SERIES 132 ISOLATED 4-20 mA CURRENT TRANSMITTER

The series 132 is a optional board which typically scales the standard 0-5 DC output of the EVA sensors into 4-20 mA. Many users select this option to re-transmit from the system electronics the average duct or stack velocity signal. Occasionally, some users also re-transmit the sample flow rate signal in 4-20 mA format. The series 132 units are available in rack modules of 1.4 inches wide. These units have a coresponding 132RM model number (1/12 rack).

Series 132 isolated current transmitters are primarily required when signals must be transmitted over long distances. With the use of voltage signal transmission over long wire runs, a significant amount of voltage drop will occur resulting in a signal error. Substituting a current loop signal source in place of the voltage source solves this transmission line loss problem. The way this is achieved is as follows, the current transmitter provides at its outputs a voltage and senses the return current as a feed back signal. This return current is proportional to the applied input signal. Loop control is maintained as long as the applied voltage is sufficient to cause the required feed back current. It is readily seen that this circuit corrects out any signal losses due to signal line resistances and voltage drops.

USER GUIDE
IK-EVA 4200 MULTI-POINT ISOKINETIC SAMPLING SYSYTEM

Engineering Document No. 420035001

2411 Garden Road
Monterey, CA 93940

800-424-7356
408-646-5911

IK-EVA 4200 SYSTEM DESCRIPTION

The portions of this manual that pertain to the customers system are as noted and defined herein. Other sections of this manual are not applicable.

Customer purchase order number ______________________

Kurz order number ______________________

Kurz project number ______________________

Equipment model number ______________________

Serial number(s) ______________________

Design particulars:

Stack or duct flow range ______________________

Stack or sample flow range ______________________

Stack or duct inside dimensions ______________________

Stack or duct temperature range ______________________

Input power requirements:

115 VAC / 60 HZ (+ or - 10 %) _____

220 VAC / 60 HZ (+ or - 10 %) _____

Other _____

Signal outputs:

0 - 5 Volts DC linear _____

4 - 20 mA linear (optional) _____

Other ______________________ _____

Probe assembly:

IK - BAR - 12 _____ Aluminum _____ 316 SS _____

Other_________

IK - BAR - 24 _____ Aluminum _____ 316 SS _____

Other _________

Mounting configuration:

TSSE _____

TSDE _____

Other _____

Mounting hardware:

FMA _____

CFMA _____

DESC _____

FDESC _____

Enclosure specification:

Series 195 Model ____________________

Series 193 Model ____________________

Electronic specification:

Series 465, Model __________

Series 505, Model __________

Series 191, Model __________

Series 151, Model __________

Series 730, Model __________

Series 710, Model __________

Options:

Series 132, Model __________

Series 161, Model __________

Series 171, Model __________

Series ETI, Model __________

Series 133, Model __________

Series 101, Model __________

Series 111, Model __________

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TITLE PAGE:

Lists Customer's PO#, parties involved, plant where installed.

I M P O R T A N T   N O T I C E S

PROPRIETARY RIGHTS:

DOCUMENTATION:

The modular nature of the IK-EVA systems has the result that every installation is different. Kurz attempts to provide reasonable documentation generic in nature and covering typical systems and installations. No guarantee is made that documentation to the equipment produced as-built. Extensive typical drawings are available for use in field installation. Customers who desire as-built drawings and manuals should contact the factory for price quotations.

NUCLEAR QUALIFICATION

Equipment sold by Kurz Instruments Inc. is not intended for use in connection with any nuclear facility or activity unless covered by a specific quotation where the conditions of such usage will be detailed. If equipment is used in nuclear facility or activity without supporting quotation, Kurz disclaims all liability for any damage, injury or contamination, and the buyer shall indemnify and hold Kurz, its officers, agents, employees, successors, assigns and customers, whether direct or indirect, harmless from and against any and all losses, damages or expenses of whatever form or nature (including attorney's fees and other costs of defending any action) which they, or any of them, may sustain or incur, whether as a result of breach of contract, warranty, tort (including negligence), strict liability or other theories of law, by reason of such use.

