/ Perfect Welding / Solar Energy / Perfect Charging

FRONIUS TAURO

INSTALLATION & COMMISSIONING AND SERVICE

Version 03 01/2022 KS
Solar Energy

WELCOME

We welcome you to the Fronius Tauro installation and commissioning training.
This document is for your reference and will help you should you have any questions later.

We wish you an enjoyable and successful training!

Solar Energy

For further information, please contact:
Technical Support, pv-support@fronius.com, Tel.: +43 (0) 7242 241 5670

Fronius Tauro
Installation, commissioning and service

Fronius International, Name Surname, xx.xx.20xx
Information Class: Confidential

Agenda of the training

Start: Company presentation and round of introductions	**09:00**
– **Product features and options**	Theoretical and practical part
– **Live presentation of the product**	
– **Installation instructions Fronius Tauro** (mounting and cabling)	
– **Data communication unit** (interfaces and wiring)	
– **Communication wiring**	
– **Ethernet wiring -** Setting up a system with multiple Tauros	
– **Parking controller -** feed-in management	
– **Fronius Smart Meter** (types and wiring)	
Lunch break	**12:00-13:00**
– **Initial commissioning Fronius Tauro**	Theoretical and practical part
– Fronius Solar.start	
– Star wiring	
– **Visualisation in Fronius Solar.web**	
– **Tech support part**	
– **Service & Support** (component replacement and process)	
End	**16:30**

Fronius Solhub hydrogen systems of tomorrow

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TAURO

Productfeatures & Hardfacts

Fronius Tauro ECO

Fronius Tauro ECO
Available now!

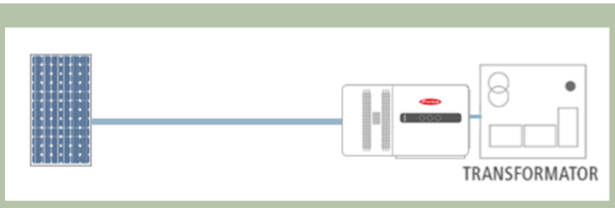
Power classes:	50 / 99 / 100 kW
MPPT voltage range:	580 – 930 V
MPP Tracker:	1
Max. Input current:	87,5 A / 175 A
Max. PV Generator:	150 %

Fronius Tauro Standard

Power class:	50 kW
MPPT voltage range:	400 – 870 V
MPP tracker:	3

Variants of the Fronius Tauro

Customised system solutions

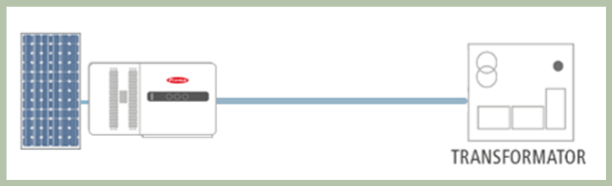


Design-Topology „PRECOMBINED (P)“

For central system design

Design-Topology „DIRECT (D)“

For decentralised system design



Precombined and Direct

What are the differences on the DC side?

Central system design

Decentralised system design

„Precombined“ variant

- DC cable 3x up to 95 mm²
- Integrated V-terminals
- AC cable up to 240 mm²

„Direct“ variant

- MC4 connector integrated
- String fuses integrated (current selectable -15A /20A)
- AC cable up to 240 mm²

AC-Option

Single Core

- 5 inputs
- 5 x M40
- Ø 15mm – 28mm (Single core cable)

Multi Core

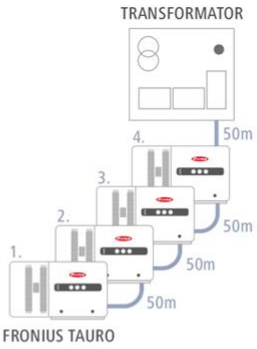
- 1 input
- Suitable from Ø 16mm - Ø 61,4mm + 1xM32
- Only 1 cable (Leiterbündel)

AC Daisy Chaining

- 10 inputs
- 10 x M32 (Single core cable)
- Ø 11,0 – 21,0 mm

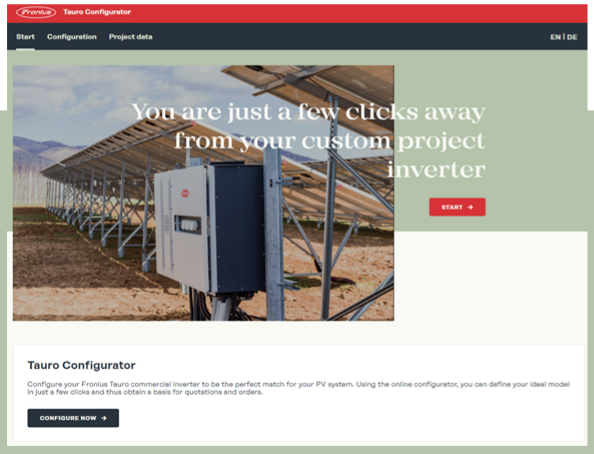
AC Daisy Chaining
Great savings potential

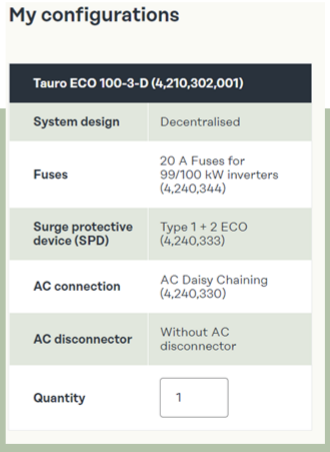
- Up to 200 kW
  - 2x 100 kW Tauro ECO / 4x 50 kW Tauro Standard / ECO
- AC cable savings
- Fewer components required
  - No AC distributor and only 1 AC isolator



Tauro configurator

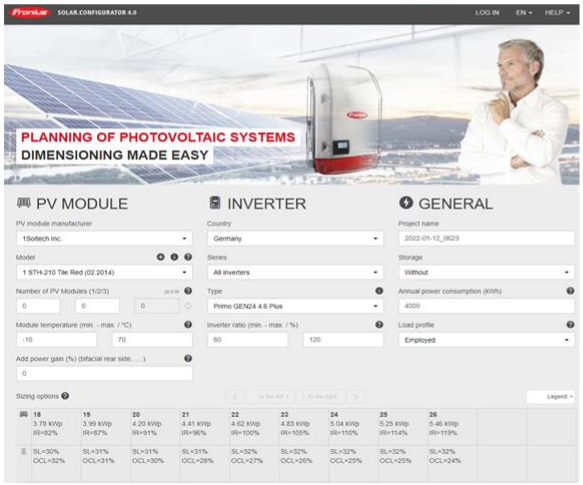
the right product in just a few steps





https://tauroconfigurator.fronius.com

Fronius Tauro im Solar.Configurator



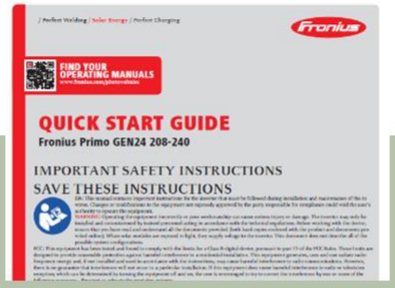
Product presentation Fronius Tauro

Installation instructions

Was benötigt man für die Installation?

Torx T20 and T25 screwdrivers

(Cordless screwdriver only with torque!)



Quick Start Guide

Package insert with product purchase

Available at www.fronius .com

Fronius Solar.start

Mobile terminal with the latest version of the Fronius Solar.start central commissioning app

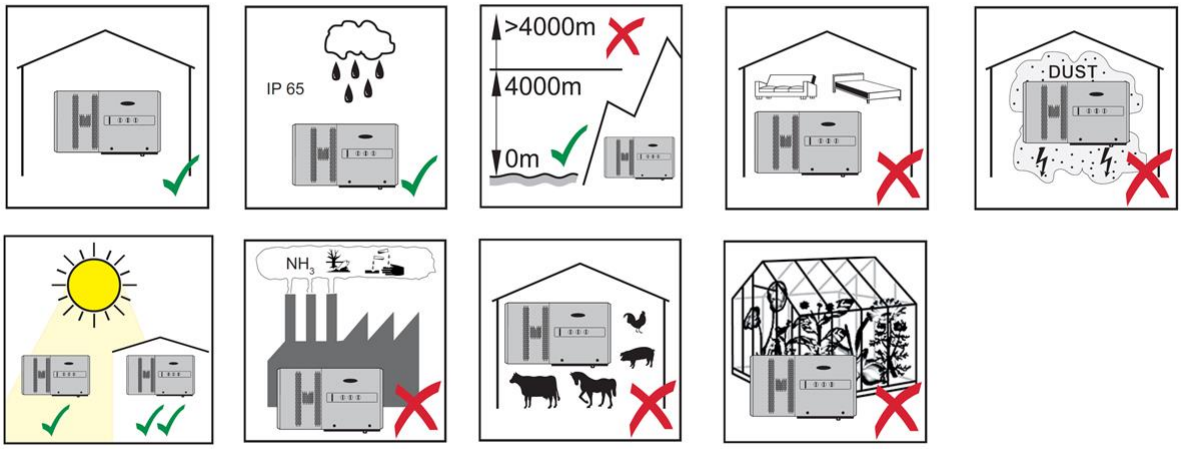
How can Tauro be transported?

- Weight 74-103 kg (depending on type)
- Chains and ropes are allowed to be mounted on predefined holding eyes
  - Use of both retaining eyes

Location selection

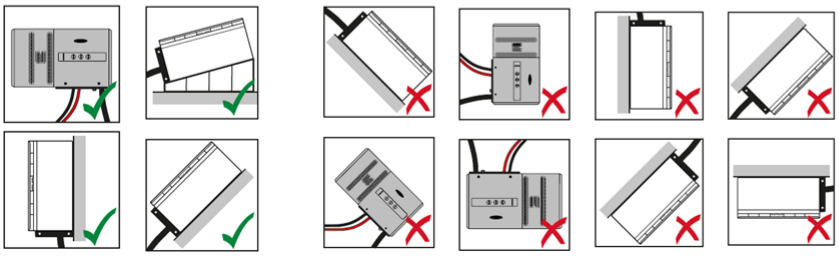
- Indoor and outdoor installation is possible
- Installation on a solid, non-flammable surface
- Up to -40 °C and +60 °C outdoor temperature range
  - Up to -30 °C with built-in AC isolator option

Installation site



Mounting position of the inverter

- Surfaces for mounting
- Wall mounting (sufficient load-bearing capacity and fire protection requirements)
- Pole mount (mounting rails behind PV modules directly on the elevation)
- Flat roofs (observe regulations for foil roofs)
- Car park roofing

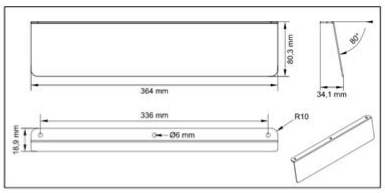


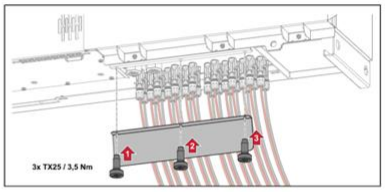
Optionally available floor racks

- Mounting of the inverter on a sloping sub-surface possible but not recommended
- Slight inclination of the floor racks for water drainage
- Screwing to the floor must be carried out (depending on conditions, not included in delivery)
- Order Floor Racks from wholesalers
  - Item article number 4,251,088

Cover for MC4 connector

- Protection of MC4 connectors from snow / weather / corrosion
- In the standard scope of delivery of the floor racks
- Cover plate can be screwed directly to the inverter

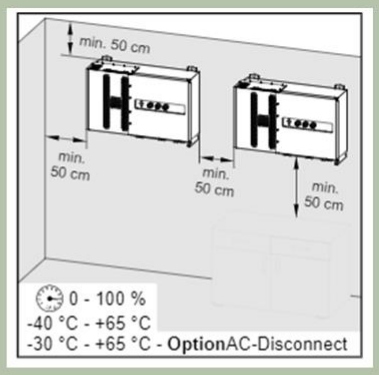


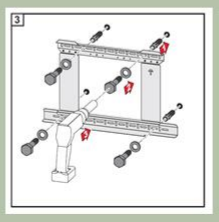


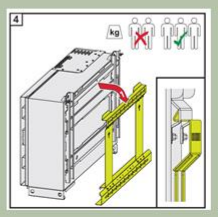
Wall mounting

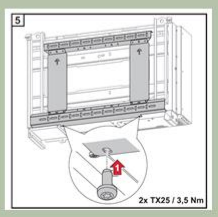
Observe distances

- Lightweight wall mount
- Included as standard
- Distance - **active cooling technology**
- Minimum: 4 screws
- Fixation with 2 screws on the bottom
- 3 persons to lift the unit





