of data packet
NC 24(CR)(LF)	Number of channels is always 24
SI n.n(CR)(LF)	Actual length of sample in seconds
LO x x(CR)(LF)	Primary and secondary Laser status for sensor 0. x is 0 if the laser reference voltage is low. If the laser reference is ok, x is 1
L1 x x(CR)(LF)	Primary and secondary Laser status for sensor 1
MF	Manifold flow indication
MN x(CR)(LF)	Current manifold position. X is an upper case alphabetic character starting with "A". If there is an error with the manifold, or no manifold is installed, X is a "?"
VI	Version number

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Table 6-1. Report Format - Continued

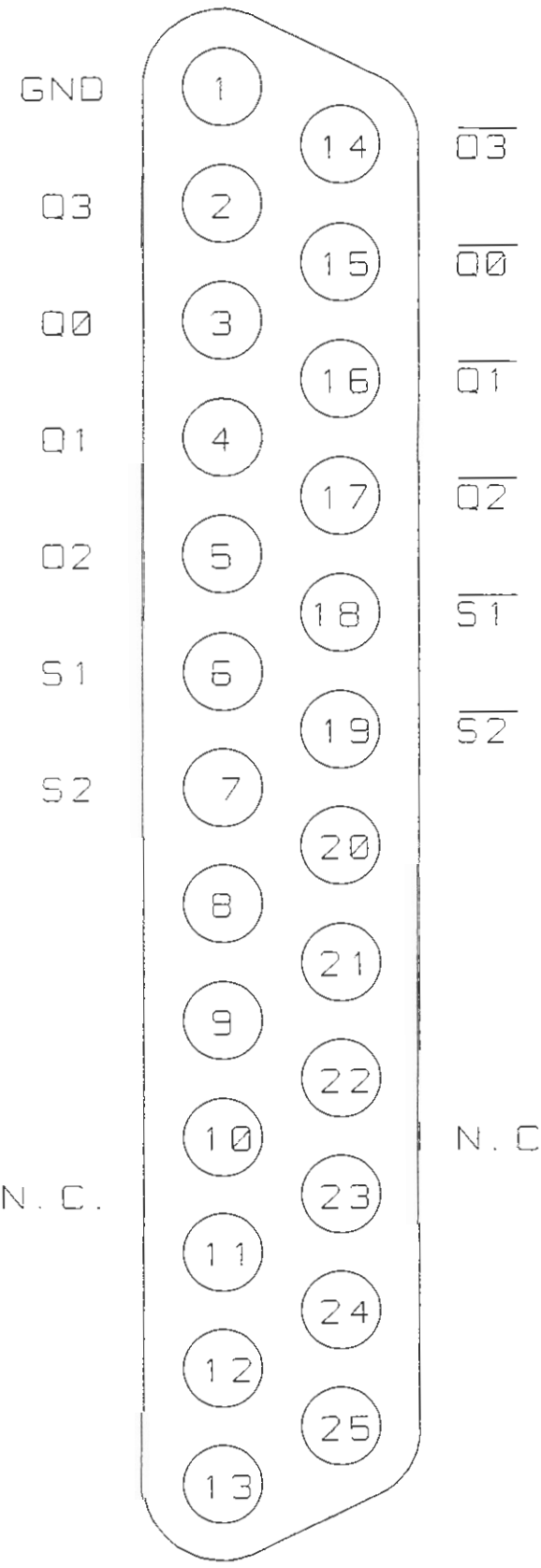
0 n(CR)(LF)	Particle counts for first channel.
	.
	.
	.
7 n(CR)(LF)	Particle counts for 8th channel.
8 n.n(CR)(LF)	Voltage in 1st analog channel.
	.
	.
	.
23 n.n(CR)(LF)	Voltage in 16th analog channel.