SPECIFICATIONS

Specifications are subject to change without notice. Kurz Instruments reserves the right to make engineering changes and product improvements at any time and without prior notice. No guarantee is made that this document conforms to current specifications, even at the date this edition is published. Contact a Kurz Factory Applications Engineer for information regarding current specifications.

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All orders are received subject to acceptance by KURZ INSTRUMENTS, INC. at the factory in Monterey, CA, U.S.A., herein referred to as COMPANY, and may be accepted only on Company's printed acknowledgement form. Purchase orders for Company products and services must be made out to the Company and must be received in writing at Monterey, CA before performance is completed unless otherwise approved by the Company.

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Until acceptance, all written quotations are subject to change upon written notice to the buyer and are void after 30 days unless otherwise specified on quote. Verbal quotations are good only on the day on which they are made by an authorized representative of the Company.

The prices shown on the published price lists and other published literature issued by the Company are not offers to sell and are subject to confirmation by specific quotation and acknowledgement. All published prices and discounts are subject to change without notice.

SEALED BIDS are subject to these Standard Conditions of Sale unless specified otherwise in bid and agreed to by the Company.

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Prices are exclusive of all foreign, federal, state, municipal or other government excise, sales, use, occupational, duty, or like taxes now in force, or enacted, in the future and therefore are subject to an increase equal in amount to any tax the Company may be required to collect or pay upon the sale or delivery of the items purchased.

TERMS
The terms of sale shown in the published price list shall apply from the date of shipment by the Company. If the Company in its judgment at any time deems that by reason of the financial condition of the Buyer or otherwise the continuance of production or shipment on the terms specified herein is not justified, the Company may require full or partial payment in advance. Certain orders may, in the judgment of the Company, because of their nature or the delivery involved, require progress payments. Pro rata payments shall become due as shipments are made. Terms are cash net 10 days. Amounts past-due are subject to a service charge of 1½% per month (or fraction thereof).

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The company makes no charge for its standard packing for domestic shipment. The Buyer may be charged for export packing or other special packing required, the cost of which will be quoted upon request. No credit or deduction will be allowed if no packing is required.

DELIVERY
Shipping dates given by the Company are approximate and are based on prompt receipt of all necessary information regarding the order. The company will use its best efforts to meet the ARO date provided the Buyer supplies all necessary information and data promptly, but cannot be held responsible for its failure to do so for causes beyond its reasonable control.

The Company shall in no event be responsible for loss of profits, damages incurred by the buyer to its customers or other consequential damages resulting from Company's failure to deliver within the time specified herein.

In the event of any delay requested by the Buyer or any delay caused by lack of shipping instructions, the Company will store all items ordered at the Buyer's risk and expense, and will invoice the Buyer for the full contract price of the apparatus on or after the date on which the same is ready for delivery. If manufacture is delayed by the Buyer, payment shall be made based on the percent of completion and the contract price.

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Shipments are f.o.b. factory, Monterey, CA, freight and insurance prepaid and added, or freight collect unless otherwise requested and agreed to by the Company. If insurance is being provided by the Buyer a formal statement of Buyer responsibility must accompany purchase order. Customer is responsible for notification in writing to the Company within 72 hours of any loss or damage of the shipment if the shipment was made f.o.b. destination. In the absence of specific instructions, the Company will select the carrier.

CHANGES
The Buyer may from time to time, but only with the written consent of the Company, make any change in the order. In the event of any such change, the Buyer shall pay to the Company the reasonable costs and other expenses (including engineering expenses and all commitments to its suppliers and sub-contractors incurred by the Company prior to receipt of notice of such change for all work rendered unnecessary by such change or incurred by the Company thereafter for all work required to effect such change. In either case, an amount determined by the Company in its discretion by applying to the amount such costs and other expenses and the Company's usual rate of profit for similar work. In the event of any such change, the Company shall further be entitled to revise its price and delivery schedules to reflect such change.

