

Differential Amplifier



Manual
8.110.1998

Differenzverstärker Differential Amplifier Amplificateur différentiel Amplificador diferencial

**Gebrauchsanweisung
Instructions for Use
Mode d'emploi
Instrucciones para el uso**

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Einleitung

Diese Gebrauchsanweisung gibt Ihnen einen Überblick über den Einsatz des Differenzverstärkers.

Bedienungselemente

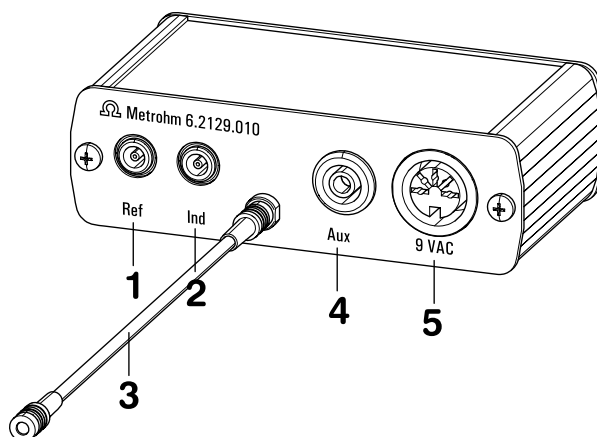


Abb. 1: Frontansicht des Differenzverstärkers 6.2129.010

1 Messeingang für Referenzelektrode

4 Messeingang für Hilfselektrode

2 Messeingang für Indikatorelektrode

5 Anschluss für Netzgerät

3 Anschlusskabel
Anschluss am Messeingang des
Titriergerätes

Funktionsprinzip

Potentiometrische Messungen in Medien niedriger Leitfähigkeit, z.B. in organischen Lösungsmitteln, werden durch statische Aufladungen stark gestört. Dies kann soweit gehen, dass Auswertungen von Titrationskurven stark erschwert oder gar verunmöglicht werden. Besonders hohe Feldstärken treten durch Reibung an Isolatoren wie Kunststoffböden, Kunststoffbekleidung u.ä. auf; Bedingungen, die in jeder normalen Laborumgebung auftreten können. Diese Störspannungen überlagern das Messsignal und bei der Aufnahme von Titrationskurven können "Geisterendpunkte" auftreten, welche eine automatische Auswertung nahezu verunmöglichen (siehe dazu auch Application-Notes T-41 und T-44).

Probleme dieser Art können durch Differenzpotentiometrie gelöst werden. Dabei werden Indikator- und Referenzelektrode je an einen hoch-

ohmigen Messeingang angeschlossen. Wichtig ist, dass beide Elektroden möglichst identisch abgeschirmt und damit in Bezug auf die Aufnahme von Störsignalen symmetrisch sind. Eine Hilfselektrode stellt die galvanische Verbindung zwischen dem Bezugspunkt der Verstärkerschaltung und der Messlösung her.

Praktische Hinweise

- Glaselektroden sollten im verwendeten Lösungsmittel ca. 1 Stunde vorkonditioniert werden.
- Für Titrations: Erfolgt nach dem ersten Dosierschritt ein zu starker Potentialsprung, kann ein kleines Startvolumen Abhilfe schaffen.

Elektroden

Die nachfolgend aufgeführten Elektroden werden gemäss Abb. 1 angeschlossen.

Referenzelektrode

<i>Best.-Nr.</i>	<i>Beschreibung</i>
6.0729.100	Ag/AgCl-Bezugselektrode, double junction, abgeschirmt, mit Metrohm-Steckkopf G; für Messgefässe
6.0729.110	Ag/AgCl-Bezugselektrode, double junction, abgeschirmt, mit Metrohm-Steckkopf G; für Sample Processoren

Indikatorelektrode

<i>Best.-Nr.</i>	<i>Beschreibung</i>
6.0431.100	Pt-Titrode mit Metrohm-Steckkopf G; getrennte pH-Glaselektrode und Hilfselektrode in einer Elektrode kombiniert
6.0150.100	Getrennte pH-Glaselektrode mit Metrohm-Steckkopf G

Hilfselektrode

<i>Best.-Nr.</i>	<i>Beschreibung</i>
6.0331.000	Getrennte Pt-Stift-Elektrode mit Metrohm-Steckerbuchse B
6.0301.100	Getrennte Pt-Drahtelektrode mit Metrohm-Steckkopf B

Anhang

Technische Daten

Messverstärker

Eingangsspannungsbereich	- 4000 ... + 4000 mV
Eingangswiderstand	$> 10^{12} \Omega$
Offsetstrom	$< 10^{-12} \text{ A}$
Gleichtaktunterdrückung AC	$> 30 \text{ dB (50 Hz)}$
Gleichtaktunterdrückung DC	60 dB (bei $U_{\text{Ind/Ref}} \pm 2000 \text{ mV}$)

Stromversorgung

Netzgerät	9 V AC
Leistungsaufnahme	1 W

Umgebungstemperatur

Nomineller Funktionsbereich	+ 5 °C ... + 45 °C (bei max. 85 % Luftfeuchte)
Lagerung	- 20 °C ... + 60 °C
Transport	- 40 °C ... + 60 °C

