

RECon Line

Converters for Renewable Energies





With continuous investments in research and development, **FRIEM** is leader in Diode, Thyristor or IGBT type High Power Converters, applying the most advanced technologies and electronics.

Founded in 1950 to design and manufacture High Power Converters, FRIEM continued to develop its know-how in energy conversion for industrial and traction applications.

In **1956** FRIEM produced and installed its first 50kA Rectifier Unit for application in **Chlor- Alkali industry**. At the absolute forefront in technology, in the early 60's FRIEM was able to manufacture units rated up to 110kA and to design the first high current Thyristor Rectifier.

Service continuity required by the Electrochemical Industry oriented FRIEM's design towards absolute **reliability**: quality, safety, latest international standards have always been the base for the design and development of our Equipments.

This experience and know-how were applied in the early **70's** when FRIEM started the production of Rectifier Units for **traction application**. With the support of its Partners, FRIEM provides complete Substations Systems with all the main equipment and services.

In **1984** FRIEM was able to design and start-up its first Power Supply for a **PolySilicon** CVD Reactor. Nowadays FRIEM has hundreds of units in service all over the World supplying all the different types of CVD Reactors.

In **2009** FRIEM started the production of the ReCon Line, a complete line of Inverters for the **renewable energies** (Photovoltaic Plants and Wind Turbines), becoming one of the main manufacturer in Italy and in the World.

In order to serve our customers with a wider range of products and solutions, **FRIEM** has started partnerships and investments with expert Electrotechnical Companies. This strategy gives **FRIEM** an even stronger Local presence, with offices or representatives in more than 20 Countries all over the World.

In its 11000m² facilities nowadays FRIEM designs, manufactures and delivers all over the World:

- AC/DC High Power Rectifiers
- DC/DC High Power Converters
- DC/AC High Power Inverters
- AC/AC High Power Converters

For all the Main Applications

- *Renewable Energies*
Inverters for Photovoltaic plants and Wind turbines
- *PolySilicon Production*
Power Supply for CVD Reactors and TET Converters
- *Chemicals Production*
Rectifiers and Power Converters for Chlorine, Caustic soda, Hypochloride, Hypochlorine
- *Metal refining*
Rectifiers for Aluminium and Zinc smelters, Copper, Nickel, Lead, Iridium, Indium refineries
- *DC Arc furnaces*
Rectifiers for Steel DC Arc furnaces for stainless steel and alloys
- *Graphite refining*
Rectifiers for Graphite refining furnaces and heating processes
- *Traction Application*
Rectifiers and Power converters for main DC line substations



Index

General Characteristics	05	RECon Station RST Line	
MPPT Maximum Power Point Tracking	07	General Characteristics	65
Output Efficiency Curve	09	Models Available	65
Applicable Standards	11	RST-22.2-T - 22.4-T - 17.1-T - 17.3-T - 11.1-T - 11.2-T	66
Models Available	13	RST-50 - 33 - 22	68
RECon S Line		RST-100 - 83 - 66	70
RECon S-10, S-15, S-20	14	RST-130	72
RECon 10L Line		Accessories	
RECon 10L-33 / 33-T	16	Accessories Available	74
RECon 10L-66 / 66-T	18	QI: Interface Cabinet	74
RECon 10L-99 / 99-T	20	STR: String Box	76
RECon 10L-132 / 132-T	22	RMS: RECon Monitoring System	78
RECon 10L-165	24		
RECon 10L-198	26		
RECon 10H Line			
RECon 10H-50 / 50-T	28		
RECon 10H-100 / 100-T	30		
RECon 10H-150 / 150-T	32		
RECon 10H-200 / 200-T	34		
RECon 10H-250	36		
RECon 10H-300	38		
RECon 30L Line			
RECon 30L-100 / 100-T	40		
RECon 30L-200 / 200-T	42		
RECon 30L-300 / 300-T	44		
RECon 30L-400 / 400-T	46		
RECon 30L-500	48		
RECon 30L-600	50		
RECon 30H Line			
RECon 30H-150 / 150-T	52		
RECon 30H-300 / 300-T	54		
RECon 30H-450 / 450-T	56		
RECon 30H-600	58		
RECon 30H-750	60		
RECon 30H-900	62		



General Characteristics

FRIEM has developed a complete line of High Power Solar and Wind Inverters.

The **RECon Line** concept is derived from the long experience FRIEM has achieved in Power Conversion and in the use of all kind of semiconductors.

The Line has been developed following FRIEM's traditional concept of reliability, efficiency and modularity devoted to high flexibility and easy maintenance.

The different models of **RECon Line** Inverters are available in three main versions:

RECon-xxx: Three-phase Inverter for LV/MV applications with external transformer.

RECon-xxx-T: Three-phase Inverter grid connected with LV/LV integrated transformer.

RECon S: Three-phase string Inverter for L.V. connection.

All the different models of the RECon Line can be either used as single units or combined in parallel to reach the requested power.

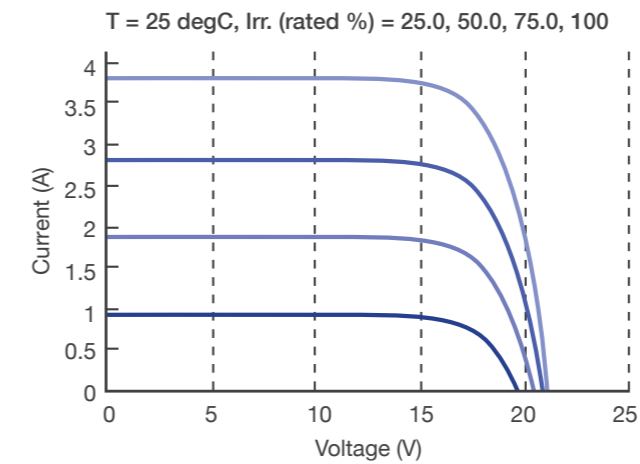
The **RECon Line** Inverters offer:

- Modular draw-out and Compact Design for configuration flexibility, space saving and fast installation.
- Parallel Modules or Independent Modules Configurations.
- Easy Maintenance thanks to the completely withdrawable Power Section.
- The Digital Regulator FRIEM DRP-6Ph Type allows the fully automated Control and Protection of the Inverter itself and offers the availability of:
 - Single or Multiple MPPT management.
 - Real Time and Recorded Measurements.
 - Event Recording, Load Profile and Oscylography.
 - Internal Canbus Communication Protocol for I/O management (temperature, irradiation and wind speed sensors).
 - Programmable Output Relays, Digital Inputs and Outputs.
 - Comprehensive self diagnostic - not just memory checksums - periodically tests the entire regulator.
- A Touch Screen Operator Panel for easy access to Measurements and Setting Parameters of one or more Inverters and of the PV Field, equipped with:
 - Front Face USB Serial Comm. Port for Local Interface.
 - Second Serial RS485 Comm. Port.
 - RS232/Modem Comm. Port.
 - Ethernet Serial Comm. Port.
- Standard Modbus-RTU or Profibus-DP communication protocols.
- Conformance to IEC Standards and CE Directive; UL-CSA listed.
- ISO 9001: 2008 Certified Quality System



MPPT Maximum Power Point Tracking

The characteristics of photovoltaic panels are not stable, in fact they vary in function of weather conditions and solar irradiation.



The MPPT controls the voltage, current and power of the photovoltaic field and generates the Reference Current for the Current Regulator of the Inverter to achieve the greatest possible power harvest.

The MPPT algorithm samples the output of the photovoltaic panel, to obtain the Maximum Power for any given environmental condition.

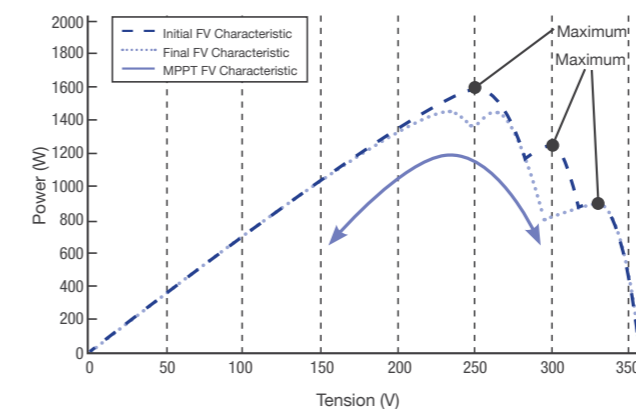
The calculated voltage at which the photovoltaic panel should work is based on the voltage measurement of the panel and from the supplied Power.

The two most common methods to execute the MPPT algorithm are:

- Incremental Conductance (IncCon).
- Perturb and Observe (P&O).

The RECon Line Inverters use both algorithms.

The purpose of the MPPT System is to follow the maximum power point for any photovoltaic module. Analyzing the V-P solar panel characteristic, it can be noticed that, when environmental conditions change (partial shading of the panels), there exist different absolute and relative maximum power points.

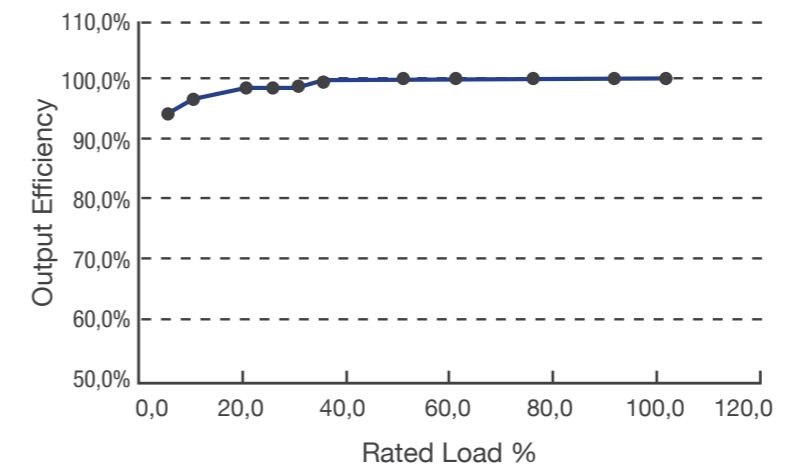




Output Efficiency Curve

The graph here below shows the efficiency load curve of the RECon-line Inverters. The efficiency reaches not only very high absolute values (η_{max} 99,7% @ 0,9 P_n), but also stays above the 98%, starting from the 20% of the load, granting an high EURO efficiency.

Output Efficiency at Operating Voltage



Rated Output Efficiency	99,7%
Maximum Output Efficiency	99,7%
EURO Output Efficiency	98,7%

No-load loss	35W
Stand-by loss	50W

When an efficiency value has been guaranteed, the tolerance of this value shall be within the value at rated conditions indicated below:

$$-0,2 \times (1-\eta) \times h \text{ (\%)}$$

(η =guaranteed efficiency)



Applicable Standards and Certifications

Electromagnetic Compatibility Directive

(89/336/CEE and later modified 92/31/CEE 93/68/CEE and 93/97/CEE):

DIN VDE 0126-1-1 "ENS"

EN61000-6-1 - EN61000-6-3

EN55014 - EN61000-3-2 Electromagnetic Compatibility

EN61000-2-2 - EN61173

IEC60664-1, A2, Ed. 1 - IEC61183

Electrostatic Discharge Immunity Test EN61000-4-2

Levels : 6 kV for contact discharge

: 8 kV for air discharge

Fast transient immunity EN61000-4-5

Levels : 3,8 kV/5kHz towards PV field and Net

: 2 kV/5kHz towards the RS485 serial Port

Surge immunity testing EN61000-4-5

Levels : 1 kV +/- poles - PV field

: 2 kV + pole/PV field

: 2 kV - pole/PV field

: 1 kV phase/neutral - towards the Net

: 2 kV phase/ground - towards the Net

: 2 kV phase/ground - towards the Net

Network connection criteria

CEI 11-20 Electric energy production plants and uninterrupted power supplies connected to I and II type networks.

