

# HIRSCHMANN®



## solarus®

HiClass in digital titration

# solarus® advanced energy concept, precision results

solarus® sets standards as the world's first digital burette with an integrated solar cell. The power supply for the electronics and display is derived exclusively from an integrated solar cell. Batteries can be completely dispensed with.

Easily replaceable valves, individual calibration with "Quick-Cal" and permanent storage of the manufacturer's calibration mean that solarus® can be adapted rapidly and flexibly. The vivid digital display prevents meniscus reading errors and is always clearly legible, regardless of the viewing angle. The handwheels with a soft touch surface are ergonomically optimised for particularly precise control.

solarus® is available in a 10 ml, 20 ml and 50 ml version. Thanks to its innovative technology, the solarus® 10 ml enables titration of the smallest volumes with an indicating range of 10 µl to 99.99 ml in 10 µl graduations. The ejection unit with a fine tip is supplied as a standard component.

## Overview of details

- Power supplied by a solar cell
- Free rotation
- Media recirculating system for simple and rapid venting without reagent loss
- Easily replaceable valves
- Handwheels with soft touch surface
- Clearly legible display, regardless of the viewing angle
- Individual calibration of user-specified adaptations with "Quick-Cal"
- Serial bidirectional interface (RS232 and USB)
- Discharge valves and valve seats consisting of high-purity aluminium oxide ceramic
- Valve springs from Hastelloy





## Solar technology for sustainable performance

Use of solarus® ensures that the term “sustainable” is related directly to work in the laboratory. The unique solar-powered digital burette is powered exclusively using photovoltaic. Power is supplied to the solarus® electronics via the solar cell at the rear. Charging and changing of batteries, excessive stand-by costs or returning the unit for replacement of lithium cells are therefore a thing of the past.

solarus® exploits instead the advantages of solar technology: comfortable, simple, environmentally friendly, inexhaustible and free. Use of superior-quality solar cells ensures a reliable power supply at all times, even where lighting conditions are restricted in the laboratory.

### perfect ergonomics

For efficient, non-fatiguing work

### maintenance-friendly

Easily replaceable valves

### clear

Large, clearly legible display

### inspected

Individual quality certificate, with declaration of conformity acc. to DIN 12600

### accurate

Manufacturer's calibration is permanently stored

sustainable innovation

# Convincing functionality and design

solarus® is not only distinguished during laboratory work by its use of solar technology, but also numerous further sophisticated functions, innovative details and design aesthetics. These have already gained it accolades on several occasions at the most prestigious international design competitions.

Manual titration with solarus® combines flexibility and technical innovation. The display is powered by the solar cell and enables precise operation completely without a power connection and cable. It is self-explanatory and clearly legible at all times, regardless of the viewing angle. Specific customer configurations can be realised both rapidly and simply.

Manual handling is supported on solarus® by user-friendly details, ranging from handwheels with a soft touch surface for a firm hold and the Hirschmann media recirculation system to free rotation onto the laboratory bottle.



## The Hirschmann recirculation system

User, environmentally and budget friendly. The comfortable Hirschmann recirculation system facilitates rapid aeration without loss of reagent.



## All-round rotation

solarus® can be freely screwed as desired onto the bottle. The advantage: the labels and labelled side of the bottle faces the user at all times. This means that you can keep an eye on everything.

HIRSCHMANN			
Kalibrierzertifikat / Calibration Report Certificado de Calibración / Certificado de Calibración			
solarus®		Justierung/Calibration/Justage/Ajuste:	
Act./No. Code no. Ser./Ref.:	922050	Seien Nr./Serial no. Nº de série/número de serie	50108051
Charges Nr./Batch no. Número de lote/número de lote	EX 20 °C	Símbolo / Type / Tipo	
Neomvolumen/Nominal volume Volume nominal/Volumen nominal	50 ml	Toleranz(X) / Tolerance(X) Tolerancia(X) / Tolerancia(X)	0.2 %
Prüfvolumen/Test volume Volume de test/test volumen	50 ml	Toleranz(Y) / Tolerance(Y) Tolerancia(Y) / Tolerancia(Y)	0.1 %
V1	25 ml	Ergebnis X/Determination X evaluate/R evaluado	-0.047 %
V2	5 ml	Ergebnis Y/Determination Y Y evaluate/Y evaluado	-0.070 %
V3			-0.071 %
Prüfmitel/Testing device/Instrumento de control/Instrumentos de medición:			0.060 %
Waage/Balance/Pesaje/Balanza:			0.064 %
Terminometer/Thermometer/Termómetro:			0.073 %