Referenzbedingungen

Umgebungstemperatur	+ 25 °C ($\pm 3 \text{ °C}$)
Rel. Feuchte	$\leq 60 \%$
Gerätezustand	$> 10 \text{ min}$ in Betrieb

Dimensionen

Material Gehäuse	Aluminium
Breite	156 mm
Höhe	32 mm
Tiefe	54 mm
Gewicht	158 g

Lieferumfang

Differenzverstärker EU

Anzahl	Best.-Nr.	Beschreibung	
1	6.2117.000	Netzgerät EURO 230 V / 9 V AC	
1	6.2129.010	Differenzverstärker	

Differenzverstärker US

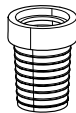
Anzahl	Best.-Nr.	Beschreibung	
1	6.2119.000	Netzgerät USA 115 V / 9 V AC	
1	6.2129.010	Differenzverstärker	

Optionales Zubehör

Elektroden für Sample Processoren

Anzahl	Best.-Nr.	Beschreibung	
1	6.1241.040	Elektrodenschaft aus PP für Elektrodenstifte mit Steckerbuchse B	
1	6.1248.000	Pt-Elektrodenstift zu 6.1241.040	
1	6.1248.040	Glassy-Carbon-Elektrodenstift zu 6.1241.040	

Elektrodenzubehör

Anzahl	Best.-Nr.	Beschreibung	
1	6.1236.020	Schliffhülse für Elektrode 6.0301.100	

Elektrodenkabel

<i>Anzahl</i>	<i>Best.-Nr.</i>	<i>Beschreibung</i>	
1	6.2104.020	Anschlusskabel für Metrohm-Elektroden mit Steckkopf G, Länge 1 m	
1	6.2104.030	Anschlusskabel für Metrohm-Elektroden mit Steckkopf G, Länge 2 m	
1	6.2106.020	Anschlusskabel für Metrohm-Elektroden mit Steckerbuchse B, Länge 1 m	
1	6.2106.060	Anschlusskabel für Metrohm-Elektroden mit Steckerbuchse B, Länge 2 m	

Gewährleistung und Konformität

Gewährleistung

Die Gewährleistung auf unseren Erzeugnissen beschränkt sich darauf, dass Defekte, die nachweisbar auf Material-, Konstruktions- oder Fabrikationsfehler zurückzuführen sind und innerhalb von 12 Monaten, vom Tage der Lieferung an gerechnet, auftreten, in unseren Werkstätten kostenlos behoben werden. Transportkosten gehen zu Lasten des Bestellers.

Bei Tag- und Nachtbetrieb beträgt die Gewährleistung 6 Monate.

Glasbruch bei Elektroden oder anderen Glasteilen ist von der Gewährleistung ausgenommen. Kontrollen, die nicht durch Material- oder Fabrikationsfehler bedingt sind, werden auch während der Gewährleistungszeit verrechnet. Für Fremdfabrikate, soweit diese einen wesentlichen Teil unseres Gerätes ausmachen, gelten die Gewährleistungsbestimmungen des Herstellers.

Für die Genauigkeitsgewährleistung sind die in dieser Gebrauchsanweisung genannten technischen Daten massgebend.

Wegen Mängeln in Material, Konstruktion oder Ausführung sowie wegen Fehlens zugesicherter Eigenschaften hat der Besteller keine Rechte und Ansprüche ausser den oben genannten.

Sind beim Empfang einer Sendung an der Verpackung Beschädigungen sichtbar, oder zeigen sich nach dem Auspacken Transportschäden an der Ware, so ist der Frachtführer unverzüglich zu benachrichtigen und die Aufnahme eines Schadenprotokolls zu verlangen. Das Fehlen eines offiziellen Schadenprotokolls entbindet Metrohm von jeder Ersatzpflicht.

Bei Rücksendungen irgendwelcher Geräte und Teile ist nach Möglichkeit die Originalverpackung zu verwenden. Dies gilt vor allem für Geräte, Elektroden, Bürettenzylinder und PTFE-Kolben. Vor dem Einbetten in Holzwole oder ähnliches Material sind die Teile staubdicht einzupacken (für Apparate unbedingt Plastiksack verwenden). Sind im Lieferumfang offene Baugruppen beige packt, die empfindlich sind gegen elektrostatische Spannungen (z.B. Datenschnittstellen usw.), so sind diese in der zugehörigen Original-Schutzverpackung, z.B. leitende Schutzbeutel, zurückzusenden. (Ausnahme: Baugruppen mit eingebauter Spannungsquelle gehören in nicht leitende Schutzverpackung.)

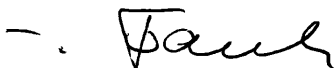
Für Schäden, die durch Nichtbeachtung dieser Vorschriften entstehen, lehnt die Firma Metrohm eine Gewährleistungspflicht ab.

Declaration of Conformity

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.



