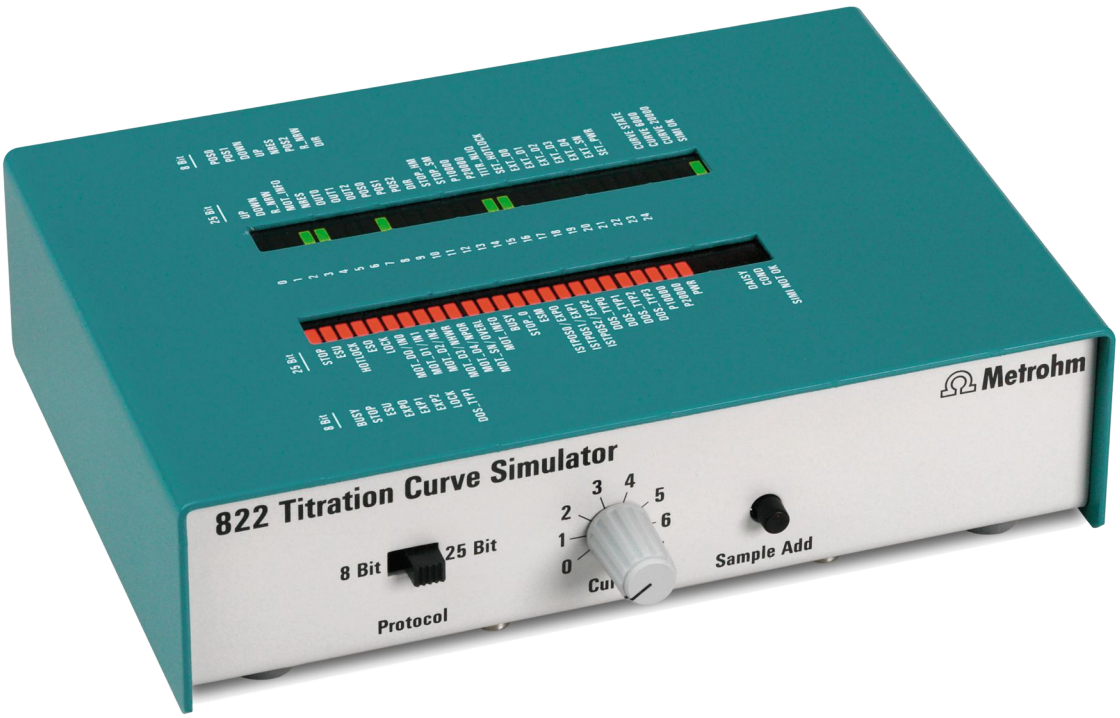
822 Titration Curve Simulator



Manual

8.822.1013

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8.822.1013 06.2006 jb

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Documentation in additional languages can be found on *http://documents.metrohm.com*.

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List of illustrations

1 Introduction

These Instructions for Use give you a overview of the applications and the functionality of the 822 Titration Curve Simulator.

First, the device as such and the simulation of the titration curves are explained. The description of the additional curves, the explanation of the LEDs and the technical data are summarized in the appendix.

1.1 Instrument description

The 822 Titration Curve Simulator is a diagnostic tool that allows Metrohm service technicians to check titrators. With this simulator a possible malfunction of the titration or dosing device or even the electrode can be identified quickly and easily. This is done by connecting the 822 Titration Curve Simulator instead of an electrode. During the test it simulates a titration, i.e. the user gets a titration curve without using electrodes or chemicals.

1.2 Parts and controls

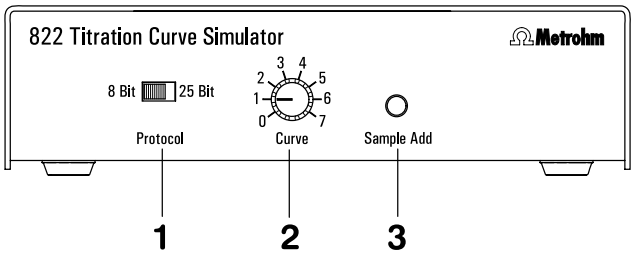


Fig. 1: Front view of the Curve Simulator

1 Communication protocol
for adjusting communication type; depends on the external dosing device

2 Curve selector
for adjusting the desired titration curve

3 Sample addition key for KF titrations
simulates the sample addition after conditioning

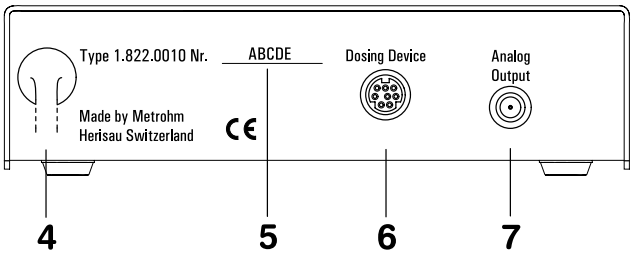


Fig. 2: Rear view of the Curve Simulator

4 **Connector cable**
connection to the titrator (MSB, Dosing or Remote)

5 **Serial number** digit 1 and 2 identify the device series, digit 3 to 5 the device number

6 **Connector for dosing device**
directly or with 6.2134.020 adapter cable

7 **Connector for measuring signal cable**
connection to the measuring interface with 6.2116.020 cable (2x plug type F)

1.3 Functional principle

The 822 Titration Curve Simulator uses the dosing pulses of the titrator to output, as the volume increases, an analog signal corresponding to the titration curve selected. These values are evaluated again by the titrator and the equivalence points found are displayed. The data sets of the titration curves are stored digitally in the Curve Simulator. This allows to achieve an excellent reproducibility of the equivalence points.

