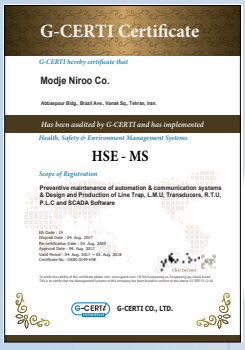
# Modje Niroo Co.

- Telecommunication
- Dispatching
- Automation
- Cyber Security
- Protection
- ICT

# Certificates and Awards

## ISO





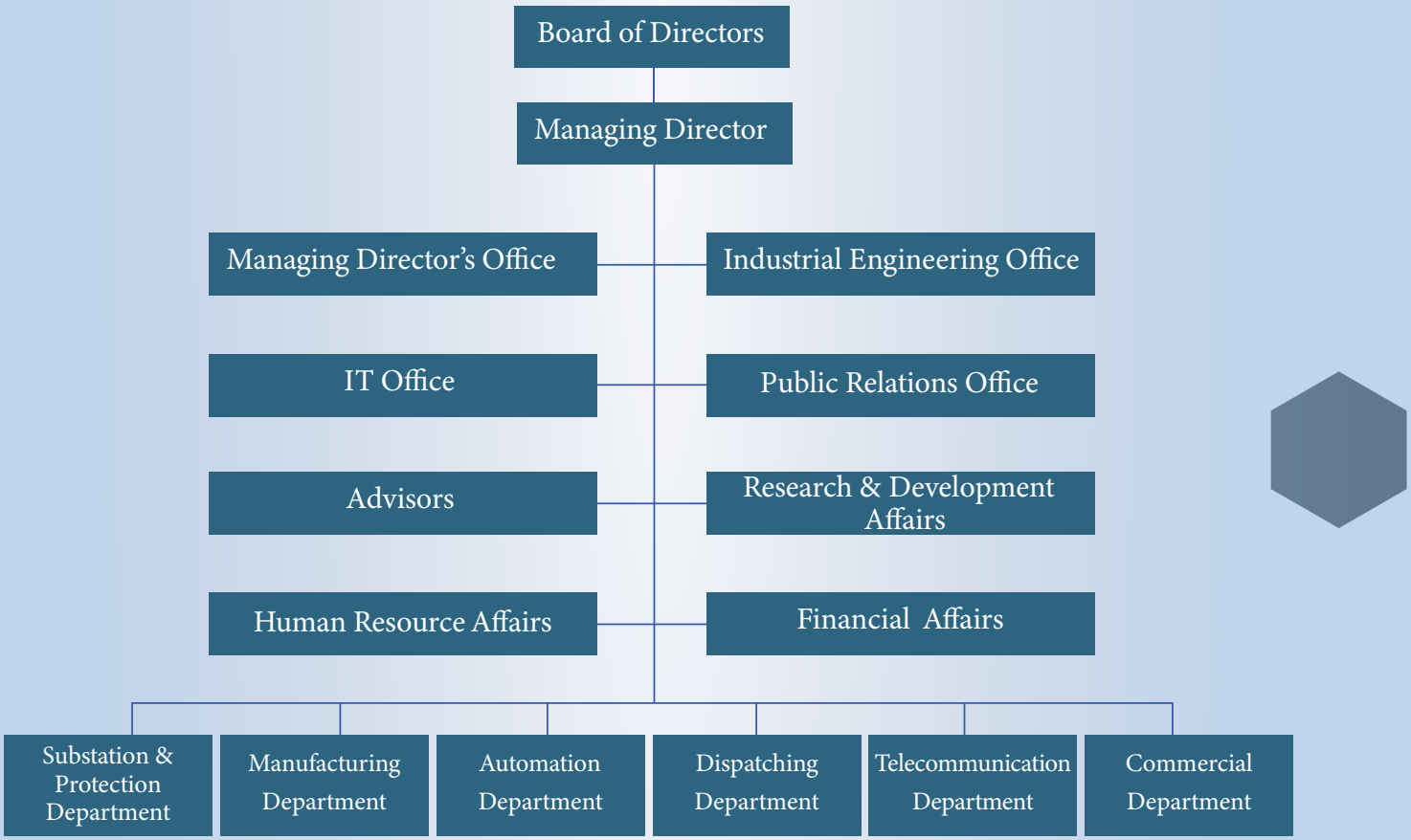

## Awards


## Certificate


## Introduction

Modje Niroo Company (MNC) is one of the companies affiliated to the ministry of energy and was established in 1992 as a result of government privatization policy. MNC has employed highly educated and experienced engineers in the fields of power system telecommunication, dispatching and automation. This company is honored to provide services including installation, commissioning, repair and maintenance of dispatching and telecommunication centers in the form of Engineering, Procurement and Construction (EPC), production, and supply of equipment. Proudly, it is known as a knowledge-based company due to its successful products, such as PAYA-SCADA, PAYA-SAS, Line Trap (LT), Line Matching Unit (LMU) and FSK modems.

It is worth noting that repair and maintenance of the telemetry and telecommunication systems of Iran Grid Management Company (IGMC) power plants and Regional Electric Companies' (RECs) substations all over the country as well as repair and maintenance of IGMC Control Center are from the brilliant MNC history.



