JDEVS

National Solar Inverter Technology Center

Grid-Tied PV Inverters • Solar Plant Monitoring







WWW.JDEVS.IR

Designing, Engineering & Manufacturing of:

String and Central Grid-Tied Solar Inverters, and Solar Plant Monitoring Systems

Jahad Daneshgahi Elm va Sanat
Tehran, I.R. Iran

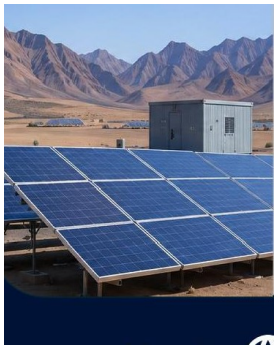
CLEAN ENERGY • HIGH EFFICIENCY

Introduction 1

JDEVS (Jahad Daneshgahi Elm va Sanat) is an Iranian public non-governmental, self-finance scientific, engineering and production organization, established in 1980. It is involved in technical and industrial activities in the fields of electrical, mechanical, environmental and civil engineering through different subsections working as independent centres.

The **National Solar Inverter Technology Center** was formed to localize the design, engineering and series production of grid-tied photovoltaic inverters and the digital platforms that operate them. The centre builds on four decades of JDEVS experience in industrial power electronics — UPS systems, industrial chargers, transformer-rectifiers and medium-voltage variable frequency drives — and transfers that proven converter technology to the renewable-energy sector.

The centre covers the complete chain: power-stage and control-board design, embedded firmware, cabinet manufacturing, factory testing, commissioning and long-term field support.



Utility-scale PV installation

1980	1500 V	99%	100%
Organization founded	DC system voltage	Max. efficiency	Local design

Conceptual design, detailed engineering, manufacturing, type testing in a nationally accredited laboratory, commissioning and after-sales support are all performed in-house.

Product Range



String Inverter — 360 kW



Central Inverter — 1250 kW



Solar Plant Monitoring System

String Inverter 360 kW

Six independent MPPT trackers, 24 DC inputs and direct 20 kV medium-voltage output for large ground-mounted arrays.

Central Inverter 1250 kW

Floor-standing 1375 kVA unit with LVRT, full protection suite and AC-side parallel technology for solar parks.

Monitoring System

IEC 61724-1 oriented platform for real-time monitoring, performance analysis, alarms and reporting.

String Inverter — 360 kW

2

The JDEVS 360 kW string inverter is a three-phase grid-tied unit developed for large ground-mounted photovoltaic plants. Six independent MPPT trackers and twenty-four DC inputs allow the array to be divided into small, individually optimized sub-fields, so that shading, soiling or mismatch on one section does not pull down the yield of the whole block.

The unit operates on a 1500 V DC system and delivers directly to a 20 kV medium-voltage network through an integrated LV/MV arrangement, which removes a separate conversion stage and reduces cabling losses on the AC side. A wide MPPT window of 500–1500 Vdc keeps the plant productive from early morning irradiance through to peak output.

Max. efficiency 99.0% **Euro efficiency 98.8%** **THDI <3%**



360 kW string inverter

Features

High Efficiency

Maximum efficiency up to 99% and Euro efficiency up to 98.8%, with MPPT tracking efficiency above 99%.

Stable & Reliable

Wide MPPT operating range and advanced grid-support functions for stable behaviour under weak-grid conditions.

Smart Cooling

Forced air cooling keeps component temperatures low and extends service life in high-ambient climates.

Comprehensive Protection

Over- and under-voltage, over-current and over-temperature protection, with continuous self-diagnosis.

Flexible Communication

RS485 as standard and external Ethernet as an option, for direct integration with the plant monitoring system.

Direct MV Connection

0.8 kV / 20 kV three-phase output arrangement for connection to the medium-voltage collection network.



360 kW string inverter — product presentation

Table 1 — Technical Specification, String Inverter 360 kW

Input (DC)	
Max. DC input voltage	1500 Vdc
MPPT voltage range	500 ~ 1500 Vdc
Number of MPPT	6
Number of DC inputs	24
Output (AC)	
Rated output power	360 kW
Max. output power	360 kW
AC output voltage	20 kV
Grid frequency range	50 Hz (±0.5 Hz), adjustable
LV / MV voltage	0.8 kV / 20 kV — 3 ph
Power factor (cos φ)	1 (0.9 leading ~ 0.9 lagging), adjustable
THDI	< 3%
System Features	
Inverter max. efficiency	99.0%
Inverter Euro efficiency	98.8%
MPPT efficiency	> 99%
Cooling type	Forced air cooling
Communication interface	RS485; external Ethernet (optional)
Standards	
Safety standards	IEC/EN 62109-1, IEC/EN 62109-2
Grid connection standards	IEC 62116, IEC 61727, IEC 61683

Application note. With six MPPT trackers per unit, a 360 kW inverter typically serves an array block of up to approximately 430 kWp. Final string sizing is confirmed case by case against module data, site irradiance and temperature extremes.