2 Connection

Titrators with internal dosing drive do not need an additional dosing device. Titrators without internal dosing drive (e. g. 809/836 Titrando, 726/796 Titroprocessor) need a connected dosing device (685/805 Dosimat or 700/800 Dosino). The Curve Simulator is connected between titrator and dosing device.

A detailed list of the connecting combinations can be found in the drawings given below.

Note!
The 822 Titration Curve Simulator does not replace a dosing device!

The communication protocol **1** has to be adjusted depending on the type of the external dosing device connected. The setting is not important for internal dosing drives.

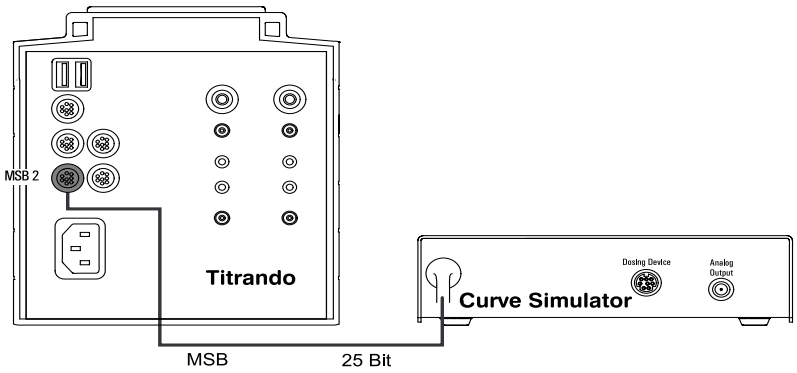
2.1 Connection to the MSB interface

2.1.1 Connection to Titrandos with internal dosing drive

☞ Connect the 822 Titration Curve Simulator with the connector cable **4** to the MSB 2 connection of the Titrando.

☞ Connect the measuring input of the Titrando with the Analog Output **7** of the 822 Titration Curve Simulator using the 6.2116.020 cable.

☞ Adjust the communication protocol **1** to 25 bit.



Signals for the internal dosing drive can only be read at MSB 2. Therefore you have to activate the checkbox **Send dosing signals to MSB 2** under **System/Diagnosis/822 Curve Simulator**. This setting will only be deactivated when restarting the PC Control software or switching off and on the Touch Control.

Note!
No dosing device may be connected to the 822 Titration Curve Simulator in this case.

2.1.2 Connection to Titrandos by using an external dosing device

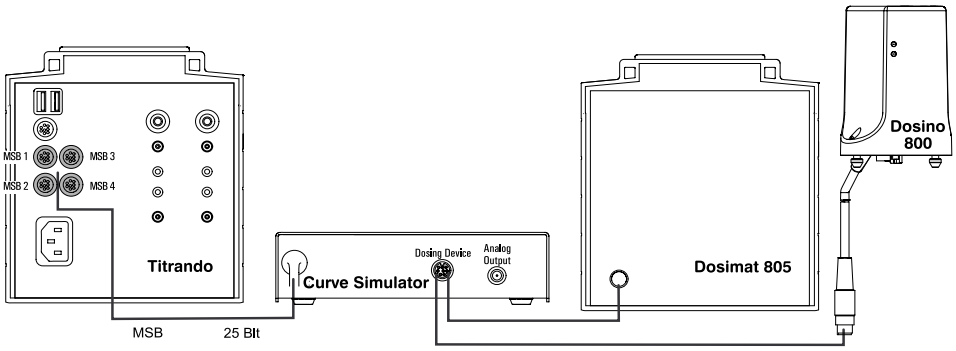
☞ Connect the 822 Titration Curve Simulator with the connector cable **4** to any of the four MSB connections of the Titrando.

☞ Connect the dosing device to the Dosing device connection **6** of the 822 Titration Curve Simulator.

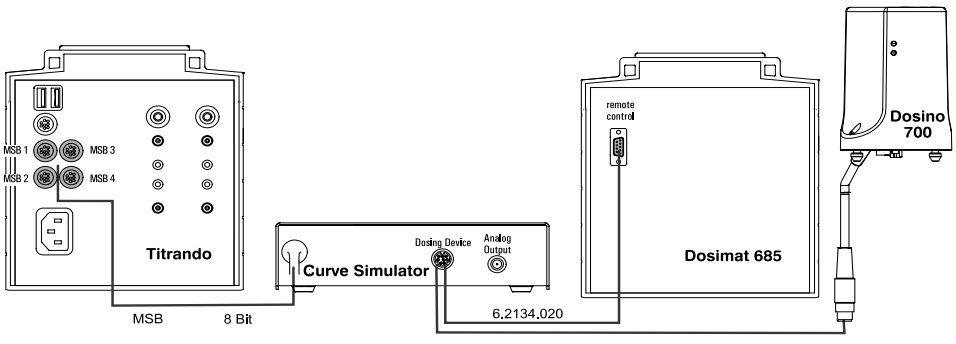
☞ Connect the Analog Output **7** with the measuring input of the Titrando using the 6.2116.020 cable.

