



S O L A R I N V E R T E R S

250 kW to 3.85 MW
Grid Tied Solar Inverters
for Utility Projects



More than 6 GW capacity of higher DC voltage inverters are in operation in Indian Railway over the decades.

Diversifying its Inverter capabilities into Solar since 2018!

MEDHA, an Indian MNC with R&D focus, founded in 1984, has expertise in design, development and manufacturing of leading technology Power Electronics products for Railway applications. Medha is the largest supplier of complete propulsion system which includes vehicle control systems, traction converters, traction motors, auxiliary power converters and other control and power electronic systems to Indian Railways and to several other country railways. Medha's propulsion control system and Train Control Management System power the reputed 'Vande Bharat Express' – the first train in India to travel at 160 km/h. Medha is on its way to build first of its kind 'Rail Coach Factory' in Hyderabad, Telangana spanning 100 acres with 800 Cr. investment.



Building on the knowledge base of successfully developing rugged, reliable, highly complex and state of the art propulsion systems for Rail applications, Medha has successfully developed most advanced grid tied utility grade Solar Inverters and Electric vehicles in Heavy commercial segment. Medha is also applying its extensive knowledge of converters and motors for defense applications.

Medha offers first "Make in India" Central inverters in compliance with all stringent IEC standards, certified by international Labs.

Medha's Research & Design Centre

Medha is an R&D focused company with over 30 years of experience in designing and manufacturing components and systems for railway applications, Solar, and EV.

In India, Medha is credited with reputation of having designed many high technology products and systems for the first time in the country. The range includes Vehicle Control System, Electronic Governor, Vehicle Remote Monitoring, IGBT Traction Converters, Electronic Interlocking, Train Control System, Common Rail Direct Injection and many more.

Medha also leverages its capabilities to design products and systems to suit customer specific requirements.

Product cost competitiveness, short implementation times, ruggedness to withstand railway conditions, low life cycle costs, are some of the underlying guiding principles for product designs.

All designs pass through internal validation and verification before being released for field trials and commercial operation.

With highly skilled technical team of over 600 design engineers, and

corporate financial commitment to reinvest upto 15% revenue into R&D activities, continuous product improvement and new product innovation is an ever going activity at Medha.

Medha's R&D centre at Hyderabad in India, is spread over 4 acres with over 18,000 m² built-up space housing various labs. Centre is equipped with latest software tools and testing facilities to support product development. Most of the customized test benches are unique to suit the product application for railway environment. Medha also has one of its kind facility for propulsion system integration testing with 25 kV OHE supply from railways.

Medha is guided by well laid down quality norms and procedures for all stages of design and development activities. Award of quality certifications such as IRIS, ISO 9001:2015 and CMMI Level 4 are testament to Medha's quality in product development.

These achievements are not stopping Medha from working towards achieving higher quality certifications including CMMI Level 5.



Medha's Production Facilities

Medha's facilities at Hyderabad, India, are spread over 15 acres, with over 53,000 m² indoor space, housing production equipment and assembly lines. Over 2000 dedicated people work with SAP ERP enabled processes, using lean manufacturing practices to meet on-time delivery requirements.

Stringent quality controls starts right from step one, when the material is received from the suppliers. In spite of special care being taken in selection of supplier, all inwards goods still undergo 'Inward Goods Inspection' before reaching the stores or production area. In most cases 100% inspection is carried out with sampling inspection for other components.

Mechanical manufacturing facilities are equipped with latest CNC machines and automatic lathe, drilling, milling, presses, gear hobbing and other product specific special purpose machines. High precision mechanical products and components are manufactured in-house, in-line with our corporate quality policy.

Medha designs its own electronic Printed Circuit Boards (PCBs) for all requirements. PCB assembly line is equipped with fully

automated radial, axial and IC component insertion machines, high performance pick and place machine for surface mounted devices (SMD), wave soldering machines for leaded components, re-flow oven for SMD, automatic optical inspection machine. PCB manufacturing and testing areas are ESD protected and equipped with air filtering.

