Quality of Electrical Energy Networks

Iskra®
Iskra MIS

From Your Problems...

Why do you pay too much for poor power quality, insecurity and control of your network?

High energy costs due to poor power quality

Could you improve your power quality and save money?

Your energy costs are much higher due to existence of reactive energy and harmonic currents in your electrical network. Lower efficiency affects your productivity and harm your equipment which results in frequent breakdowns, instability and higher cost of maintenance. Harmonic currents also reduce life span of power capacitors in power factor correction systems.

Energetic system control

Is it difficult to control your power sources and consumers?

When you have to control different power sources (sun power, hydro power, wind power, etc.) or consumers (plants, buildings, etc.) which are difficult to access, it is expensive and inefficient without using automation. You have to pay a lot for an unreliable system which doesn't enable you to react in real time.

Electrical grid security

Do you know insecure electrical grids cause damage to the network and could harm people?

Your electrical cables could be overloaded due to harmonic currents and high share of reactive power consumption. When connecting small renewable sources to a public low voltage grid, it is life threatening when maintaining public grid without disconnecting all renewable sources from the grid. Middle voltage grids can be exposed to high impedance faults that can not be detected by classical current protection.

... To Our Solutions

Increase electrical grid security with automatic control and save money.

Test your electrical power quality
and detect disturbances in your electrical network.

Use portable analyzer to measure power factor and existence of harmonics, and analyze your consumed electrical power. Eliminate disturbances in electrical network and save money.

Use measuring system
for monitoring and analyzing your electrical power quality.

Install power quality analyzing system for monitoring interruptions, breakdowns and analysis of all power quality parameters. Send alarms and notifications by SMS or by light signals. Don't pay for poor power quality. You can make a complaint about poor power quality to electric utility.

Power factor correction systems

Improve your Power Factor
The majority of electrical devices such as asynchronous motors, collective motors of rotation current, transformers, etc. need working power and reactive power for their own operation. This entails additional costs for energy supply and also additional loads on transmission lines and other elements.

Passive and Active Power Factor Correction System
Such conditions can be improved with power factor correction system compensation by fitting a suitable capacitor between the inductive consumer and the generator.

Use Our Solutions for Your Benefits

- Lower consumption and cost for energy products
- Automatic remote readout of consumption of all energy products
- Fast energy analysis and forecasts
- Supervision of electric energy quality
- Simple and low-cost system installation, integration and introduction
- Decrease of costs by informing a user in real time and possibility for immediate action
- Faster correction of failures by means of analysis and location of failure in network
- Inspection of consumption and detection of losses in network together with the possibility of
- Eliminating reasons for losses

Make the **smart** move.
Contact us.

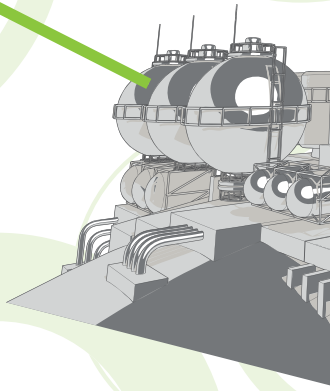
Software for monitoring and analyzing of energy consumption in buildings

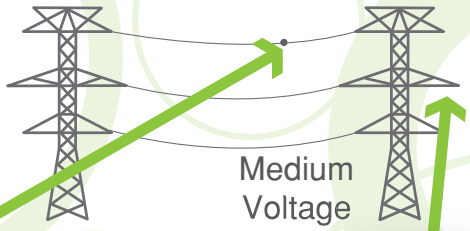
MiSMART

Communication Adapter

LAN, WAN

Portable Network Analyzer





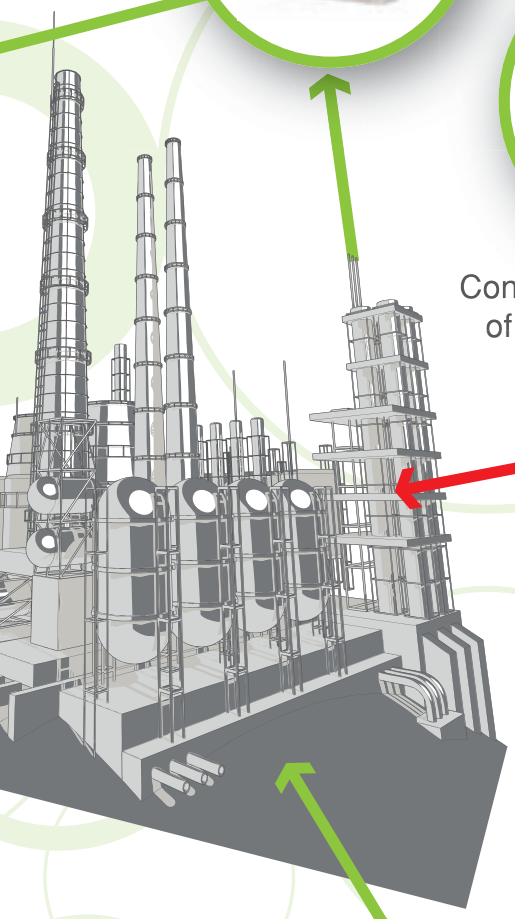
Medium Voltage

LiSa® Control

System for detection of cut transmission lines and control of transformer stations defects - LiSa ®

MV Filter Power Factor Correction System
MV Power Capacitors

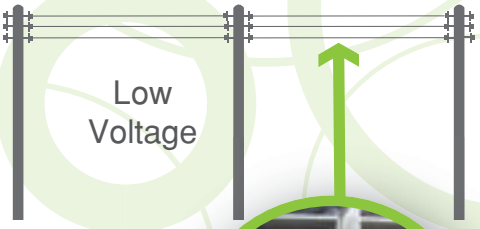
Communicators



Control of the connection
of renewable sources
into network

NEW

Measuring
Transducers



Low
Voltage

LV Automatic Capacitor Bank
LV Power Capacitors

Measuring Centres

Power Quality with EN 50160 Standard

WHY IS IT IMPORTANT THAT YOUR POWER GRID IS IN ACCORDANCE WITH EN 50160?

The EN 50160 standard specifies the most important voltage characteristics of electricity supplied by the public distribution systems and the limit values where such characteristics can be expected. EN 50160 specifies allowable voltage values at:

- Voltage and frequency deviations
- Voltage dips, interruptions and voltage unbalance
- Overvoltages
- Fast voltage changes
- Flicker intensity
- Harmonics and THD

Iskra MIS network analyzers let you know when voltage quality does not meet your needs and you can act appropriately.