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Wiring Diagrams

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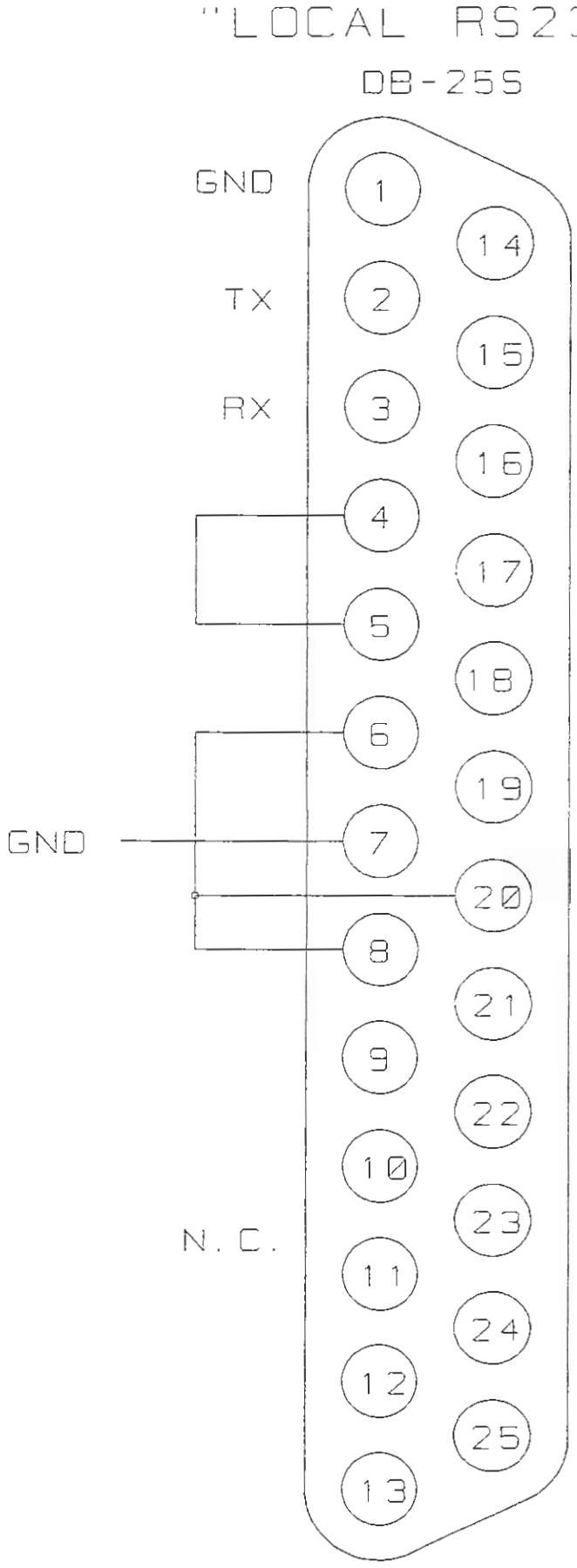
PARTICLE SENSOR #1, #2



PARTICLE MEASURING SYSTEMS INC. 1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100			
LAN-NODE 200 *PARTICLE SENSOR #1, #2* PINOUT DIAGRAM			
DATE 4-15-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-986		SLOT NUMBER	JOB NUMBER

WR # 842
4-15-92

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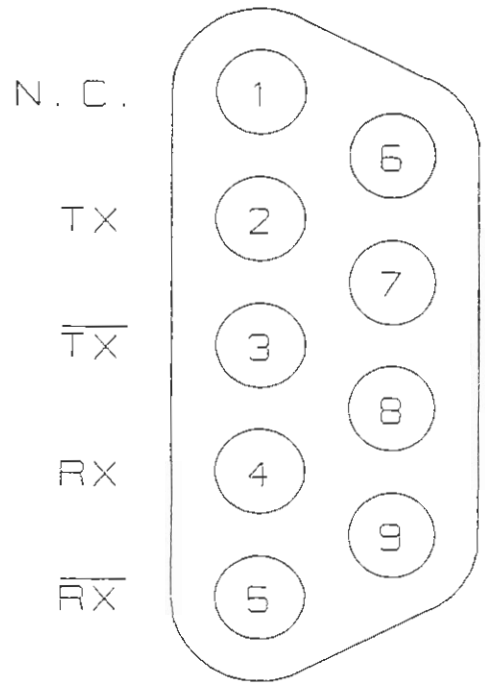