CEI 0-16 Technical standard for passive and active load connections to HV and MV Energy Distributor Companies' networks.

ENEL: Guide for the connections to the Enel Distribuzione network, I - 1/213 December, 2010 ed.

For North America (U.S. and Canada) our Inverters comply to the following applicable Standards:

General Requirements:

UL 1741: Safety requirements, including compliance with NEC690.

Grid Connection Requirements for United States:

IEEE 1547: Standard for Interconnecting Distributed Resources with Electric Power Systems

Grid Connection Requirements for United States:

CSA C22.2 No. 107.1-01 (Sept. 2001): General Use Power Supplies



Models Available

Line "S": Low Voltage PV - Vin = (250-850) Vdc - Vout = 230/400 Vca - Iout = 14,5-29 A ac

S-10	Threephase Inverter:	P _{IN} = (10,5)kWp	- P _{OUT} = 10 kWac
S-15	Threephase Inverter:	P _{IN} = (15,75)kWp	- P _{OUT} = 15 kWac
S-20	Threephase Inverter:	P _{IN} = (21)kWp	- P _{OUT} = 20 kWac

Line "10L-": Low Voltage PV - Vin = (325÷665) Vdc - Vout = 200 Vca - Iout = 97 A ac/mod.

10L- 33	Threephase Inverter:	P _{IN} = (20÷37)kWp	- P _{OUT} = 33 kWac
10L- 66	Threephase Inverter:	P _{IN} = (45÷74)kWp	- P _{OUT} = 66 kWac
10L- 99	Threephase Inverter:	P _{IN} = (70÷110)kWp	- P _{OUT} = 100 kWac
10L- 132	Threephase Inverter:	P _{IN} = (90÷147)kWp	- P _{OUT} = 132 kWac
10L- 165	Threephase Inverter:	P _{IN} = (115÷185)kWp	- P _{OUT} = 165 kWac
10L- 198	Threephase Inverter:	P _{IN} = (139÷220)kWp	- P _{OUT} = 198 kWac
10L- 33-T	Threephase Inverter:	P _{IN} = (20÷37)kWp	- P _{OUT} = 33 kWac with LV/LV Integrated Trasfo
10L- 66-T	Threephase Inverter:	P _{IN} = (45÷74)kWp	- P _{OUT} = 66 kWac with LV/LV Integrated Trasfo
10L- 99-T	Threephase Inverter:	P _{IN} = (70÷110)kWp	- P _{OUT} = 99 kWac with LV/LV Integrated Trasfo
10L- 132-T	Threephase Inverter:	P _{IN} = (90÷147)kWp	- P _{OUT} = 132 kWac with LV/LV Integrated Trasfo

Line "10H-": High Voltage PV - Vin = (470÷850) Vdc - Vout = 300 Vca - Iout = 97 A ac/mod.

10H-50	Threephase Inverter:	P _{IN} = (33÷55)kWp	- P _{OUT} = 50 kWac
10H-100	Threephase Inverter:	P _{IN} = (70÷110)kWp	- P _{OUT} = 100 kWac
10H-150	Threephase Inverter:	P _{IN} = (100÷170)kWp	- P _{OUT} = 150 kWac
10H-200	Threephase Inverter:	P _{IN} = (140÷220)kWp	- P _{OUT} = 200 kWac
10H-250	Threephase Inverter:	P _{IN} = (175÷278)kWp	- P _{OUT} = 250 kWac
10H-300	Threephase Inverter:	P _{IN} = (200÷335)kWp	- P _{OUT} = 300 kWac
10H-50-T	Threephase Inverter:	P _{IN} = (33÷55)kWp	- P _{OUT} = 50 kWac with LV/LV Integrated Trasfo
10H-100-T	Threephase Inverter:	P _{IN} = (70÷110)kWp	- P _{OUT} = 100 kWac with LV/LV Integrated Trasfo
10H-150-T	Threephase Inverter:	P _{IN} = (100÷170)kWp	- P _{OUT} = 150 kWac with LV/LV Integrated Trasfo
10H-200-T	Threephase Inverter:	P _{IN} = (140÷220)kWp	- P _{OUT} = 200 kWac with LV/LV Integrated Trasfo

Line "30L-": Low Voltage PV - Vin = (325÷665) Vdc - Vout = 200 Vca - Iout = 290 A ac/mod.

30L-100	Threephase Inverter:	P _{IN} = (70÷110)kWp	- P _{OUT} = 100 kWac
30L-200	Threephase Inverter:	P _{IN} = (140÷225)kWp	- P _{OUT} = 200 kWac
30L-300	Threephase Inverter:	P _{IN} = (200÷335)kWp	- P _{OUT} = 300 kWac
30L-400	Threephase Inverter:	P _{IN} = (280÷450)kWp	- P _{OUT} = 400 kWac
30L-500	Threephase Inverter:	P _{IN} = (350÷560)kWp	- P _{OUT} = 500 kWac
30L-600	Threephase Inverter:	P _{IN} = (400÷670)kWp	- P _{OUT} = 600 kWac
30L-100-T	Threephase Inverter:	P _{IN} = (70÷110)kWp	- P _{OUT} = 100 kWac with LV/LV Integrated Trasfo
30L-200-T	Threephase Inverter:	P _{IN} = (140÷225)kWp	- P _{OUT} = 200 kWac with LV/LV Integrated Trasfo
30L-300-T	Threephase Inverter:	P _{IN} = (200÷335)kWp	- P _{OUT} = 300 kWac with LV/LV Integrated Trasfo
30L-400-T	Threephase Inverter:	P _{IN} = (280÷450)kWp	- P _{OUT} = 400 kWac with LV/LV Integrated Trasfo