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<i>Name of commodity</i>	Differenzverstärker
<i>System software</i>	Stored in ROMs
<i>Name of manufacturer</i>	Metrohm Ltd., Herisau, Switzerland
<i>Description</i> Device for titrators without built-in differential amplifier to make them usable for differential potentiometry.	
This Metrohm instrument has been built and has undergone final type testing according to the standards: <i>Electromagnetic compatibility: Emission</i> EN/IEC 61326, EN 55022 / CISPR 22 <i>Electromagnetic compatibility: Immunity</i> EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-8, EN/IEC 61000-4-11, EN/IEC 61000-4-14 <i>Safety specifications</i> EN/IEC 61010-1, UL3101-1 <i>The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:</i>	
EN 61326	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
Metrohm Ltd. Is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing. The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance. The technical specifications are documented in the instruction manual.	
Herisau, December 20, 2002  Dr. J. Frank Vice President Head of R&D  Ch. Buchmann Vice President Head of Production Responsible for Quality Assurance	

Quality Management Principles

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Metrohm Ltd. Holds the ISO 9001 Certificate, registration number 10872-02, issued by SQS (Swiss Association for Quality and Management Systems). Internal and external audits are carried out periodically to assure that the standards defined by Metrohm's QM Manual are maintained.

The steps involved in the design, manufacture and servicing of instruments are fully documented and the resulting reports are archived for ten years. The development of software for PCs and instruments is also duly documented and the documents and source codes are archived. Both remain the possession of Metrohm. A non-disclosure agreement may be asked to be provided by those requiring access to them.

The implementation of the ISO 9001 quality system is described in Metrohm's QM Manual, which comprises detailed instructions on the following fields of activity:

Instrument development

The organisation of the instrument design, its planning and the intermediate controls are fully documented and traceable. Laboratory testing accompanies all phases of instrument development.

Software development

Software development occurs in terms of the software life cycle. Tests are performed to detect programming errors and to assess the program's functionality in a laboratory environment.

Components

All components used in the Metrohm instruments have to satisfy the quality standards that are defined and implemented for our products. Suppliers of components are audited by Metrohm as the need arises.

Manufacture

The measures put into practice in the production of our instruments guarantee a constant quality standard. Production planning and manufacturing procedures, maintenance of production means and testing of components, intermediate and finished products are prescribed.

Customer support and service

Customer support involves all phases of instrument acquisition and use by the customer, i.e. consulting to define the adequate equipment for the analytical problem at hand, delivery of the equipment, user manuals, training, after-sales service and processing of customer complaints. The Metrohm service organisation is equipped to support customers in implementing standards such as GLP, GMP, ISO 900X, in performing Operational Qualification and Performance Verification of the system components or in carrying out the System Validation for the quantitative determination of a substance in a given matrix.

Introduction

These Instructions for Use give you a overview of the applications of the Differential Amplifier.

Parts and controls

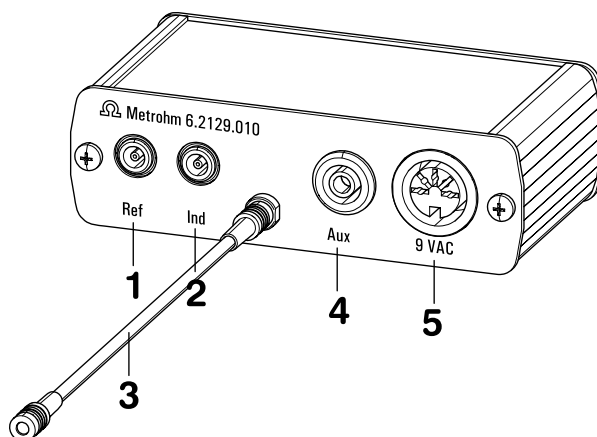


Fig. 2: Front view of the Differential Amplifier 6.2129.010

1 Measuring interface for reference electrode

2 Measuring interface for indicator electrode

3 Connecting cable
Connection to the measuring interface of the titrator

4 Measuring interface for auxiliary electrode

5 Connection for power supply unit

Functional principle

Potentiometric measurements in poorly conducting media, e.g. organic solvents, are seriously affected by static charges. This can go that far that evaluations of titration curves are complicated or even impossible. Especially strong field strengths are generated by friction on insulators such as plastic floors, clothing made of synthetic fibers etc.; conditions that occur in any laboratory. The interfering voltages are superimposed on the measuring signal and this can lead to imaginary endpoints in titrations which renders automatic evaluation almost impossible (see Application Notes T-41 and T-44).

Problems of this kind can be solved by differential potentiometry. In these measurements, indicator and reference electrode are each connected to a high impedance input. It is very important that both electrodes are shielded identically as far as possible and are therefore symmetrical with respect to their taking up of interfering voltages. An auxiliary electrode establishes the galvanic connection between the reference point of the amplifier circuit and the measuring solution.

Practical hints

- Glass electrodes should be conditioned for about 1 hour in the solvent used.
- For titrations: If the potential jump after the first volume increment is too high a small start volume may put things right.