PARTICLE MEASURING SYSTEMS INC 1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100				
LAN-NODE 200 "LOCAL RS-232" PINOUT DIAGRAM				
DATE 4-15-92	REVISED	DRAWN BY MGC	APPROVED BY MTS	
DRAWING NUMBER WD-987		SLOT NUMBER	JOB NUMBER	

WR # 842
4-15-92

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"NETWORK" IN
DE-9S



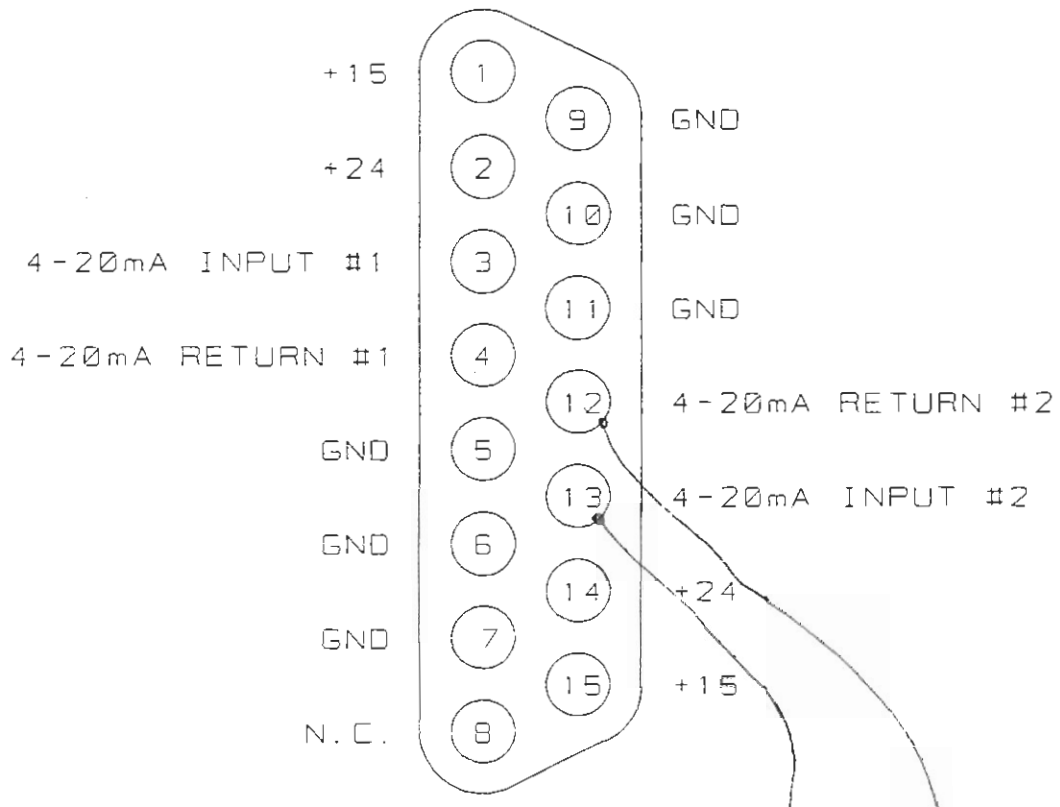
PARTICLE MEASURING SYSTEMS INC.	LAN-NODE 200 "NETWORK" IN/OUT PINOUT DIAGRAM
1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100	
DATE 4-15-92	REVISED
DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-988	SLOT NUMBER
JOB NUMBER	