## Continuous monitoring

Each solarus® is individually inspected for precision. The individual quality certificate documents the serial number and five test values and confirms conformity pursuant to the German Calibration Regulation (Eichordnung). It can therefore be filed directly in quality documentation conforming to DIN EN ISO 9000.



## Link to the future

You can log all titrations via the serial bidirectional interface and further process the data. It is also possible to enter an individual calibration factor. Suitable power cables are available as accessories.



### Unambiguous

The "fill" and "titrate" direction of rotation is indicated with arrows, and key operation is unambiguous. This enables volumetrically accurate working and error-free reading, even where the finest titration is involved.



### Sensitive and precise

Handwheels with a soft touch surface for a firm hold enable sensitive titration via the precision and smooth-running gear mechanism.



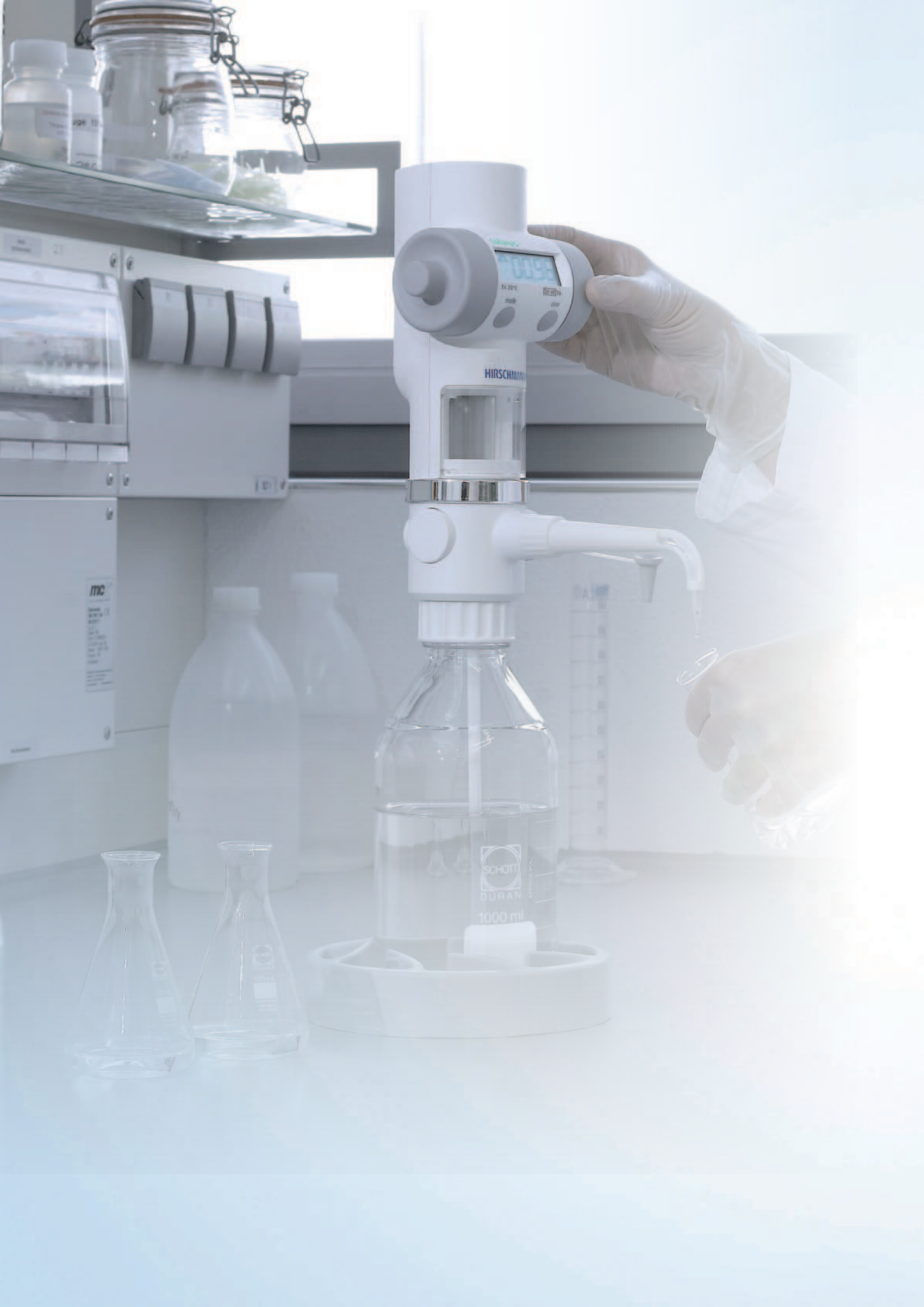
### Quick-Cal

Permits individual calibration of user-specified adaptations. It is possible to switch at any time between the permanently stored manufacturer's calibration and the calibration specified by the customer at the push of a button.



### Always in sight

Clear, self-explanatory and user-friendly: the display is clearly legible at all times, regardless of the viewing angle, display 0.01 ml - 99.99 ml.



# Awards for environmental innovation and design

As the world's first digital burette with an integrated solar cell, solarus® represents a milestone in the development of innovative laboratory devices. In 2001, Hirschmann was the only manufacturer to launch a liquid-handling unit with patented technology on the market: Using a regenerative energy source, solarus® was designed for energy efficiency and sustainability. The actual functions were not neglected in this respect, but also developed further.