# Products Overview

## MNC- LT: Line Traps for Transmission Lines

MNC-LT can be applied for transmission/sub-transmission lines in the voltage ranges from 10 kV to 400 kV. Its continuous rated current can be from 400 A to 3150 A with different inductances and band frequencies. MNC-LTs have type tests from KEMA, CESI and NIC VVA.


## MNC- LMU: Line Matching Unit for Transmission Lines

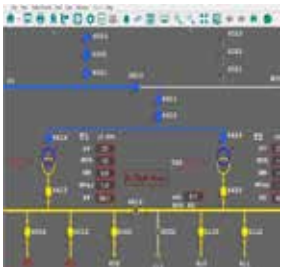
MNC-LMU can be used in both phase to phase and phase to ground modes. Its universal coupling device in connection with coupling capacitor, fully meets the requirement of power line carrier communication according to IEC481 recommendation. MNC-LMU has IP type test certificate from EPIL.

## MNC-Power Reactors

Different types of air-core reactors including shunt reactor, current limiting reactor, detuned filter reactor, and harmonic filter reactor have been produced in MNC. Their voltage class, output reactive power and inductance can be adjusted from 3 kV to 230 kV, from 0.5 KVAr to 10 MVAr (single phase), from 50 μH to 100 mH, respectively. It should be noted that these products comply with IEC60076-6 standard and MNC has type test certificate from EPIL and JDEVS for these products.


## PAYA-SCADA/EMS Software for Network Management

PAYA-SCADA is the most powerful Iranian SCADA software that has been developed to manage the Electricity networks, Gas, Oil, Water, Wastewater, Agriculture, and Railway industries beside any other critical industries. It is noteworthy that all common tele-control, automation and digital communication systems can be connected to this software. This industry-leading software has been designed and developed with the aim of monitoring and controlling power networks in addition to data acquisition and archiving.



## PAYA-SAS Substation Automation System Solution

PAYA-SAS is the first Iranian software by Tavanir organization for installation in transmission and sub-transmission substations. This solution supports all well-known protocols such as IEC61850 standard as well as LON, IEC60870-5-103, 104, Modbus and other common SAS communication protocols.

## PAYA-MPC Multi-Protocol Converter Module

PAYA-MPC has been developed to exchange data between different control centers with all SCADA brands. This module supports protocols IEC60870-5-101, 103, 104, IEC61850, Tase.2, HDLC-LAPB, DNP3.0, ModBus, Indactic2033, and LON/SPA standards.

## MNC-SRTU Smart RTU for Small Substations

MNC-SRTU is compatible with all brands of RTUs to meet almost all customers' requirements in small electrical substations as well as other substations in Oil, Gas, and Railway systems.

## MNC-FSK Modems

MNC-FSK Modems are used for SCADA communication and offer maximum versatility and reliability. MNC produces four type of FSK modems including MNK5D (compatible with NSK5 ABB), MNK5E external modem, MNK6 modular modem in 19 inch subrack, and MNC-23WT25 (compatible with 23WT25 ABB).

## MN-MUX Multiplexer

MN-MUX is access multiplexer equipment using E1/Fiber links with two types including compact type multi-service access with 8 channel services and intelligent type multi-service access with 30 channel services. Service module comprises of telephone (FXS, FXO, E&M), audio, data, RS485, RS232, Ethernet, E1, etc. The main features of these series are modular service cards, centralized monitoring system, multiple protection mode, support inband NMS, and service port monitoring.

## MNC-Y-Switch

MNC-Y-Switch is used in SCADA communication and enables redundancy feature in the SCADA systems by providing two independent paths of transferred data in both send and receive directions.

## MNC-DTS Box

MNC-DTS Box 14A is a robust telephone converter system that converts 2 wire to 4 wire E&M and vice versa. It is also able to display the status of E&M signaling.

## MNC-TR Transducers and Power Meters

MNC-TR includes different types of transmitters. Programmable transducers and power meters can convert the electrical network data to 4-20 mA or 0-10 VDC signals and transmit them.

## Telecommunication Department

This department with over 30 years of experience and the extensive use of technical knowledge and proficiency of over 80 experts is responsible for establishing stable telecommunication links which are required in all power networks. Its long-standing history, familiarity with different paths of telecommunication links, and under maintenance network expansion are additional capabilities in the telecommunication department. This is our honor that sufficient experience in installation, utilization and maintenance of Power Line Carrier (PLC), fiber optic and radio systems has made us incompetent in repair and maintenance of the telecommunication networks in the power industry.

### The main fields of activity in the Telecommunication Department are as follows:

- ICT (Information and Communication Technologies) including designing data network, data center, etc.;
- Telephone centers including transit centers, central and DTS dispatching (PABX & IP-PBX);
- Fiber optics including passive and active (SDH-MUX-DWDM-PTN);
- Radio including wireless, wide range, microwave, and free band communication links;
- PLC/TPS including private protection and communication of the electricity industry based on power lines;
- Power supply including UPS, AC/DC, and diesel generator.

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## Dispatching Department

The dispatching department, having experienced professionals all over the country, has helped MNC to be one of the most reputable companies in the field of design and implementation of SCADA systems in Iran electricity industries. This department has sufficient proficiency and knowledge in the fields of telemetry systems, RTU, and DCS. Therefore, it has the ability to design engineering services, implement, install, commission dispatching projects, and to consult in all mentioned areas.