"NETWORK" OUT
DE-9P

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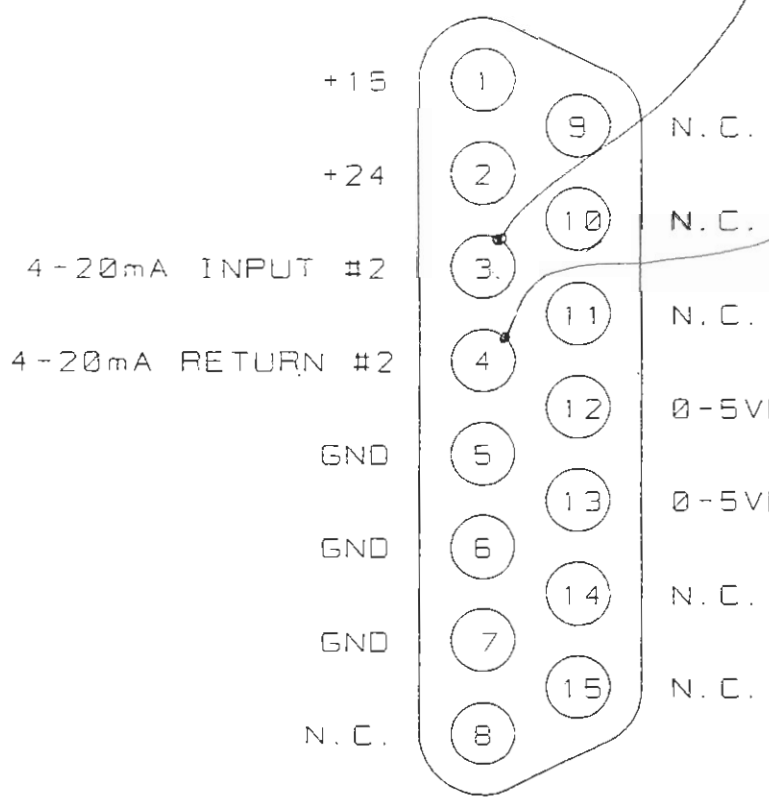
"ANALOG (ODD NUMBERS)"

DA-15S



"ANALOG (EVEN NUMBERS)"

DA-15S

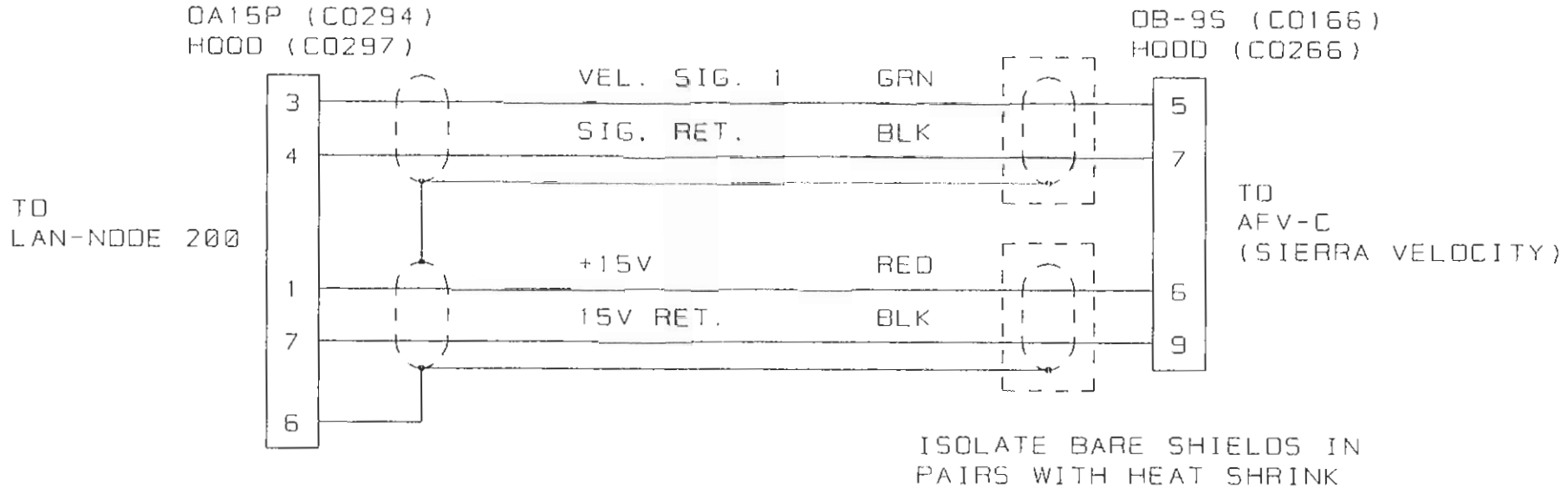


BY PASSE

PARTICLE MEASURING SYSTEMS INC. 1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100				
LAN-NODE 200 "ANALOG xx" PINOUT DIAGRAM				
DATE 4-15-92	REVISED 6-5-92	DRAWN BY MGC	APPROVED BY MTS	
DRAWING NUMBER WD-989		SLOT NUMBER	JOB NUMBER	