Products and systems are subject to sub-assembly and assembly level testing to ensure their reliable operation in the field. Extensive test facilities for each product includes exhaustive functional testing using customized test benches and aging tests at elevated environmental conditions.

Dedicated training department caters to our ever growing need for personnel knowledge and skills upgrades and to take knowledge of our latest products and technologies to our reputed clients.

Newer technologies, production processes and systems are regularly studied and implemented to ensure continuous improvements in manufactured products.



3.125 MW to 3.85 MW Grid Tied Central Inverter

With legacy of more than three decades in Power Electronics, especially in higher DC voltage Inverters / converters, Medha Servo Drives has developed India's first and most advance Utility grade Solar Central Inverter in 1500VDC operation ranging from 3.125 MW to 3.85 MW capacities in Central Inverters and 200kW – 250kW capacities in String Inverters.

After successful launch of 1.25 MW Inverters in 1000 VDC in 2018 and supply experience of >100 MW Inverters in Indian Territory and two years of marathon efforts, Medha's experienced R&D team has developed highest capacity Solar Inverters by any Indian company.

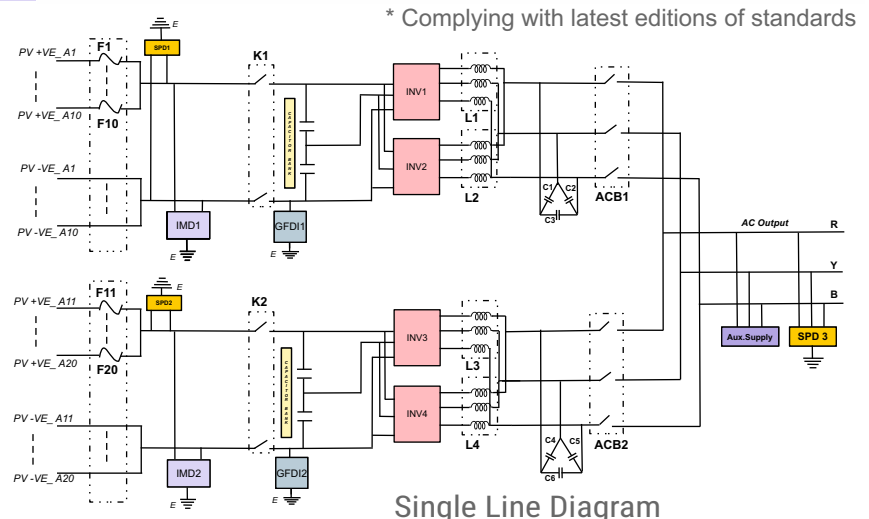
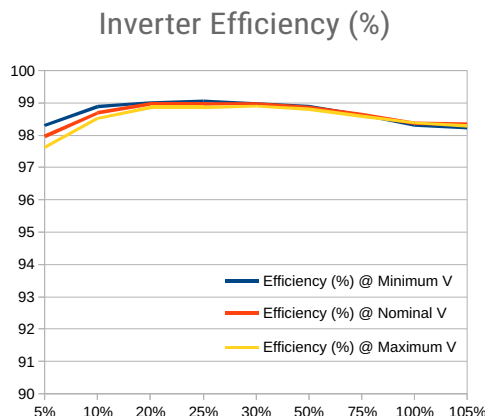
This inverter is not only matching global standards and but also offers many unique advantages & user friendly features over other leading makes operational in India. Medha takes pride to offer first "Make in India" Solar inverters with compliance of all stringent IEC standards.