### The main fields of activity in the Dispatching Department are as follows:

- Design, installation, commissioning of SCADA and telemetry systems in power plants and power system substations all over the country;
- Repair and supply of all telemetry equipment, including RTU, transducer, modem, charger, etc.;
- Design, supply, and installation of Distribution Control System (DCS) and monitoring systems in electricity, water, oil and gas industry;
- Smartification, monitoring, and control of various industries according to the customers' requirements;
- Consultation, design, and implementation of SCADA systems
  - Based on the latest IGMC template in all substations;
  - Based on the latest RECs templates in the sub-transmission substations, distribution substations, and Distributed Generation (DG) power plants;
- Preparation of As-built documents for all power plants and substations;
- Cooperation in the preparation and installation of instrument and measurement equipment in all power plants and substations.

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# Automation Department

The main activity fields of MNC are installation, commissioning, and maintenance of control and dispatching centers and automation systems. Thus, it can be concluded that one of its important departments is the automation department. With regards to the expanse of the automation concept and the inclusion of several sections, such as protection, field relaying, telemetry, telecommunications, equipment supply, the main activities of mentioned department are specified in the following.

## The main fields of activity in the Automation Department are as follows:

- Design, installation, and implementation of SCADA and dispatching centers in power, gas, water, oil, railway and other industries;
- Engineering, design and implementation of Operational Technology (OT) security systems in SCADA and automation industry;
- Design, installation, and implementation of Substation Automation Systems (SASs);
- Engineering and implementation of protection, relaying, and DCS systems;
- Consultation in dispatching projects, SCADA, network management, and Industrial Cyber Security (ICS), SCADA centers hardening;
- Engineering and implementation of all projects related to smart grids and smart industries.

## Research & Development (R&D) Affairs

Whether you specialize in engineering and project management or other disciplines, you will find practically unlimited opportunities to broaden your experience and take your career to the next level. Hence, R&D engineers develop breakthrough technologies that change the way the world works and industries do business. Notably, these specialists constantly push the limits of convention in order to provide a better life to the people.

As a knowledge-based company, MNC with an extensive use of specialists from the best universities of the country in the R&D group is now ready to deal with the most of challenges in the electricity industry. Moreover, it aims to apply new ideas in management of power grid and energy industries in order to enhance efficiency, reliability, and productivity to the power systems.

### The main fields of activity in the R&D Affairs are as follows:

- Design and development of SCADA systems for all industries including electricity, oil, gas, water, agriculture, etc.;
- Design and development of modern DCS and SAS based on international protocols, e.g., Modbus, IEC61850, IEC60870-5-103, LON, etc.;
- Design and development of Advanced Power Application System (APAS) including all necessary power analysis modules including load forecast, load flow, state estimation, contingency analysis, short circuit analysis, etc.;
- Design and construction of MPC module to provide communication link between control centers with all standard protocols;
- Design and construction of microprocessor relays and Intelligent Electronic Devices (IEDs) based on international protocols;
- Design and implementation of Security Information and Event Management (SIEM).

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## Manufacturing Department

The manufacturing department was established in 1997 and presently it is the most reputed producer of telecommunication and dispatching equipment. The current location of factory is in Parand Industrial Town with an area of about 4000 square meters. In particular, MNC is one of the leading producers of LT, LMU, air-core and iron-core reactors. These products are designed and manufactured by the effort of a team of highly qualified and skilled experts for a wide range of customer needs.

## The main products of Manufacturing Department are as follows:

- Line Trap (LT)
- Line Matching Unit (LMU)
- Air-Core and Iron-Core Reactors
- Industrial Filters and SVC Systems
- Fiber Optic/ E1 Access Equipment (Multiplexer)
- FSK Modems
- DTS-BOX & Y-Switch
- Transducers
- SRTU