NETWORK ANALYZERS AND MEASURING CENTRES

MC 7x4 - network analyzers with wide variety of I/O modules
MC 7x0 - network analyzers in smaller housing
MC 6x0 - housing for DIN rail mounting

Network Analyzers and Measuring Centres

Use
Measuring, analysing and monitoring of single-phase or three-phase electrical power network. Supervison of electrical network quality everywhere where rational use of electric energy is needed.

Common Features
- Measurements of instantaneous values of more than 140 quantities (U, I, P, Q, S, PF, PA, f, ϕ, THD, MD, energy, energy cost by tariffs, etc.)
- Accuracy class 0.5
- Harmonic analysis of phase, phase-to-phase voltages and currents up to the 31st harmonic
- Recording up to 32 measurands and 32 alarms in the internal memory (except MC 740, MC 646, MC 640)
- Measurements of 40 minimal and maximal values in different time periods
- 32 adjustable alarms
- Frequency range from 16 Hz to 400 Hz
- RS 232/RS 485 communication up to 115,200 bit/s or Ethernet communication (MC 6x6 and MC 6x0 are without Ether net communication)
- MODBUS and DNP3 communication protocol
- MMC/SD card for data transmission, setting and upgrading
- Up to 4 inputs or outputs (analogue outputs, pulse outputs, alarm outputs, tariff inputs)
- Universal power supply
- Graphical LCD; 128 x 64 dots with illumination
- Automatic range of nominal current and voltage (max. 12.5 A and 750 V)
- Adjustable tariff clock, display of electric energy consumption in optional currency
- Multilingual support
- User-friendly PC MiQen software

Extended features

Instruments	Features
MC 764, MC 760, MC 666, MC 660	Evaluation of the electricity supply quality in compliance with EN 50160
MC 764, MC 754, MC 744, MC 760, MC 750	Accuracy class 0.2 (optional)
MC 764, MC 760, MC 666, MC 660	Harmonic analysis of phase, phase-to-phase voltages and currents up to 63rd harmonic
MC 764, MC 754, MC 744	Additional I/O modules with up to 16 digital inputs or outputs, or up to 8 analogue inputs or outputs
MC 764, MC 754, MC 744, MC 760, MC 750	Additional communication port (COM2)
MC 666, MC 660, MC 656, MC 650, MC 646, MC 640	Housing for DIN rail mounting
MC 666, MC 656, MC 646	Direct 65 A connection
MC 660, MC 650, MC 640	CT 5 A connection

The Best Price Performance Ratio

MC 3x0 - MEASURING CENTRES

Use:
Measuring, analysing and monitoring of single-phase or three-phase electrical power network. Supervison of electrical network everywhere where rational use of electric energy is needed.

Features
- Measurements of instantaneous values for more than 60 quantities (U, I, P, Q, S, PF, PA, f, ϕ, THD, MD …) - only MC330
- 4 Energy counters
- Accuracy class U, I, P 0.5 (active energy Class 1)
- Frequency range from 16 Hz to 400 Hz
- Up to 2 tariff inputs (option)
- Up to 2 pulse or relay outputs (option)
- AC or Universal (option) power supply
- Graphical LCD; 128 x 64 dots with illumination
- Automatic range of nominal current (max. 12.5A) and voltage (option)
- User-adjustable display of measurements
- Multilingual support (13 languages)
- RS 485 or RS232 communication up to 115,200 bit/s (option)
- MODBUS communication protocol supported
- User-friendly PC MiQen software for setting via RS485 or RS232 communication

PORTABLE NETWORK ANALYZER

Use:
Portable network analyzer is used for analysis of electric voltage quality in compliance with the EN 50160 standard.
The system detects faults in medium voltage network and transformer stations. The system can be used for detecting faults in medium volage network and transformer stations such as:

- Torn down overhead lines with semi-insulated conductors
- Other torn down overhead lines (bear conductors)
- Detecting other faults in medium voltage network
- Informing about faults in transformer stations (contacts, high voltage fuse, low voltage fuse, etc.).
- Alarms via SMS
- Measuring and recording measurements of transformer station electric energy quantities
- Real time measurements on SMS

Features

- Evaluation of the quality of electric voltage in compliance with EN 50160
- Measurements of instantaneous values of more than 140 quantities
- Accuracy class 1
- Harmonic analysis of phase, phase-to-phase voltages and currents
- Measurements of 40 minimal and maximal values in different time periods
- 32 adjustable alarms
- Wide frequency range from 16 Hz to 400 Hz
- RS 232 communication up to 115,200 bit/s, Ethernet & USB communication
- MODBUS and DNP3 communication protocol
- One tariff input
- AC power supply
- Automatic range of nominal current and nominal voltage up to 500 V
- Multilingual support
- User-friendly PC MiQen software

Measuring Transducers

ANALYZERS AND RECORDERS

MT 5x0

Use:
Measuring transducers are used everywhere, where measurement of electrical quantities and sending of data/signals to devices is needed for checking and supervising of used energy. They are used for conversion of electrical quantities in single and three phase electrical systems. They can be used in places where you need analogue output quantities as input into another device. They are able to do permanent analysis of electricity supply quality in compliance with the EN 50160 standard.

Features
- Evaluation of the electricity supply quality in compliance with EN 50160
- Voltage and current auto range measurements up to 600 V_{L-N}, 12.5 A
- Wide measurement frequency range 16 - 400 Hz
- Power accuracy class 0.2 (IEC-688), 0.1 on communication
- 32 adjustable alarms
- Up to three independent communication ports (Serial, Ethernet and USB communication)
- Up to four I/O modules (analogue output, alarm output, pulse output, digital output, digital input, tariff input, analogue input, pulse input)
- Powerful analogue output; 6 voltage and current ranges, non-linear characteristics…
- User-friendly PC setting software (MiQen)

REMOTE DISPLAY

RD 500

Use:
A remote display is very useful for a quick look-up to all measured parameters or for setting up the MT/UMT 5x0 measuring transducers without the PC. A graphical display with the resolution of 128x64 enables graphical representation of signals and parameters. With five select buttons. It is possible to browse through the user-friendly menu.

Features
- Network connection for up to 32 transducers
- RS485 communication
- Universal power supply 48-276 V AC, 20-300 V DC
- Graphical LCD 128 x 64 dots
- Multilingual support

Measuring Transducers

SINGLE-PHASE TRANSDUCERS

MT 51x

Use:
Measuring transducers are used everywhere, where measurement of electrical quantities and sending of data/signals to devices is needed for checking and supervising of used energy. They are used for conversion of electrical quantities in single and three phase electrical systems. They can be used in places where you need analogue output quantities as input into another device.