CANCELLATION
In the event of cancellation, the Buyer shall be liable for the payment of reasonable cancellation charges, which shall not exceed the unit retail list price of the items cancelled and shall include, among other things, expenses already incurred by the Company, actual liabilities against Commitments incident to the order involved, and properly allowable indirect charges as well as a reasonable profit. No delivery delay requested by Buyer on an order placed under this Agreement shall be effective unless covered by an amendment to the order that provides for the payment of any agreed upon costs the delay imposes on the Company and that is accepted on the Company's printed acknowledgement form. Standard products only once delivered may be returned at the Company's discretion and upon approval from the Company in Monterey, CA, at a minimum charge for restocking of 20% of list price. Return shipping charges are of Buyer's expense.

If the Buyer makes an assignment for the benefit of creditors, if a voluntary or involuntary petition or other action in bankruptcy or for reorganization or under any other insolvency law shall be filed by or against the Buyer, if the Buyer shall admit its inability to pay its debts, if a trustee, receiver or liquidator is appointed for any part of the assets of the Buyer, or if the Buyer fails to make payments to the Company in accordance with the terms hereof, the Company may at its option cancel all undelivered parts of any order by written notice to the Buyer at no expense to the Company.

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Unless otherwise agreed to by the Company, the criterion for acceptance of the Company's products including options shall be the successful operation of the product and options using the Company's standard test procedures applicable to the product and options involved. All acceptance tests shall be run by Company personnel at the Company's factory, unless otherwise allowed for and agreed to by the Company.

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The Company's products are warranted to be free from defects in material and workmanship for one year from date of shipment from the factory. The Company's obligation is limited to repairing, or at their option, replacing products and components which, on verification, prove to be defective, at the factory in Monterey, CA. The Company shall not be liable for installation charges, for expenses of Buyer for repairs or replacement, for damages from delay or loss of use, or other indirect or consequential damages of any kind. The Company extends this warranty only upon proper use and/or installation of the product in the application for which intended and does not cover products which have been modified without the Company's approval or which have been subjected to unusual physical or electrical stress, or upon which the original identification marks have been removed or altered.

Whenever the design of the equipment to be furnished or the system in which it is to be incorporated originate with the buyer, manufacturer's warranty is limited specifically to matters relating to furnishing of equipment free of defects in material and workmanship and assumes no responsibility for implied warranties of fitness for purpose or use.

Transportation charges for material shipped to the factory for warranty repair are to be paid by the shipper. The Company will return items repaired or replaced under warranty prepaid. No items shall be returned for warranty repair without prior authorization from the Company.

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The company will, at its own expense, defend any suit against the Buyer for the infringement of United States patents and trademarks by products purchased from the Company and in any such suit will satisfy any final award for infringement; except that the Company assumes no obligation to defend or assume liability for damages (consequential or otherwise) resulting from infringements (a) of patent claims covering any other products or any contemplated equipment or any assembly, combination, method or process, in which, or in the manufacture or testing of which any such products purchased from the Company may be used *(notwithstanding that such products purchased from the Company may have been designed only for use in or may only be useful in such other patented products or such patented equipment, assembly, circuit, combination, method, or process, or in the manufacture or testing thereof and that such products purchased from the Company may have been purchased and sold for such use)*, or (b) resulting from designs supplied by the purchaser, or for any trademark infringement involving any marketing or branding applied by the Company or involving any marking or branding applied at the request of the buyer.

The indemnity is upon the condition that the buyer give the Company prompt notice in writing of any such suit for infringement or threat of such suit and full opportunity to conduct the defense thereof. No costs or expenses shall be incurred for the account of the Company without its written consent. At its option, the Company may, at any time, replace or modify any products sold under this contract to avoid patent or trademark infringement provided such replacement or modification does not materially affect performance. The Company's liability under this indemnity shall not exceed the purchase price of the infringing product.

DOCUMENTATION AND TRAINING
In no event shall orders be accepted where payment is contingent on provision of documentation, unless agreed to in advance. Documentation is generic in nature, no guarantee is made that the documentation conforms to the equipment produced as built. As built documentation entails an additional charge.