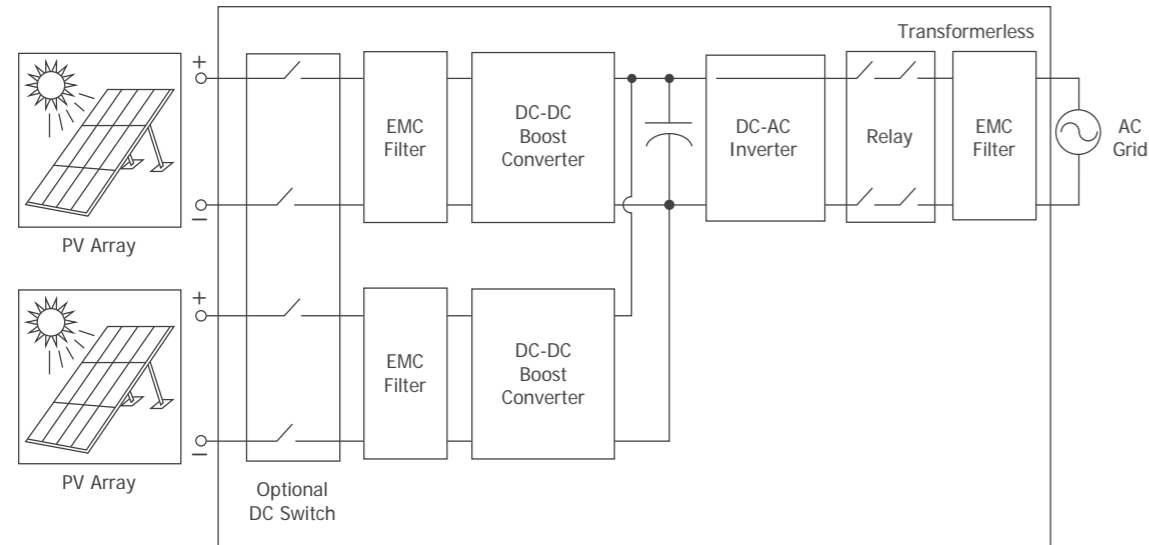
Line "30H-": High Voltage PV - Vin = (470÷850) Vdc - Vout = 300 Vca - Iout = 290 A ac/mod.

30H-150	Threephase Inverter:	P _{IN} = (100÷170)kWp	- P _{OUT} = 150 kWac
30H-300	Threephase Inverter:	P _{IN} = (200÷335)kWp	- P _{OUT} = 300 kWac
30H-450	Threephase Inverter:	P _{IN} = (300÷500)kWp	- P _{OUT} = 450 kWac
30H-600	Threephase Inverter:	P _{IN} = (400÷670)kWp	- P _{OUT} = 600 kWac
30H-750	Threephase Inverter:	P _{IN} = (500÷835)kWp	- P _{OUT} = 750 kWac
30H-900	Threephase Inverter:	P _{IN} = (600÷1000)kWp	- P _{OUT} = 900 kWac
30H-150-T	Threephase Inverter:	P _{IN} = (100÷170)kWp	- P _{OUT} = 150 kWac with LV/LV Integrated Trasfo
30H-300-T	Threephase Inverter:	P _{IN} = (200÷335)kWp	- P _{OUT} = 300 kWac with LV/LV Integrated Trasfo
30H-450-T	Threephase Inverter:	P _{IN} = (300÷500)kWp	- P _{OUT} = 450 kWac with LV/LV Integrated Trasfo