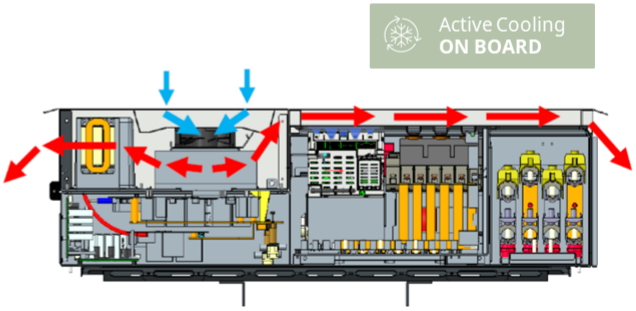




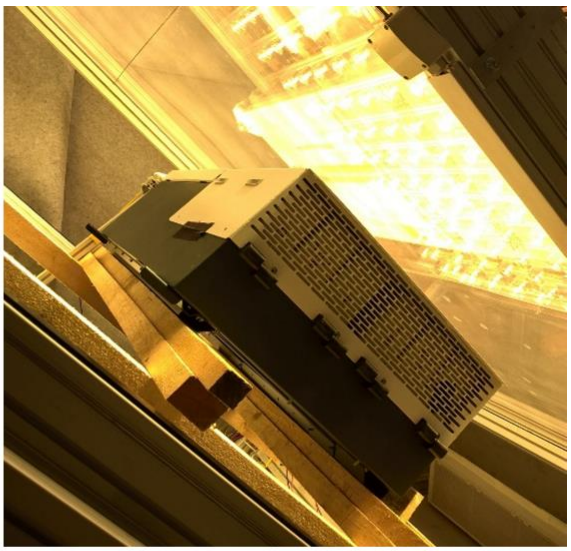
Active cooling
More yield through Active Cooling

Maximum service life despite heat

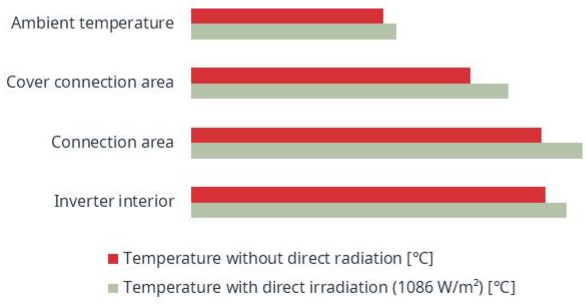
- **Double Wall System**
  - Front cover with double-wall insulation
- **Full power up to 50 °C**
  - More yield due to late derating
- **Placement in direct sun**
  - 13.5 °C less due to double-wall cooling
- **Longer service life**
  - Of components and unit



Fronius Tauro technology tested in the solar simulator



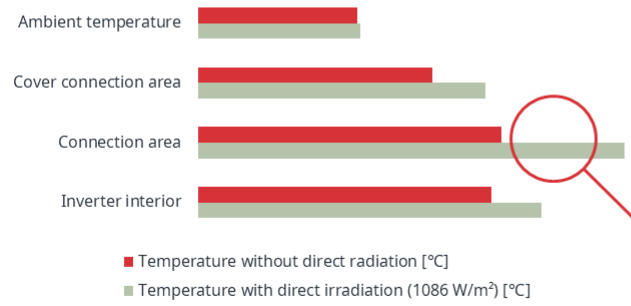
ASIC solar simulator with Double-Wall Concept



-13,5 °C
Temperature difference indoors!

What would the situation look like without the double-wall system?

ASIC solar simulator without double wall concept



+13,5 °C
Temperature difference!

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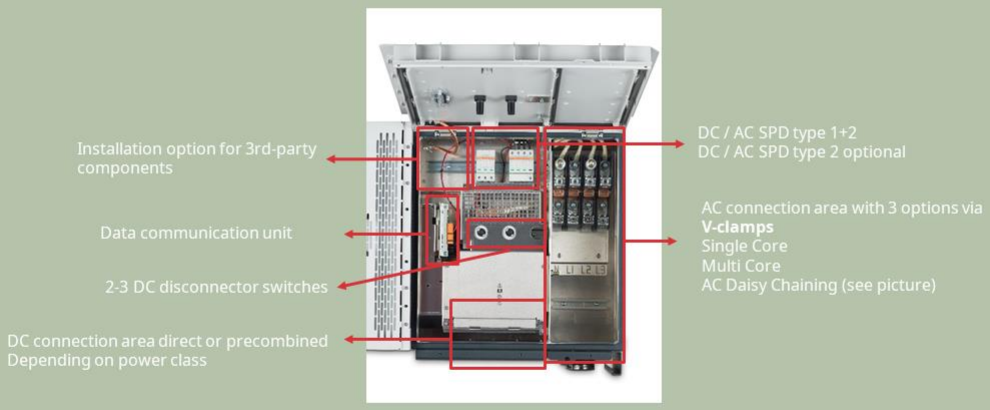
Wiring

Opening the inverter

- Access to AC and DC connection area
- DC disconnect switch in OFF position
- 7x TX25 gland on the front of the unit
  - Engaging the front cover
- With the A-disconnect option installed → switch off

Number of DC disconnectors by unit type			
Tauro Direct		**Tauro Precombined**	
Tauro Eco 50	2	Tauro Eco 50	2
Tauro Eco 50, 99 and 100	3	Tauro Eco 50, 99 and 100	2
Tauro Standard 50	3	Tauro Standard 50	3

Cable connections Fronius Tauro

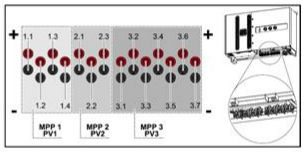


DC wiring
Tauro Direct

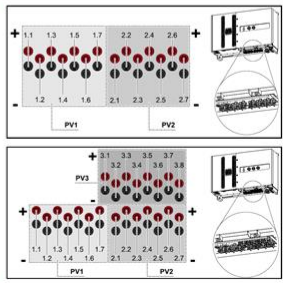
Cable connections Tauro Direct

- Decentral topology – Tauro Direct variant
- Direct connections of PV strings
  - 14 strings (50 kW devices)
  - 22 strings (100 kW device)
- MC4 connectors
- No usage of DC combiner boxes

Tauro Standard Direct
50 kW



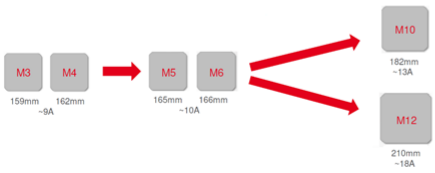
Tauro Eco Direct
50 / 99 / 100 kW



Note module currents

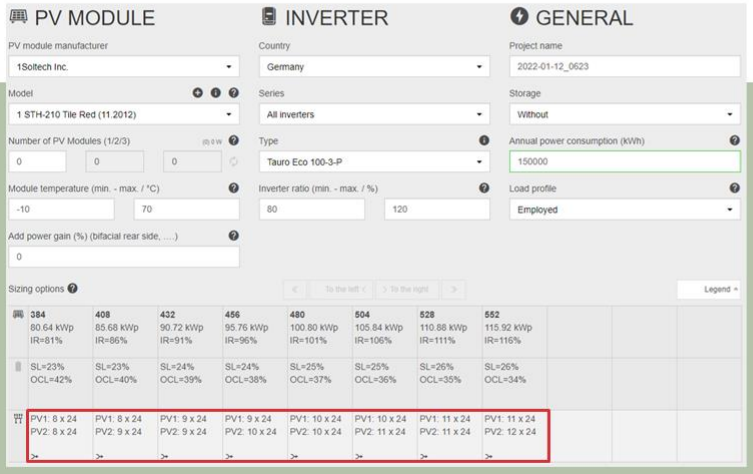
- Trend towards modules with higher currents
- Tauro Precombined not affected and with all module types compatible

- Tauro Direct variants (Eco 100-D, Eco 50-D, Standard 50-D)
  - Isc: 18 A
  - Impp: 13 A



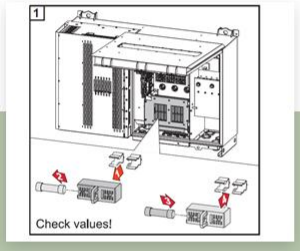
	Standard module	13 A class	18 A class
Power	~ 350 Wp	~ 400 Wp	~ 550 Wp
Impp	~ 10 A	~ 12 or 13 A	~ 13 or 18 A
Umpp	~ 35 V	~ 31 V	~ 41 V or 31 V
Dimension	~ 100 x 170 cm	~ 110 x 175 cm	Free-field

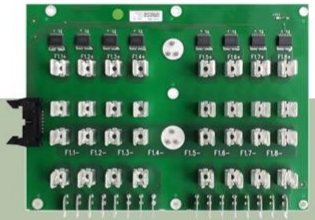
Note module voltage



- **Max. 1000 V –** string configurations with **Fronius Solar.Configurator**
- No changes of calculated string lengths (string design report)

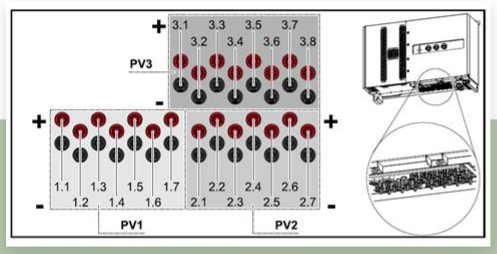
Integrated string fuses





- **15 A / 20 A string fuses** standardized integrated
- Right choice for string fuses
- Easy exchange of fuses possible

Splitting of PV strings



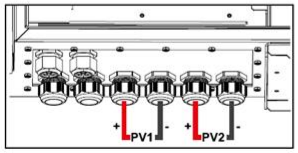
Tauro Eco Direct 100 kW

- PV strings **evenly divided on PV inputs (PV1 / PV2 / PV3)**
- Beginning with odd inputs / fill up the even inputs
- Equal distribution of power

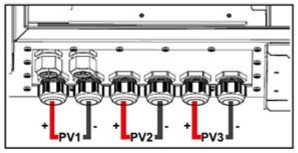
DC wiring
Tauro Precombined

Cable connections Tauro Precombined

- Central topology – Tauro Precombined variant
- Use of DC combiner boxes
- V-clamps for direct connection
- 6 cable inlets
  - 4 x M32 for Tauro Eco variant
  - 6x M32 für Tauro Standard variant

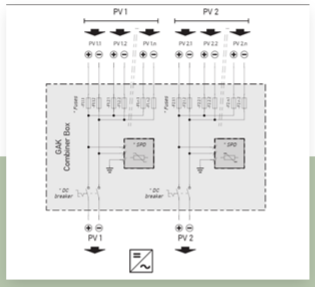


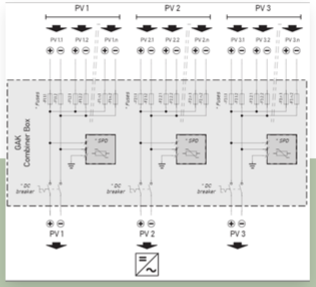
Tauro Eco Precombined
50 / 99 / 100 kW



Tauro Standard
Precombined
50 kW

Example string combiner boxes

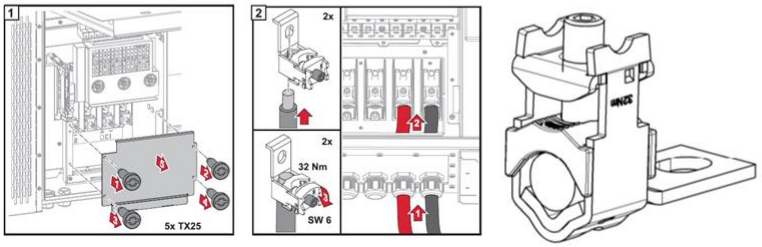


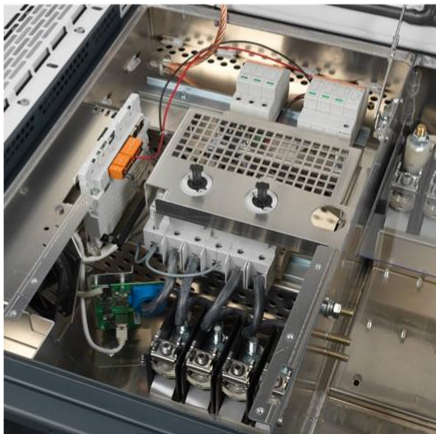


- Example of combiner boxes for Tauro Eco / Tauro Standard Precombined
- DC fuses optional depending on country norm / DC breaker optional / DC SPD optional