- IP 65 Outdoor Inverters
- IP 55 for cooling section
- Higher Efficiency, up to 98.8%
- Multiple MPPT ensures higher generation
- Modular based design
- Smart and intelligent control and monitoring system
- Higher Power rating of 3.85MW @ 50deg
- Operates 110% AC Power at lower temperature
- High DC/AC ratio up to 1.7
- Integrated array protection with Fuses
- Compatible to positive/ negative grounding system
- Low Auxiliary consumption
- Easy to install / easy to maintain
- 25 years of product life cycle backed by strong Indian setup
- Strong Service network – largest in India



Operating Performances	Maximum Efficiency (excluding auxiliary supply)	99.1%
	Weighted Efficiency EURO/CEC(excluding auxiliary consumption for both parameters)	98.8% / 98.7%
	MPPT Efficiency	99.9%
	Auxiliary power consumption	<3500 W
	Night mode/ standby power consumption	<195 W

Compliance*	Efficiency Measurements	IEC 61683
	Environmental Testing	IEC 60068-2-1, -2-2, -2-14, -2-30/ -2-78
	Electromagnetic Compatibility (EMC)	IEC 61000-6-2, -6-4
	Electrical Safety	IEC 62109-1; IEC 62109-2
	Protection against Islanding of grid	IEEE 1547
	Photovoltaic (PV) systems characteristics of the utility Interface	IEC 61727
	LVRT, HVRT and FqRT	In line with CEA guidelines



	MCI-0842-15-	3125kW	3208kW	3500kW	3750kW	3850kW
DC Data	Max. DC voltage	1500 V				
	Voltage Operating Range	875-1450 V	800-1450 V	875-1450 V	950-1450 V	950-1450 V
	Nominal Operating DC voltage	1090 V	1050 V	1090 V	1125 V	1125 V
	Max. Recommended DC Power	5338 kWp	5113 kWp	5338 kWp	5521 kWp	5521 kWp
	No. of MPPT trackers	2				
	Number of Protected DC Inputs	up to 20 inputs with fuse protection at +ve terminals				

AC Data	Rated AC power (Cos Φ = 1, Ambient = 50°C)	3125 kW	3208 kW	3500 kW	3750 kW	3850 kW
	Max. AC power	3850kW	3529 kW	3850 kW	4235 kW	4235 kW
	Rated power factor at rated power and range	>0.99 Adjustable from 0.8 Lead to 0.8 Lagg				
	Rated AC Voltage	600 V	550 V	600 V	660 V	660 V
	Rated Frequency*	50 Hz				
	Max. distortion factor THD at rated power conditions	< 3 %				
	DC current Injection	< 0.5%				
	Distribution Network type	TN & IT				

* Frequency range of 47.5 Hz to 52 Hz is allowed.

Protections	DC, AC disconnection device	DC side: Motorized switch; AC side: ACB
	Anti islanding-loss of mains	Yes
	DC reverse polarity & Over voltage	Yes
	AC and DC short circuit & over load	Yes
	AC and DC Surge Protection	DC-Side Type-I, AC-Side- Type-II
	Insulation monitoring	Yes
	AC Over/Under voltage/frequency	Yes
	Over Temperature	Yes

General Data	Dimensions (W x H x D)	3927 x 2000 x 1336 mm
	Degree of protection	IP65 (IP55 for Cooling Zone)
	Cooling method	Temperature controlled smart forced air cooling
	Fresh air consumption	12000 m ³ /h
	Weight	<4050 kg
	Installation	Outdoor
	Ambient temperature range	-20°C to 60°C (>50°C with deration)

1 MW - 1.25 MW

Grid Tied Central Inverter

Medha has developed its first and also India's first 1.25 MW grid tied Solar central Inverters in 2018 with most advance features for utility grade Solar projects and till date, supplied and commissioned >100MW in southern part of India.

Thanks to its strong technology, Medha's inverters are generating more power compared to other leading makes installed in nearby areas with same developer.

This installation has helped Medha to develop its next generation Solar Inverters in 1500 V DC with higher capacity of 3.125 MW to 3.85 MW capacities.