# PAYA-SCADA/EMS Software for Network Management

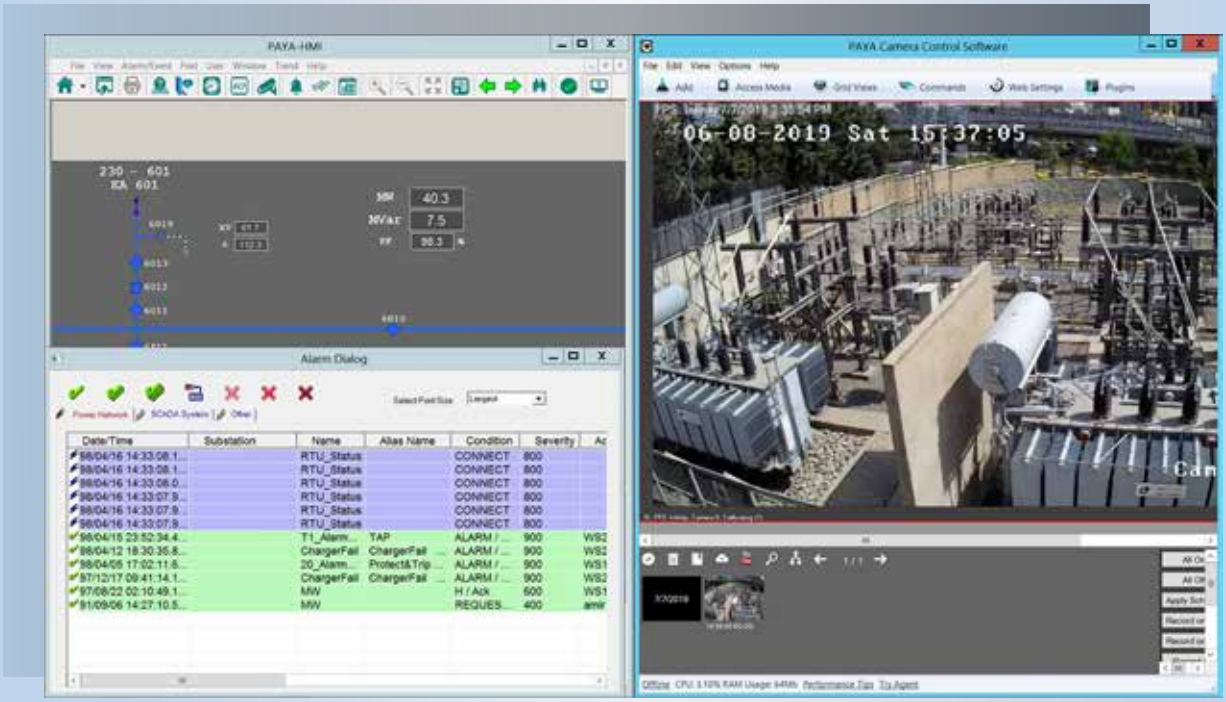
PAYA-SCADA is the most powerful Iranian SCADA software that has been designed to manage the Electricity networks, Gas, Oil, Water, Wastewater, Agriculture, and Railway industries beside any other critical industries. It is noteworthy that all common tele-control, automation, and digital communication systems can be connected to it. This industry-leading software has been designed and developed with the aim of monitoring and controlling power systems such as data acquisition and archiving. It provides gathering data from different parts of the system, processing the data along with generated events and alarms, archiving and reporting the information, and displaying the data in graphical forms like trends and electrical diagrams.

This software includes Human Machine Interface (HMI), System Engineering (SE), Historical Information System (HIS), Front End Processor (FEP), and server as the data processing unit. These modules can be run on a single system (stand-alone) or over a LAN (distributed).

## HMI

HMI module is the interface between the system and user in the SCADA system. Most of the user interactions with the SCADA system are carried out through this module. Displaying the information is accomplished graphically in the form of single-line diagrams or overview maps. In addition, all warnings and events associated with the system are accessible and manageable in HMI. Besides, variations of data can be shown through trends and curves. With this module, users are able to check the information of substation equipment and send controlling commands according to the interlock capability.

Displaying alarms and events is one of the most important capability of HMI. This feature can be shown in HMI in the form of eight categories with the ability to find the element whose alarm is in the list. It should be noted that the occurrence of an alarm is registered based on Hijri calendar. Other features such as the ability to sort by each of the list columns and display different colors to distinguish between different warnings are also available.

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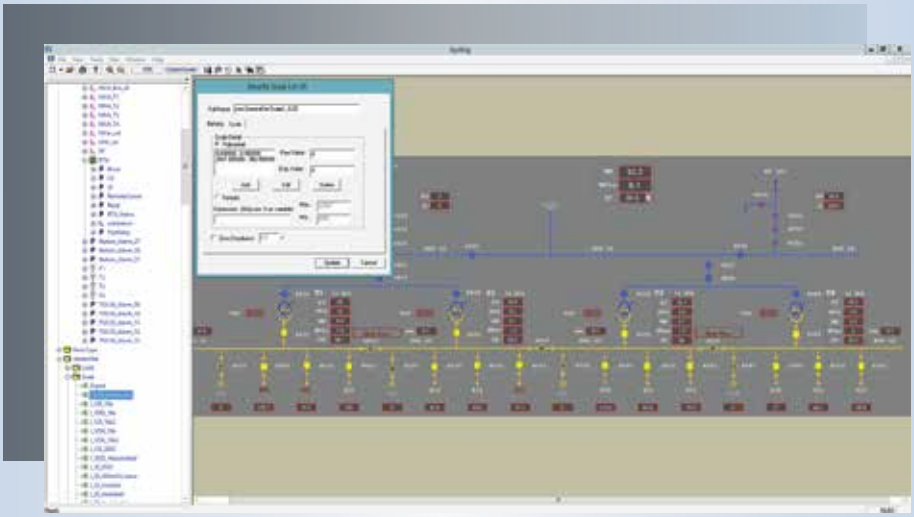
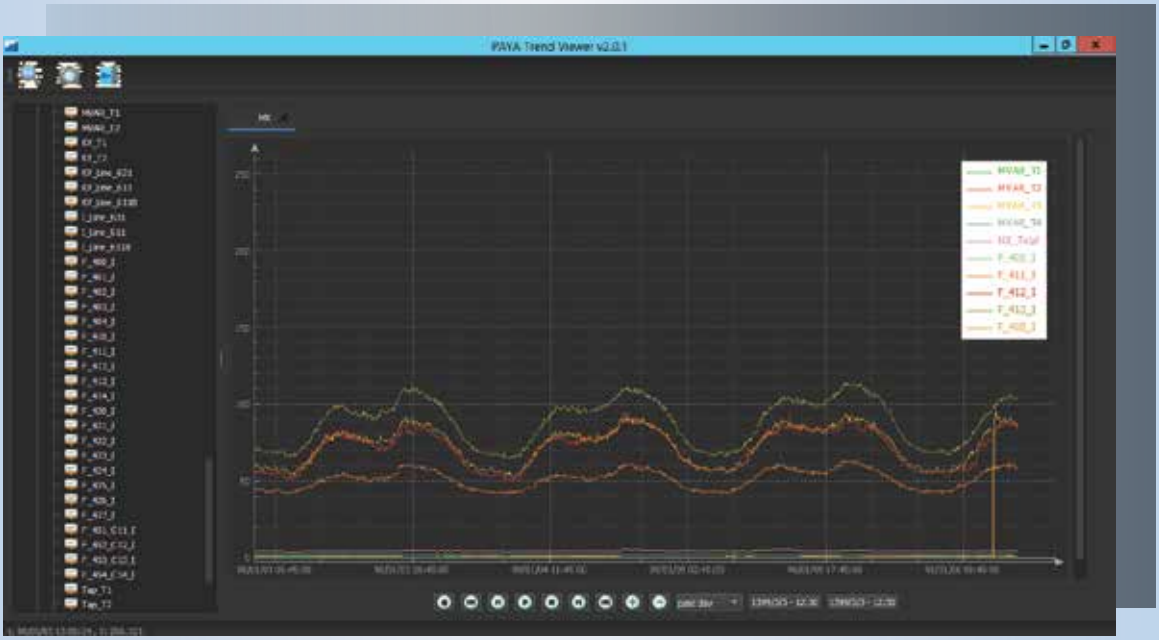
## SE