☞ The communication protocol **1** has to be adjusted depending on the type of external dosing device connected. 25 bit is needed for dosing devices type 8XX, 8 bit by using a 685 Dosimat or a 700 Dosino.

variant 1:



variant 2:



700 Dosino

The 700 Dosino with the 8-pin MiniDIN plug type (2.700.0020) can be connected directly to the 822 Titration Curve Simulator. If you have a 700 Dosino with a 9-pin Sub-D plug type (2.700.0010) you need the 6.2134.020 adapter cable.

Note!
With Titrandos with internal dosing drive (e. g. 808/835 Titrando) the 822 Titration Curve Simulator can only be connected to MSB 2 – MSB 4 because MSB 1 is occupied by the internal dosing drive.

2.2 Connection to the dosing interface

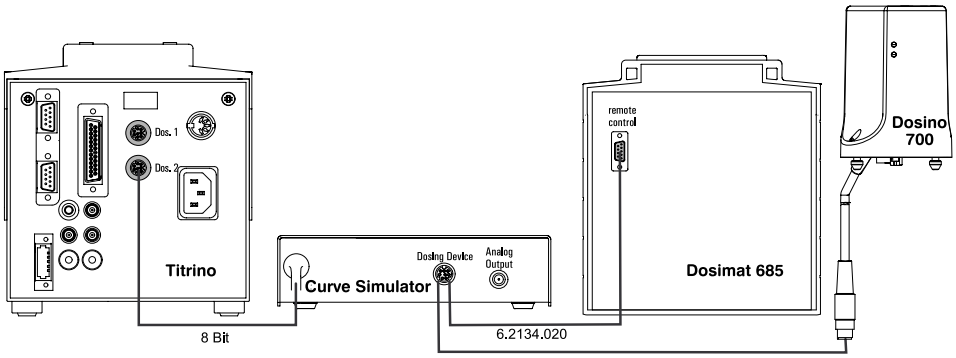
2.2.1 Connection to Titrinos by using an external dosing device

☞ Connect the 822 Titration Curve Simulator with the connector cable **4** to the dosing input Dos 1 or Dos 2 of the Titrino.

☞ Connect the dosing device to the Dosing device connection **6** of the 822 Titration Curve Simulator.

☞ Connect the Analog Output **7** with the measuring input of the Titrino using the 6.2116.020 cable.

☞ Adjust the communication protocol **1** to 8 bit.



700 Dosino

The 700 Dosino with the 8-pin MiniDIN plug type (2.700.0020) can be connected directly to the 822 Titration Curve Simulator. If you have a 700 Dosino with a 9-pin Sub-D plug type (2.700.0010) you need the 6.2134.020 adapter cable.

The endpoint volume of certain Titrino models 736, 751 and 758 is approx. 50 % lower than the one specified for the curves. Please ask the Metrohm service to remedy this or use the internal dosing drive.

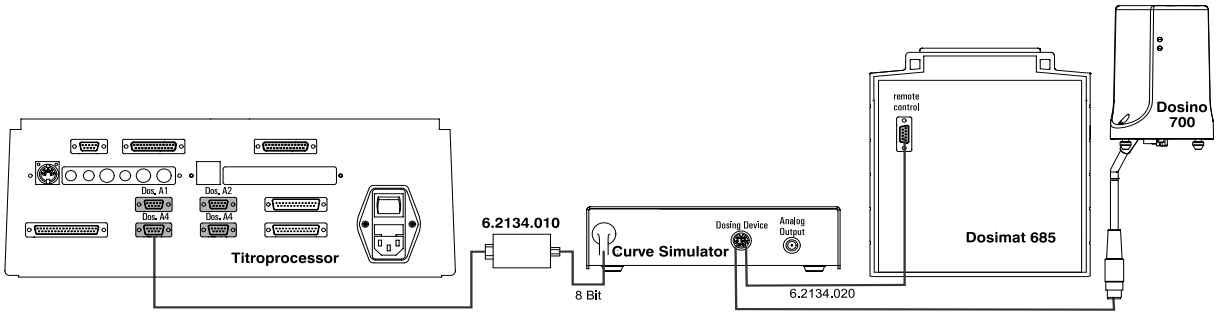
2.2.2 Connection to Titroprocessors

☞ Connect the 822 Titration Curve Simulator to the 6.2134.010 adapter box with the connector cable **4**. Connect the adapter box with one of the dosing interfaces Dos. A1...4 of the Titroprocessor.

☞ Connect the dosing device to the Dosing device connection **6** of the 822 Titration Curve Simulator.