Central Inverter — 1250 kW

3



1250 kW central inverter

The JDEVS 1250 kW central inverter is a floor-standing, grid-tied unit designed for utility-scale solar parks where large array blocks are concentrated on a single conversion point. It delivers a nominal 1250 kW with a maximum apparent power of 1375 kVA at 800 VAC, and is built for continuous duty in the climatic conditions typical of Iranian solar sites.

The unit carries a complete protection suite — DC reverse polarity, anti-islanding, short circuit, output over-current, Type II surge arresters on both DC and AC sides, insulation impedance detection, ground fault monitoring and residual leakage current detection — together with low-voltage ride-through, so that the plant stays connected during grid disturbances instead of tripping off.

1375 kVA | LVRT | Altitude up to 6000 m

Features

High Efficiency

Maximum conversion efficiency above 97% across the normal operating range of the plant.

Reliable Protection

Full DC- and AC-side protection including Type II surge arresters, insulation monitoring and residual current detection.

Grid Connection

LVRT capability and power factor better than 0.99 at nominal power, adjustable from 0.9 leading to 0.9 lagging.

AC-Side Parallel Technology

Several units operate in parallel on the AC side, allowing plant capacity to be built up in modular blocks.

Service & Diagnostics

Fault wave record diagnosis and online firmware upgrade reduce site visits and shorten fault-finding time.

Operator Interface

HMI touch display for local operation, with RS485 communication and optional Ethernet for remote supervision.



1250 kW grid-tied central inverter — product presentation

Table 2 — Technical Specification, Central Inverter 1250 kW

Input (PV)	
Max. PV input voltage	1500 VDC
Startup PV voltage	820 VDC
MPPT operation voltage range	880 ~ 1200 VDC
Max. input current	370 × 2 A
MPPT number	1
Max. input strings number	4

General	
Display	HMI
Communication port	RS485; optional Ethernet
Dimensions (W×H×D)	1200 × 2260 × 1000 mm
Weight	1000 kg
Operating temperature	−10 ~ +55 °C (derating above 35 °C)
Cooling method	Fan cooling
Max. operation altitude	6000 m (derating above 3000 m)

Efficiency & Standards	
Max. efficiency	> 97%
Grid connection standard	IEC 62116, IEC 61727, IEC 61683
Safety / EMC standard	IEC/EN 62109-1, IEC/EN 62109-2

Output (Grid)	
Nominal output power	1250 kW
Max. output power	1375 kVA
Nominal grid voltage / frequency	3/N/PE 800 VAC / 50 Hz
Max. output current	902 A
PF at nominal power range	>0.99 (0.9 lead ~ 0.9 lag)
THDi	< 3%

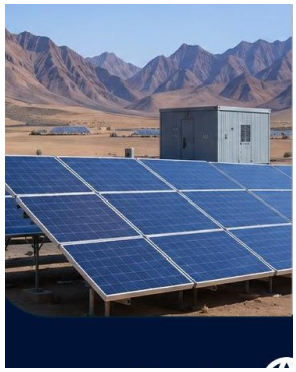
Protection	
Input DC switch	Yes
DC reverse polarity protection	Yes
Anti-islanding protection	Yes
Short circuit protection	Yes
Output over-current protection	Yes
DC surge protection	Type II
AC surge protection	Type II
Insulation impedance detection	Yes
Ground fault monitoring	Yes
Residual leakage current detection	Yes

Other Functions	
LVRT function	Yes
AC side parallel technology	Yes
Anti-PID function	Optional
Fault wave record diagnosis	Yes
Online upgrade	Yes

Solar Plant Monitoring System 4

The JDEVS Solar Plant Monitoring System is a complete supervisory platform for photovoltaic power plants. It gives the operator a single view of every device on site — inverters, meters, sensors and field equipment — and turns raw measurements into the indicators that actually drive revenue: performance ratio, specific yield, availability and loss analysis.
The platform is built around the measurement and reporting approach of **IEC 61724-1**, the international standard for photovoltaic system performance monitoring, so that recorded data is consistent, comparable and defensible in acceptance tests and long-term performance reporting.
Deployment follows the plant: a local server for sites that must remain self-contained, or a central installation supervising several plants from one control room.

IEC 61724-1 oriented | Real-time | Multi-plant



Field instrumentation and plant data acquisition

Key Capabilities

Real-Time Monitoring
Live display of every plant parameter — power, energy, irradiance, module and ambient temperature, wind speed — at high time resolution.