Electrodes

Reference electrode

<i>Order-No.</i>	<i>Description</i>
6.0729.100	Ag/AgCl reference electrode, double junction, screened, with Metrohm plug-in head G; for measuring vessels
6.0729.110	Ag/AgCl reference electrode, double junction, screened, with Metrohm plug-in head G; for Sample Processors

Indicator electrode

<i>Order-No.</i>	<i>Description</i>
6.0431.100	Pt-Titrode with Metrohm plug-in head G; separate pH glass electrode and auxiliary electrode combined in one electrode
6.0150.100	Separate pH glass electrode with Metrohm plug-in head G

Auxiliary electrode

<i>Order-No.</i>	<i>Description</i>
6.0331.000	Separate Pt-rod electrode with Metrohm socket B
6.0301.100	Separate Pt-wire electrode with Metrohm socket B

Appendix

Technical data

Measuring amplifier

<i>Input voltage range</i>	- 4000 ... + 4000 mV
<i>Input impedance</i>	$> 10^{12} \Omega$
<i>Offset current</i>	$< 10^{-12} \text{ A}$
<i>Common mode rejection AC</i>	$> 30 \text{ dB (50 Hz)}$
<i>Common mode rejection DC</i>	60 dB (at $U_{\text{Ind/Ref}} \pm 2000 \text{ mV}$)

Power supply

<i>Power supply</i>	9 V AC
<i>Power consumption</i>	1 W

Ambient temperature

<i>Nominal working range</i>	+ 5 °C ... + 45 °C (bei max. 85 % Luftfeuchte)
<i>Storage</i>	- 20 °C ... + 60 °C
<i>Transport</i>	- 40 °C ... + 60 °C

Dimensions

<i>Housing material</i>	aluminium
<i>Width</i>	156 mm
<i>Height</i>	32 mm
<i>Depth</i>	54 mm
<i>Weight</i>	158 g

Standard equipment

Differential amplifier EU

No.	Order-No.	Description	
1	6.2117.000	Power supply unit EURO 230 V / 9 V AC	
1	6.2129.010	Differential amplifier	

Differential amplifier US

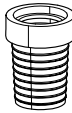
No.	Order-No.	Description	
1	6.2119.000	Power supply unit USA 115 V / 9 V AC	
1	6.2129.010	Differential amplifier	

Optional accessories

Electrodes for Sample Processors

No.	Order-No.	Description
1	6.1241.040	Shaft made of PP for electrode rods with socket B
1	6.1248.000	Pt-electrode rod for 6.1241.040
1	6.1248.040	Glassy-Carbon-electrode rod for 6.1241.040

Accessories for electrodes

No.	Order-No.	Description	
1	6.1236.020	SGJ sleeve for electrode 6.0301.100	

Cables for electrodes

<i>No.</i>	<i>Order-No.</i>	<i>Description</i>
1	6.2104.020	Connecting cable for Metrohm electrodes with plug-in head G, length 1 m
1	6.2104.030	Connecting cable for Metrohm electrodes with plug-in head G, length 2 m
1	6.2106.020	Connecting cable for Metrohm electrodes with plug B, length 1 m
1	6.2106.060	Connecting cable for Metrohm electrodes with plug B, length 2 m

Warranty and conformity

Warranty

The warranty on our products is limited to defects that are traceable to material, construction or manufacturing error which occur within 12 months from the day of delivery. In this case the defects will be rectified in our workshops free of charge. Transport costs are to be paid by the customer.

For day and night operation the warranty is limited to 6 months.

Glass breakage in the case of electrodes or other parts is not covered by the warranty. Checks which are not a result of material or manufacturing faults are also charged during the warranty period. For parts from outside manufacturers, insofar as these constitute an appreciable part of our instrument, the warranty stipulations of the manufacturer in question apply.

With the regard to the guarantee of accuracy the technical specifications in the instruction manual are authoritative.

Concerning defects in materials, construction or design as well as the absence of guaranteed features the purchaser has no rights or claims except those mentioned above.

If damage of the packaging is evident on receipt of a consignment or if the goods show signs of transport damage after unpacking, the carrier must be informed immediately and a written damage report demanded. Lack of an official damage report releases Metrohm from any liability to pay compensation.

If any instruments and parts have to be returned then the original packaging should be used if at all possible. This applies above all to instruments, electrodes, buret cylinders and PTFE pistons. Before embedding in wood shavings or similar material the parts must be packed in a dustproof package (for instruments the use of a plastic bag is essential). If open assemblies are included that are sensitive to electromagnetic voltages (e.g. data interfaces, etc.) then these must be returned in the associated original protective packaging (e.g. conductive protective bag). (Exception: assemblies with a built-in voltage source belong in non-conductive protective packaging).

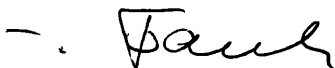
For damage which arises as a result of non-compliance with these instructions no warranty responsibility whatsoever will be accepted by Metrohm.

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Introduction

Ce mode d'emploi vous donne une vue d'ensemble sur l'utilisation de l'Amplificateur différentiel.

