

OPERATION & MAINTENANCE

Preventive & Predictive Quality Services



PARALOS

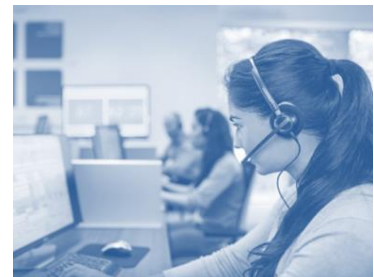
OPERATION & MAINTENANCE | ENERGY & INDUSTRY



PARALOS provides a variety of specialized Operation & Maintenance Services both for industrial and energy installations. Our services include routine, preventive and predictive maintenance, focusing on safely reducing costs, improving efficiencies, raising quality and increasing productivity. Being one of the leading EPC players in the industrial and energy sector, we have gained the experience and knowledge of such critical installations weaknesses, thus we are continuously developing our maintenance plans and methods, keeping our clients safe and fully operational.

Our O&M services mainly include:

- ✓ Operation and management
- ✓ Preventive & Predictive Maintenance
- ✓ Minor & Major Corrective Maintenance
- ✓ Monitoring and Reporting
- ✓ Health & Safety management
- ✓ Supply of spare parts and Integrated supplies
- ✓ Spare parts storage and management
- ✓ Technical Audits
- ✓ Training courses
- ✓ On call services (24/7 basis)
- ✓ Warrantee Management
- ✓ Maintenance over mobile applications



KEY FIGURES:

- 5** SPECIALIZED MAINTENANCE ENGINEERS
- 40** CERTIFIED SERVICE TECHNICIANS
- 20** SERVICE VEHICLES / **1** CRANE
- 1** SPARE PARTS WAREHOUSE (300m²)
- 1** STATE OF ART MAINTENANCE EQUIPMENT
- 1** HI END TESTING / COMMISSIONING EQUIPMENT

OUR EXPERIENCE IN NUMBERS :

- 1,5GW** INSTALLED POWER
- 20** HV / MV ELECTRICAL SUBSTATIONS
- 10 industries** MAINTENANCE CONTRACTS
- 200MW Wind Farms** MAINTENANCE CONTRACTS
- 20MW Solar Parks** MAINTENANCE CONTRACTS
- 1** INTER. AIRPORT / **1** SHIPYARD / **5** HOSPITALS

PREVENTIVE MAINTENANCE

Specialized technicians equipped with complete sets of certified tools, perform preventive maintenance to all kind of electromechanical equipment in critical installations such as HV/MV Substations, Wind Farms, Heavy Industries, Airports and Hospitals.

Each team is supervised by a chief engineer specialized in maintenance methods and procedures.

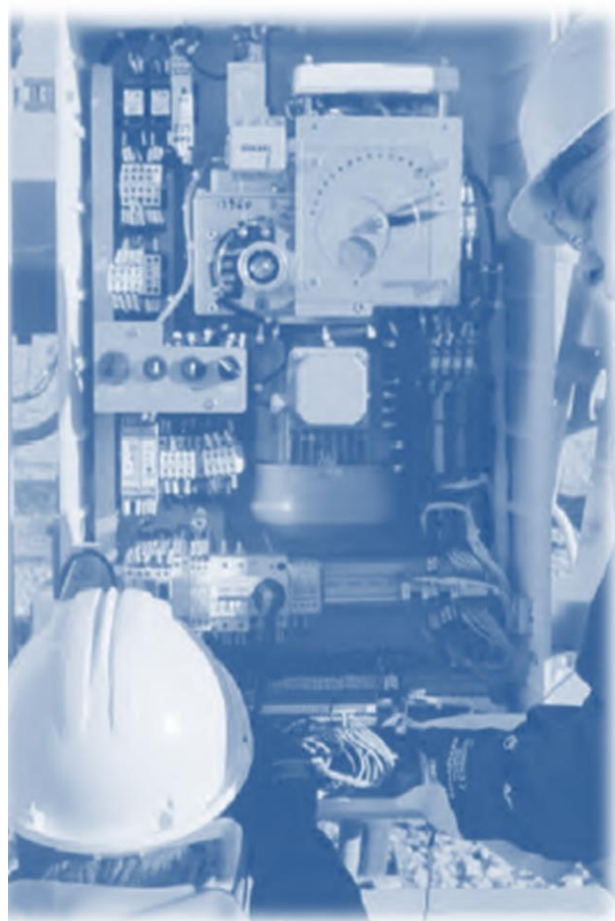
Routine inspections check lists are strictly followed ensuring that all parts are inspected and maintained thoroughly.