V-clamps in DC connection area

– No usage of cable lugs necessary
– Fast installation with direct connection





Permitted DC cable cross sections

Power class	Device type	Cable cross section
Tauro Standard 50 Tauro Eco 50 / 99 /100	Direct	**2,5-10 mm² (see data sheet)**
	Precombined	**25-95 mm²**

– Temperature resistance of DC cables must be at least 90° C
  – Optional available: Fronius protective hoses
– Select sufficiently high cable cross-sections depending on the device type

DC / AC SPD type 1+2

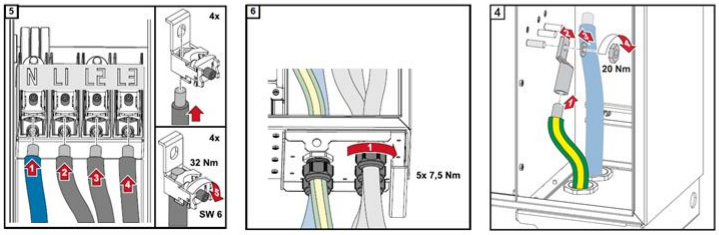
Monitored, integrated DC overvoltage protection

- No additional box required
- SPD type 1+2 integrated in the device
  - Optional SPD type 2
- High-quality SPD
  - Exchangeable and feedback contact on the data communication unit
  - Individual SPD components can be exchanged

AC wiring

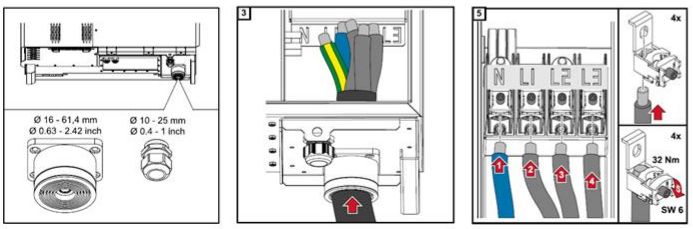
AC option Single Core

- 5 cable inlets M40 (single conductor cable)
- Different cable diameters possible (10mm² to 28 mm²)
- Copper and aluminium cable
- Mind the torques!



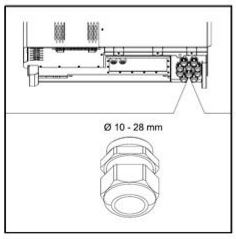
AC option Multi Core

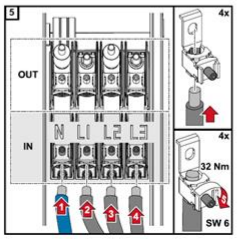
- 1 cable inlet (conductor bundle)
- Big cable gland up to 61,4 mm diameter
- Small cable gland up to 25 mm diameter
- Mind the torques!

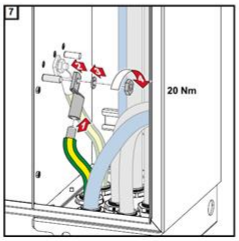


AC option AC Daisy Chaining

- 10 cable inlets M32 (single conductor cable)
- AC input and AC output
- First Tauro in chain → Single Core sufficient

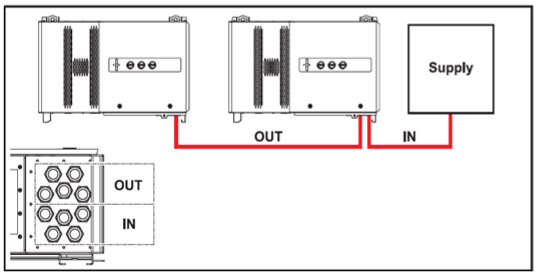


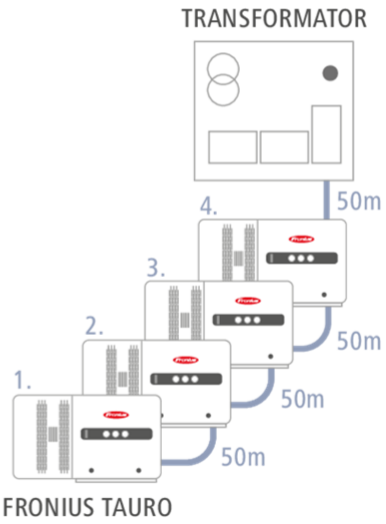




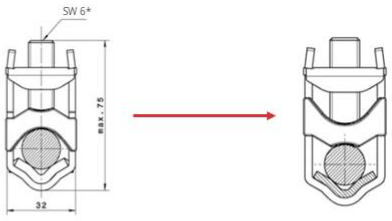
AC option AC Daisy Chaining

- Interlinkage of up to 200 kW AC inverter output power
  - 2x 100 kW Tauro / 4x 50 kW Tauro
- Savings in cable costs, wiring effort and additional AC components (AC distribution board, AC disconnector)





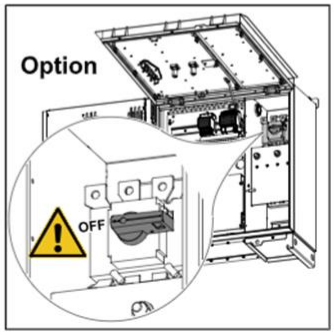
V-clamps in AC connection area



- Connection of following cables
  - RE (solid round conductor)
  - RM (stranded round conductor)
  - SE (solid sector conductor)
  - SM (stranded sector conductor)
  - Fine-core cables only in conjunction with ferrules
    - M10 cable lugs to the M10 threaded bolts
- Delivery condition 25-150 mm²
- Change of clamping area from 185 to 300 mm² possible
- Cable lug alternative (M12 threaded bolts)

Option integrated AC disconnector

- Optionally integrated
- Configurable and orderable ex factory
- Available for AC options
  - Single Core
  - Multi Core
- When working within the device: AC disconnector switch on OFF position



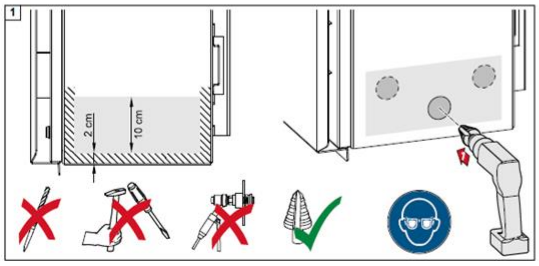
Up to 240 mm² AC cable cross section

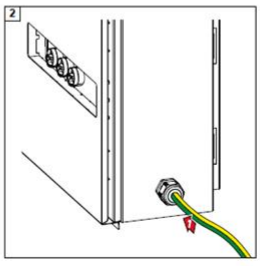
Power class	Connection variant	Cable cross section
Tauro Standard 50 Tauro Eco 50	Standard Optional AC disconnector Daisy Chain	**35-240 mm²**
Tauro Eco 99 Tauro Eco 100	Standard Optional AC disconnector Daisy Chain	**70-240 mm²**

- The temperature resistance of the AC cables must be at least 90°C
  - Optional: Fronius protective hoses (article number: 4,251,050) for temperature resistance
- Connection of aluminium cable possible

Additional PE cable gland

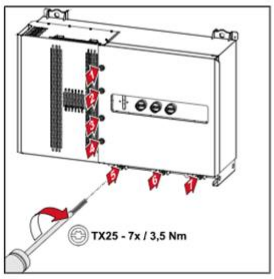
- **Optional hole** for additional PE entry
- Insertion of a screw connection in the hole
- Observe sealing (protection class)

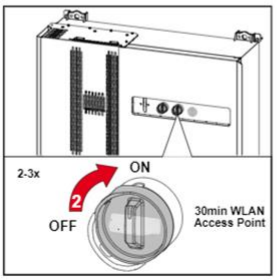




Completion of the installation

- Properly carried out AC- / DC cabling
  - Optional: AC disconnector switch on ON position
- Screwing of the front cover
  - 7x TX25 with 3,5 Nm
- Turn on DC disconnector switch
  - Opening the WiFi access point





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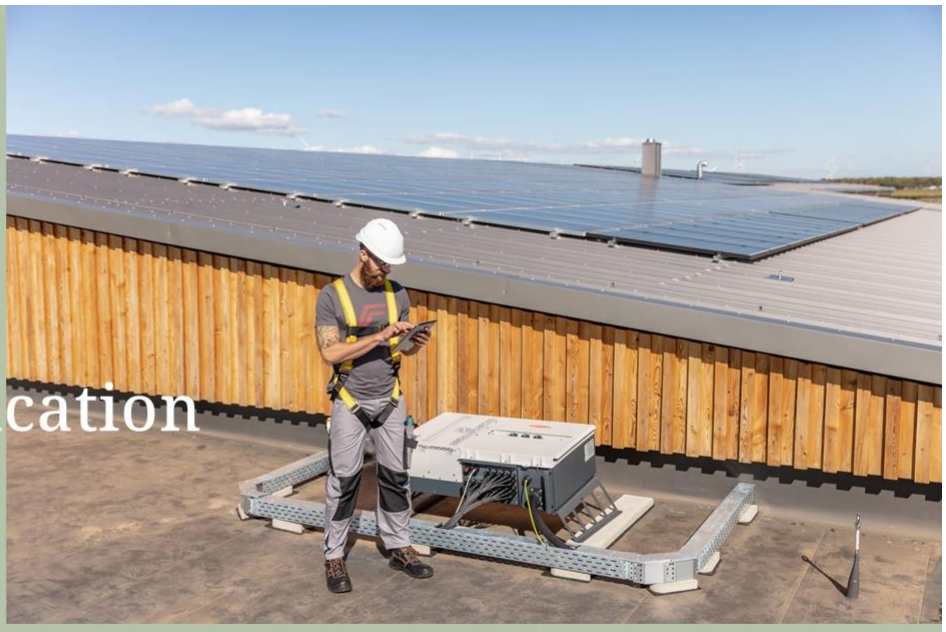
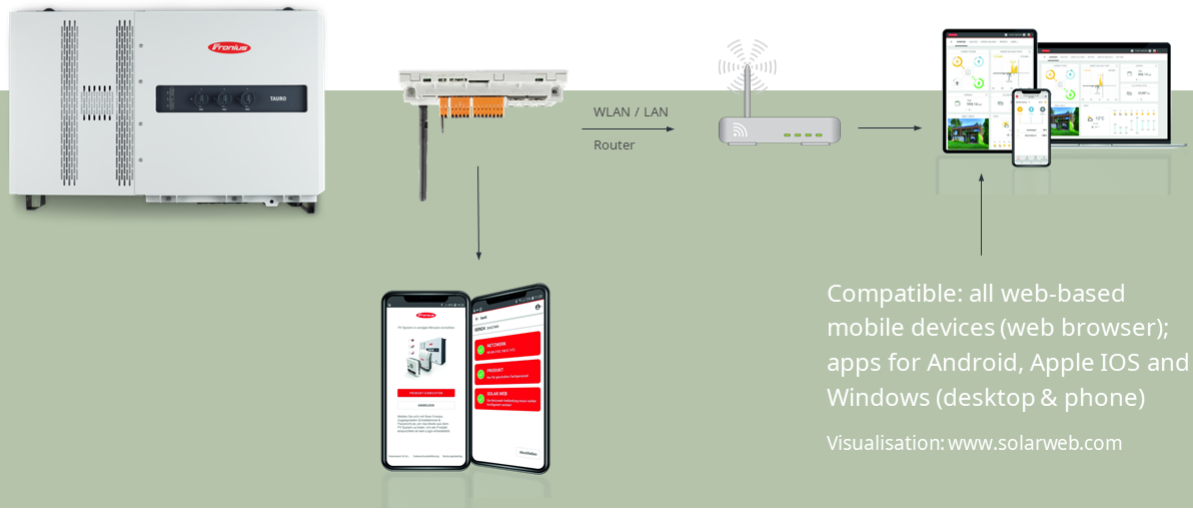
Data communication