Elements de commande

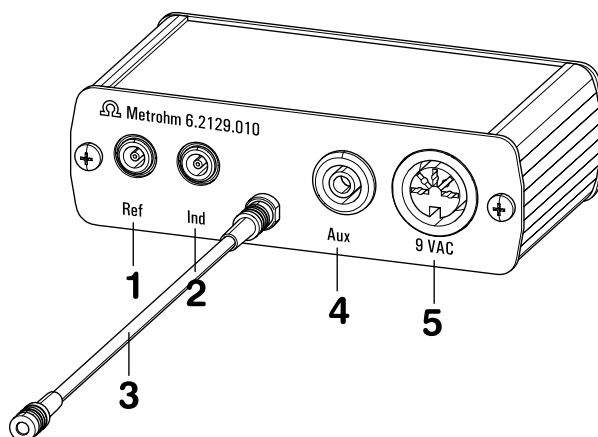


Fig. 3: Vue frontale de l'Amplificateur différentiel 6.2129.010

1 Entrée de mesure pour l'électrode de référence

2 Entrée de mesure pour l'électrode indicatrice

3 Câble de connexion
pour connecter à l'entrée de mesure de l'appareil de titrage

4 Entrée de mesure pour l'électrode auxiliaire

5 Connecteur pour le bloc d'alimentation

Principe de fonctionnement

Les mesures potentiométriques en milieux de basse conductivité, p.ex. des solvants organiques, sont fortement perturbées par des charges électrostatiques. Ce fait peut rendre une évaluation d'une courbe de titrage compliqué ou impossible. Une très haute intensité de champ peut être créée en produisant une friction aux isolateurs, p.ex. aux sols plastique ou aux habits en fibres synthétiques; des conditions normales dans tous les laboratoires. Ces tensions parasites interfèrent le signal de mesure et elles peuvent créer des points finals imaginés dans les courbes de tirage qui rendent une évaluation automatique presque impossible (voir Application Notes T-41 et T-44).

Ces problèmes trouvent une solution par la potentiométrie différentielle. Pour cela il faut connecter l'électrode indicatrice et de référence à une

entrée à haute impédance. Il est important que les deux électrodes soient blindées de façon identique autant que possible et comme cela elles sont symétriques par rapport à l'accueil des tensions parasites. Une électrode auxiliaire fait la connexion entre le point de référence du circuit de l'amplificateur différentiel et la solution de mesure.

Renseignements pratiques

- Préconditionner les électrodes de verre dans le solvant organique pendant environ 1 heure.
- Pour les tirages: S'il y a un grand saut de tension après le premier incrément, doser un petit volume de départ.

Electrodes

Electrodes de référence

<i>N° réf.</i>	<i>Description</i>
6.0729.100	Ag/AgCl électrode de référence, double jonction, blindée, avec tête enfichable Metrohm G; pour récipients de mesure
6.0729.110	Ag/AgCl électrode de référence, double jonction, blindée, avec tête enfichable Metrohm G; pour Sample Processors

Electrode indicatrice

<i>N° réf.</i>	<i>Description</i>
6.0431.100	Titrode Pt avec tête enfichable Metrohm G; électrode pH séparée et électrode auxiliaire combiné dans une électrode
6.0150.100	Electrode pH séparée avec tête enfichable Metrohm G

Electrode auxiliaire

<i>N° réf.</i>	<i>Description</i>
6.0331.000	Electrode séparée à pointe de Pt avec tête enfichable Metrohm B
6.0301.100	Electrode séparée à fil de Pt avec tête enfichable Metrohm B

Annexe

Spécifications techniques

Amplificateur de mesure

	- 4000 ... + 4000 mV
<i>Impédance d'entrée</i>	$> 10^{12} \Omega$
<i>Courant offset</i>	$< 10^{-12} \text{ A}$
<i>Réjection en mode commun AC</i>	$> 30 \text{ dB (50 Hz)}$
<i>Réjection en mode commun DC</i>	60 dB

Alimentation en courant

<i>Unité d'alimentation</i>	9 V AC
<i>Puissance absorbée</i>	1 W

Température ambiante

<i>Gamme de fonctionnement nominale</i>	+ 5 °C ... + 45 °C (à 85 % d'humidité de l'air max.)
<i>Stockage</i>	- 20 °C ... + 60 °C
<i>Transport</i>	- 40 °C ... + 60 °C

Dimensions

<i>Matériau du boîtier</i>	aluminium
<i>Largeur</i>	156 mm
<i>Hauteur</i>	32 mm
<i>Profondeur</i>	54 mm
<i>Poids</i>	158 g

Matériel livré

Amplificateur différentiel EU

Quantité	N° réf.	Description
1	6.2117.000	Bloc d'alimentation EURO 230 V / 9 V AC
1	6.2129.010	Amplificateur différentiel

Amplificateur différentiel US

Quantité	N° réf.	Description
1	6.2119.000	Bloc d'alimentation USA 115 V / 9 V AC
1	6.2129.010	Amplificateur différentiel

Accessoires optionnels

Electrodes pour Sample Processors

Quantité	N° réf.	Description
1	6.1241.040	Tige en PP pour pointes d'électrode avec tête enfichable B
1	6.1248.000	Pointe d'électrode en Pt pour 6.1241.040
1	6.1248.040	Pointe d'électrode en carbone vitreux pour 6.1241.040