☞ Connect the Analog Output **7** with the measuring input of the Titroprocessor with the 6.2116.020 cable.

☞ Adjust the communication protocol **1** to 8 bit.



700 Dosino

The 700 Dosino with the 8-pin MiniDIN plug type (2.700.0020) can be connected directly to the 822 Titration Curve Simulator. If you have a 700 Dosino with a 9-pin Sub-D plug type (2.700.0010) you need the 6.2134.020 adapter cable.

2.3 Connection to the remote interface

2.3.1 Connection to Titrinos with internal dosing drive

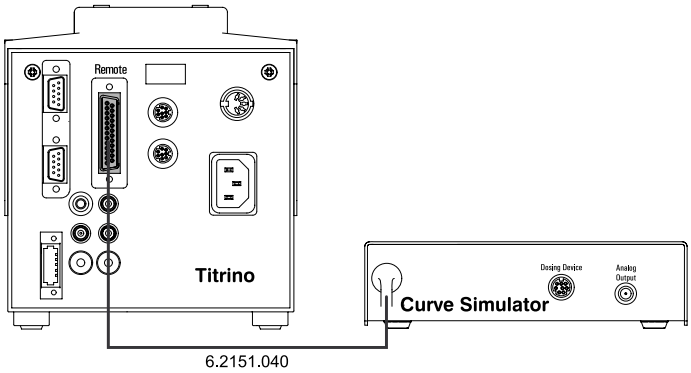
☞ Connect the 822 Titration Curve Simulator with the connector cable **4** to the remote interface of the Titrino.

☞ Connect the Analog Output **7** with the measuring input of the Titrino with the 6.2116.020 cable.

☞ The adjustment of the communication protocol **1** does not matter in this case.

☞ Switch on the activation pulse of the Titrino under **`parameters>preselections`**.

Note!
*The parameter **`activate pulse`** does not exist for the 701 and 787 Titrinos. The conditioning must therefore be switched off so that a KF titration can be simulated.*



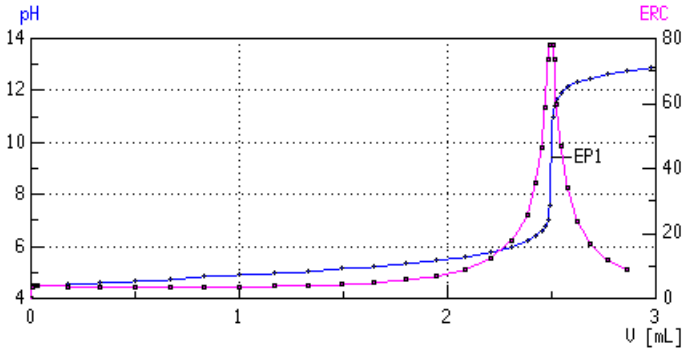
The Titrinos 701, 702, 716, 718, 719, 720, 721, 736, 787 and 794 work with only 6000 pulses per cylinder volume. This means that the EP volumes received have to be multiplied by 0.6.

The 751 and 758 Titrinos with program version 0020 do not provide the required pulses on the remote interface. For this device combination you either need an update of the Titrino program software or you have to use the 6.2148.000 remote box.

3 Description of the titration curves

3.1 Acid-Base titration

If you turn the curve selector to position "0", an acid-base titration with one endpoint is simulated. Program a corresponding method and start the titration. The illustration below shows an example of a simulated curve.

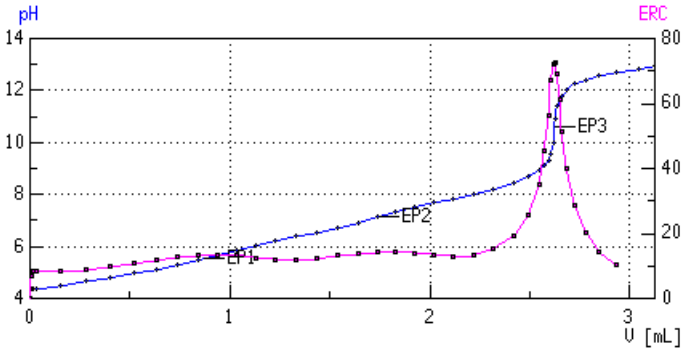


Endpoint at (50.00 ± 0.03) % of the cylinder volume

parameters: DET pH with standard parameters
5 mL exchange unit
Stop EP: 1
Volume after EP: 0.5 mL

3.2 Titration of citric acid

If you turn the curve selector to position "1", the titration of citric acid with three endpoints is simulated:



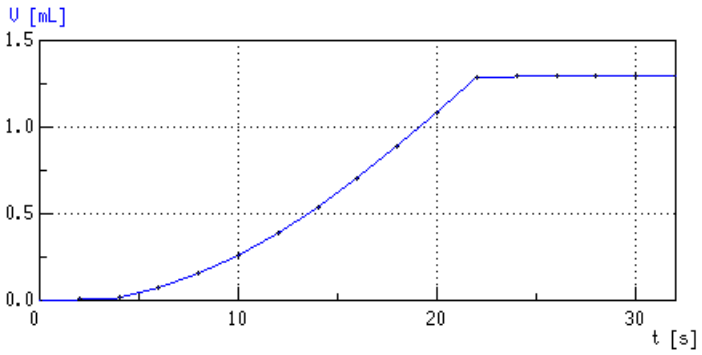
1st endpoint at (17.50 ± 0.15) % of the cylinder volume
2nd endpoint at (35.0 ± 0.1) % of the cylinder volume
3rd endpoint at (52.50 ± 0.02) % of the cylinder volume

parameters: DET pH with standard parameters
5 mL exchange unit
Stop EP: 3
Volume after EP: 0.5 mL

3.3 Conditioning and Karl Fischer titration

Turn the curve selector **2** to position "3" for simulating a Karl Fischer titration (except with 701, 787 Titrino; see following page).