- IP20 Indoor Inverters
- Most suitable for retrofitting requirements
- Smart Inverter control - intelligent fault monitoring system Product Display
- Higher Power rating of 1.31 MVA @ 50deg
- Operates 110% AC Power at lower temperature
- High DC/AC ratio up to 1.25
- Integrated array protection with fuses
- No external auxiliary power required for Inverter's control
- Compatible to positive/ negative grounding system
- Low Auxiliary consumption
- 25 years of product life cycle backed by strong Indian setup
- Strong Service network – largest in India

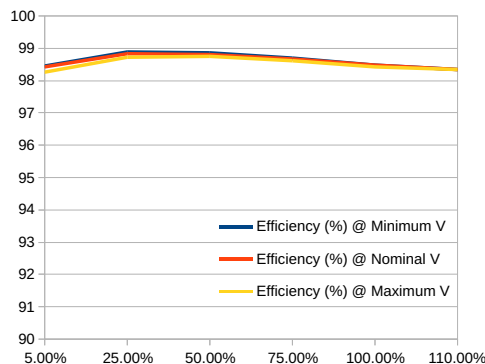


Operating Performances	Maximum Efficiency (excluding auxiliary supply)	98.9%
	Weighted Efficiency EURO/CEC(excluding auxiliary consumption for both parameters)	98.7% / 98.7%
	MPPT Efficiency	99.9%
	Auxiliary power consumption	<2900 W
	Night mode/ standby power consumption	<100 W

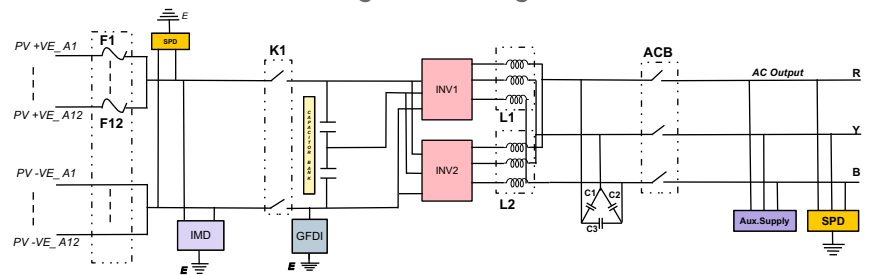
Compliance*	Efficiency Measurements	IEC 61683
	Environmental Testing	IEC 60068-2-1, -2-2, -2-14, -2-30/ -2-78
	Electromagnetic Compatibility (EMC)	IEC 61000-6-2, -6-4
	Electrical Safety	IEC 62109-1; IEC 62109-2
	Protection against Islanding of grid	IEEE 1547
	Photovoltaic (PV) systems characteristics of the utility Interface	IEC 61727
	LVRT, HVRT and FqRT	In line with CEA guidelines

* Complying with latest editions of standards

Inverter Efficiency (%)



Single Line Diagram



	MCI-0760-10-	1000kW	1250kW
DC Data	Max. DC voltage	1000 V	
	Voltage Operating Range	550-950 V	640-950 V
	Nominal Operating DC voltage	700 V	745 V
	Max. Recommended DC Power	1400 kWp	1500 kWp
	No. of MPPT trackers	1	
	Maximum number of Protected DC Inputs	9-12	

AC Data	Rated AC power (Cos Φ = 1, Ambient = 50°C)	1000 kW	1250 kW
	Max. AC power @ 40°C	1197 kW	1387 kW
	Rated power factor at rated power and range	>0.99 Adjustable from 0.8 Lead to 0.8 Lagg	
	Rated AC Voltage	380 V	440 V
	Rated Frequency*	50 Hz	
	Max. distortion factor THD at rated power conditions	< 3 %	
	DC current Injection	< 0.5%	
	Distribution Network type	TN & IT	

* Frequency range of 47.5 Hz to 52 Hz is allowed.