WR # 842
4-15-92

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WR # 822
2-29-92

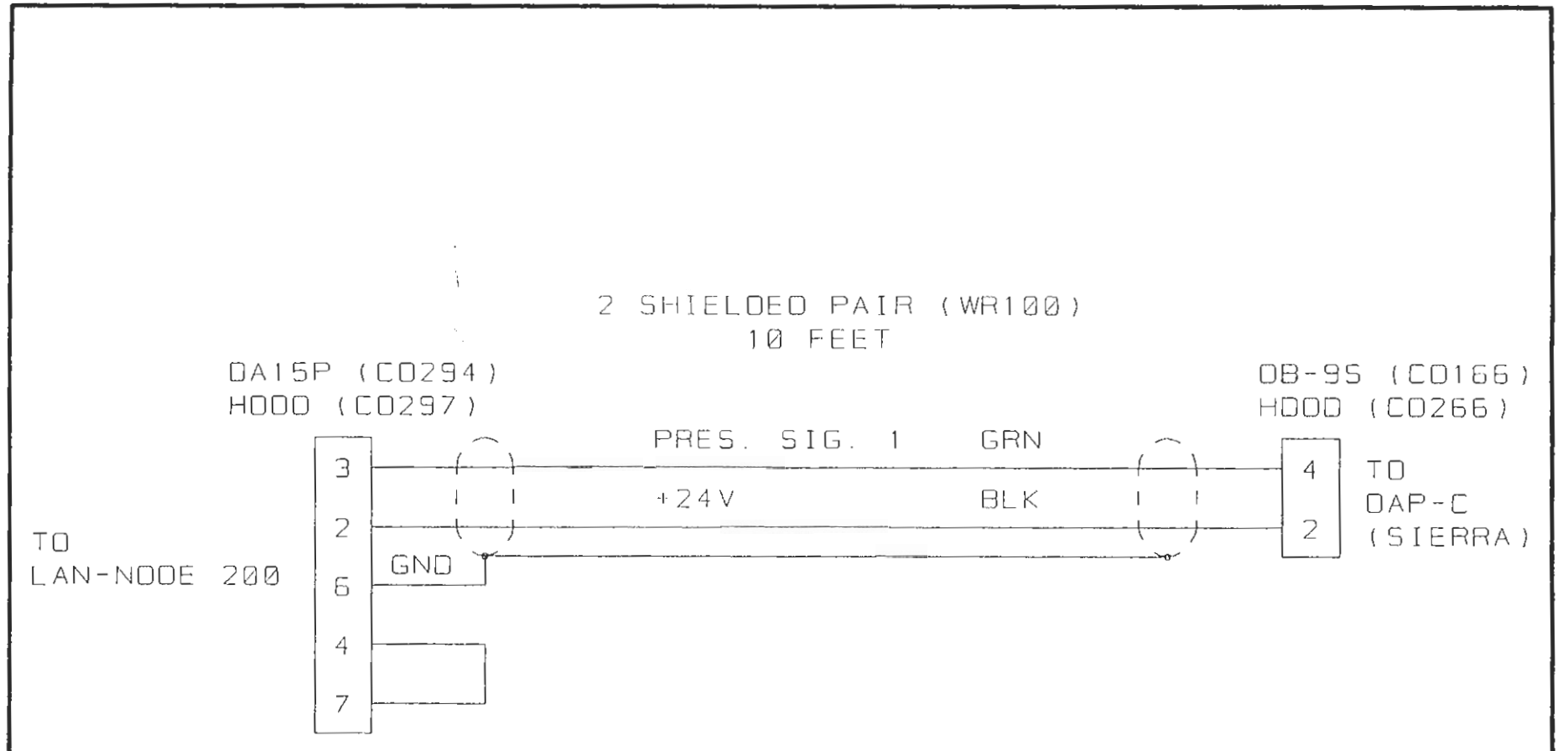
PARTICLE MEASURING SYSTEMS INC.
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LAN-NODE 200
TO AFV-C CABLE