Accessoires pour électrodes

Quantité	N° réf.	Description
1	6.1236.020	Douille à RN pour électrode 6.0301.100



Câbles pour électrodes

<i>Quantité</i>	<i>N° réf.</i>	<i>Description</i>
1	6.2104.020	Câble de raccordement pour électrodes Metrohm avec tête enfichable G, longueur 1 m
1	6.2104.030	Câble de raccordement pour électrodes Metrohm avec tête enfichable G, longueur 2 m
1	6.2106.020	Câble de raccordement pour électrodes Metrohm avec tête enfichable B, longueur 1 m
1	6.2106.060	Câble de raccordement pour électrodes Metrohm avec tête enfichable B, longueur 2 m

Garantie et conformité

Garantie

La garantie sur nos produits est limitée au remplacement gratuit dans nos ateliers des défauts dont il peut être fait la preuve qu'ils sont dus à des défauts de matériau, de conception ou de fabrication et qui se manifestent dans les 12 mois suivant la date de livraison. Les frais de transport sont à la charge de l'acheteur.

Le délai de garantie est réduit à 6 mois en cas d'exploitation de l'appareil jour et nuit.

Le bris de glace des électrodes ou de toutes autres parties en verre est exclu de la garantie. Les contrôles ne résultant pas de défauts de matériau ou de fabrication sont facturés, même pendant la durée de garantie. Dans la mesure où elles constituent une partie essentielle de nos appareils, les pièces de fabricants tiers sont soumises aux dispositions de garantie du fabricant.

En ce qui concerne la garantie de précision, les caractéristiques techniques stipulées dans le présent mode d'emploi sont déterminantes.

En cas de défauts affectant le matériel, la conception ou l'exécution, ainsi qu'en cas d'absence de qualités assurées par Metrohm, l'acheteur n'a d'autres droits et prétentions que ceux mentionnés ci-dessus.

Si l'endommagement de l'emballage est visible à la réception d'un envoi, ou bien si l'on observe des dommages dus au transport sur la marchandise après l'avoir déballée, il convient d'informer immédiatement le transporteur et d'exiger l'établissement d'un procès-verbal de dommage. En l'absence d'un procès-verbal de dommage officiel, Metrohm est dégagé de toute obligation de remplacement.

Utiliser si possible l'emballage original lors de tout retour d'appareils ou de pièces, en particulier pour les appareils, les électrodes, les cylindres de burette et les pistons en PTFE. Avant d'insérer les pièces dans de la laine de bois ou un matériel identique, il faut les emballer de façon étanche à la poussière (utiliser absolument un sac plastique pour les appareils). Si le contenu de la livraison contient des éléments ouverts sensibles aux tensions électrostatiques (par exemple interfaces de données, etc.), il convient de les retourner dans leur emballage protecteur d'origine, par exemple dans des sacs de protection conducteurs.

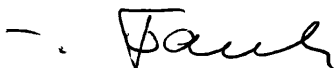
La société Metrohm rejette toute responsabilité pour les dommages résultant du non-respect de ces consignes.

Declaration of Conformity

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.



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<i>Name of commodity</i>	Amplificateur différentiel
<i>System software</i>	Stored in ROMs
<i>Name of manufacturer</i>	Metrohm Ltd., Herisau, Switzerland
<i>Description</i>	<i>Device for titrators without built-in differential amplifier to make them usable for differential potentiometry.</i>
This Metrohm instrument has been built and has undergone final type testing according to the standards: <i>Electromagnetic compatibility: Emission</i> EN/IEC 61326, EN 55022 / CISPR 22 <i>Electromagnetic compatibility: Immunity</i> EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-8, EN/IEC 61000-4-11, EN/IEC 61000-4-14 <i>Safety specifications</i> EN/IEC 61010-1, UL3101-1 <i>The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:</i>	
EN 61326	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing. The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance. The technical specifications are documented in the instruction manual.	
Herisau, December 20, 2002  Dr. J. Frank Vice President Head of R&D  Ch. Buchmann Vice President Head of Production Responsible for Quality Assurance	

Quality Management Principles

Metrohm Ltd., CH-9101 Herisau, Switzerland

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Metrohm Ltd. holds the ISO 9001 Certificate, registration number 10872-02, issued by SQS (Swiss Association for Quality and Management Systems). Internal and external audits are carried out periodically to assure that the standards defined by Metrohm's QM Manual are maintained.

The steps involved in the design, manufacture and servicing of instruments are fully documented and the resulting reports are archived for ten years. The development of software for PCs and instruments is also duly documented and the documents and source codes are archived. Both remain the possession of Metrohm. A non-disclosure agreement may be asked to be provided by those requiring access to them.

The implementation of the ISO 9001 quality system is described in Metrohm's QM Manual, which comprises detailed instructions on the following fields of activity:

Instrument development

The organisation of the instrument design, its planning and the intermediate controls are fully documented and traceable. Laboratory testing accompanies all phases of instrument development.