Protections	DC, AC disconnection device	DC side: Contactor; AC side: ACB
	Anti islanding-loss of mains	Yes
	DC reverse polarity and Over voltage protection	Yes
	AC and DC short circuit and over load protection	Yes
	AC and DC Surge Protection	DC-Side Type-I, AC-Side- Type-II
	Insulation monitoring and protection	Yes
	AC Over/Under voltage/frequency protection	Yes
	Over Temperature	Yes

General Data	Dimensions (W x H x D)	3200 x 2000 x 657 mm
	Degree of protection	IP20 (IP54 for electronic Chamber)
	Cooling method	Temperature controlled smart forced air cooling
	Fresh air consumption	2880 m ³ /h
	Weight	<1710 kg
	Installation	Indoor
	Ambient temperature range	-20°C to 60°C (>50°C with deration)

250 kW Grid Tied String Inverter

for Utility Grade Solar Projects

String Inverters is in growing demand in Utility Solar projects due to higher yield and lower maintenance cost compared to Central Inverters. Further, considering growing demand of higher capacity Mono Perc / Bifacial Solar modules and challenges in availability of suitable land parcel, String Inverters have become preferred choice of developers for all those projects.

Medha, an Indian MNC with its highly experienced R&D team and state of the art international standard manufacturing setup, recognized criticality of this requirements and set to offer most advanced “Make In India” Grid Tied String Inverters for Utility grade Solar projects with highest capacity of 250kW at 50 Deg C.

Medha’s Make in India String Inverters meet strict compliance to guidelines issued by GOI under “Atma Nirbhar Bharat” initiatives while maintaining global standards.

- High ROI with 12 MPPT for maximum energy harvest
- Highest European efficiency 98.9%
- Fuse free design and string current monitoring
- Optimized cooling fan control for energy savings as well as longer fan life
- Robust enclosure with IP66 rating for outdoor installation
- Compatible with bifacial module
- High DC/AC ratio as 1.7
- Smart I-V curve scan for module diagnosis
- Capable of supplying reactive Power(SVG) at Night
- Built-in PID recovery for better module performance
- Strong Service network – largest in India
- Set point control of active power, reactive power and power factor

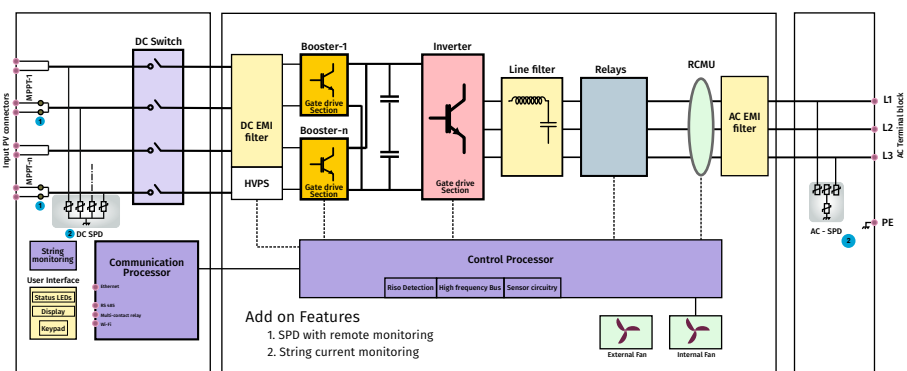
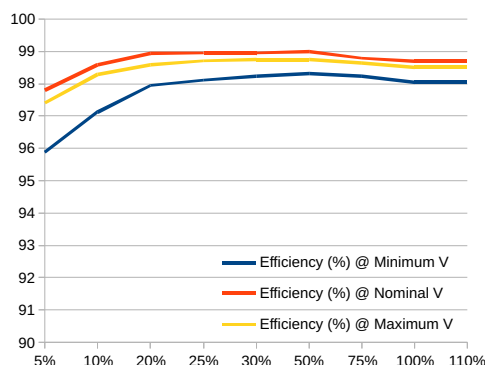


Operating Performances	Maximum Efficiency (excluding auxiliary supply)	99%
	Weighted Efficiency EURO	98.5%
	MPPT Efficiency	99.9%
	Night mode/ standby power consumption	<2 W