RECon S-10, S-15, S-20



Inverter RECon S-10, S-15, S-20

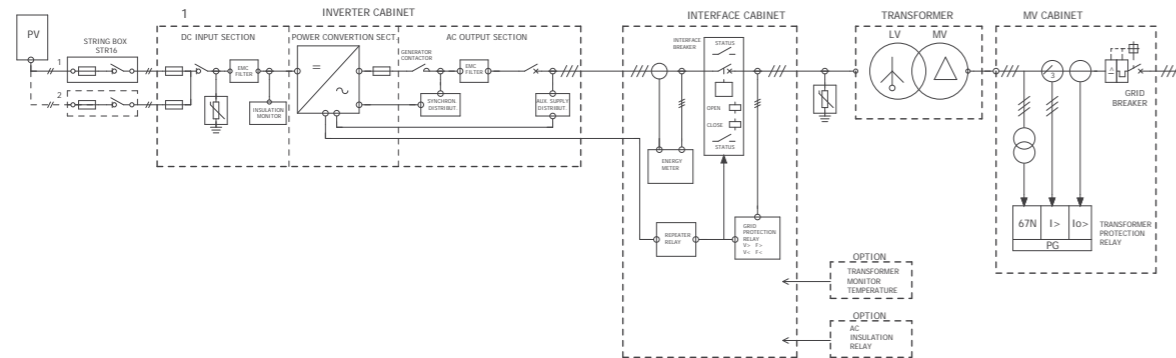


	RECon S-10	RECon S-15	RECon S-20
Input (DC)			
Field Power Range [kW DC]	10.5	15.75	21
DC Voltage Range MPPT [V]	250-850	250-850	250-850
Maximum DC voltage [V]	1000	1000	1000
Maximum DC current [A]	16x2	20x2	23x2
Number of protected DC inputs	2	2	2
Number of independent MPPT	2	2	2
Voltage ripple	±10%	±10%	±10%
Standard DC devices			
DC fuses on both terminals	No	No	No
DC on-load isolator	Yes	Yes	Yes
Insulating monitoring system	Yes	Yes	Yes
Surge arrestor	Yes	Yes	Yes
Output (AC)			
Rated AC output power [kW]	10	15	20
Max AC output power [kW]	11.1	16.6	20.8
Rated AC current [A]	14.5	21.7	29
Operating grid voltage [V]	230/400	230/400	230/400
Operating grid frequency [Hz]	50/60	50/60	50/60
Harmonic distortion of grid current (THD)	3%	3%	3%
Power factor (cos φ)	0,99 ± 0,8	0,99 ± 0,8	0,99 ± 0,8
Grid structure	TT/TN	TT/TN	TT/TN
Standard AC devices			
Contactors (DDG) with fuses	No	No	No
Automatic Circuit breaker	No	No	No
Grid Interface Protection Relay	No	No	No
Efficiency			
Maximum efficiency	97,9%	97,8%	97,8%
EURO Efficiency	97,1%	97,1%	97,1%
Power consumption			
Auxiliary Supply	230 Vac, 50Hz from UPS	230 Vac, 50Hz from UPS	230 Vac, 50Hz from UPS
Night consumption [W]	1	1	1
Weight and Dimension			
Approximate weight [kg]	46	52	57
Width [mm]	548	548	548
Height [mm]	565	565	565
Depth [mm]	268	268	268
Environmental Data			
Protection Degree	IP65 - IP55 FAN	IP65 - IP55 FAN	IP65 - IP55 FAN
Operating temperature range [°C]	- 20 / + 60	- 20 / + 60	- 20 / + 60
Cooling Air Flow [m3/h]	34.5	62.4	137.4
Relative Humidity (not condensing)	100%	100%	100%
Maximum altitude without derating (a.s.l.) [m]	2000	2000	2000
Maximum noise level [dBA @ 1m]	≤ 55	≤ 55	≤ 55
User interface and communication			
Local user interface	Graphic Display	Graphic Display	Graphic Display
String box communication port	RS485	RS485	RS485
PC communication port	USB	USB	USB
Remote communication port (optional)	RS485+LOG	RS485+LOG	RS485+LOG
Standard compliance			
EMC	EN 61000-6-2, EN 61000-6-4, IEC62109-1 (2010), EN 62109-1:2011, EN 61000-6-2, EN61000-6-3		
CE Compliance	LVD: 2006/95/EC, EMC:2004/108/EC		
Other Standard	RoSH compliance, VDE-AR-N 4105, VDE0126-1-1/A1, CEI 0-21, RD1663, G59 Issue 2		
Grid connection	Guide to the connections to the Enel Distribuzione Network, Ed. 2.1 - 12 / 2010, BDEW (MVD)		

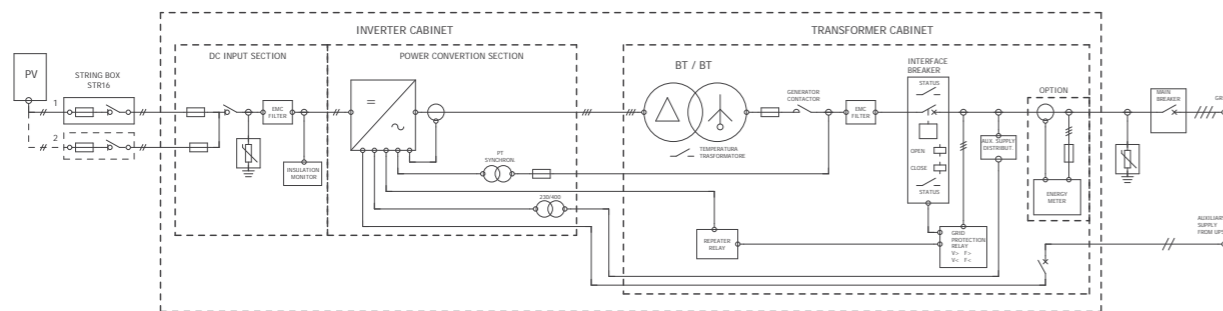
RECon 10L-33, 10L-33-T



Inverter RECon 10L-33



Inverter RECon 10L-33-T

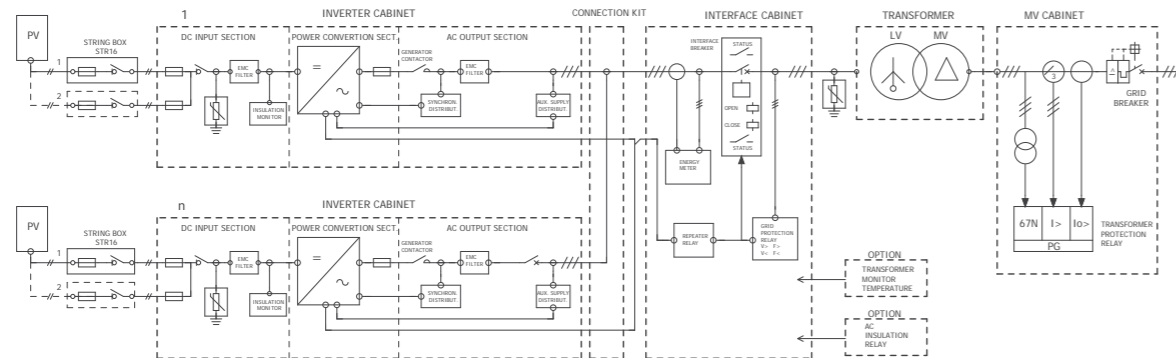


	RECon 10L-33	RECon 10L-33-T
Input (DC)		
Field Power Range [kW DC]	20-37	20-37
DC Voltage Range MPPT [V]	325-680	325-680
Maximum DC voltage [V]	700	700
Maximum DC current [A]	110	110
Number of protected DC inputs	2	2
Number of independent MPPT	1	1
Voltage ripple	< 3% @ Pn	< 3% @ Pn
Standard DC devices		
DC fuses on both terminals	Yes	Yes
DC on-load isolator	Yes	Yes
Insulating monitoring system	Yes	Yes
Surge arrester	Yes	Yes
Output (AC)		
Rated AC output power [kW]	33	33
Max AC output power [kW]	37	37
Rated AC current [A]	97	48
Operating grid voltage [V]	200	400
Operating grid frequency [Hz]	50/60	50/60
Harmonic distortion of grid current (THD)	≤ 2% @ Pn	≤ 2% @ Pn
Power factor (cos φ)	≥ 0,99 @ Pn	≥ 0,99 @ Pn
Grid structure	IT	TN-S
Standard AC devices		
Contactor (DDG) with fuses	Yes	Yes
Automatic Circuit breaker	Yes	Yes
Grid Interface Protection Relay	No	Yes
Efficiency		
Maximum efficiency	99	96,9
EURO Efficiency	98,1	95,7
Power consumption		
Auxiliary Supply	230 Vac, 50Hz from UPS	230 Vac, 50Hz from UPS
Night consumption [W]	< 70	< 100
Weight and Dimension		
Approximate weight [kg]	250	700
Width [mm]	400	800
Height [mm]	1.800	1.800
Depth [mm]	800	800
Environmental Data		
Protection Degree	IP20	IP20
Operating temperature range [°C]	- 10 / + 40	- 10 / + 40
Cooling Air Flow [m3/h]	800	1.600
Relative Humidity (not condensing)	5% ÷ 95%	5% ÷ 95%
Maximum altitude without derating (a.s.l.) [m]	1000	1000
Maximum noise level [dBA @ 1m]	< 70	< 70
User interface and communication		
Local user interface	Touch Screen O. P.	
String box communication port	RS485	
PC communication port	RS232 - RS485	
Remote communication port (optional)	Ethernet, (GPRS)	
Standard compliance		
EMC	EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN61000-3-12	
CE Compliance	Yes	
Other Standard	CEI 0-16	
Grid connection	Guide to the connetions to the Enel Distribuzione Network, I -1/213 December, 2010 ed.	
UL 1741-3R and IEEE 1547 listed models available		