Program a Karl Fischer method with conditioning and sample data request. Start the conditioning. Start the titration as soon as "Conditioning OK" is displayed. The cylinder will be filled again. Now press the key "Sample Add" **3** and confirm the sample weight. The curve simulator changes internally automatically to curve "4". The illustration below shows an example of a simulated curve.



Endpoint at (26.15 ± 0.10) % of the cylinder volume

parameters: KFT Ipol with standard parameters
5 mL exchange unit

Procedure with 701, 787 Titrino:

Turn the curve selector **2** to position "4".

Program a Karl Fischer method without conditioning but with sample data request. Start the titration and confirm the sample weight.

Note!
The endpoint of the conditioning curve "3" is at 10 % of the piston stroke with Curve Simulators of the series 02 and 03 but at 8.4 % for those from series 04 (see serial number, page 2). By reconditioning with Curve Simulators of the series 02 and 03 the status "Conditioning OK" will never be reached because the cylinder will be filled at 10 % of the piston stroke.

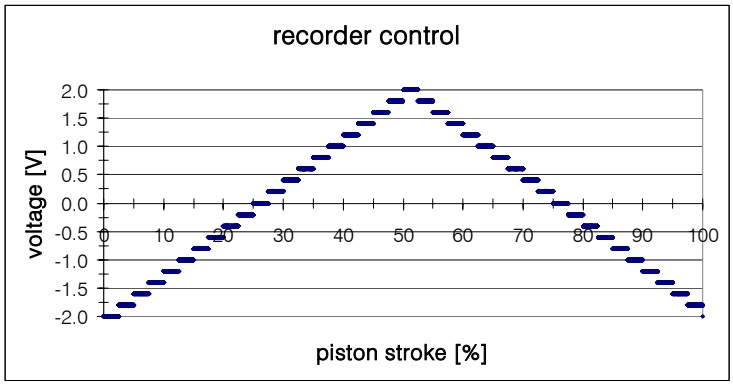
4 Appendix

In this section you will find the description of the additional curves of the 822 Titration Curve Simulator (for Metrohm Service technicians only) as well as the most important technical data, a list with standard accessories and the warranty and conformity declarations.

4.1 Description of the curves

4.1.1 Recorder control

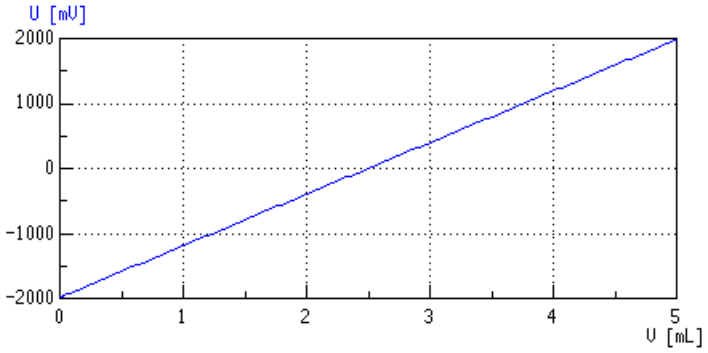
A connected recorder can be checked with curve "2". The full voltage range is passed through twice. The range is –2.5 V to +2.5 V for devices of the series 02 and 03 (see serial number, *page 2*) and –2 V to +2 V for devices from series 04.



Excel diagram from original data

4.1.2 Diagonal

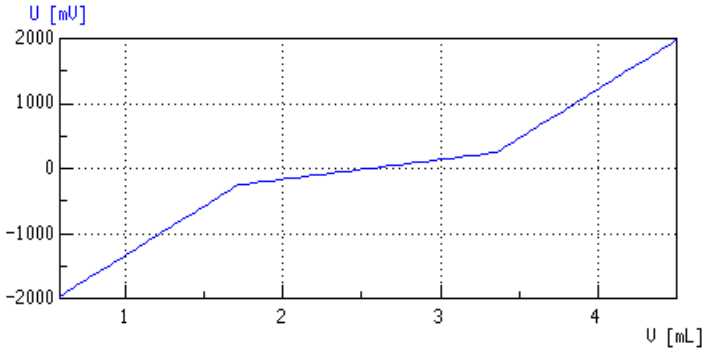
With curve "5" the whole voltage range is run through in the form of a diagonal. The range is –2.5 V to +2.5 V for devices of the series 02 and 03 (see serial number, *page 2*) and –2 V to +2 V for devices from series 04.