Features
- All single-phase AC network measurements
- Voltage and current auto range measurements up to 600 V_{L-N}, 12.5 A
- Wide frequency measurement range 16 - 400 Hz
- Power accuracy class 0.2 (IEC-688)
- 8MB flash internal memory; MT 511 only
- Recording of up to 8 measurands and 16 alarms in the internal memory (8 MB flash); MT 511 only
- Serial or Ethernet and USB communication
- Up to two I/O modules (analogue output, alarm output, pulse output, digital input, digital output)
- Powerful analogue out; 6 voltage and current ranges,non-linear characteristics…
- User-friendly PC setting software (MiQen)

Measuring Transducers

MULTIFUNCTION TRANSDUCER

MT 440

Use:
Multifunction transducer is intended for measuring and monitoring single phase or three-phase electrical power network.

Features
- Measurements of instantaneous values of more than 50 quantities (V, A, kW, kVA, kvar, kWh, kvarh, PF, Hz, MD thermal, THD, etc)
- Power accuracy class 0.5
- 16 adjustable alarms
- Input frequency: 50/60 Hz, 400 Hz
- Serial communication (RS232 or RS485 up to 115,200 bit/s) and USB 2.0
- MODBUS RTU communication protocol
- Up to 4 I/O (analogue outputs, alarm outputs, pulse outputs, general purpose relay output, general purpose solid-state out put)
- Single wide auxiliary power supply range 24 - 300 V DC, 40 - 276 V AC
- Automatic range of current and voltage (max. 12.5 A and 600 V_{L-N})
- Housing for DIN rail mounting
- User-friendly setting software, MiQen

PROGRAMMABLE AC CURRENT TRANSDUCER

MT 418

Use:
Current transducer is used for a permanent monitoring of a single-phase current and frequency values in electrical power network.

Features
- Measurements of RMS current, frequency, THD I and MD
- Accuracy class 0.5 (EN 60688)
- Input frequency range: 50/60 Hz, 400 Hz
- RS 232/RS 485 communication up to 115,200 bit/s and USB 2.0 communication
- MODBUS communication protocol
- Universal power supply or transformer power supply
- Automatic range (max. 12 A)
- Housing for DIN rail mounting
- User-friendly PC MiQen software

Measuring Transducers

VOLTAGE TRANSDUCER

MT 416

Use:
Voltage transducer is used for a permanent monitoring of a single-phase voltage and frequency values in electrical power network.

Features
- Measurements of RMS voltage, frequency and THD U
- Accuracy class 0.5 (EN 60688)
- Input frequency range: 50/60 Hz, 400 Hz
- RS 232/RS 485 communication up to 115, 200 bit/s and USB 2.0 communication
- MODBUS communication protocol
- Universal power supply or transformer power supply
- Automatic range (max. 600 V_{L-N})
- Housing for DIN rail mounting
- User-friendly PC MiQen software

CURRENT AND VOLTAGE AC TRANSDUCERS

MT 408 Current transducer and MT 406 Voltage transducer

Use:
Transducers are used for a permanent monitoring of a single-phase current and value. PLCs, PCs, microprocessor control, indicators, alarms units etc. can be operated by the output signal.

Features
- Sinusoidal AC current and voltage measurements
- Current range measurements up to 6 A
- Voltage range measurements up to 500 V_{L-N}
- Galvanic insulation between input and output
- Accuracy class 0.5
- Self powered
- Housing for DIN rail mounting

Energy Meters for Rail Mounting

BILLING COUNTERS

WS 0101, WS 0102, WS 1102 WS 0301, WS 0302, WS 1302

Use:
Energy meters for rail mounting are intended for energy measurement in industrial environments. They can provide information about energy consumption in production plants. They are microprocessor controlled, can communicate with PC and can have tariff inputs.

Features
- Industrial applications or meters with type approval according to European Directive 2004/22/EC MID **(billing counters for active energy)**
- Direct connection up to 65 A (WSx10x)
- Connection with current transformer (WS x30x)
- Active energy - class B in compliance with EN 50470-3, class 1 in compliance with EN 62053-21
- Reactive energy - class 2 in compliance with EN 62053-23
- Three-phase connection
- Energy measurement in both directions (import-export)
- Microprocessor control
- 7 digit energy counter (WS 0101, WS 0301)
- Double 7 digit energy counter (WS 0102, WS 0302)
- LCD 9 digit display (WS 1102, WS 1302)
- Tariff inputs (option)
- Communication (option): RS485 (MODBUS protocol)
- Pulse outputs (option)
- Housing for DIN rail mounting
- Protective cover for terminals (possible seal up against non-authorized access)