Compliance*	Efficiency Measurements	IEC 61683
	Environmental Testing	IEC 60068-2-1, -2-2, -2-14, -2-30/ -2-78
	Electromagnetic Compatibility (EMC)	IEC 61000-6-2, -6-4
	Electrical Safety	IEC 62109-1; IEC 62109-2
	Protection against Islanding of grid	IEEE 1547
	Photovoltaic (PV) systems characteristics of the utility Interface	IEC 61727
	LVRT, HVRT and FqRT	In line with CEA guidelines

* Complying with latest editions of standards

Inverter Efficiency (%)



Single Line Diagram

MSI-0180-15-250kW

DC Data	Max. DC voltage	1500 V
	Voltage Operating Range	550 - 1500 V
	Nominal Operating DC voltage	1160 V
	Max. Recommended DC Power	425 kWp
	No. of MPPT trackers	12
	Maximum DC current for each MPPT	30 A

AC Data	Rated AC power (Cos Φ = 1, Ambient = 50°C)	250 kW
	Max. AC power	260 kW
	Rated power factor at rated power and range	>0.99 Adjustable from 0.8 Lead to 0.8 Lagg
	Rated AC Voltage	800 V
	Rated Frequency*	50 Hz
	Max. distortion factor THD at rated power conditions	< 3 %
	DC current Injection	< 0.5%
	AC connection type	OT Terminal - support up to 300 mm Al cable

* Frequency range of 47.5 Hz to 52 Hz is allowed.

Protections	IV curve scanning	Yes
	Anti islanding-loss of mains	Yes
	DC reverse polarity and Over voltage protection	Yes
	Night time SVG	Yes
	AC and DC Surge Protection	DC-Side- Type-II , AC-Side- Type-II
	Insulation monitoring and protection	Yes
	AC Over/Under voltage/frequency protection	Yes
	Over Temperature	Yes

General Data	Dimensions (W x H x D)	970 x 900 x 365 mm
	Degree of protection	IP66
	Cooling method	Temperature controlled smart forced air cooling
	Weight	<125 kg
	Installation	Outdoor
	Ambient temperature range	-20°C to 60°C (>50°C with deration)

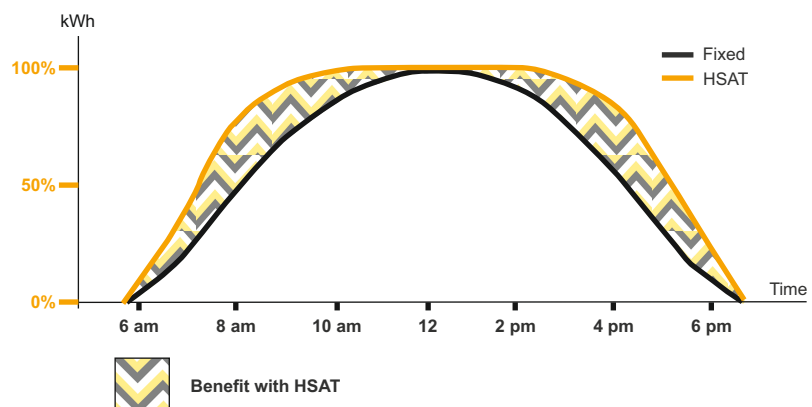
Horizontal Single-Axis Tracker

Horizontal Single Axis tracker has become proven technology (techno-commercially) in India today which has track record of higher generation. This tracker solution has done wonders especially in high altitude areas. This also contribute in saving land cost especially in fertile region and still generating more power.

Medha offers tailor made solutions by providing the controller, Motor and structural design for the panel mountings for any kind of EPC Projects based on the overall system configuration required to the end customer.