Every work is performed under the guidelines of a detailed Safety Plan securing the safety of the technical personnel and equipment.

All PARALOS operations are certified by TUV ISO 9001.

PARALOS guarantees

- ✓ Reduced downtimes
- ✓ Lower overall costs
- ✓ Increase of liability
- ✓ Extension of equipment lifetime
- ✓ Personnel safety



PROJECT : KITHAIRONAS O&M SERVICES		 PARALOS INDUSTRIAL & ENERGY ENGINEERING & CONSTRUCTION S.A.			
CONTRACTOR : GAMESA EOLICA MEPE					
SUBCONTRACTOR : PARALOS ENGINEERING SA					
MAINTENANCE SERVICES - Wind Turbines					
WIND TURBINE 27					
TYPE		A/A	WORKS	Y/N	REMARKS
PREVENTIVE MAINTENANCE SCHEDULE GAMESA WIND TURBINES	MV Transformers	1.1	Visual inspection of all major screwed	<input checked="" type="checkbox"/>	
		1.2	Testing the operation of transformer protection: thermometer, thermostat, etc., checking the performance of the protections	<input checked="" type="checkbox"/>	
		1.3	Cleaning of insulating elements	<input checked="" type="checkbox"/>	
		1.4	Check connections, retightening if necessary	<input checked="" type="checkbox"/>	
		1.5	Check earthing connections	<input checked="" type="checkbox"/>	
	Gear	2.1	Visual inspection of the earthing	<input checked="" type="checkbox"/>	The grounding conductors of the MV cables are in direct contact with the metallic housing, causing corrosion effects.
		2.2	Checking the presence of dust or dirt on insulating parts	<input checked="" type="checkbox"/>	
		2.3	Checking ring of security outside location, loose nuts or bolts	<input checked="" type="checkbox"/>	
		2.4	Verify the absence of deformation or cracking of insulating parts	<input checked="" type="checkbox"/>	
		2.5	Check absence of oxidation in the contacts (only for disconnecting circuit breakers)	<input type="checkbox"/>	
		2.6	Verify the absence of signs of overheating or loosened nuts on the connections to the terminals of the switch (only for the fixed switch)	<input checked="" type="checkbox"/>	
		2.7	Check severing earthing contact (isolator switch only when provided)	<input checked="" type="checkbox"/>	

PREDICTIVE MAINTENANCE

PARALOS testing / commissioning equipment can predict fault conditions by measuring values that reflect the equipment real condition. All our equipment is calibrated and certified yearly.