Communication Adapter

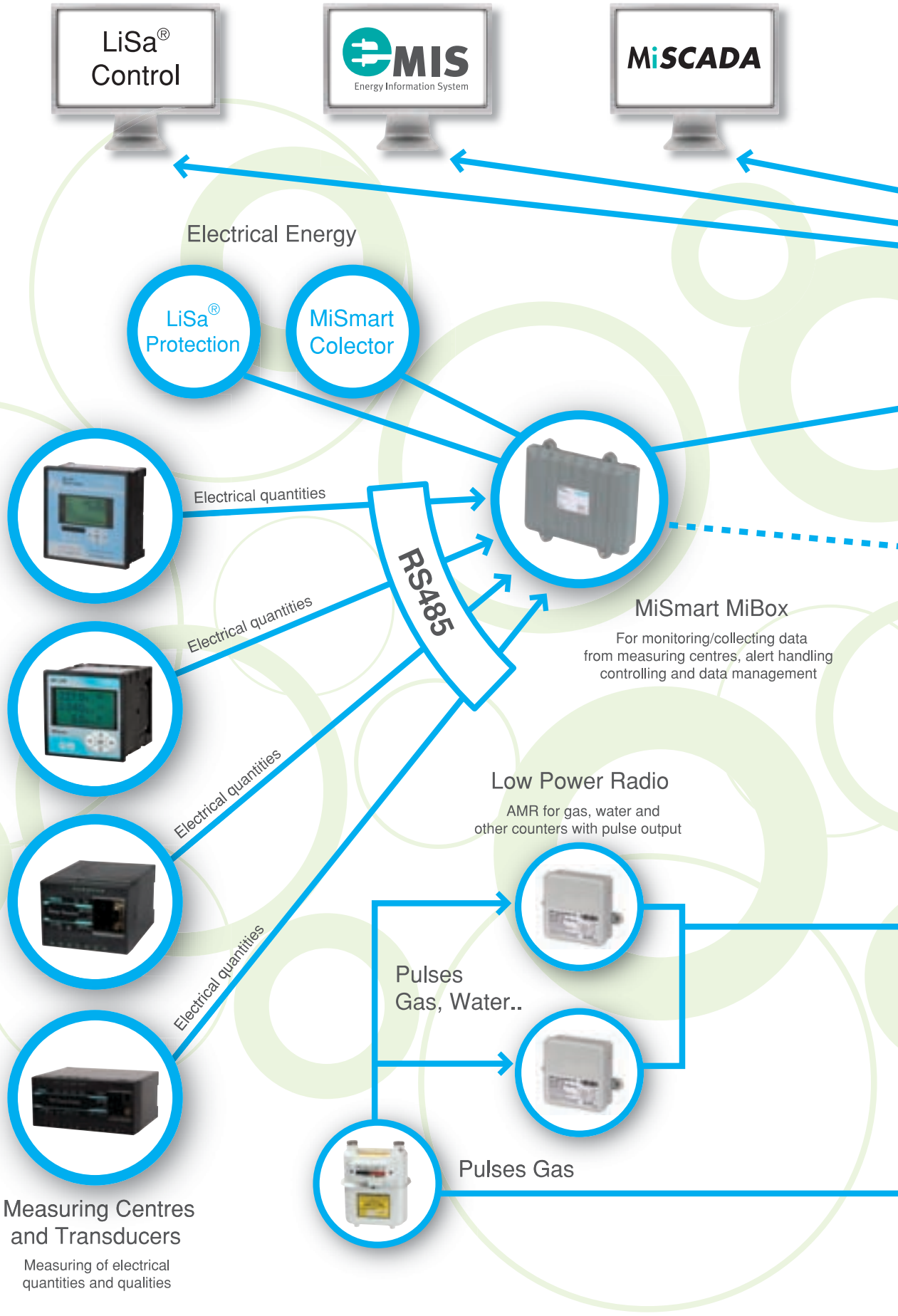
GSM LOGGER

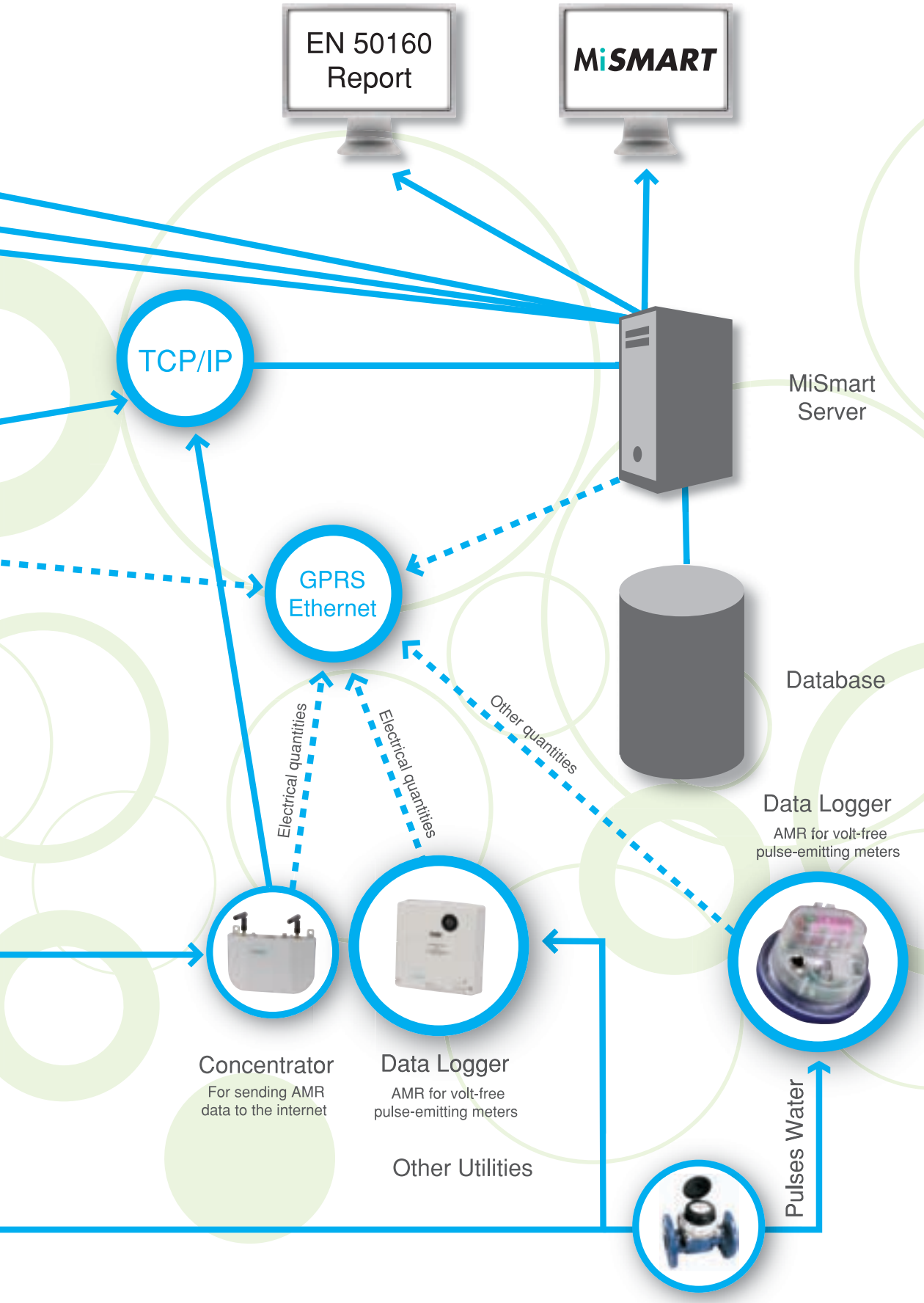
MI 480

Use:
Communication adapter is an ideal instrument to be used in systems where permanent or periodical monitoring, storing the measurements for momentary and later analysis and processing are required. The system can be adapted to the needs and requirements of the individual user or system to which it is built-in.

Features
- Alarms via an SMS message to a mobile phone
- Trend alarms via an SMS message to a mobile phone
- Data on instantaneous measurements via SMS on request
- Sending measurement packages to the server for further processing
- Survey of all measurements via a web portal
- All settings are accessible via a web portal

Communicator Use in Smart Metering




EN 50160
Report
MiSMART
TCP/IP
MiSmart
Server
GPRS
Ethernet
Database
Electrical quantities
Electrical quantities
Other quantities
Data Logger
AMR for volt-free
pulse-emitting meters
Concentrator
For sending AMR
data to the internet
Data Logger
AMR for volt-free
pulse-emitting meters
Other Utilities
Pulses Water

Communicators

DATA LOGGER WITH GSM FOR AMR

X4

Use:
For building managers and owners, utility companies, AMR solutions providers, EM solutions providers, etc.