Creating new process points or editing their information can be realized using SE module. It is also possible to define the system parameters such as alarm limits, conversion ratios, and other system settings. In fact, all necessary settings to display the points in HMI and also determination of information processing in the main server are carried out in this module. It is worth nothing that drawing maps and defining points are accomplished graphically in same environment. In addition, there are two ways for designing in SE, namely custom designing and using pre-designed elements. Actually, there is a rich library of pre-designed elements of all industries which can be utilized in designing step. Scalable Vector Graphics (SVG) and web design technologies are creatively used to draw maps in SE and web engines are well benefitted for displaying the maps and other graphical forms in HMI.



## HIS

Archiving data is accomplished in this module of the software. In addition, definition of the points that are needed to be stored along with the definition of the rate and period of storage are managed here. It is also possible to define the virtual points, which are calculated logically or mathematically, using other points and store them. HIS sends the archived data to HMI to be displayed graphically using PAYA-Trend-Viewer and also to other well-known programs such as Excel for future analysis.

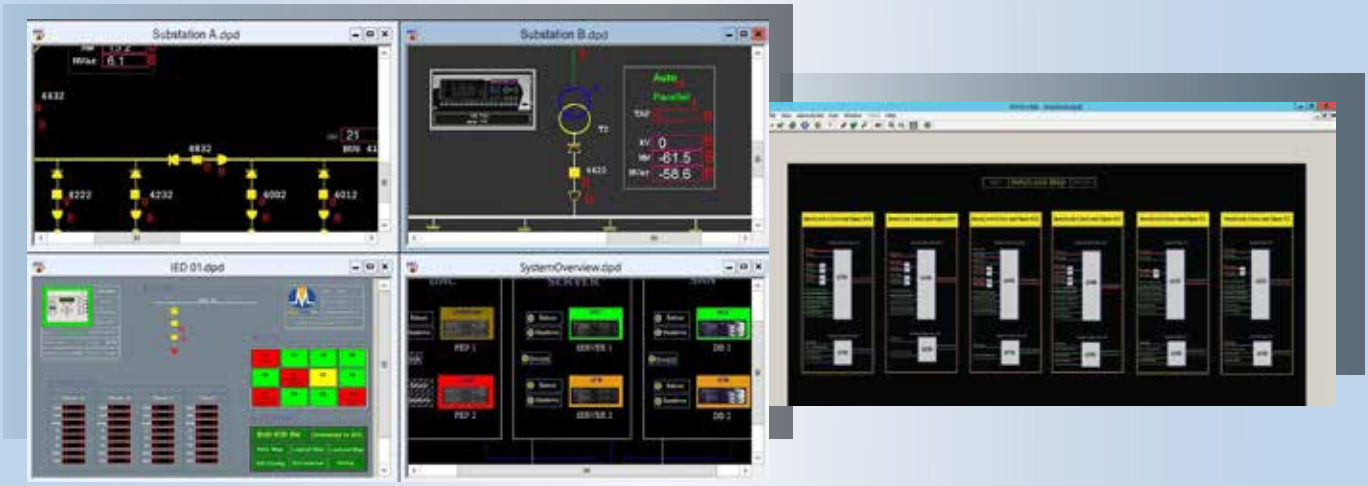


## FEP

There are different communication protocols for connection with terminals, e.g., DNP3.0, IEC870-5-101, 103, 104, IEC61850, Tase.2, Indactic2033, Hitachi HDLC, and Modbus. This module includes an industrial computer having several ports to communicate with terminals and Ethernet network for sending standard TCP/IP connection frames to the main SCADA processor. In addition to the ability for allocating an independent telecommunication link for each terminal, data collection in several terminals of a communication link is also possible.