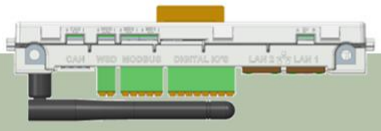
Data communication unit



Compatible: all web-based mobile devices (web browser); apps for Android, Apple IOS and Windows (desktop & phone)

Visualisation: www.solarweb.com

Data communication unit



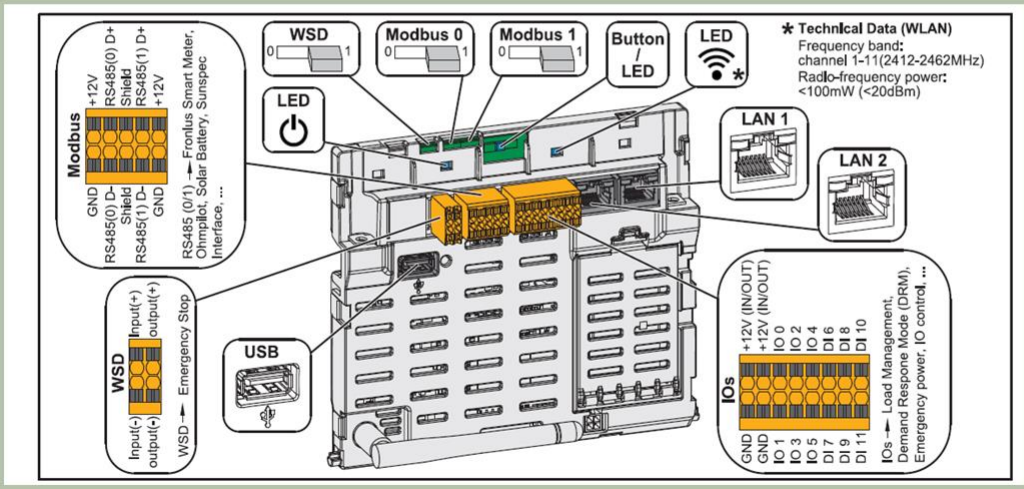
- LED status display
- Data logger, web-server, WiFi interface card
- Visualisation via Fronius Solar.web portal, Fronius Solar.web app, Solar TV

Multiple open interfaces

- 2 Ethernet / LAN (LAN1 for direct ethernet connection): Modbus TCP SunSpec or Fronius Solar API JSON protocol (LAN2 for internal use)
- 2 Modbus RTU (RS 485) interfaces
- WSD function
- Digital inputs and outputs (I/O's)

Overview integrated interfaces

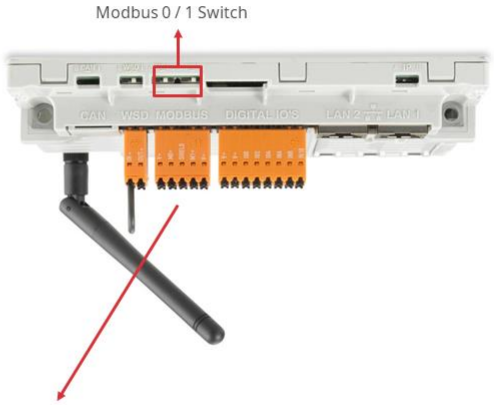
Data communication unit



Overview integrated interfaces

Modbus RTU / RS485

- Push-in clamp (orange plug)
- **2 Modbus RTU (RS 485)** interfaces
- Modbus 0, Modbus 1, 12 V and GND (Ground)
- Fronius Smart Meter
- Modbus 0 / 1 Switch
  - Position 0: termination resistance off
  - Position 1: termination resistance on

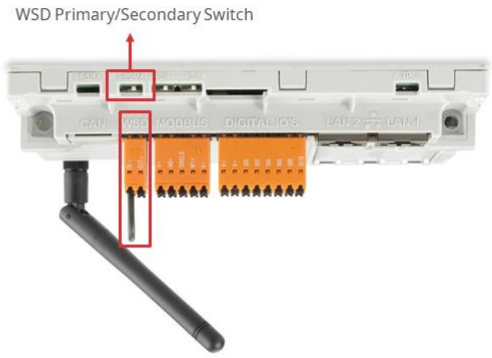


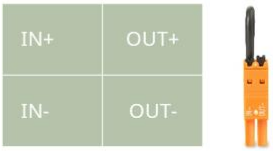
V+	M0+	SHIELD	M1+	V+
GND	M0-	SHIELD	M1-	GND

Overview integrated interfaces

WSD (Wired Shut Down)

- Safety function
- WSD function of the inverter interrupts during feed-in process if the switch has been activated (triggered)
- WSD primary / secondary switch (with chain connection of the inverter)
- Max. distance between two devices: 100 m
- Max. amount of devices: 10
- WSD connection standardized bridged ex factory

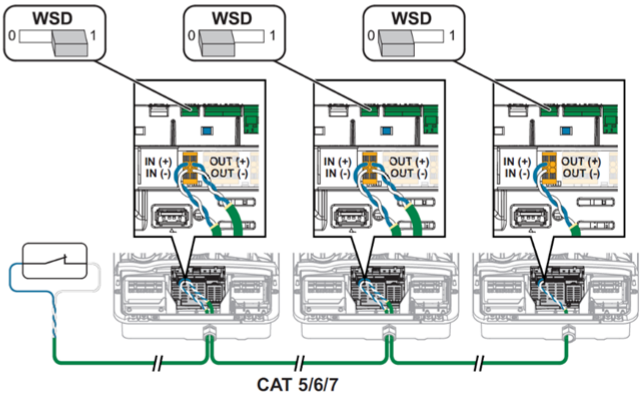




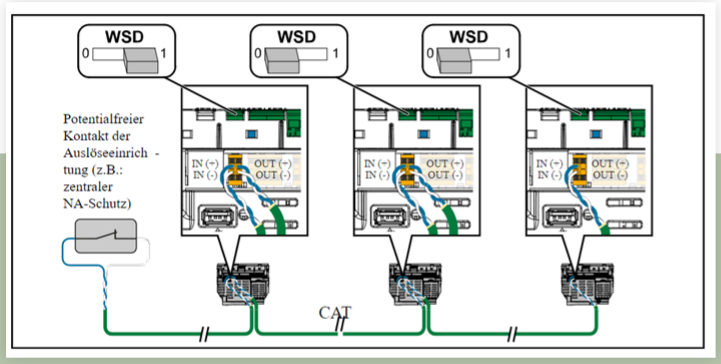
WSD function in a chain – triggering

WSD (Wired Shut Down) function

- The WSD switch of the first inverter with connected trigger device in the WSD chain must be in position 1 (master)
- The WSD switch of all other inverters should be in the 0 (slave) position
- In case of failure of a slave device → bridging
- **In case of failure of a master device or a failure beginning from two slave devices → triggering**



Grid and system protection



- Possibility to use integrated AC relays as tie switches in connection with central grid and system protection (according to VDE-AR-N 4105:2018:11)
- Integration of the central release device (switch) in **WSD chain**

Overview integrated interfaces

Further interfaces

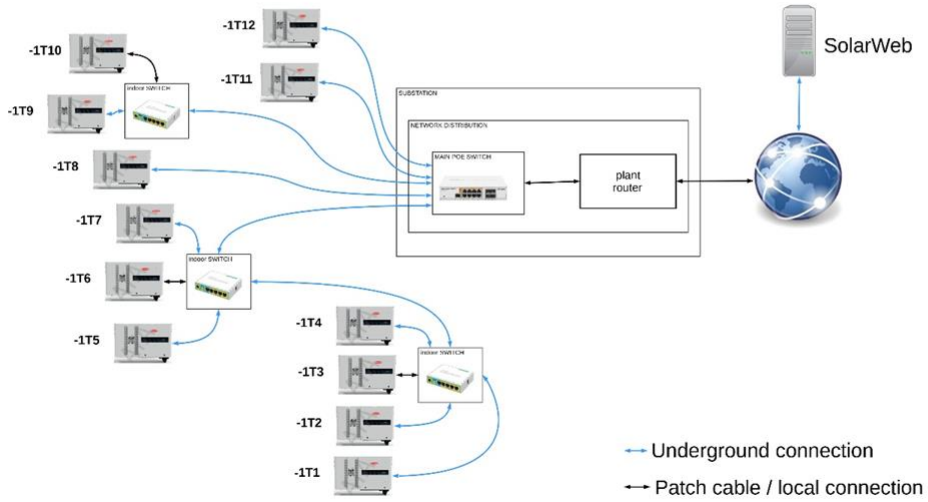
- **LAN 1 and LAN 2:** Ethernet ports for data communication (only LAN 1 functional)
- LAN 2 for internal use only
- **USB slot:** only for power supply
- 5V 1A for ethernet switch
- Attention to the housing temperature
- **LED status display** (see initial commissioning of the inverter)

Cable selection for data communication

Interface	Max. cable cross section	Max. cable length	Cable recommendation
LAN		**100 m**	**CAT 5 STP**
Modbus	1,5 mm²	300 m	Min. CAT 5 STP
IO	1,5 mm²	30 m	Single ladder possible
WSD	1,5 mm²	100 m	Min. CAT 5 UTP

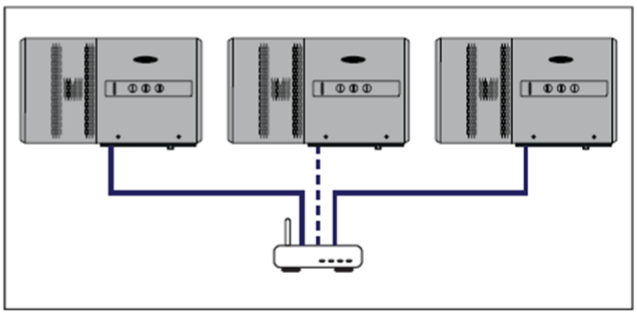
Interconnection of multiple Tauro devices within one system

Network wiring



Ethernet wiring

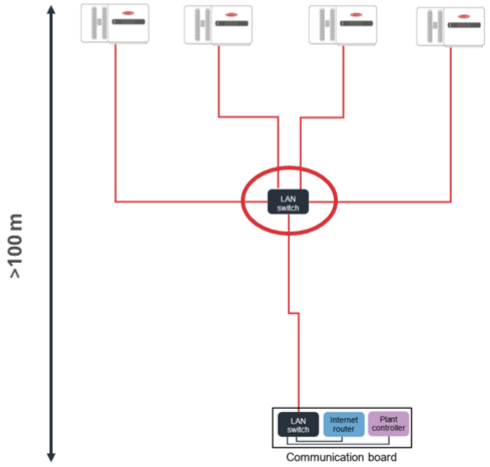
- **Star wiring as an independent and robust cable layout**
  - Easy planning
  - Fail-safe
  - Fast troubleshooting
  - Further LAN switches as signal amplifier
    - POE / outdoor switches



Maximum LAN cable length
100 meter!