DATE	REVISED	DRAWN BY	APPROVED BY
2-28-92		MGC	MTS

DRAWING NUMBER	SLOT NUMBER	JOB NUMBER
WD-992		

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WR # 822
2-29-92

CLERICAL
5-20-92

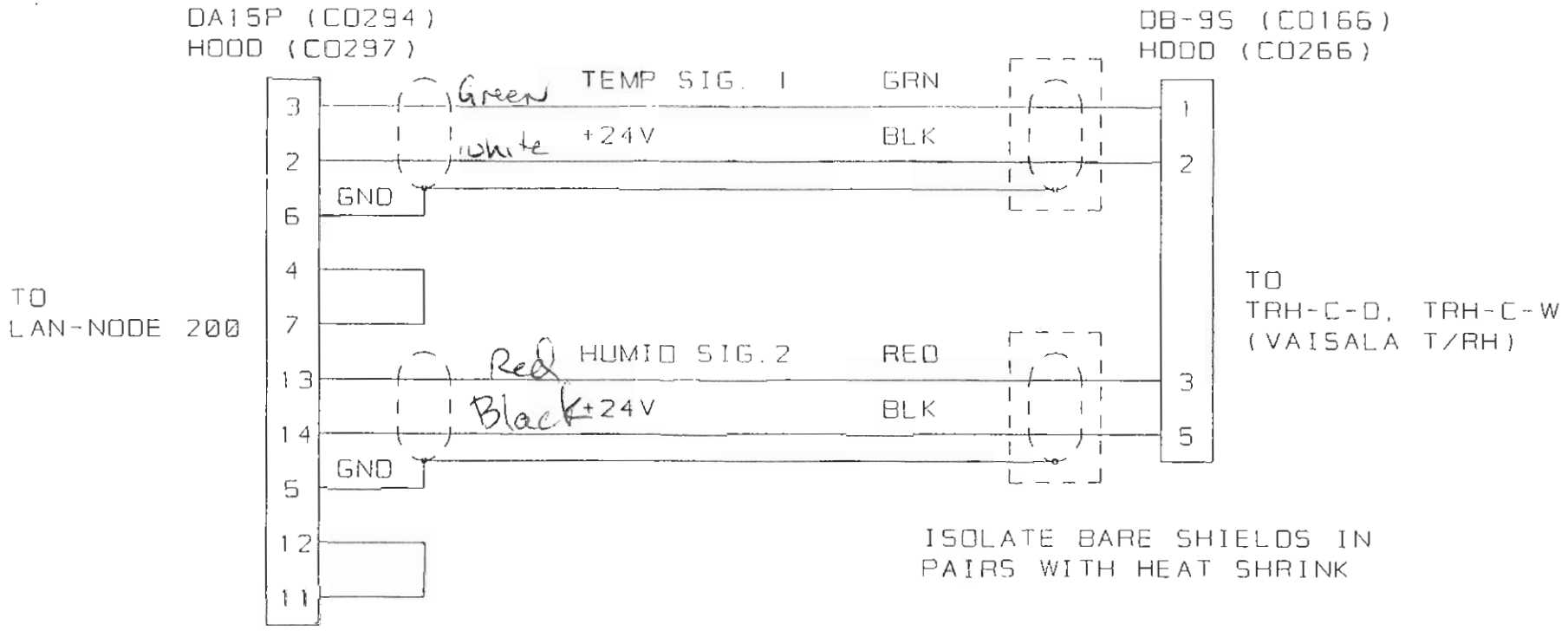
PARTICLE MEASURING SYSTEMS INC.
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LAN-NODE 200
TO DAP-C CABLE

DATE	REVISED	DRAWN BY	APPROVED BY
2-28-92	5-20-92	MGC	MTS

DRAWING NUMBER	SLOT NUMBER	JOB NUMBER
WD-993		

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WR # 822
2-29-92

PARTICLE MEASURING SYSTEMS INC.
1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100

LAN-NODE 200
TO TRH-C-D, TRH-C-W CABLE

DATE	REVISED	DRAWN BY	APPROVED BY
2-28-92		MGC	MTS

DRAWING NUMBER	SLOT NUMBER	JOB NUMBER
WD-994		

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- *whether it is an aerosol or liquid particle counter*
- *the serial number*

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