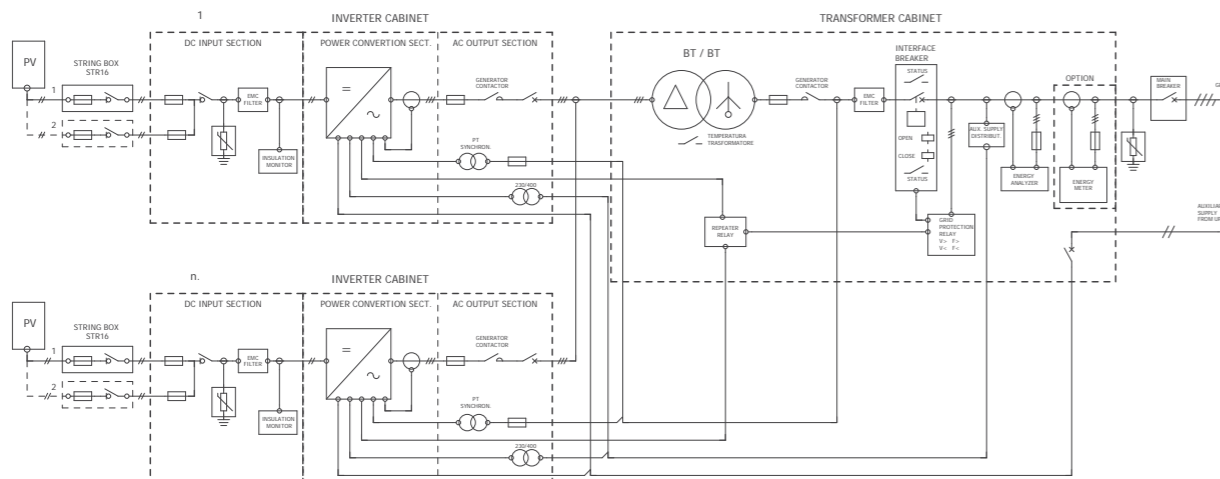
RECon 10L-66, 10L-66-T



Inverter RECon 10L-66



Inverter RECon 10L-66-T



RECon 10L-66

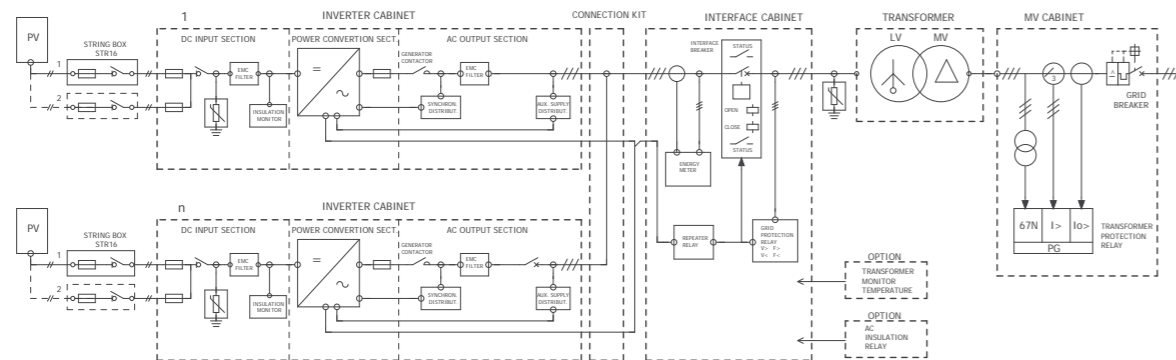
RECon 10L-66-T

	RECon 10L-66	RECon 10L-66-T
Input (DC)		
Field Power Range [kW DC]	45-74	45-74
DC Voltage Range MPPT [V]	325-680	325-680
Maximum DC voltage [V]	700	700
Maximum DC current [A]	220	220
Number of protected DC inputs	4	4
Number of independent MPPT	2	2
Voltage ripple	< 3% @ Pn	< 3% @ Pn
Standard DC devices		
DC fuses on both terminals	Yes	Yes
DC on-load isolator	Yes	Yes
Insulating monitoring system	Yes	Yes
Surge arrester	Yes	Yes
Output (AC)		
Rated AC output power [kW]	66	66
Max AC output power [kW]	74	74
Rated AC current [A]	194	96
Operating grid voltage [V]	200	400
Operating grid frequency [Hz]	50/60	50/60
Harmonic distortion of grid current (THD)	≤ 2% @ Pn	≤ 2% @ Pn
Power factor (cos φ)	≥ 0,99 @ Pn	≥ 0,99 @ Pn
Grid structure	IT	TN-S
Standard AC devices		
Contactor (DDG) with fuses	Yes	Yes
Automatic Circuit breaker	Yes	Yes
Grid Interface Protection Relay	No	Yes
Efficiency		
Maximum efficiency	99	96,9
EURO Efficiency	98,1	95,7
Power consumption		
Auxiliary Supply	230 Vac, 50Hz from UPS	230 Vac, 50Hz from UPS
Night consumption [W]	< 140	< 170
Weight and Dimension		
Approximate weight [kg]	500	1.200
Width [mm]	800	1.500
Height [mm]	1.800	1.800
Depth [mm]	800	800
Environmental Data		
Protection Degree	IP20	IP20
Operating temperature range [°C]	- 10 / + 40	- 10 / + 40
Cooling Air Flow [m3/h]	1.600	2.400
Relative Humidity (not condensing)	5% ÷ 95%	5% ÷ 95%
Maximum altitude without derating (a.s.l.) [m]	1000	1000
Maximum noise level [dBA @ 1m]	< 70	< 70
User interface and communication		
Local user interface	Touch Screen O. P.	
String box communication port	RS485	
PC communication port	RS232 - RS485	
Remote communication port (optional)	Ethernet, (GPRS)	
Standard compliance		
EMC	EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN61000-3-12	
CE Compliance	Yes	
Other Standard	CEI 0-16	
Grid connection	Guide to the connetions to the Enel Distribuzione Network, I -1/213 December, 2010 ed.	
UL 1741-3R and IEEE 1547 listed models available		