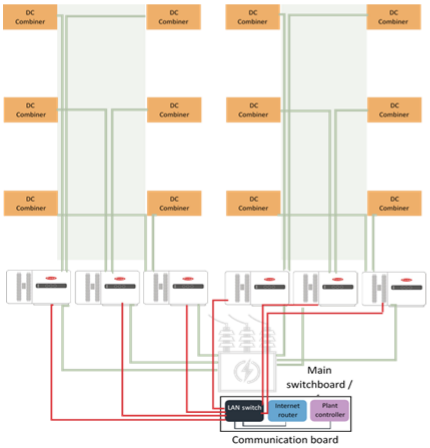
Star wiring over 100 meter

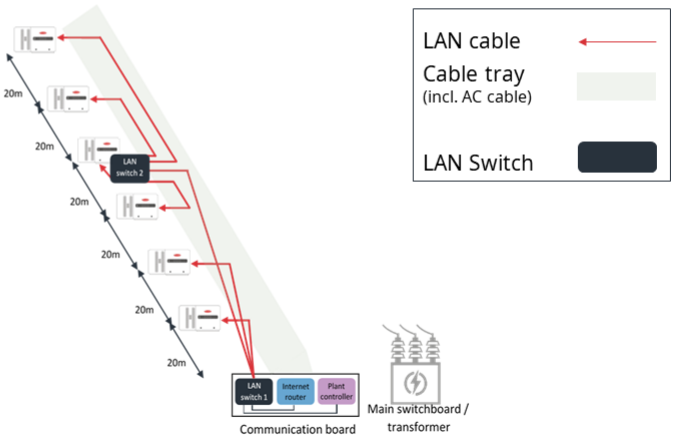
– It is important to note that if **the LAN line length exceeds 100 meters**, an additional LAN switch is used to amplify the signal



Typical communication structure

Central und decentral system design



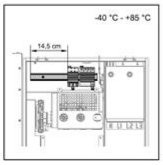


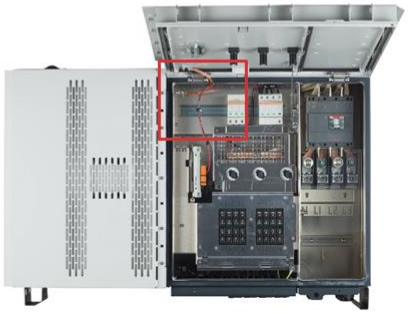
Which LAN switches are available?

- **Standard ethernet switch**
- **PoE switch**
- What does **PoE (power over ethernet)** mean?
- Power supply of various network-capable devices via LAN cable
- Power cable saving
- **Outdoor switches** (in an external IP-protected box)

3rd party components

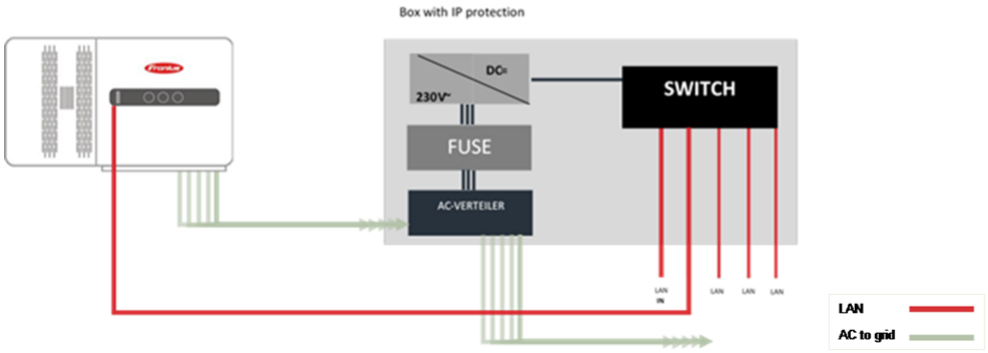
- **DIN-rail mounting possibility for 3rd party components**
- Maximum width **14,5 cm (8 TE)**
- Temperature stability of components **from -40°C to +85°C**
- Possibility of installing **LAN switches**
- Power supply via data communication unit
  - USB: 5V / 1A
  - I/O's: 12V / 500mA





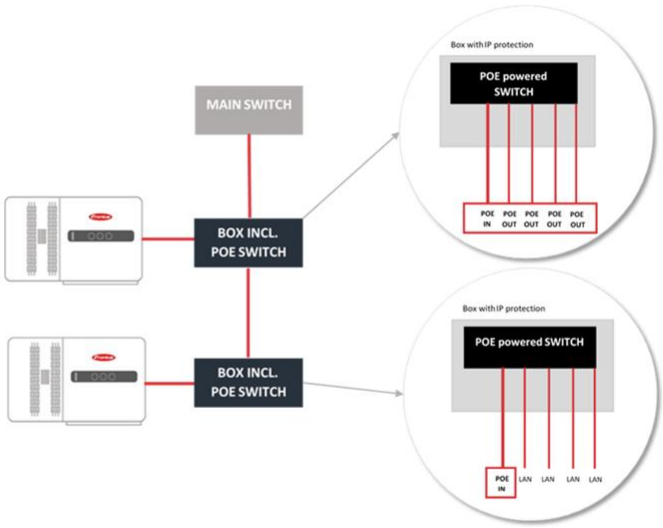
Standard Ethernet Switch

- **Required materials**
  - Box with power supply and IP protection
  - Standard ethernet switch



POE Switch

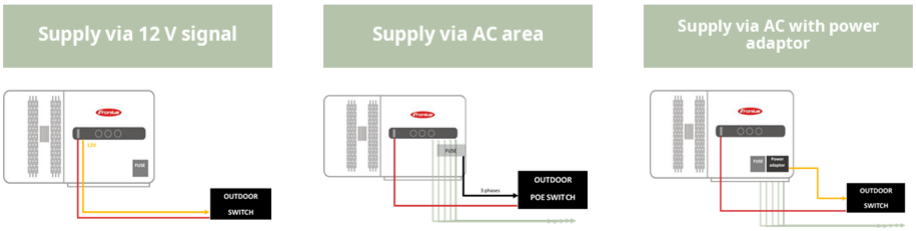
- **Required materials**
  - Box with IP protection
  - Standard POE ethernet switch



Outdoor switch (without POE)

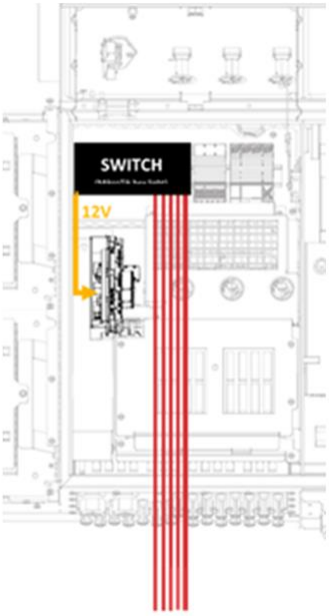
Required materials:

- No box required
- Power supply needed (available with POE)
- Higher effort due to power supply
- Different options to supply the switch



Practical example

- **Power over Ethernet (POE)**
- **Data communication** secured even in case of inverter failure
- Requests of a **system controller** can also be accepted during such scenarions



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Fronius Smart Meter

Bidirectional energy meter

- **Analysis and visualisation** of consumption data
- Base for **complete monitoring** in Fronius Solar.web
- **Bidirectional energy meter**
- **Information at the feed-in point**
- Essential for **feed-in management of a single Tauro device**
- **Feed-in management for multiple Tauro devices** possible
  - **Depending from the feed-in limit and system limitations**
  - **Regulation via a single Tauro device**

Commercial Fronius Smart Meter

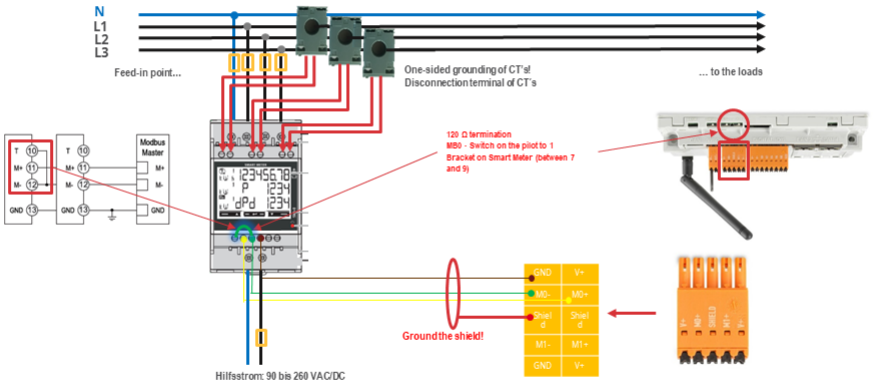
50 kA-3

- 3-phase
- External current transformer

5kA-3

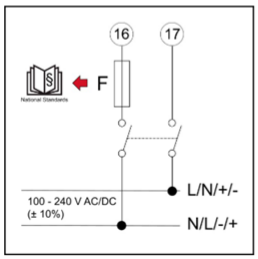
- 3-phase
- External current transformer
- Touchscreen

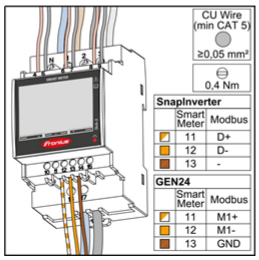
Fronius Smart Meter TS 5kA-3 wiring



Protective circuit and auxiliary power

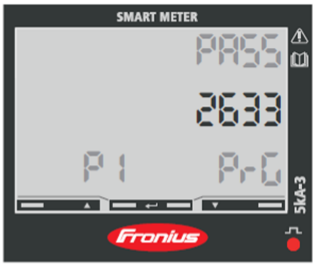
- Disconnecting device required (circuit breaker, switch or disconnector)
- Overcurrent protection required (automatic circuit breaker)
- Consumption **Smart Meter TS 10-30 mA**
- Additional, auxiliary power supply (port 16, 17) required





Transformation ratio of current transformer

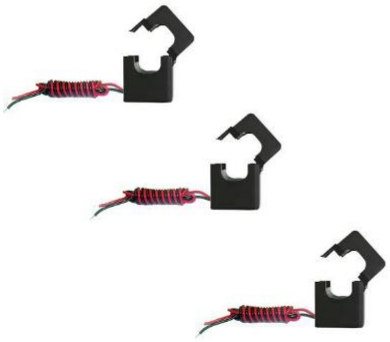
- **Code: 2633**
- Calculate transmission ratio
  - Primary (P) : Secondary (S) = CT Factor
  - E. g. 50 : 5 = 0010 → **to be entered CT factor**



Symbol	Name	Event	Function
	Up	1 x	Scroll one screen forward, increase the value by 1
	Down	1 x	Scroll one screen back, decrease the value by 1
	Enter	2 seconds	Call up settings, confirm value

Selection criteria current transformer

- **Selection support** for current transformers
- More information at www.fronius.com



Selection criteria for current transformer

General
Do not use current transformers with a voltage output.
Current transformers are directional. If they are mounted backwards or with swapped wires, the measured power will be negative.

Primary current
Maximum current per phase. A current converter with a primary current greater than the maximum expected current per phase should be selected. The closer the expected current is to this value, the more precise the measurement will be.

Secondary current
The current transformer must supply alternating current at a nominal current of 1 or 5 A. The nominal values for the current transformer are listed in the current transformer data sheet.

Power
The Fronius Smart Meter TS needs 0.5 VA to carry out its measurements. Losses also occur on the outgoing and return leads. The power of the current converter must be greater than the sum total of the power of the Fronius Smart Meter TS and the leads. The higher the power, the better.

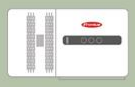
Line resistances at different cross-sections (copper wires)

Secondary current [A]	Cross-section [mm²]	Line resistances at different lead lengths (outgoing and return lead)				
		0.5 m	1.0 m	2.5 m	5 m	10 m
5	1.5	0.3 VA	0.6 VA	1.5 VA	2.9 VA	5.8 VA
5	2.5	0.2 VA	0.4 VA	0.9 VA	1.8 VA	3.6 VA
5	4	-	-	0.6 VA	1.1 VA	2.2 VA

Example
The length of the outgoing and return lead (0.5 m each) between the Fronius Smart Meter TS and the current transformer is a total of 1 m and has a copper cable cross-section of 1.5 mm²; the line resistance is therefore 0.6 VA according to the table above. The self-consumption of the Fronius Smart Meter TS is 0.5 VA.
Line resistance 0.6 VA + self-consumption 0.5 VA = 1.1 VA
→ A current transformer with a rating of 1.5 VA, 5 VA or higher is suitable here.

Accuracy class
Use Class 1 or better (Class 0.5 / 0.2, etc.). Class 1 is equivalent to a deviation of ± 1% of the secondary current at maximum power.

Mounting
Rigid or hinged
"Rigid" is usually cheaper with better power and accuracy values. Hinged current transformers can be opened for attachment to the conductor. To prevent it being opened inadvertently, a plastic cable tie can be secured to the current transformer. Hinged current transformers can be installed in a system without interrupting the voltage.