	EQUIPMENT DESCRIPTION	Type	Manufacturer
1	HV Supply Unit 100kV dc	PTS 100 F	High Voltage INC - USA
2	HV Supply Unit 70kV dc / 50kV ac	PGK 70HB	BAUR - Austria
3	Fault detector	EURODESK C	BAUR - Austria
4	Fault detector – Control Unit	MG532 MPS 32/ 3	BAUR - Austria
5	HV Discharging Unit	EAM 70	BAUR - Austria
6	HV testing cable	3 x 50 m	BAUR - Austria
7	Oscillograph	IRG 300 / 19"	BAUR - Austria
8	Measuring bridge for water fault detections	DMB 5	BAUR - Austria
9	Coil Detector	SP 20	BAUR - Austria
10	Frequency transmitter	KHS	BAUR - Austria
11	Grounding resistance measuring unit	SmartTEC EARTH	METREL-Slovenia
12	Insulation measurement Unit 5 kV	Teraohm 5kV	METREL-Slovenia
13	Insulation measurement Unit 5 kV	METRISO 5000A	GOSEN-Germany
14	Diesel generator 12 HP	HONDA 1-12	HONDA - Japan
15	VLF (Very Low Frequency) Unit	VLF 6022	High Voltage INC - USA
16	Circuit Breaker tester	SA 100	WEIS Germany
17	Energy Quality Analyzer	Model 3945	AEMC USA
18	Circuit Breaker measuring unit	PME - 500- TR	EUROSMC Spain
19	Winding Resistance measuring unit	WRM-40	Vanguard USA
20	Infrared Camera	Ti 20	FLUKE USA
21	Power Transformer Ratio-meter	ATRT-03B	Vanguard USA
22	Insulation oil breakdown measuring unit	DTS 60DF	High Voltage INC - USA
23	Protection relay testing device	CMC-256 Protection Package	OMICRON Austria
24	Power Transformers Tand measurement	PT 12	PRESCO Switzerland
25	Power cables Tand measurement	TDB 60F5	High Voltage INC - USA
26	Excitation current measuring unit	EZCT 2000	Vanguard USA



PARALOS provides predictive and preventive maintenance services for several types of Wind Turbines. Our specialized personnel are certified both from the Global Wind Organization (GWO) and from major Wind Turbine manufacturers. Indicative services:

MAINTENANCE SERVICES :

- ✓ Preventive & Predictive maintenance
- ✓ Permanent Personnel at site
- ✓ "On call" service 24/7
- ✓ Minor Corrective works
- ✓ Major Corrective Works
- ✓ Spare parts / Materials handling
- ✓ Oil replacement with special truck
- ✓ Design Upgrades
- ✓ Blades inspection and repairs

ADDITIONAL SERVICES :

- ✓ MV & LV Installations inspection / maintenance
- ✓ Power Transformer inspection / maintenance
- ✓ Protection systems optimization
- ✓ Re-windings
- ✓ Diagnostics / Vibration Analysis
- ✓ Power Analysis



PARALOS provides predictive and preventive maintenance services for High and Medium Voltage installations. Our personnel holds the necessary licenses and certification to work inside such installations and are fully equipped with hi end testing devices in order to simulate and test all possible conditions in a HV/MV Substation. Our target is to maintain the Substation under fully operative and safe conditions and in parallel predict and eliminate on time any possible future fault.

MAINTENANCE SERVICES :

- | | |
|--|---|
| ✓ Substation operation and management | ✓ Safety management and monitoring |
| ✓ Preventive & Predictive Maintenance | ✓ Supply of spare parts and Integrated supplies |
| ✓ Minor & Major Corrective Works | ✓ Spare parts storage and management |
| ✓ Monitoring and Reporting | ✓ Technical Audits |
| ✓ Special Measurements on Power Transformers | ✓ On call services (24/7 basis) |
| ✓ Testing & calibration of the Protection System | ✓ Warrantee Management |
| ✓ Measurements on the grounding system | |
| ✓ Maintenance of secondary systems | |



PARALOS provides predictive and preventive maintenance services for Photovoltaic Parks .

Depending on the maintenance “package” we provide the following services:

- ✓ Monitoring / Remote Control / Reporting
- ✓ Predictive and Preventive Maintenance
- ✓ Corrective Works
- ✓ Maintenance of Electrical Substations
- ✓ Cleaning of PV Panels
- ✓ Maintenance of auxiliary systems
- ✓ Cutting of grass
- ✓ Warrantee Claim Management
- ✓ Insurance Management
- ✓ “On Call” Service / 24hours guaranteed response
- ✓ Systems Upgrades
- ✓ Technical audits & evaluations

OPERATIONS CENTERS & WAREHOUSE SERVICES

PARALOS Headquarters are located in Attica at the seaside of Piraeus Port. This excellent location offers direct and fast access to all major national roads as well as to the Port of Piraeus which is considered to be one of the most important merchant ports in Europe.

Very near to the Headquarters offices, we are operating a fully equipped 300m² warehouse that serves our internal needs for material and equipment storage and management.