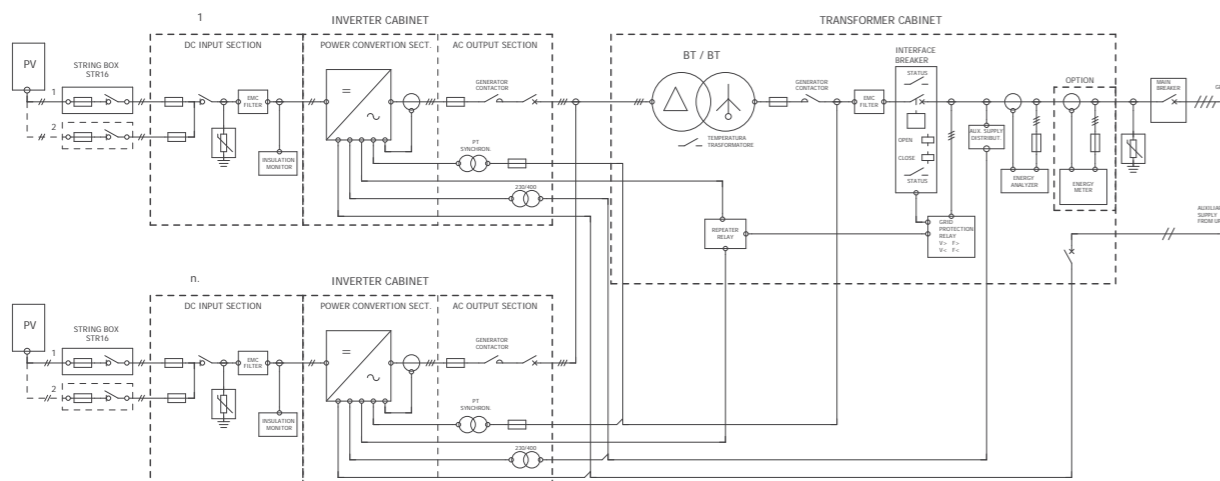
RECon 10L-99, 10L-99-T



Inverter RECon 10L-99



Inverter RECon 10L-99-T



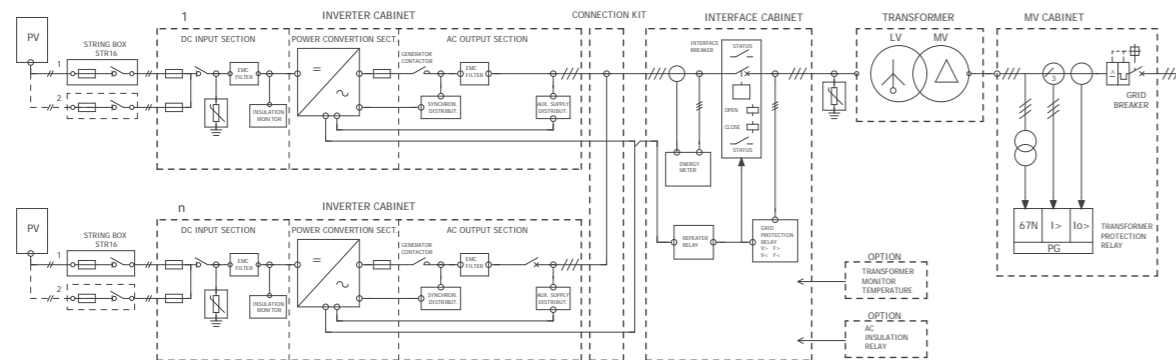
RECon 10L-99 RECon 10L-99-T

	RECon 10L-99	RECon 10L-99-T
Input (DC)		
Field Power Range [kW DC]	70-110	70-110
DC Voltage Range MPPT [V]	325-680	325-680
Maximum DC voltage [V]	700	700
Maximum DC current [A]	325	325
Number of protected DC inputs	6	6
Number of independent MPPT	3	3
Voltage ripple	< 3% @ Pn	< 3% @ Pn
Standard DC devices		
DC fuses on both terminals	Yes	Yes
DC on-load isolator	Yes	Yes
Insulating monitoring system	Yes	Yes
Surge arrester	Yes	Yes
Output (AC)		
Rated AC output power [kW]	99	99
Max AC output power [kW]	110	110
Rated AC current [A]	291	144
Operating grid voltage [V]	200	400
Operating grid frequency [Hz]	50/60	50/60
Harmonic distortion of grid current (THD)	≤ 2% @ Pn	≤ 2% @ Pn
Power factor (cos φ)	≥ 0,99 @ Pn	≥ 0,99 @ Pn
Grid structure	IT	TN-S
Standard AC devices		
Contactors (DDG) with fuses	Yes	Yes
Automatic Circuit breaker	Yes	Yes
Grid Interface Protection Relay	No	Yes
Efficiency		
Maximum efficiency	99	96,9
EURO Efficiency	98,1	95,7
Power consumption		
Auxiliary Supply	230 Vac, 50Hz from UPS	230 Vac, 50Hz from UPS
Night consumption [W]	< 210	< 240
Weight and Dimension		
Approximate weight [kg]	750	1.500
Width [mm]	1.200	1.900
Height [mm]	1.800	1.800
Depth [mm]	800	800
Environmental Data		
Protection Degree	IP20	IP20
Operating temperature range [°C]	- 10 / + 40	- 10 / + 40
Cooling Air Flow [m3/h]	2.400	3.200
Relative Humidity (not condensing)	5% ÷ 95%	5% ÷ 95%
Maximum altitude without derating (a.s.l.) [m]	1000	1000
Maximum noise level [dBA @ 1m]	< 70	< 70
User interface and communication		
Local user interface	Touch Screen O. P.	
String box communication port	RS485	
PC communication port	RS232 - RS485	
Remote communication port (optional)	Ethernet, (GPRS)	
Standard compliance		
EMC	EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN61000-3-12	
CE Compliance	Yes	
Other Standard	CEI 0-16	
Grid connection	Guide to the connetions to the Enel Distribuzione Network, I -1/213 December, 2010 ed.	