parameters: DET U with standard parameters
5 mL exchange unit
stop volume: 5.0 mL

4.1.3 D/A – converter test

Curve "6" checks the D/A converter in the entire voltage range from -2.5 V to +2.5 V. The 822 Titration Curve Simulator produces the following curve:

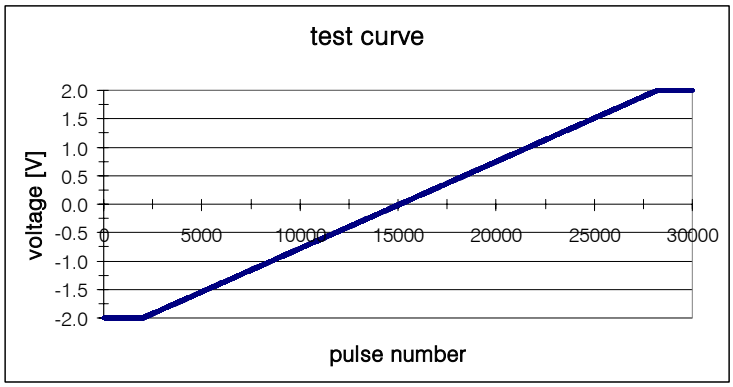


parameters: DET U with standard parameters
5 mL exchange unit
stop volume: 5.0 mL

The A/D converter input of the titrators ranges only from –2 V to +2 V. The area below and above is cut off.

4.1.4 Testing department – test

A ramp in the voltage range of –2 V to +2 V is run through with curve "7".



Excel diagram from original data

4.2 Meaning of the LEDs

The green LEDs represent the commands (more exactly: the single bits) from the control device for the dosing device. The red LEDs represent the reply i.e. the single bits from the dosing device to the control device.

Labeling on the device:

Red LEDs serial out (SER_OUT)			Green LEDs serial in (SER_IN)	
serial 8-bit	serial 25-bit	bit-No.	serial 25-bit	serial 8-bit
e. g.: 685 Dosimat 700 Dosino	e. g.: 805 Dosimat, 800 Dosino		e. g.: 805 Dosimat, 800 Dosino	e. g.: 685 Dosimat, 700 Dosino
Reply from the dosing device		0 ... 24	Commands for the dosing device	
Status information from 822		---	Status information from 822	

4.2.1 Serial 8-bit

With the 8-bit transmission the single bits 0...7 have the following meanings:

Reply from the dosing device:

SER_OUT - bit 0:	**BUSY**	Status message for active cock switching
SER_OUT - bit 1:	**STOP**	Status message if difference counter = zero
SER_OUT - bit 2:	**ESU**	End switch down: cylinder at minimal stroke
SER_OUT - bit 3:	**EXPO**	Bit 0 for coding the cylinder volume

SER_OUT - bit 4:	**EXP1**	Bit 1 for coding the cylinder volume
SER_OUT - bit 5:	**EXP2**	Bit 2 for coding the cylinder volume
SER_OUT - bit 6:	**LOCK**	Exchange unit present
SER_OUT - bit 7:	**DOS_TYP1**	Bit 1 definition of the chip function (formerly "GTYP")

Commands for dosing device:

SER_IN - bit 0:	**POS0**	Bit 0 for the default of the desired cock position
SER_IN - bit 1:	**POS1**	Bit 1 for the default of the desired cock position
SER_IN - bit 2:	**DOWN**	Dosing impulses for spindle motor
SER_IN - bit 3:	**UP**	Filling impulses for spindle motor
SER_IN - bit 4:	**NRES**	Reset for the Dosimat controller (L active)
SER_IN - bit 5:	**POS2**	Bit 2 for the default of the desired cock position
SER_IN - bit 6:	**R_NRW**	Use data or set STROBE impulse
SER_IN - bit 7:	**DIR**	Definition of the direction of rotation of the cock motor

4.2.2 Serial 25 bit

With the 25 bit transmission the single bits 0...24 have the following meanings:

Reply from the dosing device:

SER_OUT - bit 0:	**STOP**	Status message if difference counter = zero
SER_OUT - bit 1:	**ESU**	End switch down: cylinder at minimal stroke
SER_OUT - bit 2:	**HOTLOCK**	Bit for prompting the "Hot Plug & Play" of the exchange unit
SER_OUT - bit 3:	**ESO**	End switch up: cylinder at maximum stroke
SER_OUT - bit 4:	**LOCK**	Exchange unit present
SER_OUT - bit 5:	**MOT_D0/IN0**	Bit 0 D/A converter or digital input IN0
SER_OUT - bit 6:	**MOT_D1/IN1**	Bit 1 D/A converter or digital input IN1
SER_OUT - bit 7:	**MOT_D2/IN2**	Bit 2 D/A converter or digital input IN2
SER_OUT - bit 8:	**MOT_D3/NHWR**	Bit 3 D/A converter or status message of the reset signal
SER_OUT - bit 9:	**MOT_D4/NPOR**	Bit 4 D/A converter or of the power-on-reset
SER_OUT - bit 10:	**MOT_SN/OVERL**	Algebraic sign of D/A converter or motor overload