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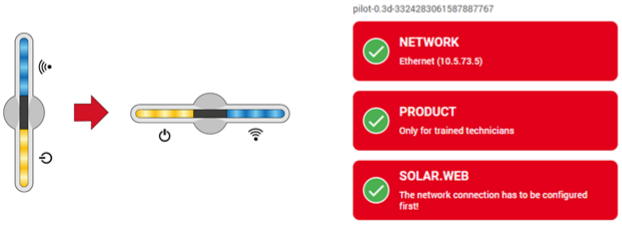
Initial commissioning

Initial commissioning

– Correctly completed AC / DC wiring
– Setup settings with initial commissioning
– Setting of the country setup only possible during initial commissioning



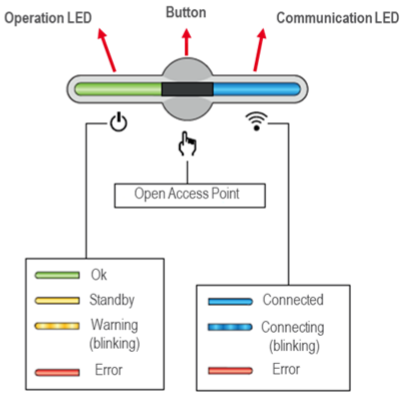
How does the inverter communicate?

Infrared-sensitive button with three functions

– **Pressing once**
  – Activation of the WiFi access point

– **Pressing twice**
  – WPS function is activated

– **Long press (3-6 seconds)**
  – Acknowledging the error message
  – (De-) / activation of button lock



Solar.Start App

3 easy steps
-
User friendly

Automatic WiFi-connection
-
Fast commissioning

FRONIUS TAURO
-
Fastest commissioning on the market

Commissioning via Fronius Solar.start

Download of Solar.start App
– Free Download
– Available in Google Play and iOS Store

Open Solar.start App
– Open the App
– Step-by-step approach

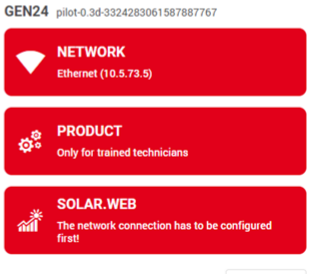
WiFi Access Point
– One quick push on the inverter front side
– Feedback via blue blinking light of communication LED

Initial commissioning data communication unit

Installation via browser

WiFi Connection

- Open access point with one quick push on the inverter
- Connect to the inverter network
  - Name: **FRONIUS_serial number**
  - Password: **12345678**
- Enter IP-adress **192.168.250.181** in the address bar
- Open installation wizard
- Finish in Fronius Solar.web (network connection necessary)



Installation via browser

LAN / Ethernet connection

- Connect to inverter via network cable (min. CAT 5 STP)
- Use **LAN 1** – interface on the pilot
- No password entry necessary
- Enter IP address **169.254.0.180** in the address bar
- Open installation wizard
- Finish in Fronius Solar.web (network connection necessary)

What do you have to keep in mind with Windows 10?

Advice for LAN / WLAN connection with Windows 10

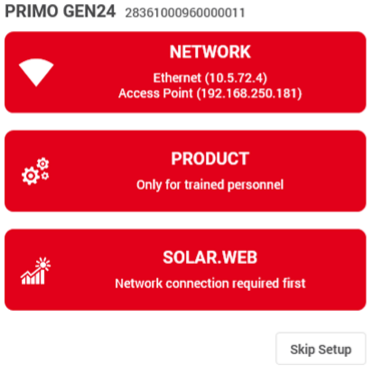
- When entering the password under Windows 10, the link "Connect using a network security key instead" must first be activated
- Only then it is possible to establish a connection with password: 12345678!

Windows 10

Important for a smooth connection!

Where to assign which passwords?

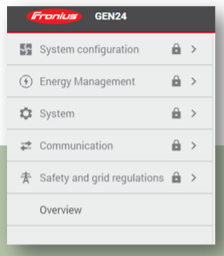
Different levels with different passwords



- Network configuration
- Assign **customer password**
- Product configuration
- Assign **technician password**
- Solar.web configuration
- Registration in Fronius Solar.web
- Feature: Invitation via e-mail from installer to Solar.we of end customer

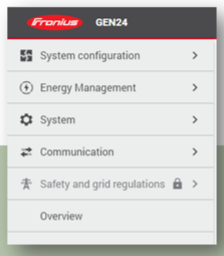
- Skip setup – all settings have to be entered manually

Which passwords are assigned?



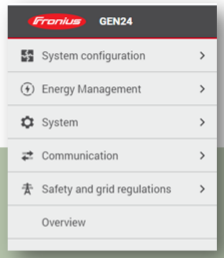
Guest

- No login data needed
- No possibility to do commissioning of inverter or network
- Only observer mode
- All menus / submenus are locked



Customer

- Password assignment in wizard
- Customer access is needed for network settings
- No access to critical network parameters



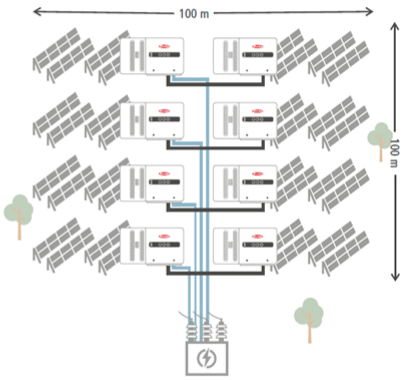
Technician

- Password assignment in wizard
- Technician access is needed for product settings
- Unrestricted access to inverter settings (exception: Grid Code settings)

Initial commissioning of multiple Tauro devices within one system

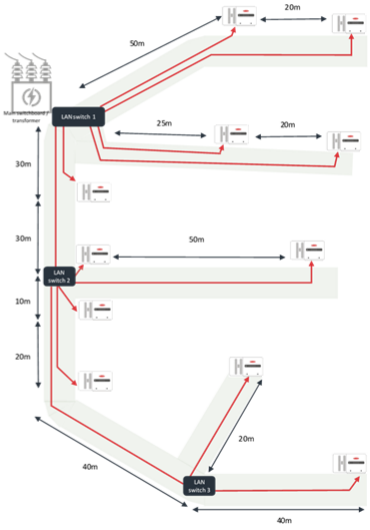
Initial commissioning of larger systems

- Common commissioning possible via **central place**
  - Serial numbers and system overview (setup) necessary
- **Individual commissioning** of each Tauro required
  - No copying of commissioning data of one device to the others is possible



Checklist commissioning star arrangement

1. Each inverters needs to be connected to the same network
2. Note of installed devices **(serial numbers required)**
3. Direct connection to network / router
4. Check of configured IP addresses (via router or separate tool)
5. Connection via IP addresses to each inverter
6. Check of serial number in the installation wizard
7. **Inverter configurations** can be set



Fronius Tauro configuration via DHCP network

Server adresses for data transmission

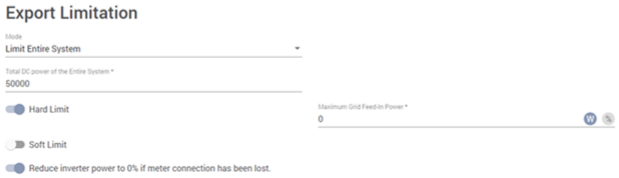
- For outgoing connections following **protocols, server addresses and ports must be allowed** to ensure **successful data transmission**
  - Tcp fronius-se-iot.azure-devices.net:8883
  - Tcp fronius-se-iot-telemetry.azure-devices.net:8883
  - Tcp fronius-se-iot-telemetry.azure-devices.net:443
  - Udp sera-gen24.fronius.com:1194 (213.33.117.120:1194)
  - Tcp froniusseiot.blob.core.windows.net:443

Integration of a plant controller

Feed-in management with Tauro

- Base for plant control is an intact data communication
  - Fronius inverter are capable of an integrated energy and feed-in management system
  - Soft- and Hardware implementations to enable power reduction
  - Different possibilities

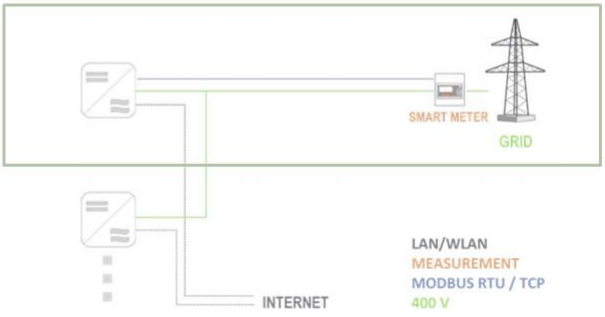
$$0\ \%\ of\ P_{INV1} + 100\ \%\ of\ P_{INV2} + 100\ \%\ of\ P_{INV3\ldots} <= feed\text{-}in\ limit$$



Feed-in control by a Tauro

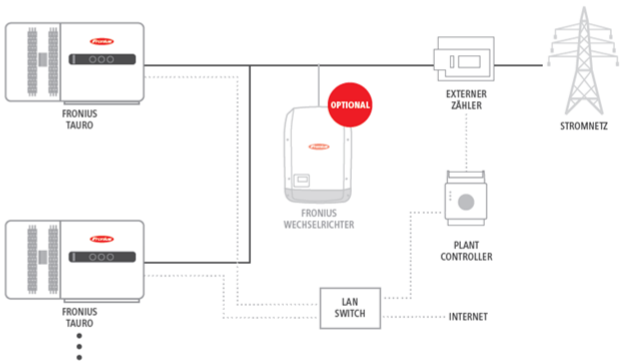
- Connection of **one Tauro to the Fronius Smart Meter**
- Tauro limitation at the feed-in point
- Unlimited feed-in of further Tauros
- Solution depending on system size / requirements

Regulation via
a Tauro with Smart Meter!



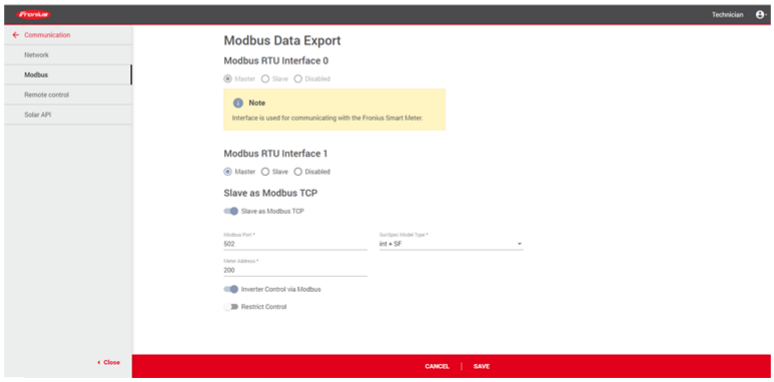
Operational scenario of plant control

- Multiple Fronius Tauro inverters
- Plant controller
  - e.g. SolarLog, Meteocontrol
- External control and central monitoring
  - Legal requirement of the grid operator
  - Grid conformity
  - Remote control / remote switch-off
  - Guaranteed safety functions
  - Secured data transfer for direct marketing



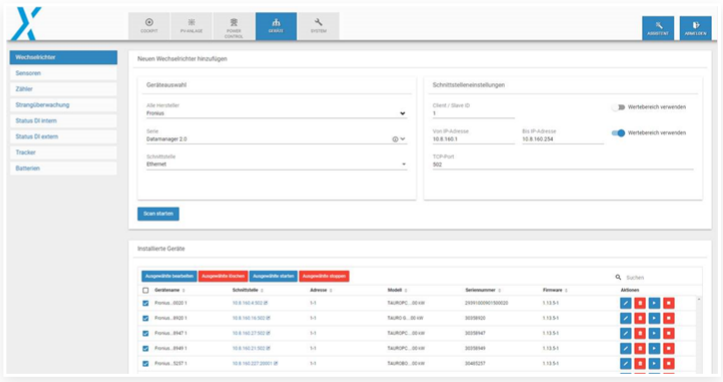
Activation of Modbus data export

- Activation “Slave as Modbus TCP”
- Activation of “Inverter control via Modbus ”
- Check sunspec model type – e.g. “int + SF” for Meteocontrol
- Standard TCP port output