- Robust Structural design to withstand heavy wind speeds
- High performance slew drive which enables tracking at high wind speeds
- Self powered control unit with high energy backup
- Wireless communication and RS-485 communication
- High accuracy sun tracking with back tracking and wind safe algorithms
- Can be installed on 10° inclination
- Faster installation with fasteners and bolted connections - No field cutting, drilling or welding, enhancing the replaceability
- Quick reset to stowage position within 4 minutes
- Solar modules Cleaning process can be done easily
- Remote control with SCADA and local control with Emergency Stop Switch



General and Mechanical Data

Tracking Type	Horizontal single-axis, independent row
Typical Row size	Up to 60 Modules
String Voltage	Up to 1500 V DC
Tracking Range of Motion	110° (± 55°)
Ground Coverage Ratio(GCR)	Configurable , 28-45% typical
Module Supported	All commercially available modules
Array height	1.3 m standard , adjustable up to 1.8 m
Max .Allowable wind Speed	72 kmph
Max.withstanding wind speed	170 kmph
Drive System	Slew Drive, 24 V DC Motor
Max. Operating Torque	7040 Nm
Annual Energy Consumption	15 kWh per year (estimate)
Compliance	IEC 62817 ,UL 3703

Electronics Data

Solar Tracking Method	Astronomical algorithm with back tracking and intelligent wind stowing.
Tracking Accuracy	Typical ± 2°
Power source	Self powered PV series 44 W/ 50 W , AC Source 520 – 880 V/ 50 W DC source 40-50 V/ 50 W
Controller	MCU with in built inclinometer
Power back up & battery type	Up to 3 days , Li-ion /LiFepo4
Night time Stow	Yes
Back tracking	Yes
Communication	Zigbee wireless communication /RS 485
Motor type	24 V DC, 200 W PMDC

Environmental Data

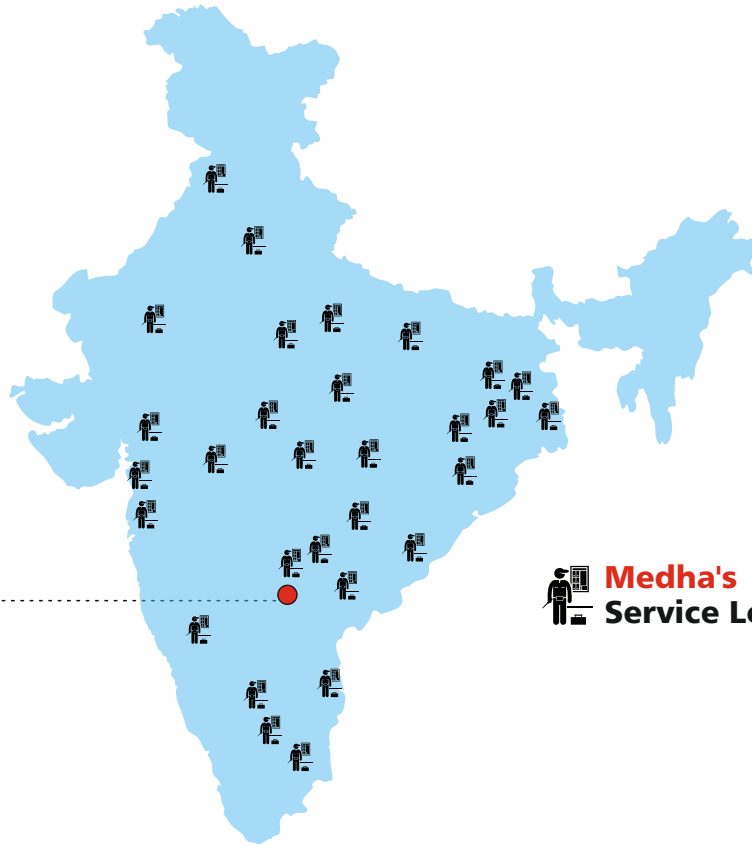
IP Rating	IP65
Maximum Altitude	2000 m
Operating Temperature	-25°C to 65°C
Snow rating	Up to 10 kg/m ²

Medha's Research & Design Centre



● 18,000 m² built-up space

● 600+ R & D Engineers



 **Medha's
Service Locations**

Medha's Production Facilities



● 53,000+ m² built-up space

● 2000+ Employees

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