Software development

Software development occurs in terms of the software life cycle. Tests are performed to detect programming errors and to assess the program's functionality in a laboratory environment.

Components

All components used in the Metrohm instruments have to satisfy the quality standards that are defined and implemented for our products. Suppliers of components are audited by Metrohm as the need arises.

Manufacture

The measures put into practice in the production of our instruments guarantee a constant quality standard. Production planning and manufacturing procedures, maintenance of production means and testing of components, intermediate and finished products are prescribed.

Customer support and service

Customer support involves all phases of instrument acquisition and use by the customer, i.e. consulting to define the adequate equipment for the analytical problem at hand, delivery of the equipment, user manuals, training, after-sales service and processing of customer complaints. The Metrohm service organisation is equipped to support customers in implementing standards such as GLP, GMP, ISO 900X, in performing Operational Qualification and Performance Verification of the system components or in carrying out the System Validation for the quantitative determination of a substance in a given matrix.

Introducción

Estas instrucciones para el uso dan una vista de conjunto del empleo del Amplificador diferencial.

Elementos de manejo

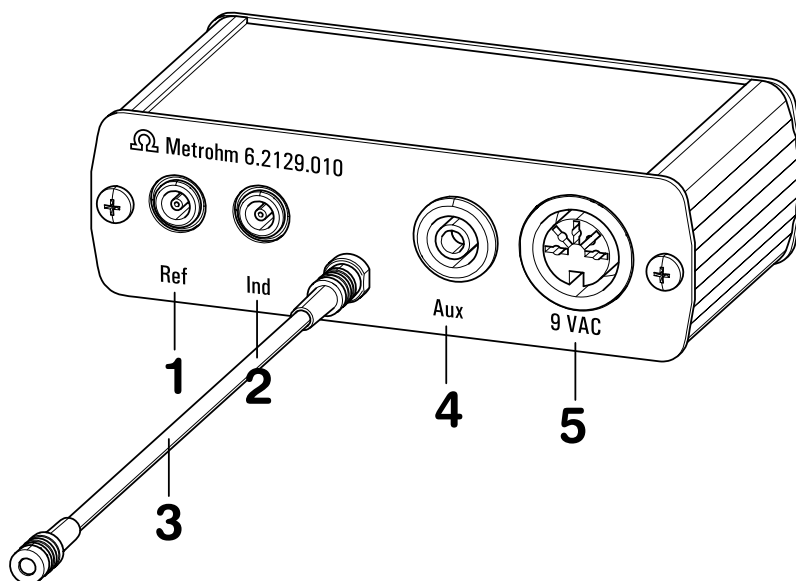


Abb. 4: Vista frontal del Amplificador diferencial 6.2129.010

1	Entrada de medida para electrodo de referencia	4	Entrada de medida para electrodo auxiliar
2	Entrada de medida para electrodo indicador	5	Conector para el alimentador a red eléctrica
3	Cable de conexión para conectar a la entrada de medida del titrador		

Principio de funcionamiento

Las medidas potenciométricas en medios de baja conductividad, por ej. en muchos disolventes orgánicos, pueden alterarse fuertemente por la acción de cargas electrostáticas. Esto puede dificultar o incluso hacer imposible la evaluación de las curvas de titración. Una intensidad de campo muy alta, provocada por el contacto o roce con aislantes como el suelo sintético, la ropa de fibra sintética, etc, que por otra parte son habituales en todos los laboratorios, produce interferencias con la señal de medida y por eso, en las curvas de titración, pueden

aparecer puntos finales falsos. Estos puntos impiden, en la práctica, una correcta evaluación automática (ver también los Application Notes T-41 y T-44).

Estos problemas se pueden resolver empleando la potencimetría diferencial. Para ello, se conectan el electrodo indicador y el electrodo de referencia a una entrada de medida de alta resistencia. Es importante que ambos electrodos estén igualmente blindados y de esta manera se comportarán de manera idéntica respecto a señales perturbadoras. Un tercer electrodo, auxiliar, establecerá una conexión galvánica entre el punto de referencia del circuito amplificador y la solución de medida.

Indicaciones prácticas

- Los electrodos de vidrio deben preacondicionarse durante 1 hora en el disolvente utilizado.
- Para titulaciones: Si, después de las primeras dosificaciones, aparece un salto de potencial demasiado grande, es mejor programar la adición de un pequeño volumen inicial.