Apart from the typical warehouse services we also provide to our clients materials and spare parts complete management, including materials approval and receipt, storage and safeguarding, transportations from the supplier and to the site, materials records. Our warehouse is covered by an “All Risk” insurance contract.

A second Operations Center is located at Thessaloniki, the second largest city of Greece, in order to cover our clients’ needs in the region of North Greece.

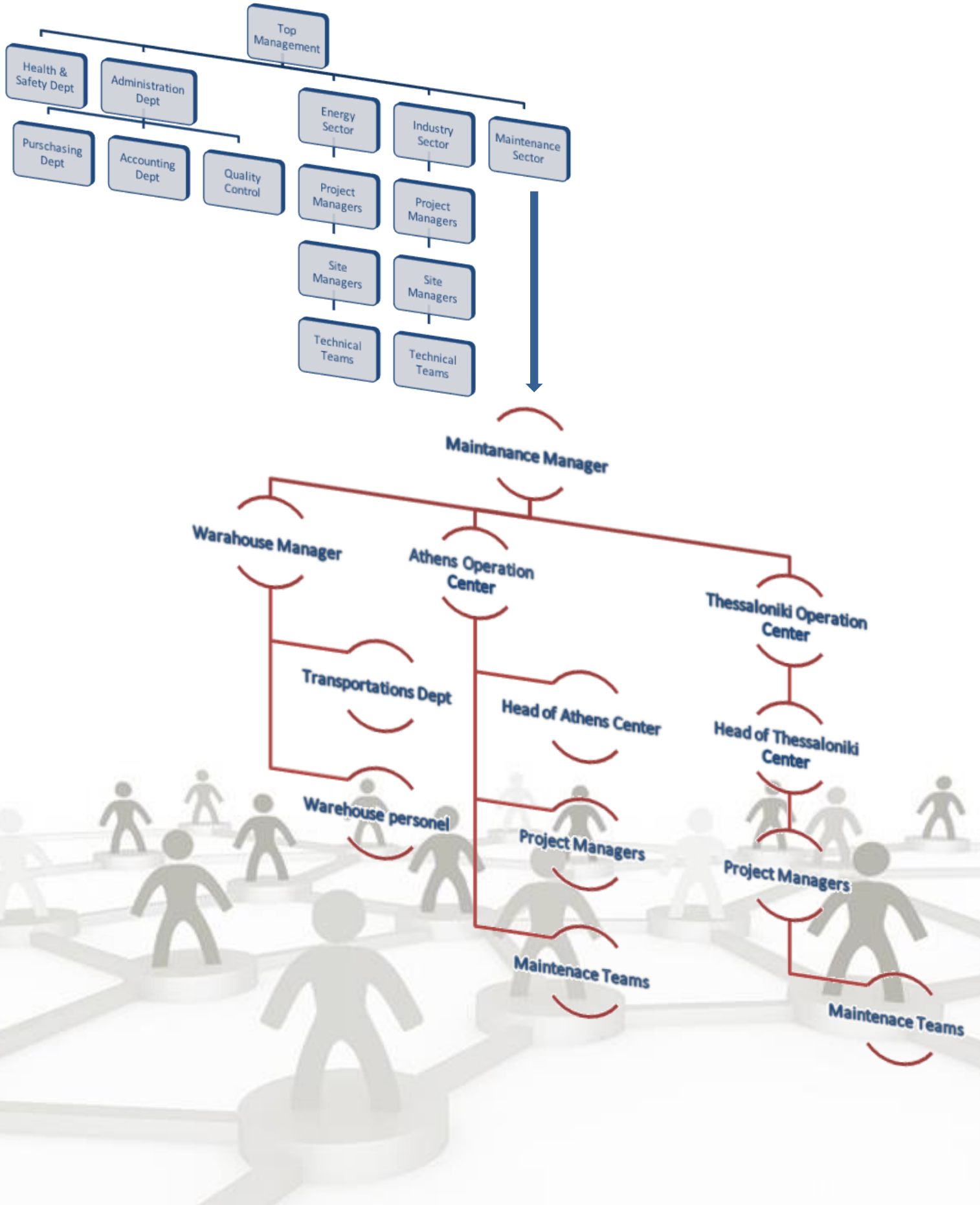




PARALOS

OPERATION & MAINTENANCE | ENERGY & INDUSTRY

ORGANIZATION CHART



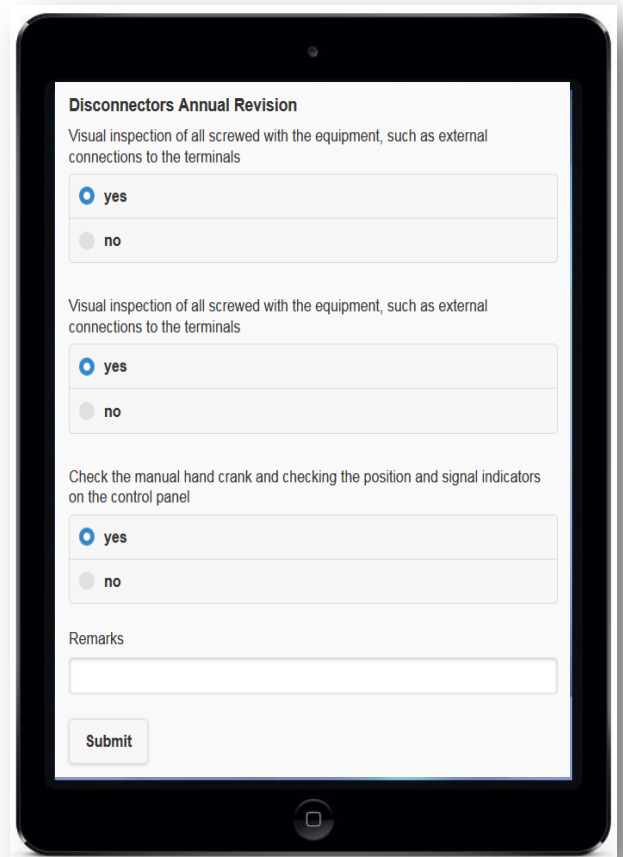
MAINTENANCE OVER MOBILE

To serve the needs of continuous monitoring, data collection and analysis, we have developed a reporting and data collecting platform that runs in mobile / tablet environment, called the **“TEMPEST”**. With the input of the maintenance personnel this smart tool collects all the maintenance information from the site and sends it to a central computer where the data are stored and analyzed.

The operator has a complete file of all maintenance history of each component at all times.