The company will supply reasonable written documentation including operator instructions. Factory and on-site training in use and operation of the Company's products may be made available at Buyer's expense, subject to acceptance by the Company

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The Company assumes the right to make substitutions and modifications in the specifications of equipment designed by the Company providing that such substitutions or modifications will not materially affect performance in the intended application.

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The Company shall retain title to and possession of any models, patterns, dies, molds, jigs, fixtures and other tools made for or obtained in connection with this contract unless otherwise agreed to by the Company.

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All quotations are made and all orders are accepted by the Company with reference to the laws of the State of California, the rights and duties of all persons and the construction and effect of all provision thereof shall be governed by and construed according to the laws of that state.

Should any term or provision contained in these conditions contravene or be invalid under applicable law, the contract of which these conditions form a part shall not fail by reason thereof but shall be construed in the same manner as if such terms or provision had not appeared herein.

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The Company makes no promise or representation that its product will conform to any state or local laws, ordinances, regulations, codes or standards, except as particularly specified and agreed upon for compliance in writing as a part of the contract between Buyer and the Company. The Company's prices do not include the cost of any related inspections or permits or inspection fees.

EXCUSABLE CESSATION OF PERFORMANCE FOR NON-PAYMENT
Whenever Buyer fails to meet the payment requirements set forth in this condition, manufacturer may cease performance and delivery and accelerate payment of any and all unpaid charges, such cessation of performance shall not be construed to be a breach of any contract or agreement and manufacturer will resume production as soon as reasonably possible upon receipt of payment of all balances due.

NUCLEAR QUALIFICATION
Equipment sold by Kurz Instruments, Inc. is not intended for use in connection with any nuclear facility or activity unless covered by a specific quotation where the conditions of such usage will be detailed. If equipment is used in a nuclear facility or activity without a supporting quotation, Kurz disclaims all liability for any damage, injury or contamination, and the buyer shall indemnify and hold Kurz, its officers, agents, employees, successors, assigns and customers, whether direct or indirect, harmless from and against any and all losses, damages or expenses of whatever form or nature (including attorney's fees and other costs of defending any action) which they, or any of them, may sustain or incur, whether as a result of breach of contract, warranty, tort (including negligence), strict liability or other theories of law, by reason of such use.

10/1/86

FORWARD

The IK-EVA 4200 USER GUIDE is designed to serve several purposes. Among them are:

Instruction Manual:

The level of information presented on the Kurz 4200 Isokinetic Sampling System includes instruction manual level material. This includes "Installation," "Hookup" and "Operation" sections as well as complete drawings, parts lists and schematics.

Seminar Reference Information:

This publication is also intended to be supporting material at Kurz Isokinetic Technology Seminars, or at the more general Kurz Mass Flow Technology and Applications Seminars.

Sales Literature:

The Kurz 4200 Isokinetic Systems are built in modular fashion from other products standard in the Kurz line. While the principal engineer (customer) may understand the 4200 System thoroughly, other people, such as project engineers, safety officers, procurement people and engineering committees need complete information on the 4200 Isokinetic Systems also.

Detailed Product Specification Information:

Since the IK-EVA 4200 Isokinetic Systems are specific to the application or installation, numerous choices must be made by the user when ordering a 4200 system. These include decisions such as the number of velocity sensors needed, number of sample withdrawal points needed, size of the sample collection filter or whether to use a filter at all and whether options such as velocity profilers and stack totalizers are required. Potential users and specifiers of IK-EVA 4200 systems can use this manual for information regarding customer-specified components. Also, feel free to call the factory for further applications assistance.

INTRODUCTION TO ISOKINETIC SAMPLING

The purpose of isokinetic sampling is to withdraw a representative sample of the particles in a fluid stream at the same rate (velocity) at which the fluid flows through the stack. Under such conditions, minimal interference is imparted on the fluid, such that particles in the fluid do not cross streamlines either to enter or to bypass the sampling nozzles. Non-isokinetic sampling generally results in a non-representative sample that is distorted with respect to particle size, the degree of this distortion being more pronounced with larger particles.