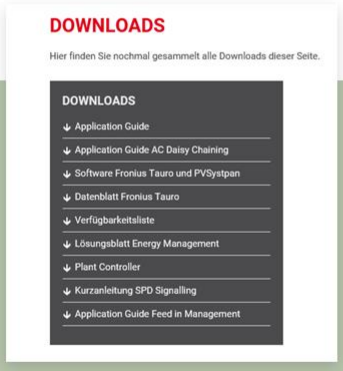


Example integration BlueLog X-Serie

- Manufacturer: Fronius
- Series: DM 2.0
- Interface: Ethernet
- Client / Slave ID: 1
- Enter IP address
- TCP-Port: 502 (default)
- Each inverter must be listed!
- Recommendation: Select all after integration and choose stop for “chosen inverter”
  - Switch-off of the inverter must follow



Solution sheets and application guides



www.fronius.com/solar-energy

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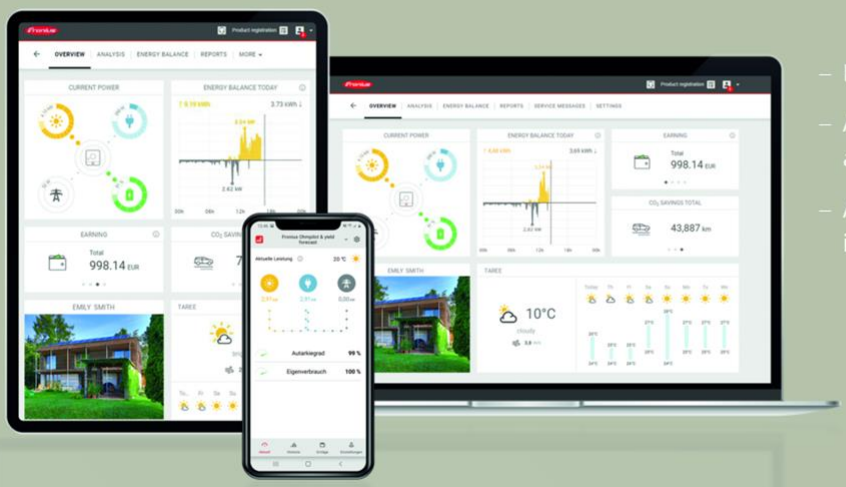
Monitoring in Fronius Solar.Web

Solar.Web

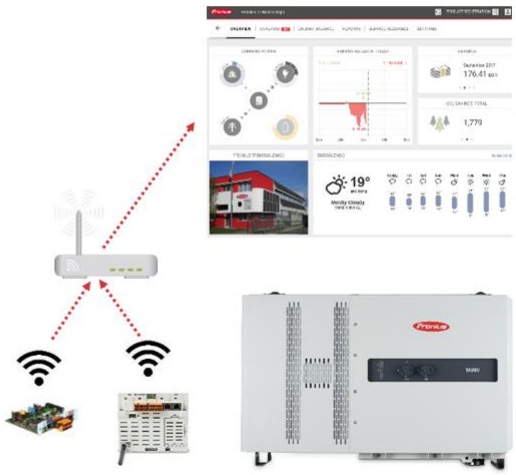


- Production always in the view
- All informations anytime and everywhere available
- Automatic notification in case of important incidents

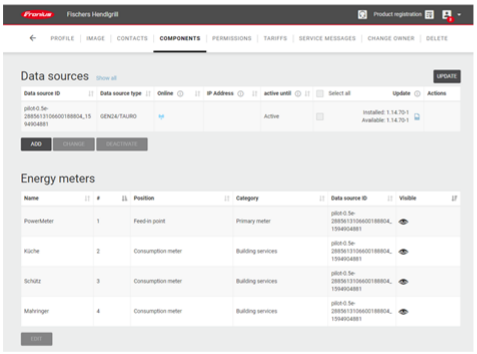
System combination SnapINverter & Tauro

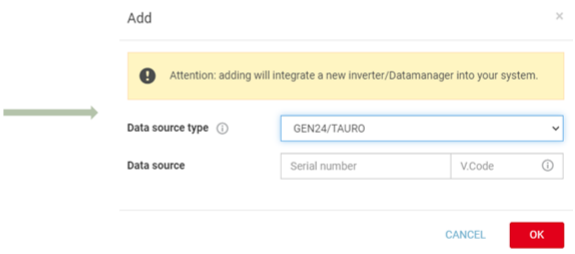
- Systems are combined online via Fronius Solar.web
- No Solar.net connection at the data communication unit (Tauro)

Connection plug! **Solar.net Ring** Termination plug!

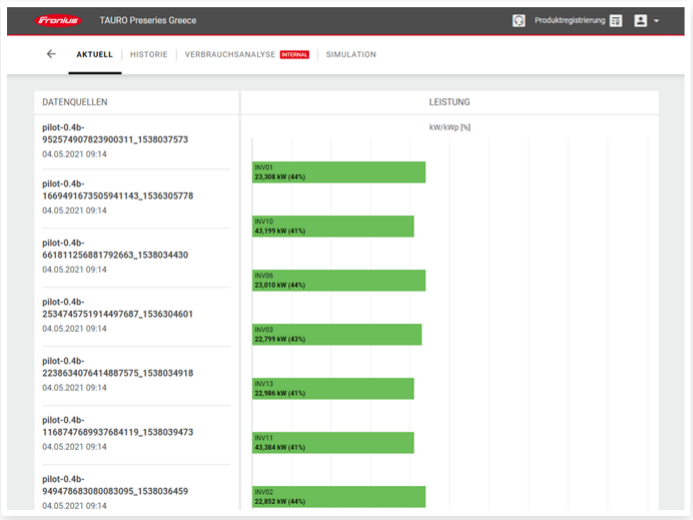


Adding data sources





Example preseries Greece



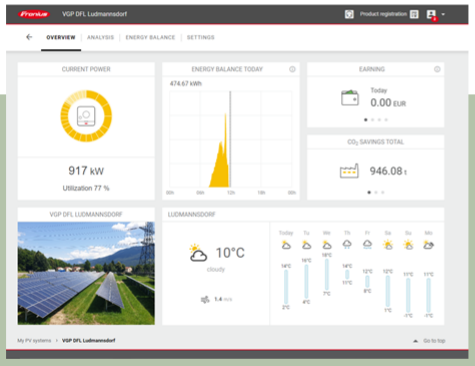
Tauro eco reference in Austria

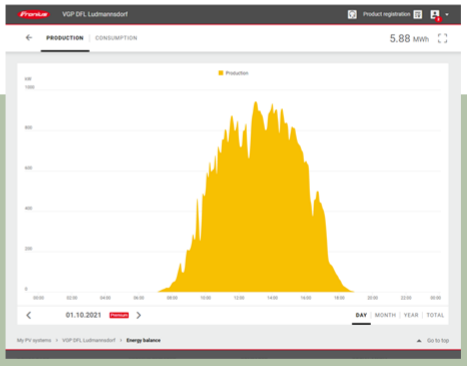
1.3 MWp in Carinthia, Austria

- Ground-mount system at a run-of-river power station
- **12 Fronius Tauro Eco 100 kW** with Fronius Smart Meter
- Decentral system topology (direct)
- Annual yield: approx. 1500 MWh

>> The installation was effortless! <<

Tauro eco reference in Austria

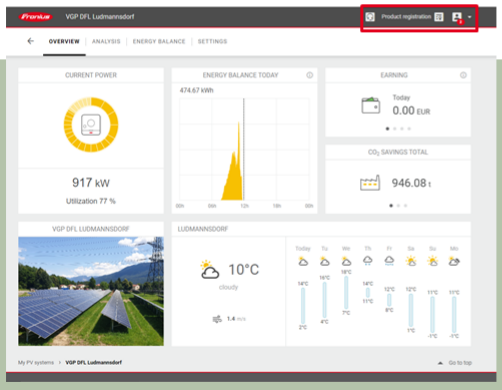


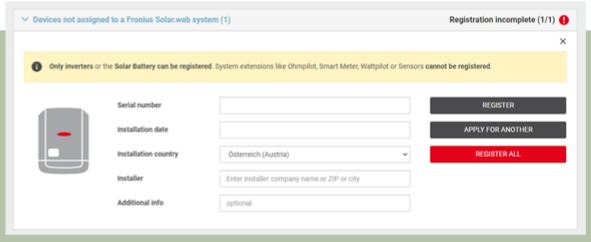


Product registration in Solar.Web

Direct product registration in fronius Solar.Web

– Verification code (V.Code) additionally necessary





What are the fronius warranty options?

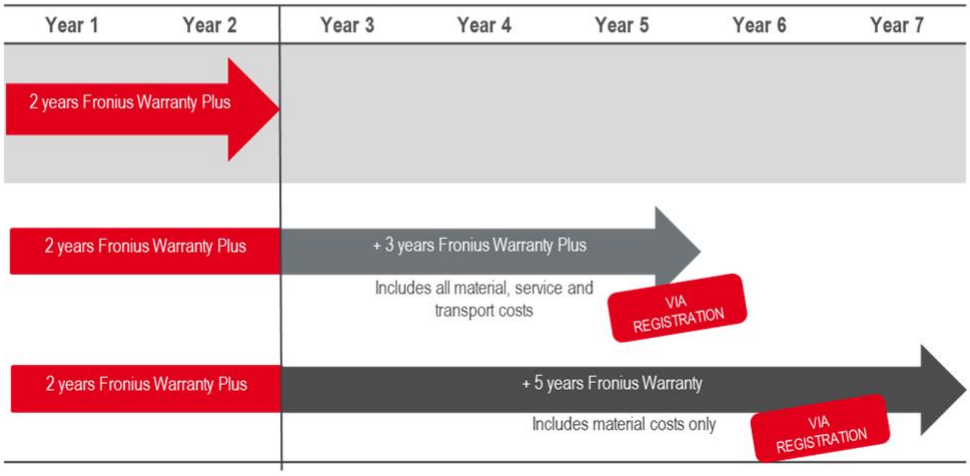
Standard warranty
– Full warranty standardized for **2 years** after delivery ex factory
– "Fronius Warranty Plus"
– No product registration required

Fronius warranty
– Warranty extension free of charge
– Warranty service on material
– **5 additional years**

Fronius warranty Plus
– Warranty extension free of charge
– Warranty service on material, service and transport
– **3 additional years**

Individual warranty packages

Customized models for individual requirements



FRONIUS
TAURO

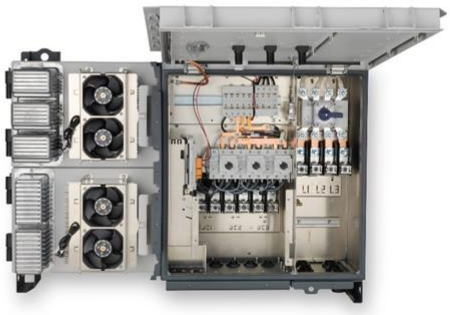
Service & component exchange

Cost savings
with unique service

Fast and easy service

NO COMPONENT EXCHANGE REQUIRED
- Exchange of power stage (~ 25 kg) – no need to replace entire inverter

SIGNIFICANT TIME AND COST SAVINGS
- Only 1 person and trip to site necessary



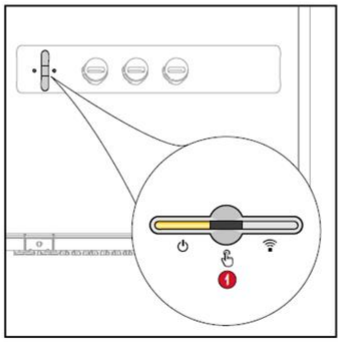
How to guarantee optimum service?

Basic requirement - Bringing the inverter online (Solar.Web)!