TEMPEST benefits:

- ✓ Organized & quick access maintenance history
- ✓ Data collection and algorithms analysis
- ✓ Tracking of personnel position on site
(enhancement of personnel safety especially for far off locations, e.g. wind farms)
- ✓ Capability of sound recording and photos
- ✓ Automatically extracted reports



Disconnectors Annual Revision

Visual inspection of all screwed with the equipment, such as external connections to the terminals

☒ yes
☐ no

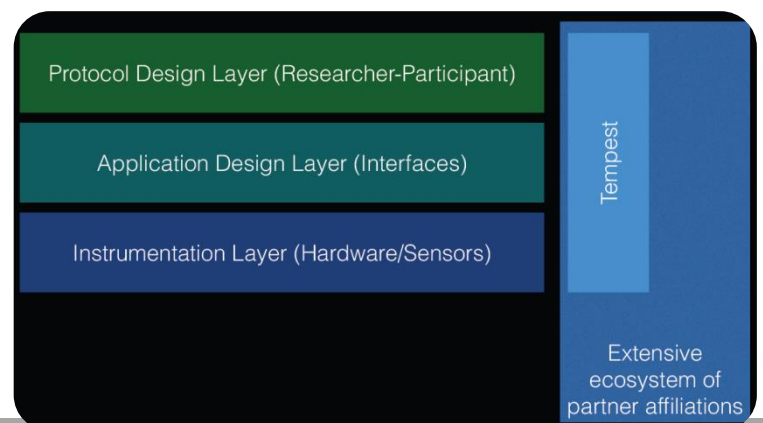
Visual inspection of all screwed with the equipment, such as external connections to the terminals

☒ yes
☐ no

Check the manual hand crank and checking the position and signal indicators on the control panel

☒ yes
☐ no

Remarks





PARALOS is committed to the health and safety of its employees and for all who are involved in our projects. Protection of employees from injury or occupational disease is a major continuing objective. Everyone in PARALOS is committed to take every reasonable effort to eliminate the hazards that could cause accidents and injuries.