Isokinetic sampling means that the sample flow rate is proportional to the flow rate in the duct or stack. It should be noted that isokinetic sampling is not required to obtain a representative sample of a gaseous pollutant. It is more theoretically correct, however, to obtain a flow-proportional sample to facilitate measurement of the total mass emission rate of a gaseous pollutant. For example, a cogeneration facility in Southern California used isokinetic sampling in conjunction with an NO_x analyzer to demonstrate air quality compliance necessary for their operating permit.

Isokinetic sampling is required for all extractive, particulate, source-measurement methods (EPA Methods 5 and 17 for example) and in sampling airborne, radioactive materials (ANSI N13.1-1969). EPA Method five is a manual test method which uses a Pitot tube for measuring velocity and a calibrated orifice for measuring sample flow rate at each specified sample point in the duct or stack being tested. A complex series of calculations are required to set the proper sample flow rate at each sample point. Equal sample times are used at each point where each sample point represents the center of an equal area of flow within the duct or stack, thereby obtaining an accurate isokinetic sample of the entire area of the duct or stack.

Continuous isokinetic sampling systems have generally used several fixed sampling nozzles and velocity sensors mounted within the duct, each of which are located at the center of equal flow areas, thereby performing an "instantaneous" velocity traverse. Many systems use an averaging, multipoint Pitot tube to measure the average velocity and a sampling "rake" (with several nozzles) to withdraw the sample. Generally, an orifice-type flow meter is used to measure the total sample flow rate, with the flow rate held proportional to the average velocity. Pneumatic isokinetic systems as described may be manually or automatically operated.

FUTURE ISOKINETIC SAMPLING TECHNOLOGY DEVELOPMENTS

Kurz Instruments have been pioneers in isokinetic sampling technology since the early days of the science when experimenters pieced together their own contraptions. Kurz has dramatically improved the quality of the isokinetic sample with the development of the 4200 system. The 4200 has evolved over a two year period and includes such outstanding features as:

All metal high temperature thermal mass flow sensors. These sensors allow unprecedented performance by sensing true mass flow and operating in the harshest of environments.

Unique single turn Electric Rotary Ramp Flow Control Valve invented at Kurz. This new flow control valve alone allows new achievements in control over the isokinetic sampling rate.

The 4200 is an integrated, modular Isokinetic Sampling System that uses the most advanced mass flow sensing technology in the world today. The 4200 System has become a standard product in the Kurz line, yet it represents a product so advanced it will be considered state of the art for the next decade. The 4200 is the premier isokinetic sampling product extant today. Kurz is proud of the 4200 System. It reflects Kurz Instruments' commitment to maintaining their pioneering leadership in isokinetic technology.

FUTURE ISOKINETIC SAMPLING TECHNOLOGY DEVELOPMENTS

Kurz today is aggressively continuing development of new isokinetic sampling technologies. This includes work on improving sensor performance, increasing system modularity, making available new types of isokinetic samplers with new levels of performance and automation. Some developments have completed design and engineering stages and are only waiting for you, the customer, to create the demand for them. These developments include:

Kurz I:K-Bar sensors for providing multipoint averaged stack velocity sensors for larger stacks. The Kurz K-Bar line is Kurz's newest line of high performance sensors. A K-Bar is a probe made up of any number of individual sensors plugged together in a modular building block style. The K-Bar when used in isokinetic systems is referred to as an I:K-Bar. It's perfect for larger stacks and users desiring multi-sensor averaging of their stack flows.

Automatic Filter Cartridge Changers. 4200 Isokinetic Systems are available that include automatic filter cartridge changers that include indexing hoppers to supply fresh cartridges and store in the order of use cartridges with sample.

Real Time Gravimetric Readout of Sample. Kurz has designed a gravimetric device that can be mounted in the filter or sample box on the Isokinetic Sampling Probe in order to provide a real time readout of the weight of the sample collected. This gravimetric device directly measures the weight of the sample collected and is independent of particle size and composition, and may be verified by an actual weight measurement.