- Easy system maintenance / adjustments
- Clear visualization
- Remote updates
- Service messages
- Fast troubleshooting

Overview of LED status display

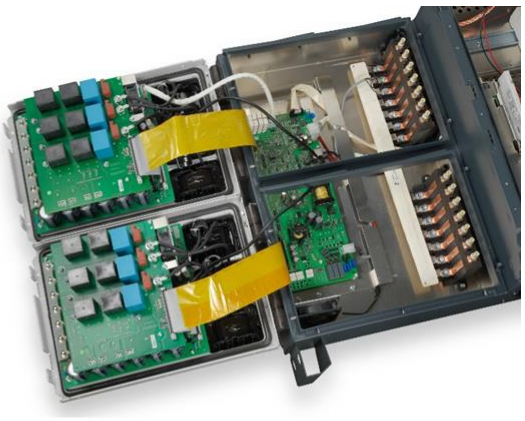
INVERTER STATUS	⏻	ᯤ
START UP	(flashing)	
UNCONFIGURED		
WIFI AP MODE		(flashing)
STANDBY, NETWORK CONNECTED		
RUNNING, NETWORK CONNECTED		
CRITICAL ERROR, NETWORK CONNECTED		
RUNNING, NETWORK ERROR		
RUNNING, NETWORK NOT CONFIGURED		
WARNING, NETWORK CONNECTED	(flashing)	
EMERGENCY POWER OVERLOAD, NETWORK LOST	(flashing)	
STANDBY, WPS SETUP		(flashing)
SPUI, NETWORK CONNECTED	(slow flashing)	
UPDATE IN PROGRESS	(flashing)	(flashing)



Service process

1. Call Fronius TechSupport team or use Fronius Solar.SOS
2. Read and announce device serial number
3. Clarification of error cause
4. Order exchange component
5. Execute exchange
6. Send back defect component (DHL return delivery note)
7. Credit note or service lump sum in case of warranty

Attention: if the defect device is not returned – billing after 30 days



Component exchange

Components

- AC power unit
- Data communication unit
- AC filter component
- DC filter component
-

Boards

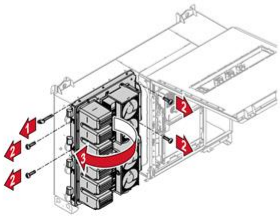
- FROFUSE-E
- FROFAP
- FROMO-FUSE
- FRO-STRO
- FROMOCONT

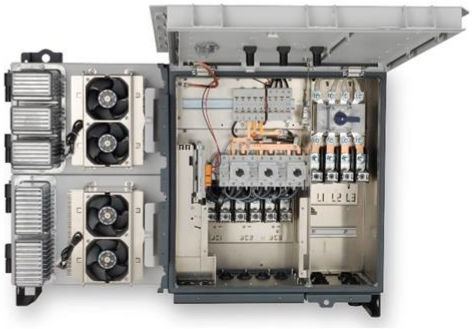
Mechanical components

- Switch knob
- AC/DC disconnector
- V-clamps
- Strain reliefs
- SPD
- Fan etc...

AC power unit

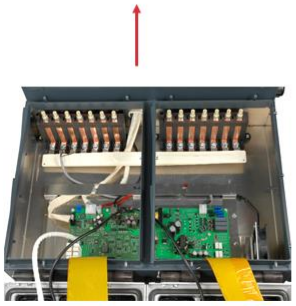
- Power stack system (1 or 2 stacks depending on power class)
- TX25 screw connections including second cover part (prior opening of the wing door and fan cover)
- Can be swiveled and lifted out
- Screws have seals – abrasion
  - **Replace with new screws in case of service**

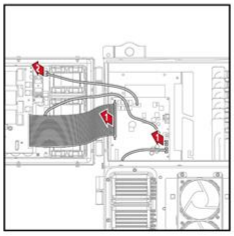




Power unit exchange

- Loosen TX25 screws
- Swing out power stage component
  - Unplug the ribbon cable and fan cable from the circuit board
  - Unplug the DC supply cable (white) from the power stage group – no replacement!





Fronius Tauro Service & component exchange

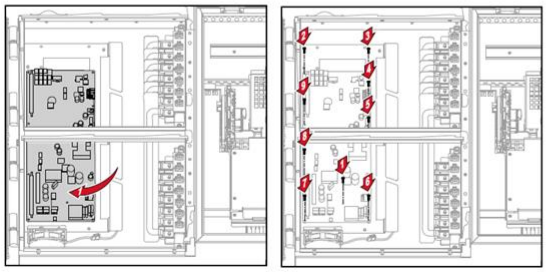
Practical part

Test instructions

- **Test instructions in the Fronius Tauro service manual** (for qualified personnel!)
- Latest version in the **online sparepart catalog (OETK)**
  - https://spareparts.fronius.com
- Precise specification of the measuring points
- Example: AC power stage
  - Measuring points and limit values

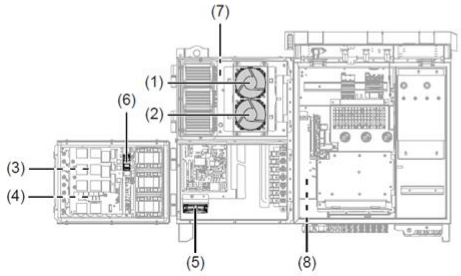
Fromocont exchange

– Swing out **AC power stages**
– Loosen plug connections
– Insert **Fromocont print**
– 9 pieces M4x12 TX20 tightened with 1,5 Nm



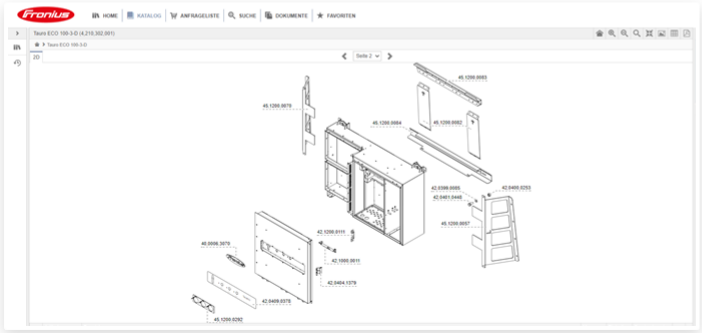
Fan exchange

– **Up to 8 built-in fans** in the device (different device types)
  – **External fan AC power stage**
  – **Internal fan in the AC power stage area**
  – **Internal fan in the DC connection area**



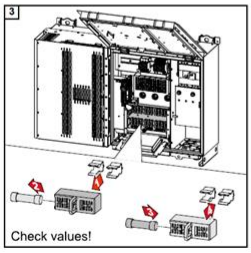
Order of exchange components

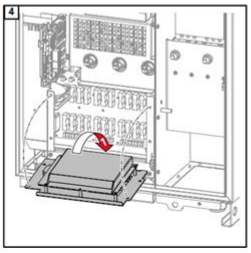
– Informations with regard to spare parts in the **online spare part catalog (OETK)**
– https://spareparts.fronius.com
– Download of **Fronius Tauro service manual**

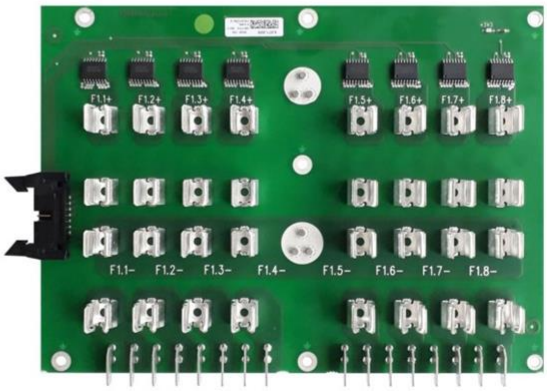


Exchange of string fuses

– Fronius string fuses of the **direct variant**
– Replace defect fuses only with new ones of the same quality
– Dependence on performance class / device type
– **Check values!**



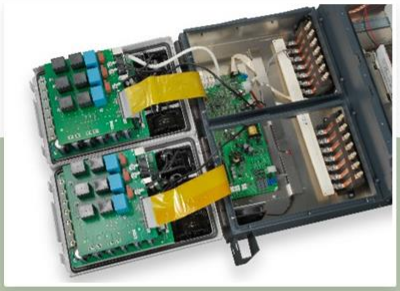




Solar.SOS

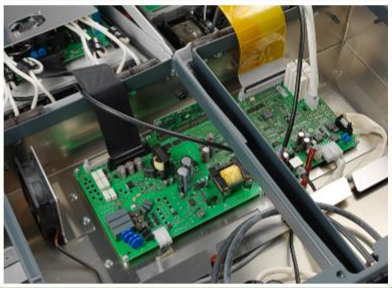
- Troubleshooting
- Rapid ordering
- Overview – all cases, ordering status, etc.
- Manuals – installation, operating instructions and video tutorials
- Automatic notification regarding replacement components and Messaging function with technical support
- Use a single account to manage multiple accounts

Licensing



Power unit

Data communication unit



FROMOCONT

- 3 different exchange scenarios with license requirement!

What types of licensing are possible?

Online licensing (recommended)

- Pilot recognizes exchange of each component
- Automatic start-up of the licensing procedure
- Insert serial number or direct scan (mobile device) is possible

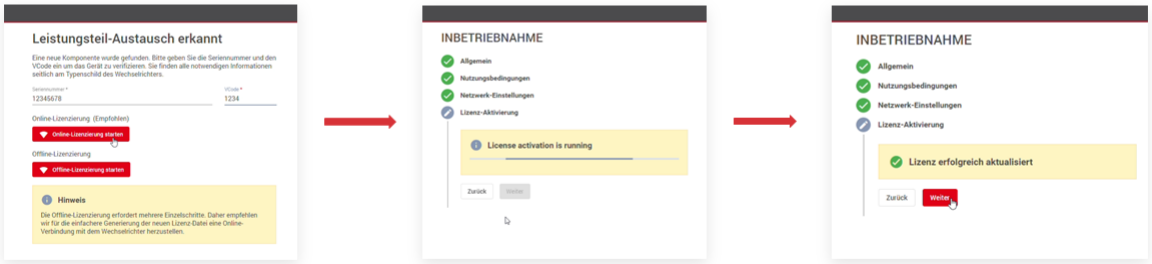
Offline licensing

- Pilot recognizes exchange of each component
- Download of **service file**
- Upload service file on www.solarweb.com/licencegenerator (Solar.web login required)
- Generate **license file** and upload in the wizard of the licensing procedure (interface)

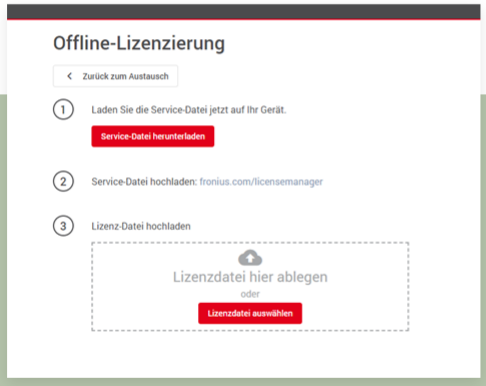
Overview of licensing procedure

Example power unit exchange

- Physical exchange of the power unit
- Opening the WiFi access point and completing the process



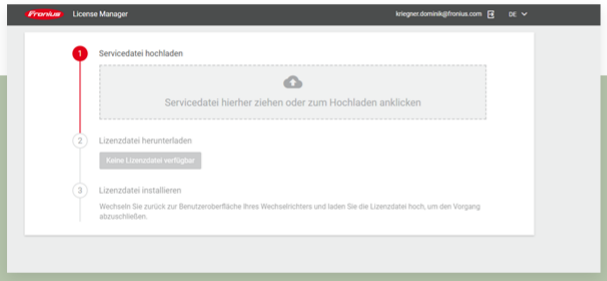
Offline licensing in detail



- Several individual steps required
- Fronius recommendation: Online variant
- **Service file**
- **Licence file**

Offline licensing in detail

Offline licence generator in Solar.Web

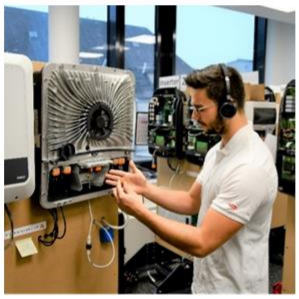


- Upload the generated service file
- Create and save the licence file
- Upload the licence file to the inverter user interface and complete the process.

Fronius Tauro Service & component exchange

Fronius Solar.SOS

Trainings and education



https://www.fronius.com/de/solarenergie/installateure-partner/service-support/trainings-webinare

New format!
Online trainings