## PAYA-SAS

PAYA-SAS is the first Iranian substation automation software certified by Tavanir organization for installation in the transmission and sub-transmission substations. This solution supports all common protocols such as IEC61850 standard as well as LON, IEC60870-5-103, 104. Furthermore, PAYA-SAS has a user-friendly engineering environment that provides an easy way to work with all brands of IEDs.




## PAYA-APAS

PAYA-APAS can be considered as a set of tools that can be applied to monitor, control, and optimize the operation of power systems. It provides decision-making tools for the operator to use it in the real-time operation and control. In addition, its information can be utilized to train the operators of a control center, do engineering studies for future programs such as network planning, optimizing, and scheduling repairs, as well as forecasting annual consumption. In general, three categories of goals are defined for the EMS which are as follows:

- System security and stability;
- Economic operation and control;
- Optimization, operation, planning, and maintenance scheduling.

PAYA-APAS also known as PAYA-EMS applies the industry standard interfaces in a modular architecture. This application represents a state-of-the-art implementation based on the patented technology, which greatly increases the likelihood of a convergent solution providing load forecast, load flow, state estimation, contingency analysis, short circuit analysis, etc. MNC is proud to be able to offer this powerful field proven EMS application suite together with its industry-leading PAYA-SCADA real-time operation platform.

## PAYA-DAS

PAYA-DAS is applied to realize optimal installation and operation in the distribution dispatching centers. In a separate working group with experts in the field of distribution automation and analysis of electricity distribution networks, a distribution automation system called PAYA-DAS has been developed. Its main objective is to integrate the database of SCADA with Geographic Information System (GIS) database and other systems databases such as 121, energy management of distribution, and simultaneous exchange of data required by retail systems and electricity market, and customer affairs.


## PAYA-MPC

PAYA-MPC is a Module which has been developed to exchange data between different control centers. This module supports all well-known protocols, e.g., IEC60870-5-101, 103, 104, IEC61850, Tase.2, HDLC-LAPB, DNP3.0, ModBus, Indactic2033 and LON/SPA standards. Its main feature is that it can be integrated with all brands of SCADA and SAS software which are already installed in Iran control centers and substations including all versions of PSI, IDS, ABB, SIEMENS, Areva, KTC and NetVision.


PAYA-MPC module can be implemented in various types as follows:

- OS-free software;
- Embedded module (Desktop/Rackmount);
- MNK5 24D Plugin (ABB NSK5 replacement).

***Certificates***

PAYA-MPC possesses Iran IT Council and Passive Defense certificates for critical levels.

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## MNC-LT (Line Traps for Transmission Lines)

The power system frequency is kept low enough due to safety issues. To block the disturbance signals with high frequency, LT are applied. Therefore, this equipment should show high impedance in high frequencies. The frequency bands covered by usual LTs are between 64 kHz to 400 kHz.

As known, high voltage transmission lines usually have high short circuit currents. As the LTs are connected in series with the transmission lines, this high short circuit current passes them and impose extreme mechanical tensions on the main coil of LTs. The LTs should be capable of withstanding such forces as well as switching impulse voltages, thermal overloading, and any other environmental or mechanical circumstances that the line might be faced with. The LT comprises of three main following components:

- Main Coil
- Surge Arrester
- Tuning Unit


**INDUTANCE OF MAIN COIL (mH)**

| Continuous Rated Current $I_n$ (A) | Steady State Component of Short Circuit $I_{sn}$ (KA/s) | 0.2 mH | | 0.32 mH | | 0.5 mH | | 1 mH | |
|---|---|---|---|---|---|---|---|---|---|
| | | Dim (W×H) | Weight (Kg) | Dim (W×H) | Weight (Kg) | Dim (W×H) | Weight (Kg) | Dim (W×H) | Weight (Kg) |
| 630 | 20 | 63×70 | 75 | 75×74 | 90 | 87×82 | 115 | 99×102 | 108 |
| 800 | 25 | 87×61 | 170 | 92×112 | 200 | 100×125 | 115 | 99×102 | 108 |
| 800 | 31.5 | 63×70 | 75 | 92×112 | 90 | 100×125 | 115 | 99×102 | 180 |
| 1000 | 25 | 87×61 | 170 | 87×71 | 200 | 100×80 | 250 | 147×80 | 350 |
| 1000 | 31.5 | 87×61 | 170 | 87×71 | 200 | 100×80 | 250 | 147×80 | 350 |
| 1250 | 31.5 | 87×61 | 170 | 100×72 | 200 | 162×116 | 250 | 147×80 | 350 |
| 1250 | 40 | 87×61 | 170 | 100×72 | 200 | 162×116 | 250 | 147×80 | 350 |
| 2000 | 40 | 111×105 | 350 | 123×113 | 410 | 135×128 | 550 | 174×160 | 850 |
| 2000 | 50 | 111×105 | 350 | 123×113 | 410 | 135×128 | 550 | 174×160 | 900 |
| 3000 | 40/50 | - | - | - | - | 174×171 | 1050 | 174×190 | 1300 |
| 3150 | 40/50 | - | - | - | - | 174×171 | 1050 | 174×190 | 1300 |

Pedestal or suspension installation
Special order is acceptable

MNC-LTs are produced according to IEC-60353 standard and they have type tests from KEMA, CESI and NIC VVA.