Kurz looks forward to sharing with you many exciting developments in isokinetic sampling technology in the future. We welcome an active dialog with all those interested in isokinetic sampling. Please feel free to call our toll-free number 800-4-AIRFLO, to discuss any isokinetic or mass flow measuring requirement anytime. Kurz looks forward to working with you to solve your applications engineering problems.

SYSTEM OVERVIEW

Kurz Series 4200 Continuous Automatic Isokinetic Stack Sampling System is a continuous, automatic, isokinetic stack sampling system. It is composed of a series of sampling nozzles paired with a number of EVA 4000 stack or duct velocity sensors. A mass flow meter measures sample flow in an isokinetic control system loop so that the sample is pulled at particle rates identical to velocity in the stack. The control electronics and the sample rate flow-control valve (usually) are mounted inside a larger NEMA type housing that may be remotely mounted with respect to the isokinetic sampling probe(s). A vacuum supply is external to this housing and may be supplied by the customer, or if supplied by Kurz, mounted anywhere convenient to the user.

Operation of the 4200 is fairly simple and straightforward. First, the EVA 4000 stack velocity sensors provide 0-5Vdc signals linearly proportional to stack velocity. These signals are averaged to provide an external setpoint input to the 4200 controller module. Secondly, a linear, thermal mass flow meter provides 0-5 Vdc signals linearly proportional to the sample flow rate. The Kurz Series 4200 Isokinetic Sampler Controller accepts the abovementioned 0-5 Vdc input signals from the sample rate mass flow meter, compares it to the setpoint signal derived from the stack velocity sensors, and sends an error signal to either open or close the control valve until the isokinetic flow control point is reached. The "Series 4200" name refers to an integrated KURZ Isokinetic Sampler Controller System, in general. It should be noted, however, that the 4200 system consists of many components that comprise standard products when sold separately, and a brief description of each subsystem follows:

1) The EVA 4000 System with either the K-BAR 12 or K-BAR 24 Probe Elements.

2) A single or dual sampling nozzle and manifold system which is attached to the K-BAR probe.

3) A sampling manifold system which brings the sample from each IK-BAR isokinetic probe together and into the isokinetic control electronics.

4) System Electronics consisting of:

   Series 151 RM Signal Conditioner/Linearizer
   Series 192 Power Supply
   Series 4200 Automatic Isokinetic Controller Module
   Series 505 Sample Rate Mass Flow Meter
   Series 730 Sample Flow Rate Flow Control Valve

The IK-EVA 4200 utilizes the K-BAR 24 size velocity probe for large ducts and temperatures up to 500°F and the K-BAR 12 size velocity sensors for smaller ducts. Since the sampling lines run through the mounting flange, the velocity sensor current transmitters are separately mounted in an individual enclosure. The system electronics are usually mounted in the series 193 electronics enclosure, although other configurations may be used. The sampling pump (available as an option) can be mounted separately exterior to the enclosure. Although aluminum K-BAR probes may be ordered, all sampling nozzles and manifolds are constructed of type 316 Stainless Steel. Filter holders for sample collection are not included, but are optionally available.

The customer is to supply a flanged spool piece to the duct which will mate with the sensor and sampling array.

THE MULTIPOINT STACK VELOCITY SENSOR AND ELECTRONICS (EVA 4000)

Stack or duct velocities are measured using the EVA 4000 multipoint airflow measuring probes. The EVA 4000 uses Kurz's own all metal, thermal mass flow sensor. Wiring from each sensor on the probe runs to a transmitter enclosure which houses a small circuit card for each sensor used. The current outputs are electrically tied together

The signal conditioning, linearization and power supply board is mounted in a rack module found in the 4200 system enclosure. The current transmitters located in the EVA transmitter enclosures allow long cable runs with no signal degradation. The currents are high level signals of a few hundred milliamps. National Bureau of Standards (NBS) Traceable calibration is standard with Calibration data and Certificate provided for each sensor. Kurz EVA stack mass velocity sensors automatically correct for changes in gas temperature and density. Therefore, readings are automatically referenced to standard conditions. Kurz Instruments has adopted standard conditions of 25'C (77'F) & 760 mm Hg (29.92 in Hg).