Features
- AMR for volt-free pulse-emitting meters (version X4-G for gas)
- ATEX Zone 0 certified for use in hazardous areas
- Multi-channel data logging
- Integrated GSM modem for remote communication (SMS, GPRS, all continents)
- Low power operation for extended battery life (up to 10 years)
- Self monitoring and status alerting
- Built-in ambient temperature monitoring, optional external sensor connection
- Input-to-output pulse replication
- Optional support for data readouts from other external devices via the local serial communication
- Compact tamper-evident housing for wall or panel mounting
- Simple installation with easily accessible terminals
- Up to four pulse inputs

PLUG AND PLAY “OUT-OF-THE-BOX”DEVICE FOR MONITORING/ ALERTING/RECORDING DATA

MiBOX

Use:
For building managers and owners, utility companies, AMR solutions providers, EM solutions providers, etc.

Features
- Embedded platform with middle range requirements
- Preinstalled MiSmart application
- The unit is independent from external resources with all the system’s components already included (measuring system, database, set-up application and monitoring application)
- For monitoring/collecting data from measuring centres,alert handling, controlling and data management
- Administration of the MiBox and data analysis/management is supported over a web interface
- IP-based network (Ethernet, GPRS/UMTS, optionally WiFi) for primary use and with local communication (USB, serial) for secondary use
- Function of protocol conversion
- Industrial temperature range from -25°C to +50°C (extended -40°C)

Communicators

LOW POWER RADIO COMMUNICATOR

C2

Use:
For building managers and owners, utility companies, AMR solutions providers, EM solutions providers, etc.

Features
- AMR for gas, water and other counters with pulse output
- LPR (868 MHz) two-way communication (typically 300m)
- Low power consumption - 5 years without battery replacement
- Battery status display
- ATEX Zone 0 certified for use in hazardous areas
- Temperature measurement (optional)
- 100% reliable pulses detection
- Remote/local setup
- Up to two pulse inputs

LOW POWER RADIO CONCENTRATOR

C100

Use:
For building managers and owners, utility companies, AMR solutions providers, EM solutions providers, etc.

Features
- For sending AMR data to the internet
- C2 counters communicators control
- LPR (868 MHz) two-way communication (typically 300m)
- Communication bridging (meshed type - repeater mode)
- Power supply from the network
- Data storage from up to 100 C2 communicators
- Remote/local setup

INDUCTION HEATING CAPACITORS KLS

Air cooled capacitor

Water cooled capacitor

Use:
KLS capacitors are especially designed for inductive heat generating plants operating at frequencies between 50 and 10000 Hz. Manufactured by request, these capacitors are designed to comply with the specific requirements of each customer. Most of these capacitors provide for step changes in kvar by virtue of terminated sections within each unit. This allows for the tuning of the circuit for changing inductive loads.

Technical data

Voltage range:	500–3000 V
Output range:	up to 500 kvar (fn = 50, 60 Hz) up to 4000 kvar (fn > 60 Hz)
Rated frequency:	50–10000 Hz
Tolerance of capacity:	- 5 %...+ 10 % (narrower tolerances on request)
Losses (typical):	0,15–0,7 W/kvar
Temperature category (ambient temperature):	-25 °C/+45 °C (air cooled capacitors); +1 °C/+45 °C (water cooled capacitors)
Outlet water temperature:	45 °C max.
Max. pressureof incoming cooling water:	8 bar
Cooling water flow:	4,5 l/min–12,5 l/min
Impregnating fluid:	environmentally compatible NON-PCB dielectric oil based on M/DBT
Discharge resistors:	On demand, for 50/60 Hz capacitors only
Internal fuses:	Air cooled 50/60 Hz capacitors only
Temperature monitoring:	Temperature sensors can be built-in upon request
Pressure monitoring:	Pressure switches can be built-in upon request
Case material:	Mild steel containers for 50/60 Hz capacitors. Brass or aluminium containers for medium frequency capacitors.
Case finish:	One layer of top coat on one layer of primer. Standard colour RAL 7032.

INDUCTION HEATING CAPACITORS KLS

High voltage power capacitors KLV

Use:
KLV capacitors are designed for reactive power compensation of electrical networks and industrial plants. When required voltages are higher then rated voltage of individual capacitor, units are integrated into banks by means of series connection. Fusing is provided according to national requirements. Owing to high partial discharge inception voltage, KLV capacitors are suitable for installation in networks with higher harmonics and transient voltages. Low temperature dependent capacitance change makes them particularly suitable for filter circuit installations.

Technical data

Voltage range:	up to 13,86 kV (terminal - to - terminal)
Output range:	up to 400 kvar at 50 Hz, up to 480 kvar at 60 Hz
Rated frequency:	50, 60 Hz
Tolerance of capacity:	- 5 %...+ 10 % (narrower tolerances on request)
Average losses:	0,08–0,15 W/kvar
Standard insulation levels:	7,2–12–17,5–24 kV
Temperature category:	-25/C per IEC 60871-1 (other categories on request)
Compliance with standards:	IEC 60871-1, 1997, ANSI/IEEE 18 - 1992, NEMA CP-1, 1988

HIGH VOLTAGE POWER CAPACITORS WITH TWO OUTPUTS

KLV xxx4

Technical data

Voltage range:	up to 12 kV
Output range:	up to 400 kvar, 50 Hz up to 480 kvar, 60 Hz
Rated frequency:	50, 60 Hz
Tolerance of capacity:	- 5 %...+ 10 % (narrower tolerances on request)
Average losses:	0,08–0,15 W/kvar
Standard insulation levels:	7,2–12
Temperature category:	-25/C per IEC60871-1 (other categories on request)

Permissible overloads
Current: 1,3 × Rated current continuously
Voltage: 1,1 × Rated voltage continuously
Output: 1,35 × Rated output continuously

Compliance with standards: Capacitor units comply with: IEC 60871-1, VDE0560 Teil 410, ANSI/IEEE 18, NEMA CP-1

KNK

Use:
The KNK capacitors are used for power factor correction of inductive consumers (transformers, electric motors, rectifiers) in industrial networks for voltages up to 660 V.