Performance Analysis
Yield, generation and performance trends, so that losses are identified and productivity improvements can be verified.

Smart Alarms
Multi-level notifications delivered by SMS and e-mail, prioritized so that critical events are not buried in routine warnings.

Device Management
Inverters, meters, sensors and all field equipment managed from a single inventory with health status per device.

Data History
High-resolution historian with powerful search and visualization tools for post-event analysis and long-term reporting.

Reports & Export
Automatic generation of periodic reports and data export in Excel format for owner, lender and regulator reporting.

Maintenance & Operation
Preventive maintenance planning, work actions and equipment health management linked to the alarm history.

Security & Reliability
Role-based access control, full audit log of user actions and scheduled backup of the plant database.



Operator dashboard — live plant overview, performance indicators and generation trends

Table 3 — Solar Plant Monitoring System, Functional Data Sheet

Monitoring Scope	
Power conversion	String and central inverters, individually addressed
Array side	String combiner boxes and DC distribution
Metering	Plant energy meters at point of common coupling
Weather station	Irradiance, module temperature, ambient temperature, wind speed
Auxiliary equipment	Trackers, transformers and other field devices (project dependent)
Measured Quantities and Indicators	
Electrical	AC and DC power, energy, voltage, current, frequency, power factor
Environmental	Irradiance (W/m^2), module temperature, ambient temperature, wind speed
Performance indicators	Performance ratio, capacity factor, specific yield, daily and cumulative energy
Availability	System health index, online / offline device count, warning and critical alarm count
Platform Functions	
Real-time view	Plant overview dashboard, device detail views, generation and irradiance trends
Alarming	Multi-level alarms with SMS and e-mail notification
Historian	High-resolution data storage with search and visualization tools
Reporting	Automatic periodic reports; data export in Excel format
Maintenance	Preventive maintenance planning and equipment health management
Security	Role-based access control, audit log, scheduled backup
System and Interfaces	
Device communication	RS485 and Ethernet, as supported by the connected equipment
Client access	Web browser on desktop and mobile devices
Deployment	On-premise plant server, or central installation for several plants
Reference standard	IEC 61724-1 — Photovoltaic system performance monitoring

IEC 61724-1. The standard defines measurement accuracy classes, data acquisition intervals and the derived parameters used to assess photovoltaic plant performance. The JDEVS platform is structured around that framework so that acceptance testing, guarantee verification and long-term performance reporting all rest on the same, consistent dataset.

Design and Construction 5

Enclosure

Central inverters are supplied in floor-mounted steel cabinets finished to RAL standard, arranged for front access so that routine maintenance and board replacement are carried out without removing the unit from service. String inverters are housed in sealed die-cast enclosures intended for direct mounting on the array structure.

Cooling

Both product families use forced air cooling with speed-controlled fans. Thermal design is verified at full load for the ambient extremes of the installation site, with documented derating curves above 35 °C and above 3000 m altitude.

Operator Interface

Central units carry an HMI touch display showing operating state, instantaneous and cumulative energy, active alarms and event history. String units provide local status indication, with full detail available through the monitoring platform.

Protection

Protection functions are implemented in hardware and firmware together: DC switching and reverse polarity protection, anti-islanding, short circuit and over-current protection, Type II surge arresters on both DC and AC sides, insulation impedance detection, ground fault monitoring and residual leakage current detection.

Documentation

Every system is delivered with a complete set of user manuals, circuit diagrams, test reports and spare-part lists, prepared in accordance with the client's documentation specification.

Safety

Internal layout is arranged for safe access during adjustment and routine maintenance, with segregation of the DC and AC compartments and clearly identified isolation points.

Table 4 — General

Cubicle (central unit)	Floor mounted steel sheet
Colour	RAL, to client specification
Operating temperature	−10 ∼ +55 °C
Operation altitude	Up to 6000 m with derating
Ventilation	Forced air, speed-controlled fans
Quality standard	ISO 9001:2015
Cable entry	Bottom (top on request)

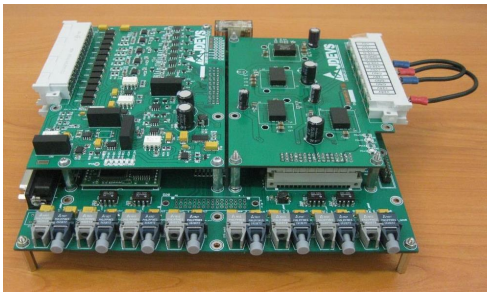
Table 5 — Standards

Inverter safety	IEC/EN 62109-1
Safety — PV inverters	IEC/EN 62109-2
Anti-islanding	IEC 62116
Grid interconnection	IEC 61727
Efficiency measurement	IEC 61683
Performance monitoring	IEC 61724-1
Quality management	ISO 9001:2015

Engineering, Quality and Support 6

Research and Development

The centre is supported by the JDEVS research institute of electrical engineering, whose groups cover power electronic converters, industrial power supplies, and measurement, processing and control. Power-stage topology, magnetics, control boards and embedded firmware are developed in-house, which allows the product to be adapted to a specific grid code or site condition rather than supplied as a fixed commodity unit.