IK-BAR 12 ISOKINETIC PROBES

The IK-BAR 12 Isokinetic Probes use the 0.75" diameter sensor sections assembled with 3/8" NPT pipe nipples. EVA IK-BAR 12 Electronic Velocity Array probes and are usually specified for smaller stacks and ducts, typically 4 ft. and under. They are available in either Aluminum or 316 Stainless Steel. Up to five velocity sensors may be used on the probe assembly, and either a single or dual sampling rake may be used. A temperature sensor may be added to the velocity probe assembly, but the probe is still limited to a maximum of five sensors due to space limitations on running sensor wiring through the sensor windows. Kurz recommends that single-ended IK-BAR 12 probe assemblies be no more than 36" in length, increasing to 72" for double-ended IK-BAR 12 probe assemblies. Radiation resistant wiring may be specified as an option for temperatures to 150'C. Standard temperature rating is 500'F.

IK-BAR 24 ISOKINETIC PROBES

The IK-BAR 24 Isokinetic Probes use the 1.5" diameter EVA Electronic Velocity Array probes and are usually specified for larger stacks and ducts, typically exceeding 4 ft. They are available in either Aluminum or 316 Stainless Steel. Up to seven velocity sensors may be used on the probe assembly, and either single or dual sampling rakes may be used.

A temperature sensor may be added to the velocity probe assembly, but the probe is still limited to a maximum of seven sensors due to space limitations on running sensor wiring thru the sensor windows. Kurz recommends that single-ended IK-BAR 24 probe assemblies be no more than 72" in length, increasing to 144" for double-ended IK-BAR 24 probe assemblies. Radiation resistant wiring may be specified as an option. Standard temperature rating is 500'F.

IK-EVA PROBE INSTALLATION CONFIGURATIONS SINGLE AND DUAL ISOKINETIC SYSTEMS

This is a wetted part on the isokinetic probe assembly used for mounting the IK-BAR 12 to a duct or stack. The flange can be specified in either Aluminum or 316 Stainless Steel.

TRANSMITTER SEPARATE, SINGLE ENDED (TSSE)

Model designations incorporating -TSSE within the model number refers to Transmitter Separate, Single Ended, IK-BAR assembly. The IK-BAR assemblies are mounted to the gas stream conduit by means of a flanged spool piece. The spool piece for the IK-BAR 12 shall consist of a 5" pipe nipple welded to a 5" class 150 ANSI flange. The spool piece for the IK-BAR 24 shall consist of a 6" pipe nipple welded to a 6" class 150 ANSI flange.

TRANSMITTER SEPARATE, DOUBLE ENDED (TSDE)

Model designations incorporating -TSDE within the model number refers to Transmitter Separate, Double Ended, IK-BAR assemblies. These assemblies require the same spool piece as noted in the TSSE write up. In addition to the spool piece a support cup is provided for the opposite end of the assembly. The support cup for the IK-BAR 12 is sized to accept a 3/8" pipe nipple. The support cup for the IK-BAR 24 is sized to accept a 1" pipe nipple.

IK-EVA TRANSMITTER ENCLOSURES SINGLE AND DUAL ISOKINETIC SYSTEMS

These are the remote transmitter enclosures that house a circuit card for each of the sensors used with a probe(s). Normally, 25 ft. of cable is supplied between the probe assembly(s) and the transmitter enclosures.

At the transmitter enclosure the current outputs of each of the sensors are transmitted to the main system signal processing electronics to allow each sensor to be monitored at the control panel. Enclosures are available in either painted steel or 304 stainless steel.

Series 195 separately mounted transmitter enclosures are available in various sizes based on system requirements. Enclosures are provided with field wiring terminals to allow user to terminate sensor and signal output wires easy access.