With its unique function and design, solarus® not only impressed users, but also the jury. Since the market launch, it has regularly been among those products nominated for awards and the prize winners of prestigious national and international design competitions. It has also won several environmental prizes, being awarded both the Blue Angel (Blauer Engel) and the Green Good Design award.



2016 – German Design Award



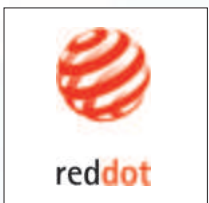
2011 – Green Good Design



2004 – German Design Award (Designpreis Deutschland)  
Design Council – nominee



2003 – Blauer Engel



2002 – red dot



2002 – iF Design Award, Hanover



Prizewinning sustainability

# Newly developed accessory range for maximum adaptability



**Base support instead of bottle attachment**  
The base support enables suctioning of the medium directly from a separate storage container using a hose.



**Stand clip for fixing the basic unit**  
The stand clip also facilitates use of solarus® in a stand assembly.



**Spare piston units**  
The piston can be replaced easily by the user without the need for tools.



**Adapter with NS 12/21 filling tube for funnel**  
The adapter with standard ground 12/21 filling tube enables problem-free filling of medium through a funnel - without unscrewing the basic unit.



**Ground adapter for direct reagent extraction from a ground bottle**  
The NS 29/32 ground adapter enables secure use of the basic unit on standard ground bottles.



**Ejection units with fine tips**  
These even finer tips facilitate precision realization of the finest droplets. Variable and spiral ejection units with fine tips allow the user to achieve exactly the results required in practically every area of application.



**Light protection window for light-sensitive media.** Titrating a light-sensitive medium? No problem for solarus®: A light protection window for the valve block is also included in the scope of delivery - simply replace if needed.

#### Connection cable for the serial interface

Cable for linking units to the serial interface (9-pole) and USB interface of the PC.

