Introduction to Solar Power

TP 8012-3



Equipment Set TP 8012-3

220 – 240 V, 50 Hz	**596086**

The most important components at a glance:

1x 12 V Lead-Acid Batteries*	595060
1x Solar Panel Test Bench	595057
1x Monocrystalline Silicon Solar Panel	595058

*A 12 V DC battery charger is required for this module. Users can use their own charger with 4 mm safety plugs or order the 4-Quadrant Power Supply and Dynamometer Controller, including manual and computer-based control (order no. 595028).

Necessary accessories, also order:

2x Digital Multimeter	579782
1x Connection Lead Set and Grounding Kit	595916
1x Mobile Frameline, Complete Model Without Energy Duct	8075133
1x Frameline Table on Wheels	8087149
1x Tabletop Workstation (DIN A4)	8153360
1x Tabletop Double-Sided Workstation (DIN A4)	8158409

Teach the fundamentals of solar power production.

This training package provides hands-on experience with basic solar power energy concepts, solar panel construction, operating characteristics and performance factors.

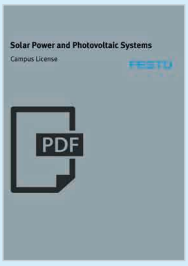
The training package contains the necessary equipment to perform the practical learning activities of the “Solar Power” course available on Festo LX (subscription required) or as a campus license (sold separately).

Learners follow step-by-step instructions to connect modules and explore topics such as solar panel characteristics, battery energy storage, and performance under varying conditions such as temperature, shading, orientation, and irradiance.

The tabletop solar panel test bench provides a controlled environment for hands-on experimentation with irradiance control, temperature monitoring, and shading capabilities. Experiments can be conducted indoors with the bench’s built-in light source or outdoors with natural sunlight. This versatile setup allows a monocrystalline silicon solar panel to be safely and efficiently connected to measure key parameters such as voltage, current, and power output under different lighting conditions.

Recommended Learning Material

Workbooks (→ page 162)



Campus license:

en	596125
de	798367
fr	8096492

Notes: The campus license includes the student and instructor manuals of the following workbooks: “Solar Power”, and “Photovoltaic Systems”. Printed workbooks available upon request.

Courses on Festo LX:

→ Solar Power
→ Photovoltaic Systems

Photovoltaic Systems

TP 8012-4



Equipment Set TP 8012-4

220 – 240 V, 50 Hz	**596087**

The most important components at a glance:

1x DC 48 V Lamps	595055
1x AC 230 V Lamps	8165858
2x 1 AC Energy Meter	594904
1x 48 V Lead-Acid Battery Pack	8174051
1x DC 48 V PWM Charge Controller	8241563
1x DC 48 V MPPT Charge Controller	595050
1x AC 230 V Power Supply	595930
1x AC 24 V Power Supply	772050
1x 1 AC 230 V Stand-Alone Inverter	595052
1x 1 AC 230 V Grid-Tied Inverter	595053
1x 4-Quadrant Power Supply and Dynamometer Controller	595028
1x Solar Power Emulator Function for the 4Q Power Supply/Dynamometer	581440
1x Data Acquisition and Control Interface DACI-1	595912

Necessary accessories, also order:

1x Communications Gateway*	595054
1x Connection Lead Set and Grounding Kit	595916
1x Mobile Frameline, Complete Model Without Energy Duct	8075133
1x Frameline Table on Wheels	8087149
1x Tabletop Workstation (DIN A4)	8153360
1x Tabletop Double-Sided Workstation (DIN A4)	8158409

* Only one per lab is necessary

Facilitate the study of solar power production systems.

This training package provides hands-on experience with photovoltaic energy production systems operating in stand-alone or grid-tied operation.

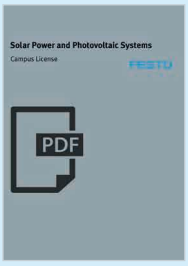
The training package contains the necessary equipment to perform the practical learning activities of the “Photovoltaic Systems” course available on Festo LX (subscription required) or as a campus license (sold separately).

Students connect modules following step-by-step instructions to explore topics such as selecting the appropriate components for stand-alone or grid-tied applications, setting up systems for DC and AC loads, improving energy efficiency, applying metering techniques, and understanding different types of charge controllers (MPPT or PWM) and inverters.