Safety is not only our priority but also our business. PARALOS is officially representing

MSA, one of the leading and pioneer companies of Personal Protective Equipment and Gas Detection Systems. MSA's goal is to manufacture and provide products, technology and services that protect people's health and enhance their safety.

Our goal, every single day, is to provide our customers with dependable, high-quality products, instruments, and service to help ensure a safe return home at the end of each work day.



OPERATION & MAINTENANCE

Indicative Projects Presentation



Industrial Projects

Wind Farm Projects

Photovoltaic Park Projects

High Voltage & Medium Voltage Projects



INTERNATIONAL AIRPORT “EL. VENIZELOS” / MV & LV TECHNICAL BASE INSTALLATIONS

GENERAL DESCRIPTION :

Maintenance contract for all the Medium & Low Voltage installations at the technical base of OLYMPIC AIR at the International Airport of Athens “ELEFThERIOS VENIZELOS”.

SCOPE OF WORKS :

- Routine inspections & predictive / preventive maintenance on all MV and LV installations of the technical base of OLYMPIC AIR.
- On call services / Electrical and Mechanical Repairs
- Technical Support for the Airports critical events
- Technical Audits of Electrical Substations



THYSSENKRUPP / HV, MV & LV INSTALLATIONS OF HELLENIC SHIPYARDS

GENERAL DESCRIPTION :

Maintenance contract for all the High, Medium & Low Voltage installations at the Hellenic Shipyards SA (THYSSEN KRUPP).

SCOPE OF WORKS :

- Routine inspections & predictive / preventive maintenance on all HV, MV and LV installations of the Shipyard. Specifically the Shipyards electrical grid included 17 MV Substations & 1 HV Substation.
- On call services / Electrical and Mechanical Repairs
- Motors & Generators repairs & maintenance
- Training courses for the Shipyards technical personnel



TITAN CEMENT COMPANY S.A. / HV, MV & LV INSTALLATIONS

GENERAL DESCRIPTION :

Maintenance contract for all the High, Medium & Low Voltage installations at the TITAN Plant "KAMARI".

SCOPE OF WORKS :

- Routine inspections & predictive / preventive maintenance on all HV, MV and LV installations of the Plant. Specifically the Plant's electrical grid includes 6 MV Substations & 1 HV Substation.
- On call services / Electrical and Mechanical Repairs



LOULIS MILLS KERATSINI PLANT / MV & LV PLANT INSTALLATIONS

GENERAL DESCRIPTION :

Maintenance contract for all the Medium & Low Voltage installations main Plant of LOULIS MILLS at Keratsini.

SCOPE OF WORKS :

- Routine inspections & predictive / preventive maintenance on all MV and LV installations
- On call services / Electrical and Mechanical Repairs
- Technical Audits of Electrical Substations



WIND TURBINES MAINTENANCE

GENERAL DESCRIPTION :

Wind Turbines maintenance contracts for Wind Farms of total power 200MW located at several areas of Greece.

SCOPE OF WORKS :

- Predictive / Preventive maintenance
- Minor Corrective Works
- Large Corrective Works
- On call services / Electrical and Mechanical Repairs
- Design Upgrades
- Spare parts handling



PHOTOVOLTAIC PARKS / MV & LV PV PLANT INSTALLATIONS

GENERAL DESCRIPTION :

Maintenance contract for several Photovoltaic Parks from 100kW up to 5MW (total power 30MW) in different areas of Greece.

SCOPE OF WORKS :

- Routine inspections & predictive / preventive maintenance on all MV and LV installations
- On call services / Electrical and Mechanical Repairs
- Technical Audits of all installations