SER_OUT - bit 11:	**MOT_INFO** MOT_INFO = L: MOT_INFO = H:	Definition of the signals SER_OUT bit 5 ... 10, 15 ... 17 Information about current speed of the spindle motor (MOT_D0…SN) and cock position (ISTPOS0…2) Information of the digital inputs IN0…2, NHWR, NPOR, OVERL, EXP0…2
SER_OUT - bit 12:	**BUSY**	Status message for active cock switching
SER_OUT - bit 13:	**STOP_0**	Driver stage spindle or cock motor inactive
SER_OUT - bit 14:	**ESM**	End switch middle
SER_OUT - bit 15:	**ISTPOS0/EXP0**	Bit 0 for cock position or coding the cylinder volume
SER_OUT - bit 16:	**ISTPOS1/EXP1**	Bit 1 for cock position or coding the cylinder volume
SER_OUT - bit 17:	**ISTPOS2/EXP2**	Bit 2 for cock position or coding the cylinder volume
SER_OUT - bit 18:	**DOS_TYP0**	Bit 0 definition of the chip function
SER_OUT - bit 19:	**DOS_TYP1**	Bit 1 definition of the chip function (formerly "GTYP")
SER_OUT - bit 20:	**DOS_TYP2**	Bit 2 definition of the chip function
SER_OUT - bit 21:	**DOS_TYP3**	Bit 3 definition of the chip function
SER_OUT - bit 22:	**P10000**	Bit 0 for stating the number of pulses for the total volume
SER_OUT - bit 23:	**P20000**	Bit 1 for stating the number of pulses for the total volume
SER_OUT - bit 24:	**PWR**	Enables "Hot Plug & Play" of the device and recognize temporally unusual supply and control data

Commands for dosing device:

SER_IN - bit 0:	**UP**	Filling impulses for spindle motor
SER_IN - bit 1:	**DOWN**	Dosing impulses for spindle motor
SER_IN - bit 2:	**R_NRW**	Use data or set STROBE impulse

SER_IN - bit 3:	**MOT_INFO**	Definition of the digital signals SER_OUT bit 5 ... 10, 15 ... 17
	MOT_INFO = L:	Information about current speed of the spindle motor (MOT_D0…SN) and cock position (ISTPOS0…2)
	MOT_INFO = H:	Information of the digital inputs IN0…2, NHWR, NPOR, OVERL, EXP0…2
SER_IN - bit 4:	**NRES**	Reset for dosimat controller (L active)
SER_IN - bit 5:	**OUT0**	Bit 0 digital output
SER_IN - bit 6:	**OUT1**	Bit 1 digital output
SER_IN - bit 7:	**OUT2**	Bit 2 digital output
SER_IN - bit 8:	**POS0**	Bit 0 for the default of the desired cock position
SER_IN - bit 9:	**POS1**	Bit 1 for the default of the desired cock position
SER_IN - bit 10:	**POS2**	Bit 2 for the default of the desired cock position
SER_IN - bit 11:	**DIR**	Definition of the direction of rotation of the cock motor
SER_IN - bit 12:	**STOP_HM**	Signal to switch off the driver stage of the cock motor
SER_IN - bit 13:	**STOP_SM**	Signal to switch off the driver stage of the spindle motor
SER_IN - bit 14:	**P10000**	Bit 0 for stating the number of pulses for the total volume
SER_IN - bit 15:	**P20000**	Bit 1 for stating the number of pulses for the total volume
SER_IN - bit 16:	**TITR_NLIQ**	Definition of the mechanism of the motor controller
SER_IN - bit 17:	**SET_HOTLOCK**	Enables "Hot Plug & Play" of the exchange unit
SER_IN - bit 18:	**EXT_D0**	Bit 0 for the theoretical speed of the spindle motor
SER_IN - bit 19:	**EXT_D1**	Bit 1 for the theoretical speed of the spindle motor
SER_IN - bit 20:	**EXT_D2**	Bit 2 for the theoretical speed of the spindle motor
SER_IN - bit 21:	**EXT_D3**	Bit 3 for the theoretical speed of the spindle motor
SER_IN - bit 22:	**EXT_D4**	Bit 4 for the theoretical speed of the spindle motor
SER_IN - bit 23:	**EXT_SN**	SIGN for the specification of the direction of rotation of the spindle motor
SER_IN - bit 24:	**SET_PWR**	Enables "Hot Plug & Play" of the device and recognize temporally unusual supply and control data

Meaning of the red status LEDs:

DAISY:
With the serial protocol several devices can be at the same bus one after the other in a so-called daisy-chain configuration but only one of them is active. The so-called daisy signal is produced with SHIFT, STROBE and the momentary condition of SER_IN to switch to the next device.

COND.:
When "Conditioning OK" is displayed on the titrator, no further pulses are coming from the titrator and the voltage at the "Analog Output" **7** remains at the same level. The air humidity is not simulated. After pressing "Sample Add" **3** the LED "COND" is switched on to show that the Karl Fischer curve is running now.