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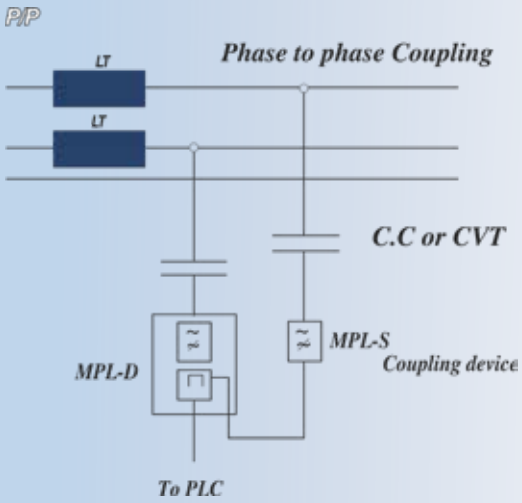
# MNC-LMU (Line Matching Unit for Transmission Lines)

The main function of LMU is to match the impedance between the PLC telecommunication systems and the equipment in the high voltage power lines. This matching process is realized by a transformer that, together with the coupling capacitor, acts as a high-pass filter. MNC-LMU is produced according to IEC481 and it has IP type test certificate from EPIL.




| MPL-S/D | LINE MATCHING UNIT | MODJE NIROO |
|---|---|---|

| TECHNICAL DATA | |
|---|---|
| Coupling type | Phase to ground |
| | Phase to Phase |
| Frequency range | 50 to 500 kHz |
| Nominal line side impedance | 200 to 700 ohm |
| Nominal equipment side impedance | 75/150 unbal/bal |
| Composite loss | < 2 dB |
| Return loss | > 12 dB |
| Dielectric strength of isolating transformer | 5 kV |
| Impulse strength of isolating transformer | 10 KV (1.2/5ms) |
| Power frequency test voltage | 5 kV |
| Drain coil impedance (50 Hz) | < 2 ohm |
| Drain coil max. continuous current (50 Hz) | 1 A |
| Rated short time current of drain coil | 50 A/0.2sec |
| Long duration pulse current / duration | 250 A/1ms |
| Lightning arrester AC spark over voltage | 2 kV rms |
| Lightning arrester impulse discharge rate | 5 kA |
| Average continuous power | 350 W |
| Nominal peak envelope power | 500 W |
| Temperature range | -20° C up to 60° C |
| Dimension (H/W/D) | 440/320/160 mm |
| Degree of protection of line matching unit cabinet | IP 54 |
| Secondary Arrester | yes |

# MNC-Power Reactors and SVC for Power Systems

## Reactors

Specially, the air-core dry-type reactors are mainly employed in the electric power transmission and distribution systems as well as in the electric power systems of electrical plants. They are mainly installed to protect these systems as well as to enhance their efficiencies. As a particular application, they can also be used in the electrical test laboratories and research institutions. MNC have different types of reactors as follows:


### Specifications of MNC Air-Core Reactors:

- Rated voltage range: 3 kV - 230 kV
- Nominal power range: 0.5 kVAr - 10 MVAr (per phase)
- Cooling: natural air flow
- Coil material: aluminum
- Type test certificates: JDEVS and EPIL Accredited Laboratories (ILAC)
- Standard: complies with IEC60076-6

## SVC

The Static Var Compensator (SVC) is an automated impedance matching device designed to bring the system closer to the unity power factor. In the industrial applications, the SVCs are typically placed near high and rapidly varying loads such as arc furnaces where they can smooth flicker voltage. Typically, the SVC comprises one or more banks of fixed or switched shunt capacitors or reactors, of which at least one of them is switched by thyristors. MNC provides technical solutions for design, manufacturing, installation, and operation of SVC systems.

## MNC-SRTU

MNC-SRTU is compatible with all brands of RTUs to meet almost all customers' requirements in the small substations as well as other substations in Oil, Gas, and Railway systems. It has internal battery and charger, command counter, and interlocks. A local touch screen SCADA system on the door is provided to make a big difference with other RTUs. MNC-SRTU supports all well-known standard protocols such as IEC61850. The main features of MNC-SRTU are as follows:

- Use of advanced RTU
- Supports a variety of standard protocols such as IEC60870 -5-101, 104, IEC61850, DNP3.0, Modbus RTU
- Ability to send multi-step command from control center
- Local monitoring using 7-inch full-color HMI
- Ability to direct connection of CT, PT and measurement of these values accurately

## MNC-TR Transducers and Power Meters

MNC-TR includes different types of transmitters. Programmable transducers and power meters can convert the electrical network data to 4-20 mA or 0-10 VDC signals and transmit them. They are installed on the standard 35 mm DIN rail or panel mounted. They all comply the IEC60688:1992 and IEC688 international standards and modbus RTU protocols. MNC-TR can generally divided into four following categories:

- Resistor Transducer (Tap Position)
- Voltage Transducer
- Current Transducer
- Active/Reactive Power Transducer