Order number	Category/Article designation
	Threaded adapters
931 35 23	PP A 45 to A 28
931 35 24	PP A 45 to A 38/430
931 36 21	ETFE A 45 to A 32
931 36 23	ETFE A 45 to A 28
931 36 24	ETFE A 45 to A 38/430
931 36 25	ETFE A 45 to A 38
931 36 27	ETFE A 45 to S 40
931 36 42	Silicon A 45 to standard ground 29/32 adapter
	Valves
931 60 28	Discharge valve, valve seat/ball made of high purity aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> 99,7%), spring made of platin-iridium (HF)
931 60 15	Discharge valve, valve seat/ball made of high purity aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> 99,7%), spring made of Hastelloy
931 65 28	Suction valve, valve seat/ball made of high purity aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> 99,7%), spring made of platin-iridium (HF)
931 65 15	Suction valve, valve seat/ball made of high purity aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> 99,7%), spring made of Hastelloy
931 66 26	Recirculation valve, valve seat/ball made of high purity aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> 99,7%), spring made of platin-iridium (HF)
931 66 15	Recirculation valve, valve seat/ball made of high purity aluminium oxide ceramic (Al <sub>2</sub> O <sub>3</sub> 99,7%), spring made of Hastelloy
	Ejection units
931 30 25	Ejection unit
956 30 04	Ejection unit, titration, variable, with hose clip, 400 mm, FEP
931 30 26	Ejection unit, flexible, spiral shaped
931 30 27	Ejection unit, flexible, spiral shaped
931 30 28	Ejection unit, with Luer lock connector
931 30 29	Ejection unit, with Luer lock connector
	Suction/ Recirculation hoses
931 50 07	Suction hose with screw fitting
	Control
956 40 05	RS232 connection cable
956 40 06	USB connection cable
	Miscellaneous
958 60 60	Brown light protection window
958 35 10	Spare piston unit for 10 ml basic unit
958 35 20	Spare piston unit for 20 ml basic unit
958 35 50	Spare piston unit for 50 ml basic unit
990 37 04	Round filter set (with plug connection on one side)



## solarus® HiClass in titration

Performance data	
Titration graduations	10 µl
Titration range	0.01 ml - 99.99 ml
Volume accuracy	solarus® 10 ml: Precise and reproducibility with absolute accuracy (R) of 0.3% and standard deviation (CV) of 0.1% solarus® 20 ml: Precise and reproducibility with absolute accuracy (R) of 0.2% and standard deviation (CV) of 0.1% solarus® 50 ml: Precise and reproducibility with absolute accuracy (R) of 0.2% and standard deviation (CV) of 0.1%
Pistons	Teflon compound ECTFE, PTFE
Cylinders	Extremely inert and wear-free design made of calibrated DURAN® glass*
Valves	Extremely inert and wear-free design, ball and seat made of ceramic (99.7% pure Al <sub>2</sub> O <sub>3</sub> ), ejection valve springs made of Hastelloy (HF: platinum-iridium). The valves can be easily removed and replaced using the fitting wrench (included in scope of delivery)
Plastic parts	All parts which come into contact with the medium are made of highly resistant fluoroplastics Valve block and valve housing made of ECTFE, FEP suction and ejection hose
Sterilisability	Media-conveying components (including ejection unit) are suitable for steam sterilisation at 121 °C
Breakage resistance	Completely enclosed protective plastic jacket with clear inspection window protects against breakage
Test protocol	Each instrument is individually tested, certified and bears a unique instrument number

Scope of delivery
<ul style="list-style-type: none"> <li>• solarus®, with fitted ejection unit and A 45 internal thread</li> <li>• A 32, A 38 and S 40 threaded adapters</li> <li>• Suction hose with union nut, recirculation hose, fitting wrench, quality certificate, brown light protection window</li> </ul>

Order number	Article designation
939 20 10	solarus® 10 ml, R = 0,3%, CV = 0.1%
939 20 20	solarus® 20 ml, R = 0,2%, CV = 0.1%
939 20 50	solarus® 50 ml, R = 0,2%, CV = 0.1%

\* DURAN® is a registered trademark of the DURAN Group GmbH, Wertheim.

# HIRSCHMANN®

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