Available Versions of KNK Capacitors

Indoor mounting:
KNK5015 - Single-phase in cylindrical housing
KNK5065, KNK6049, KNK9053 - three-phase in cylindrical housing
KNK9101 - single-phase in a prism shaped housing
KNK9103 - three-phase in a prism shaped housing
KNK9141 - single-phase with cap in a prism shaped housing (IP 55)
KNK9143 - three-phase with cap in a prism shaped housing (IP 55)
KNK9151 - single-phase with cap in a prism shaped housing (IP 40)
KNK9153 - three-phase with cap in a prism shaped housing (IP 40)

Technical data:

Rated voltage Un:	up to 660 V
Rated frequency:	50 Hz or 60 Hz
Capacitance tolerance:	- 5 % to + 15 %
Losses:	< 0,2 W/kvar (dielectric); < 0,5 W/kvar (total)
Standards:	IEC Publ. 60831 - 1/2
Safety:	self-healing, overpressure disconnector
Dielectric:	metallized polypropylene film; sealed with plant oil, PCB-free
Permitted ambient temperature:	- 25 °C to + 55 °C, other on request
Permitted storage temperature:	- 40 °C to + 70 °C
Permitted overload:	1,1 × Un (8 h per day) 1,3 × In (rated current)
In-rush current:	100 × In max.
Test conditions:	between layers 2,15 × Un, AC, 2 s; layers-housing 3,6 kV, AC, 2 s
Max. weight per kvar:	cylindrical housing: 0,1 kg; prism shaped housing: 0,3 kg

Low Voltage Dry Capacitors

KNK 1053

Use:
Capacitors are used for power factor correction of inductive consumers (transformers, electric motors, rectifiers) in industrial networks for voltages up to 600 V.

Features:
- Rated voltage Un: up to 600 V
- Rated frequency: 50 or 60 Hz
- Protection degree: IP 20
- Self-healing, overpressure disconnector
- Ambient temperature: -25 °C to +55 °C
- IEC 60831 - 1/2

Capacitor Duty Contactors

KC 12, KC 16, KC 20, KC 25, KC 33, KC 40, KC 60

Use:
Switching of capacitors in systems for compensation of reactive energy (classic automation devices).

Technical data:
- Conforms to utilization category AC-6b
- Saves costs of expensive replacement
- Long electrical life
- Reduces watt losses during “ON” condition, saves energy
- High safety
- No risk of dangerous voltage
- Switching of capacitor bank in parallel without de-rating
- Less maintenance and downtime

Power Factor Correction Systems

REACTIVE POWER

Sources, consequences and condition improvement

Most electrical devices like asynchronous motors, collective motors of rotation current, transformers, chokes, induction heating stoves, welding devices, fluorescent lamps and many others need not only working power but also reactive power for their own activity. That results not only in additional costs for energy supply but also in additional loads on transmissible lines and other contact elements. Such conditions can be improved with compensation of reactive power by fitting a suitable capacitor between the inductive consumer and the generator.

FIXED POWER FACTOR CORRECTION BANKS

Application:
- Local transformer compensation
- Local motor compensation
- Capacitors in delta connection
- Used where high harmonics aren´t present

Indoor, outdoor, wall mounting

Advantages:
- Need less space
- Flexibility if we plan some expansion
- Wall or floor fixed option

AUTOMATIC POWER FACTOR CORRECTION BANKS

Application:
- Compensation in distribution centres
- Compensation in industry
- Used where high harmonics aren't present

Indoor and outdoor option

Advantages:
- Low losses
- Modular system
- Adaptation to distribution system
- Self-standing cabinet

Power Factor Correction Systems

AUTOMATIC POWER FACTOR CORRECTION BANKS WITH HARMONICS FILTERS

Application:
- System for all locations where high harmonics are present
- Indoor or outdoor option

Advantages:
- Reduction of high harmonics
- Adaptation to distribution system
- Improved quality of electric energy

POWER FACTOR REGULATORS

Use:
Power factor regulators PFC max 6 (6 steps) and PFC max 12 (12 steps) measure cos φ of a supply system and control the automatic connection and disconnection of compensation capacitors according to desired cos φ.

Advantages:
- account for less electricity, because there is no more reactive power consumption
- reduction of losses in the network, because we have improved cos φ

Power Factor Correction Systems

MV FILTER POWER FACTOR CORRECTION SYSTEMS

- Nominal voltage: 35 kV
- Nominal power: 12 Mvar (4+8 Mvar)
- 770 MVA
- 38Si 70/170
- SF6 switch feeder
- Double star connection
- Inrush or filter reactors

MULTI-STEPS AUTOMATIC MV CAPACITOR BANK

- Nominal voltage: 6,3 kV
- Nominal power: 0,33 + 0,66 Mvar
- HRC fuses
- Inrush reactors
- Vacuum contactors
- Double star connection
- Double star protection relay
- Capacitor unit with two outputs
- 2600x2110x1100 mm, indoor version

Power Factor Correction Systems

SINGLE STEP MV AUTOMATIC CAPACITOR BANK

- Nominal voltage: 6 kV
- Nominal power: 300 kvar
- HRC fuses
- Inrush reactors
- Vacuum contactor
- Three phase capacitor
- 1000x2100x1000 mm, indoor version

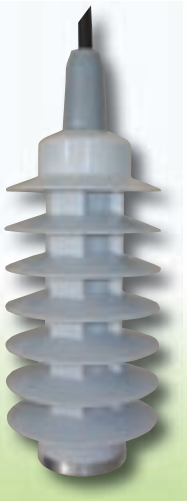
LV AUTOMATIC STANDARD OR FILTER CAPACITOR BANK

- Nominal voltage: 400 V
- Nominal power: 2x25 + 10x50 kvar
- Automatic capacitor bank
- Load break switch 1250 A
- PFC max 12 controller
- 2200x2100x500 mm, indoor version

INDUCTION HEATING CAPACITORS KLS

Outdoor fitting

Indoor fitting



Use:
Metal oxide medium voltage surge arresters are purposed for fitting in MV power network up to 35 kV as protection against direct lighting strikes.

Features
- Top quality varistor block
- Rigid construction of housing
- Isolation from silicone rubber
- Varistors filled up with silicone
- 100% final control
- Temperature range T = -40°C up to +85°C
- Flame classification V-0 (UL-94)
- IEC test class I
- Made according to standards: SIST EN 60099-4:2005 (IEC 60099-4:2004), SIST EN 60099-5:1998 (IEC 60099-5:1996), SIST EN 60099-5:1998/A1:2002 (IEC60099-5:1996/A:1999

Fitting accessories

Screws

Bare conductor

Suspension clamp

Disconnecting device

System for Detection of Cut Transmission Lines and Control of Transformer Station Defects

LISA®

Use:
The system can be used in medium-voltage networks and transformer stations to detect defects such as:

- broken overhead lines featuring semi-insulated conductors,
- other broken overhead lines (blank cables),
- detection of other defects in 20 kV networks,
- information on defects in transformer stations (contacts, high-voltage fuses, low-voltage fuses)...