Electrodos

1.1.1 Electrodos de referencia

<i>Nº pedido</i>	<i>Descripción</i>
6.0729.100	Electrodo de referencia Ag/AgCl, doble puente, blindado, con clavija Metrohm G; para recipientes de medida estándar
6.0729.110	Electrodo de referencia Ag/AgCl, doble puente, blindado, con clavija Metrohm G; para Sample Processors

Electrodo indicador

<i>Nº pedido</i>	<i>Descripción</i>
6.0431.100	Titrodo Pt con clavija Metrohm G; electrodo de pH separado y electrodo auxiliar combinados en un solo electrodo
6.0150.100	Electrodo de pH separado, con clavija Metrohm G

Electrodo auxiliar

<i>Nº pedido</i>	<i>Descripción</i>
6.0331.000	Electrodo separado de varilla de Pt con clavija Metrohm B
6.0301.100	Electrodo separado de hilo de Pt con clavija Metrohm B

Apéndice

Datos técnicos

Amplificador diferencial

	- 4000 ... + 4000 mV
<i>Impedancia de entrada</i>	$> 10^{12} \Omega$
<i>Corriente offset</i>	$> 10^{-12} \text{ A}$
<i>Modalidad común de rechazo AC</i>	$> 30 \text{ dB (50 Hz)}$
<i>Modalidad común de rechazo DC</i>	60 dB

Alimentación

<i>Aparato de conexión a la red</i>	9 V AC
<i>Absorción de potencia</i>	1 W

Temperatura ambiente

<i>Gama operativa nominal</i>	+ 5 °C ... + 40 °C (máx. 85 % humedad de aire)
<i>Almacenamiento</i>	- 40 °C ... + 70 °C
<i>Transporte</i>	- 40 °C ... + 70 °C

Dimensiones

<i>Material Carcasa</i>	aluminio
<i>Anchura</i>	156 mm
<i>Altura</i>	32 mm
<i>Profundidad</i>	54 mm
<i>Peso</i>	158 g

Alcance del suministro

Amplificador diferencial EU

<i>Cantidad</i>	<i>Nº pedido</i>	<i>Descripción</i>
1	6.2117.000	Alimentador a red eléctrica EURO 230 V / 9 V AC
1	6.2129.010	Amplificador diferencial

Amplificador diferencial US

<i>Cantidad</i>	<i>Nº pedido</i>	<i>Descripción</i>
1	6.2119.000	Alimentador a red eléctrica USA 115 V / 9 V AC
1	6.2129.010	Amplificador diferencial

Accesorios opcionales

Electrodos para Sample Processors

<i>Cantidad</i>	<i>Nº pedido</i>	<i>Descripción</i>
1	6.1241.040	Mango de PP para varillas de electrodo con clavija Metrohm B
1	6.1248.000	Varilla de electrodo de Pt para 6.1241.040
1	6.1248.040	Varilla de electrodo de carbón vitrificado para 6.1241.040

Accesorios para electrodos

<i>Cantidad</i>	<i>Nº pedido</i>	<i>Descripción</i>
1	6.1236.020	Manguito EN, para electrodo 6.0301.100



Cables para electrodo

<i>Cantidad</i>	<i>Nº pedido</i>	<i>Descripción</i>
1	6.2104.020	Cable de conexión para electrodos Metrohm con clavija G, longitud 1 m
1	6.2104.030	Cable de conexión para electrodos Metrohm con clavija G, longitud 2 m
1	6.2106.020	Cable de conexión para electrodos Metrohm con clavija B, longitud 1 m
1	6.2106.060	Cable de conexión para electrodos Metrohm con clavija B, longitud 2 m

Garantía y conformidad

Garantía

La garantía METROHM cubre cualquier defecto de fabricación o de material que pueda tener el aparato durante los 12 meses siguientes a partir de la fecha de entrega, y se reparará gratuitamente en nuestro taller. Sólo el transporte correrá a cargo del cliente.

En el caso de un servicio diurno y nocturno la garantía sólo es válida hasta los 6 meses.

Cualquier avería o verificación que no sea debida a defectos del material o de fabricación deberá ser abonada por el cliente, incluso durante el período que dure la garantía. En productos con componentes de fabricación externa, si dichos componentes constituyen la mayor parte del aparato, las condiciones de garantía dependerán del fabricante exterior.

Para la garantía en cuanto a la exactitud son válidos los datos técnicos especificados en las instrucciones para el uso.

Con respecto a defectos en el material, de construcción o de diseño, el cliente sólo tiene derecho a la garantía en los casos mencionados más arriba.

Si en el momento de la entrega el paquete está visiblemente dañado, o si al desempaquetar el aparato se observan anomalías debidas al transporte, debe informarse inmediatamente a la agencia de transportes o la oficina de correos responsable y redactar un acta de los daños. En ausencia de un informe oficial de los daños no nos hacemos responsables del pago de una indemnización.

Cuando se devuelvan equipos y sus accesorios, deberá utilizarse el embalaje original siempre que sea posible. Esto es particularmente importante cuando se trate de aparatos, electrodos, cilindros de bureta y pistones de PTFE.

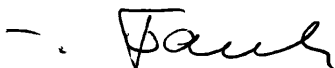
Antes de ser colocado entre virutas u otro material semejante, hay que envolver cada una de las partes para protegerlas del polvo (para aparatos es necesario utilizar una bolsa de plástico). Si con el pedido se recibe algún elemento electrónico abierto que sea sensible a tensiones electrostáticas (por ej.: una interfase de datos, etc.) éste se debe devolver en su embalaje original de protección (por ej.: bolsa conductora de protección). Excepción: los elementos electrónicos con fuente de tensión incorporada han de tener un embalaje de protección no conductor. La garantía no cubre los daños ocasionados por un embalaje inadecuado o descuidado.

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Quality Management Principles

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