IK-EVA 4200 SAMPLING MANIFOLD

Applicable to both K-BAR 12 and K-BAR 24 based systems, a sampling manifold is necessary for systems having more than one IK-EVA probe, or when a probe uses dual sampling rakes, in order to bring the entire sample to a common point. We use 316 Stainless Steel tubing and flow junction headers with mounting provisions. Usually, the sample manifold system is peculiar to each installation, and will be detailed on drawings supplied by the factory.

SAMPLE COLLECTION

A filter or sample box (we use the terms interchangeably) is optional. Most customers supply their own or route the sample into an analytical train. Kurz can supply a fiberglass, NEMA type enclosure to be mounted near the 4200 probe. These sample boxes usually hold a stainless steel four-inch filter assembly and a shut-off valve to allow filter removal and replacement. For very small sample rates, Kurz can supply a filter box with a 47mm filter. For installations where the system control electronics are to be some distance from the sampling site, filter boxes can be supplied which also mount the sample rate mass flow meter and control valve. Kurz will be happy to quote on and furnish a design for any specific customer requirements, including systems with automatic filter changers.

AUTOMATIC ISOKINETIC SAMPLING CONTROL MODULE
IK-EVA 4200 AND IK-EVA 4200D

This model number incorporates all of the electronic modules used for the EVA velocity sensors and for automatic isokinetic control. Modules include:

- Series 4200 Isokinetic Controller Module,
- Series 151 RM Signal Conditioner/Linearizer,
- Series 192 System Power Supply
- Series 505 Sample Rate Mass Flow Meter
- Series 730 Sample Rate Flow Control Valve.
- Series 193 Enclosure.

All electronic components are furnished in the rack module configuration. The standard sample flow rate will be between 1 & 5 SCFM full scale. In most cases, reasonably sized sampling nozzles may be furnished to accommodate the duct or stack velocity and the number of sample points. Please consult the factory for special situations. The standard outputs are 0-5 Vdc for the average velocity and for the sample flow rate. All of the Kurz options are available for use with the IK-EVA 4200 system. The Model IK-EVA 4200D is a dual sample automatic isokinetic system and simultaneously furnishes two independent isokinetic samples. This system includes a unique automatic circuit which samples at a constant sampling rate below a preassigned stack velocity and isokinetically at higher velocities. This allows measurements at near zero stack flow conditions.

EVA ELECTRONIC VELOCITY ARRAYS

The stack velocity probes in IK-EVA systems are composed of one or more probes, each consisting of one or more individual EVA sensors configured as multi-sensor probes using a series pipe connection. This chapter describes the EVA sensor: theory of operation, physical construction, construction of multiple sensor probes, sensor transmitter cards (Wheatstone bridge), method of averaging sensor signals and sensor specifications.

CONSTRUCTION OF MULTIPLE-SENSOR PROBES:

Usually two-or-more EVA sensors are arranged on a single probe by piping the protective flow "windows" (housing the sensors) together via connecting pipe nipples. Wiring for each sensor runs through these nipples, as well as through holes drilled lenthwise through the EVA sensor windows.

SENSOR TRANSMITTER CARDS:

Each sensor has its own accompanying "transmitter card" (a small, printed circuit board). The card contains a Wheatstone bridge and components comprising a two-wire current mode transmitter. The Wheatstone bridge is tuned using proprietary, Kurz "temp comp" techniques. Since the wiring between the sensor and transmitter card is part of the Wheatstone bridge, it must not be cut, shortened or lengthened. Most EVA systems are designed so that the individual sensor wires run out through the probe installation flange, then through customer-supplied conduit to the transmitter card enclosure. This enclosure is normally mounted within 25 ft. of the probes.

METHOD OF AVERAGING SENSOR SIGNALS:

Individual sensor currents are transmitted over the two-wire hookup and are converted to voltage at the system electronics enclosure. A two-wire run for each sensor is necessary such that the individual flow signals may be linearized. Once the signal arrives at the system electronics enclosure, its own dedicated linearizer adjusts the voltage-versus-flow to a linear function. Thereafter, linear 0-5 Vdc signals are summed to produce the average velocity signal for the entire EVA array.