Control board design and production

Testing and Quality Control

Units are tested at full load before despatch. The organization operates a high-voltage testing laboratory accredited to **ISO/IEC 17025:2017** by the National Accreditation Centre of Iran, with impulse, power-frequency, partial discharge and on-site testing capability — so type testing and verification are performed within the same organization that designs and builds the equipment.



Accredited high-voltage test laboratory

Training

Operation and maintenance courses are provided at three levels. Elementary and intermediate courses are held at the client site or at JDEVS headquarters; advanced courses are held in the JDEVS workshops alongside the production line.

Warranty

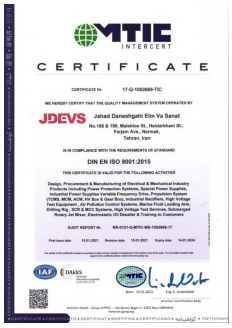
A five-year comprehensive warranty is provided as standard, backed by 24/7 technical support. Extended terms are available on request.

Spares

Stocks of boards, power modules and components are maintained so that replacement parts are delivered without long import lead times.

After Sales Service

On-site commissioning, maintenance and repair are carried out by the same engineering team that builds the equipment.



ISO 9001:2015 quality management certificate



Product quality certification

Production, Applications and Contact 7

Manufacturing

Inverter production is carried out in the JDEVS electrical workshop complex, which also builds the organization's industrial UPS systems, chargers and medium-voltage drives. Sheet metal work, busbar fabrication, wiring, board assembly and full-load testing are performed on the same site, under one quality system.
Capacity is organized in series batches, which allows the output of a utility-scale project to be scheduled against the construction programme of the plant rather than against import lead times.

Series production | Full-load factory test | ISO 9001:2015



— Inverter production hall



— JDEVS workshop complex

Applications

Utility-scale plants

Ground-mounted solar parks connected to the medium-voltage network.

Industrial self-consumption

On-site generation for energy-intensive industries subject to renewable obligations.

Commercial rooftop

Distributed rooftop installations on commercial and public buildings.

Hybrid with storage

Installations combining PV generation with battery energy storage.

Contact Us

Head office
188–190 Malekloo St., Haidarkhani St., Farjam Ave., Narmak, Tehran, I.R. Iran

Research and production complex
ACECR R&D complex, end of the Behesht Sakineh road, Karaj–Qazvin Highway, I.R. Iran

Contact
Tel: +98 21 77455001–2 | Fax: +98 21 77455003
E-mail: info@jdevs.ir | Web: www.jdevs.ir

Other Centers and Their Products

JDEVS was founded in 1980 as an industrial complex in Iran and operates in six core business areas. It is a leading designer and manufacturer of industrial power supplies, power protection systems, high voltage test equipment and air pollution control equipment, with a reputation for quality and reliability built over four decades in the demanding markets of Iran and the ECO countries.



Solar Inverters and Monitoring

- String grid-tied PV inverters
- Central grid-tied PV inverters
- Solar plant monitoring systems
- Engineering and commissioning services



Converters and Power Supplies

- Industrial UPS, single and three phase
- Standard UPS and industrial chargers
- Variable frequency drives (VFD)
- Battery monitoring systems



Industrial Transformers and Rectifiers

- High current transformer rectifiers
- High voltage rectifiers for ESPs
- Rectifiers for metro traction substations
- Dry type and special transformers



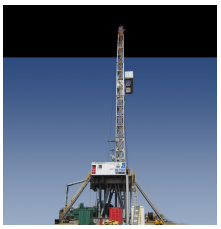
High Voltage Test Equipment and Services

- AC, DC, impulse and resonant test equipment
- Measurement and partial discharge systems
- Quality control testing services
- On-site testing, including GIS substations



Air Pollution Control Equipment

- Electrostatic precipitators and bag filters
- Internal parts, collecting plates and electrodes
- Upgrading of existing dedusting systems
- Spare parts for ESPs and bag houses



Oil Industry Equipment

- Land drilling rigs, electrical and control systems
- Oil loading arms
- Submerged rotary jet (SRJ)
- Electrostatic oil desalter