Features

- Detection of cut off power lines due to different reasons: discharges, trees, snow, sleet, steeling of conductors and equipment
- Usage of standard mobile communications, GPRS, SMS
- Data transfer from transformer station
- Analysis of power supply quality according to EN 50160
- Remote trip

POINT OF COMMON COUPLING INTERFACE

Use:
A Point of Common Coupling Interface (PCCI) is used for a simple, standardized connection of micro and small generation of electricity from renewable energy sources into network. It enables monitoring of energy generation and ensures safe disconnection from network. All types of electric energy from renewable sources or energy from photovoltaics, wind power stations, cogeneration, hydropower stations as well as “classical” small power stations can be connected.

Features
Completely safe and supervised energy generation
- Remote monitoring and control
- Simple communication with the control centre
- Simple connection of small power stations to public distribution network
- Connection of generation and consumption in the same cabinet (lower costs, more transparent control)
- Provision of uninterrupted power supply (UPS) related with renewable energy sources (RES) and energy storage reservoirs
- Possibility of monitoring electric energy quality
- Possibility of compensation control
- Various protection functions available (voltage, frequency, island operation, etc.) or optional combination
- Possibility of adding a small compensation device

Capacitors for Renewable Technology

DC LINK CAPACITORS

KNG

Applications
- Hybrid vehicles
- Wind plants
- Solar power plants
- Electric energy generation from sea waves
- Medical equipment
- Industrial equipment
- Car electronics
- Railway and turbines (generators)
- Frequency inverters
- DC filtering applications

Features
- High capacitance
- Self-healing properties
- High reliability
- Low losses
- Low dissipation factor of dielectric

SNUBBER CAPACITORS

KNO

Applications
Snubber capacitors are used in applications where high pulse loadings and high frequencies are presented. Purpose of snubber capacitors is to eleminate voltage spikes which are caused by semiconductors or other devices.
- IGBT (Insulated Gate Bipolar Transistor) module
- AC and DC converter and inverter (Electric drives)
- Uninterruptable power system (UPS)
- Power supply

Features
- High voltage
- High pulse load capability
- Self-healing properties
- High reliabilty
- Low self-inductance
- Low dissipation factor of dielectric
- Terminal options for direct mount or board

MIDDLE-VOLTAGE TWO-STEP AUTOMATIC FILTER COMPENSATION 35 KV, 12 MVAR

Problem presentation

FENI Industries AD is the largest Macedonian ferronickel producer. It operates a mine, opencast mine and smelting plant for ferronickel in Kavadarci, northern Macedonia. The company has two melting furnaces, each of them is supplied separately by a 110/35 kV, 100 MVA dry transformer. Cos of the complete FENI system was between 0.90 and 0.92, without compensation at 35 kV. Such system caused additional, unnecessary costs for electric energy to the company. Monthly costs for reactive energy thus amounted to 16,000 EUR. The company therefore decided to collect offers for a complete solution of middle-voltage compensation on a turn-key basis.

Dry transformer 110/35 kV, 100 MVA

Project implementation

The project of a middle-voltage automatic filter compensation device on a turn-key basis consisted of several phases. First we entered into discussions and visited the FENI Industries AD company, then we made a record of the situation and carried out measurements. On this basis, we made an offer, and started the project implementation immediately after being chosen for the job. We chose appropriate suppliers of some components and made a controller on middle-voltage cells. Final acceptance and start-up of the facility was performed in June 2009. The project documentation was submitted in September 2009. After switching on the compensation, cos for the complete factory is 0.96, which completely achieves the purpose for such system. Our middle-voltage compensation solution helps FENI Industries AD to save 16,000 EUR monthly.

Case Studies

Project description

Basic data:

- Nominal voltage 35 kV
- Nominal power 12Mvar
- Version two steps with filters
o 4Mvar
o 8Mvar
o Filter reactors
o Outdoor

Features of the system:
- System can work fully automatic or manual
- Operation is local or remote from energetic control room
- Capacitor bank are connected in double star connection, with appropriate protection relay

Installation of external equipment - filter choke for 4 Mvar

Capacitor battery 8 Mvar, 35 kV

Front plate of one of MV 35 kV switching cells

External equipment of middle-voltage filter compensation, 35 kV, 12 MVar

SCADA SYSTEM FOR CONTROL OF 154/33.6 KV DISTRIBUTION TRANSFORMER STATION IN ISTANBUL

In cooperation with our business partner, the ALCE company, a SCADA control system was installed in one distribution transformer station of TEIAS Turkish electric utility in Istanbul. It is one of the biggest transformer stations of approx. sixty stations in 15-million Istanbul. A customer wished to automate readout of important operating parameters. Till now, an operator had to enter them manually into the prepared tables every hour and then copy them in an Excel document. Errors were frequent and readouts were not reliable, since the operators visually read them out from old analogue meters. The time used for Čmanual« readout and related costs were high.

We succeeded to solve this problem with a simple SCADA solution designed on new measuring centres and GE Fanuc iFix 4.5 SCADAs (Iskra MIS is an authorised service provider of this manufacturer). We installed seven MC 740 measuring centres with RS485 communication in a distribution transformer station, connected them in a network and then to a computer with corresponding software.

A standard MODBUS communication protocol is used for data transmission. SCADA iFix 4.5 communication interface provides for data capture and their display. Basic data are displayed in a simplified single-pole scheme with additional alarm indicators in a main window. Data survey can be extended so that all measurands are displayed. At the moment there are 20 measurands from each measuring centre (UL-L, I, f, Ptot, Qtot, E…). However, SCADA also enables setting of different alarm levels, so that the operator is immediately informed on abnormal operation. On request, export of reports is also possible in a form used, i.e. in an Excel document. In this way compatibility with a previous system has been preserved.

With a built-in system a distribution transformer station is updated and more reliable evidence during the operation is obtained with a minimal investment. With automatic readout, data transparency and quality are ensured, and the obtained broad base offers the possibility to get detailed operation analysis. A display of minimal and maximal daily values and also loads provides the operator key data on station load. Operators' time saving is also an important factor since they do not need to readout the meters manually anymore.

This is a very open system that can be simply upgraded. It is possible to add new meters or connect already installed equipment of other manufacturers, add new functions for control and analysis, etc. With minimal corrections, the application can be extended to other similar buildings. Remote control of the distribution transformer station and data capture from the control centre can be ensured with corresponding communication equipment.

SYSTEM FOR DETECTION OF INTERRUPTED CONDUCTORS AND ACQUISITION OF MEASUREMENTS ON MIDDLE-VOLTAGE TRANSMISSION LINE ILIRSKA BISTRICA

ISKRA MIS with its strong development team cooperates closely with other private and public companies. The result of such cooperation is LiSa® - a system for detection of interrupted conductors and transmission of measurements. One application is installed in the area of Elektro Primorska electric utility. They decided to install the LiSa® system at 20 mV transmission line Matulji between "Ilirska Bistrica" distribution transformer station and "Sviščaki 1" transformer station. In this area, semi-insulated conductors are often cut-off and fall down but electric protection in "Ilirska Bistrica" distribution transformer station, Matulji transmission line, does not detect the contact with ground and therefore does not disconnect the line.