SIMI NOT OK:
When switching on the titrator a self test of the internal reference and supply voltages is carried out in the 822 Titration Curve Simulator. The self test is carried out also at a reset of the Curve Simulator caused by rotating the cock at the dosing device or a reset command on a serial transmission. After the self test the display changes to "SIMI OK".

Meaning of the green status LEDs:

CURVE STATE:
If the 822 Titration Curve Simulator recognizes pulses for ejecting at the dosing device, the LED "CURVE STATE" starts blinking i.e. it stays dark for 500 pulses and bright for the next 500 pulses and so on.

CURVE 6000:
not in use

CURVE 20000:
If dosing is done with a 805 Dosimat or with the internal dosing drive of the Titrando and a stroke with 20'000 pulses is ejected, this LED is blinking synchronously with the LED "CURVE STATE".

SIMI OK:
see SIMI NOT OK

4.3 Technical data

4.3.1 Control

parallel	Remote
serial	8 bit / 25 bit

4.3.2 Curves

Curve memory

Number of curves	8
Flash	4 Mbit

Curve types

Acid-Base	+240 mV ... –300 mV Endpoint at (50.00 ± 0.03) % of the cylinder volume
Citric acid	+250 mV ... –300 mV 1st endpoint at (17.50 ± 0.15) % of the cylinder volume 2nd endpoint at (35.0 ± 0.1) % of the cylinder volume 3rd endpoint at (52.50 ± 0.02) % of the cylinder volume
Recorder control	steps of 200 mV per 2.5 % of the cylinder volume over the whole voltage range series 02, 03: –2.5 V ... +2.5 V ... –2.5 V from series 04: –2 V ... +2 V ... –2 V
Conditioning	series 02, 03: end at 10 % of the cylinder volume from series 04: end at 8.4 % of the cylinder volume
Karl Fischer	Endpoint at (26.15 ± 0.10) % of the cylinder volume
Diagonal	series 02, 03: –2.5 V ... +2.5 V from series 04: –2 V ... +2 V
D/A converter test	–2.5 V ... +2.5 V
Testing department test	–2.0 V ... +2.0 V

Reproducibility of the endpoints (volume)

Acid-Base	99.9 %
Citric Acid	
1st endpoint	97.5 %
2nd endpoint	99.5 %
3rd endpoint	99.95 %
Karl Fischer	99.5 %

4.3.3 Analog output

Range	–2.5 V ... +2.5 V

4.3.4 Resolution

D/A converter	16 bit
LSB	76.3 µV
Curve	20'000 Word

4.3.5 Supply

Voltage	+5 V / +12 V
Power consumption	0.1 W

4.3.6 Safety specifications

Construction and testing	According to EN/IEC 61010-1, UL3101-1

4.3.7 Electromagnetic compatibility (EMC)

Emission	Standards complied with: - EN/IEC 61326 - EN 55022 / CISPR 22
Immunity	Standards complied with: - 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

4.3.8 Ambient temperature

Nominal working range	+5 °C...+45 °C (at max. 85% rel. humidity)
Storage	–40 °C...+70 °C
Transport	–40 °C...+70 °C

4.3.9 Reference conditions

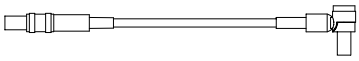
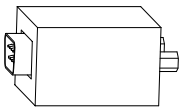
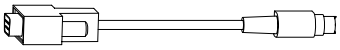
Ambient temperature	+25 °C (±3 °C)
Rel. humidity	≤60%
Warmed-up condition	Instrument in operation for at least 30 min

4.3.10 Dimensions

Housing material	Sheet steel 1 mm
Width	150 mm
Height	41 mm
Depth	118 mm
Weight	704 g

4.4 Standard equipment

4.4.1 822 Titration Curve Simulator

No.	*Order No.*	*Description*
1	1.822.0010	822 Titration Curve Simulator
1	6.2116.020	Cable for connection to the measuring input; 2 plugs type F (1 m) 
1	6.2134.010	Adapter box DB9 plug / Mini-DIN8 socket 
1	6.2134.020	Adapter cable DB9 socket / Mini-DIN8 plug for connecting a 685 Dosimat and 700 Dosino with 9-pin Sub-D plug (1.700.0010) 
1	6.2151.040	Connecting cable Curve simulator – Titrino (Remote interface) 
1	8.822.1011	Instructions for Use for 822 Titration Curve Simulator

4.5 Warranty and conformity

4.5.1 Warranty

The warranty on our products is limited to defects that are traceable to material, construction or manufacturing fault 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 embedment 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 interferences [fields] (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.

4.5.2 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.

Name of commodity

822 Titration Curve Simulator

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description GLP test device for system check. Different types of curves can be simulated for verification of dosing output, electrode input and titration software.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
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

Safety specifications
EN/IEC 61010-1, UL3101-1

CE *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:*

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, February 28, 2002

Dr. J. Frank
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.5.3 Quality Management Principles

Metrohm Ltd., CH-9101 Herisau, Switzerland

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
Internet www.metrohm.com

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 organization 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 organization 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.

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