The solar panel emulator firmware feature of the four-quadrant power supply and dynamometer simulates the behavior of a solar panel under varying environmental conditions. This provides a controlled environment to study solar power system performance and analyze how different charge controllers (MPPT or PWM) affect energy efficiency and power output in both stand-alone and grid-tied systems. The tabletop solar panel test stand further supports experimentation with irradiance control, temperature monitoring, and shading capabilities.

Recommended Learning Material

Workbooks (→ page 162)



Campus license:

en	596125
de	798367
fr	8096492

Notes: The campus license includes the student and instructor manuals of the following workbooks: “Solar Power”, and “Photovoltaic Systems”. Printed workbooks available upon request.

Courses on Festo LX:

→ Solar Power
→ Photovoltaic Systems

Solar Power, Complete

TP 8012-5



Equipment Set TP 8012-5

220 – 240 V, 50 Hz	**596088**

The most important components at a glance:

1x 12 V Lead-Acid Batteries *	595060
1x Solar Panel Test Bench	595057
1x Monocrystalline Silicon Solar Panel	595058
2x 1 AC Energy Meter	594904
1x DC 48 V PWM Charge Controller	8241563
1x DC 48 V MPPT Charge Controller	595050
1x AC 230 V Power Supply	595930
1x 1 AC 230 V Grid-Tied Inverter	595053
1x DC 48 V Lamps	595055
1x AC 230 V Lamps	8165858
1x 48 V Lead-Acid Battery Pack	8174051
1x AC 24 V Power Supply	772050
1x 1 AC 230 V Stand-Alone Inverter	595052
1x 4-Quadrant Power Supply and Dynamometer Controller	595028
1x Data Acquisition and Control Interface DACI-1	595912
1x Solar Panel Emulator Function for the 4Q Power Supply/Dynamometer	581440

*A 12 V DC battery charger is required for this module. Users can use their own charger with 4 mm safety plugs or use the 4-Quadrant Power Supply and Dynamometer Controller.

Necessary accessories, also order:

2x Digital Multimeter	579782
1x Communications Gateway*	595054
1x Connection Lead Set and Grounding Kit	595916
1x Mobile Frameline, Complete Model Without Energy Duct	8075133
1x Tabletop Workstation (DIN A4)	8153360
1x Tabletop Double-Sided Workstation (DIN A4)	8158409

* Only one per lab is necessary

Provide a complete learning experience in solar power production.

This training package provides hands-on experience with basic solar power energy concepts, solar panel construction, operating characteristics and performance factors, before moving on to the operation and maintenance of photovoltaic systems in stand-alone or grid-tied scenarios. It combines TP 8012-3 and TP 8012-4 without duplication of hardware components.

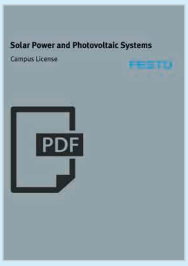
The training package contains the necessary equipment to perform the practical learning activities of the “Solar Power” and “Photovoltaic Systems” courses available on Festo LX (subscription required) or as a campus license (sold separately).

Learners follow step-by-step instructions to connect modules and explore topics such as solar panel characteristics, battery energy storage, and system performance under varying conditions such as temperature, shading, orientation, and insolation. They also explore component selection for stand-alone or grid-tied applications, system setup for DC and AC loads, energy efficiency, metering techniques, and the differences between MPPT and PWM charge controllers and inverters.

The four-quadrant power supply and test stand’s solar panel emulator firmware feature simulates solar panel behavior under changing environmental conditions, providing a controlled environment to study system performance and compare the impact of MPPT and PWM charge controllers on energy efficiency and power output in both stand-alone and grid-tied systems. The tabletop solar panel tester also provides a controlled environment for hands-on experimentation with irradiance control, temperature monitoring, and shading simulation.

Recommended Learning Material

Workbooks (→ page 162)



Campus license:

en	596125
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Notes: The campus license includes the student and instructor manuals of the following workbooks: “Solar Power”, and “Photovoltaic Systems”. Printed workbooks available upon request.

Courses on Festo LX:

→ Solar Power
→ Photovoltaic Systems