UL 1741-3R and IEEE 1547 listed models available		

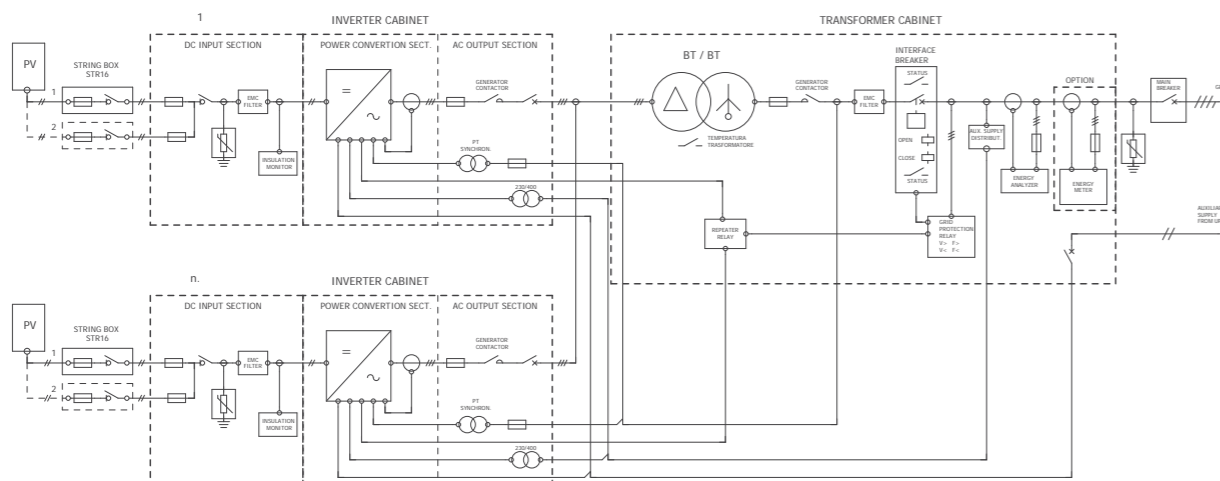
RECon 10L-132, 10L-132-T



Inverter RECon 10L-132



Inverter RECon 10L-132-T



	RECon 10L-132	RECon 10L-132-T
Input (DC)		
Field Power Range [kW DC]	90-147	90-147
DC Voltage Range MPPT [V]	325-680	325-680
Maximum DC voltage [V]	700	700
Maximum DC current [A]	435	435
Number of protected DC inputs	8	8
Number of independent MPPT	4	4
Voltage ripple	< 3% @ Pn	< 3% @ Pn
Standard DC devices		
DC fuses on both terminals	Yes	Yes
DC on-load isolator	Yes	Yes
Insulating monitoring system	Yes	Yes
Surge arrester	Yes	Yes
Output (AC)		
Rated AC output power [kW]	132	132
Max AC output power [kW]	147	147
Rated AC current [A]	388	192
Operating grid voltage [V]	200	400
Operating grid frequency [Hz]	50/60	50/60
Harmonic distortion of grid current (THD)	≤ 2% @ Pn	≤ 2% @ Pn
Power factor (cos φ)	≥ 0,99 @ Pn	≥ 0,99 @ Pn
Grid structure	IT	TN-S
Standard AC devices		
Contactors (DDG) with fuses	Yes	Yes
Automatic Circuit breaker	Yes	Yes
Grid Interface Protection Relay	No	Yes
Efficiency		
Maximum efficiency	99	96,9
EURO Efficiency	98,1	95,7
Power consumption		
Auxiliary Supply	230 Vac, 50Hz from UPS	230 Vac, 50Hz from UPS
Night consumption [W]	< 280	< 310
Weight and Dimension		
Approximate weight [kg]	1.000	2.100
Width [mm]	1.600	2.800
Height [mm]	1.800	1.800
Depth [mm]	800	800
Environmental Data		
Protection Degree	IP20	IP20
Operating temperature range [°C]	- 10 / + 40	- 10 / + 40
Cooling Air Flow [m3/h]	3.200	4.000
Relative Humidity (not condensing)	5% ÷ 95%	5% ÷ 95%
Maximum altitude without derating (a.s.l.) [m]	1000	1000
Maximum noise level [dBA @ 1m]	< 70	< 70
User interface and communication		
Local user interface	Touch Screen O. P.	
String box communication port	RS485	
PC communication port	RS232 - RS485	
Remote communication port (optional)	Ethernet, (GPRS)	
Standard compliance		
EMC	EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN61000-3-12	
CE Compliance	Yes	
Other Standard	CEI 0-16	
Grid connection	Guide to the connetions to the Enel Distribuzione Network, I -1/213 December, 2010 ed.	
UL 1741-3R and IEEE 1547 listed models available		