## MNC-FSK Modems (SCADA Modems)

MNC-FSK modems convert digital information into FSK analog signals and vice versa. They transmit the RTU information to the dispatching centers. These modems have the relevant type test certificates from EPIL reference laboratory. Moreover, they have been approved by the IGMC and RECs in Iran. Currently, the following types of MNC-FSK modems are designed and produced:

- ***MNK5***
  - MNK5D: compatible with NSK5 ABB, rack-mounted
  - MNK5E: external modem, rail-mounted
- ***MNK6:*** modular modem in 19 inch subrack with height of 3U
- ***MNC-23WT25:*** compatible with 23WT25 ABB


Specifications:

| | | | |
|---|---|---|---|
| **Modulation** | FSK | **Synchronization Clock** | Transmit / Receive |
| **Baud Rate** | 600/1200 bps | **Line Output Impedance** | 600 |
| **Frequency** | (600bps) 2760±240 Hz<br>(1200bps) 1700±400 Hz | **Data Interface** | V.24 / RS 232-D with Handshaking (DB-25) |
| **Data Transfer Method** | Serial-Synchronous and Asynchronous | **Dimensions (W×H×D)** | Rack Mount (6U) 30.5×266.7×220 mm<br>Rail Mount 107×94×59 mm |
| **Operating Mode** | Full duplex / 4-wire | **Weight** | 300 gr |
| **Tx Signal Level** | 0dBm to -20dBm | **Operating Environment** | 0 to +45 °C |
| **Rx Signal Sensitivity** | -30 dBu min | **Power Supply** | 24/48/110 V dc |

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## MN-MUX Multiplexer
## (Fiber Optic / E1 Access Equipment)

Multiplexers are applied to switch multiple inputs to one output or one input to multiple outputs in the electronic systems. This equipment is also called access systems. MN-MUX is a type of electrical multiplexing and de-multiplexing equipment with the ability to transfer telephone lines FXO/FXS and 2/4 Wire E&M as well as a variety of serial and Ethernet ports on the fiber optic link or E1. The following type of multiplexer have been produced in MNC.

### MN-MUX3036 (Intelligent Multi-Service Access Product)

MN-MUX3036 consists of chassis, main system, and service sub-card module. With the dimension of 19 inches, 1U height of chassis can provide with 4 channels of E1 interfaces, 32 pieces of universal service interfaces, 4 pieces of Ethernet interfaces, 1 piece of local monitoring, and 2 pieces of power supply interfaces. The main features of this product are as below:

- less space occupation
- Centralized monitoring system
- Multiple protection mode
- Extendible design
- Safe and flexible design
- High safety and reliability
- Optional power supply
- Support inband NMS
- Service port monitoring
- Support high-resistance recording telephone function
- Multiple service types

### MN-MUX08 (Compact Multi-Service Access Product)

MN-MUX08E and MN-MUX08S consist of small case of chassis, main system, up to 8 service sub-card modules, 1 channel Ethernet interface, and 1 piece of power supply interface. With complete multi-service access of telephone, audio, data, E1, etc., through multiplexing of 1 channel fiber or 1 channel E1 link transmission, it achieves multi- service signal point to point communication function.

## MNC-Y-SWITCH

Y-Switch is designed for the application in the tele-control lines. It enables the redundancy feature on the SCADA systems by providing two independent paths of transferred data in both send and receive directions. Normally it connects to two FEPs in a system in a redundant manner while a SCADA modem provides main link to the Y-Switch.

The following types of Y-Switch are produced in MNC:


- YS -110A: Compatible with MNC SCADA center
- YS -120D: Compatible with ABB SCADA center
- YS -130T: Compatible with KTC SCADA center

## MNC-DTS BOX

MNC-DTS 14A is a robust telephone converter system that converts 2-Wire to 4-Wire E&M and vice versa. It can display the status of E&M signaling. The quality of voice in receive and transmit paths is well preserved in this equipment by utilizing state-of-the-art digital circuitry.


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## Equipment Supplier

MNC with the aim of expanding its activities in supplying equipment for the electricity industry as well as other major industries has expanded its foreign trades to a large extent that made it ready to provide a wide range of equipment in the fields of dispatching and telecommunication.

### Telecommunication Equipment

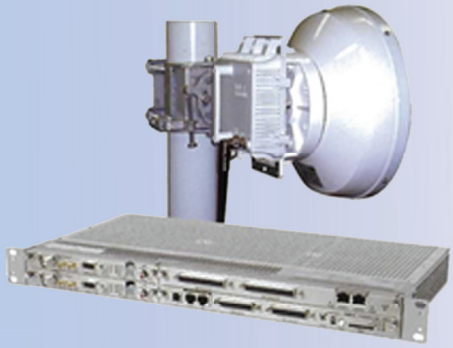
MNC has the ability to supply the telecommunication equipment including fiber optic, TPS/PLC, and dispatching proprietary PABX systems (DTS) from reputable European, Chinese and Taiwanese brands.

### TPS/PLC

### SDH/PDH

### Telephone Center

### Radio & Wireless



### Network Switches & Routers

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## Telemetry Equipment

MNC has the ability to support all types of dispatching and telemetry equipment, including RTU equipment, protection relays, transducers, and temperature monitoring systems for 20 kV feeder from reputable European and Chinese brands.

## RTU

## Transducer



## Protection Relay

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