Path

The complete path is 20 km long and has two lines, which are some kilometres long, with semi-insulated conductors. The first one is located between "Ilirska Bistrica" distribution transformer station, Matulji transmission line, and the place with a circuit breaker on a pole, and another one at hardly accessible area between "Zabiče" and "Sviščaki 1" transformer station which is at the end of the line.

Description of the project

Protection of interrupted lines is performed by means of the LiSa® protection devices which are installed in the following measurement points:

- At the end of 2Matulji" transmission line: in "Sviščaki 1" transformer station,
- Between both sections of the line with a semi-insulated conductor: on a pole with a remote controlled circuit breaker "Zabiče",
- In the beginning: in "Ilirska Bistrica" distribution transformer station, "Matulji" transmission line.

"Zabiče" remote controlled circuit breaker

Ilirska Bistrica distribution transformer station

Operation

In case of a fault, the device makes analysis on the basis of measured values and built-in logics, and sends a notice to a concentrator in a form of an SMS. The concentrator, located in the remote-control centre in Nova Gorica, consists of a computer with a GSM modem and the special software. It collects, processes and transmits information obtained from devices to a responsible staff in a form of notices. Data are also integrated in a program for network control and inspection. This solution helps a distributor to take corresponding measures immediately, i.e. to disconnect a damaged line and send a team of personnel to repair the fault.

Sources:

1. Bezjak M., Toroš Z., Turnšek, B., Bertoncelj, R., Ambrožič, G.: System for detection of interrupted semi-insulated conductors and transmission of measurements - MC LiSa; Cigre - Cired - 8th Slovenian Conference of Electric Power Engineering - Čatež 2007.
2. Bezjak M. + MMB zastopanje, projektiranje inženiring s.p.: Project documentation

NOTIFICATION SYSTEM IN POSTOJNA DISTRIBUTION TRANSFORMER STATION

ISKRA MIS offers solutions for notification systems and data acquisition using its communication devices. With the MI480 GSM communication adapter we were among the first to start using new technologies of mobile communications for industrial purposes. Data and information acquisition from connected meters and built-in digital inputs enables vast possibilities of using the system.

One of the simplest solution was produced in the Postojna distribution transformer station, operated by Elektro Primorska d.d. electric utility - Postojna business unit.
The above stated 20/10 kV distribution transformer station in Postojna was the main supply station for the Postojna region before a new 110/20 kV distribution transformer station was installed. Today, is supplies only Jama and Vodovod regions where 10 kV cable conduits and 10/0.4 kV transformer stations are located.

The distribution transformer station used to have a permanent duty staff, therefore the equipment is adapted for local control. Electric protection is performed with classical electro-mechanical relays, produced by Iskra, built in a special cabinet in a control centre. Voltage and current measurement is carried out with instrument transformers.

The secondary side of the transformer has no grounded star connection, i.e. 10 kV network is provided with isolated star connection. In such network the operation at a contact of a line conductor with ground is permitted for a certain time (2 hours). In this period, an outlet that is in contact shall be found and, if possible, the fault shall be located. After two hours, the faulty outlet shall be disconnected since it is dangerous for insulations of other two conductors which are on phase-to-phase voltage to the ground during the contact of the first conductor with ground.

All faults detected by electric protection are signalled locally. When there was a permanent duty staff, signalling was performed with a horn; now its contact is used for remote signalling of a fault. Until recently the signal was transmitted via a telephone line to Postojna business unit, and from here to the distribution remote control centre in Nova Gorica. Owing to construction works in the vicinity of the distribution transformer station, the existing poles and a cable conduit should be removed, which would involve high expenses. Elektro Primorska therefore decided to find another solution, i.e. to use standard mobile communications. Our company offered MI480 GSM communication adapter.

A horn signal was led to an MI480 digital input which sends an SMS message to a duty staff who manually switches off and on individual outlets and monitors the alarm of a ground contact. The information is sent to the SMS LiSa concentrator in the remote control centre in Nova Gorica.

Such solution enables a simple and cost effective replacement of classical communication line failure. The communication interface also enables subsequent extending of the application by connecting meters and automatic remote data capture.

Sources:
1. Bezjak M. - MMB zastopanje, projektiranje inženiring s.p.: Project task for Postojna distribution transformer station

Short Reference List

POWER FACTOR CORRECTION SYSTEMS

ARCELORMITTAL ZENICA BIH - MV power correction system 6 kV, 2,5 Mvar
ISKRA INVEST - automatic LV PFC system 550 kvar, 400 V , 50 Hz , 12 steps , with load breaker
FENI Kavadarci Macedonia - MV filter power factor correction system , 35kV, 12Mvar, 7%, automatic system
DINOS Slovenia - MV fixed power factor correction system, 6 kV, 300 kvar
DINOS Slovenia - LV automatic power factor correction systems , 175 kvar, 300 kvar, 400V,50 Hz
INDUPALTI Jarše Slovenia- automatic LV PFC system , 250 kvar, 400 V ,50 Hz
LITOSTROJ Slovenia- automatic filter LV PFC system 800 kvar, p=7%, 400V , 50 Hz , 8 steps , with load breaker
Mlinotest Ajdovščina Slovenia - Filter PFC SYSTEM 550 kvar ,400 V, 7%
PISTRIK Estonia - automatic MV PFC systems 6300V, 1MVAr, 2 steps , indoor version
ISKRA ATG Macedonia - automatic filter LV PFC system 200 kvar, p=7%, 400 V, 50 Hz , 8 steps, different automatic LV systems 60 - 225 kvar, 400 V, 50 Hz
JEZERNICA Slovenia - automatic LV PFC system 80 kvar, 400 V, 50 Hz , fixed in hydro power plant 160 kVA
ELEKTRONABAVA Slovenia - LV filter power factor correction systems, 100-200 kvar, 50Hz
TEHNOUNION Serbia - different automatic LV systems 60 - 400 kvar 400 V 50 Hz

PROJECTS OF ELECTRICAL EQUIPMENT FOR BRIDGE AND GANTRY CRANES

ŽELEZARNA JESENICE Slovenia - production and assembly of electrical equipment for bridge cranes
HE MEDVODE Slovenia - electrical equipment for a gantry crane
USS STEEL FACTORY SMEDEREVO Serbia - production, supply and assembly of electrical equipment for hoists and lifts, rotor resistors
LUKA RIJEKA Croatia - electrical equipment for portal cranes
Hydropower plant MOSTE Slovenia- production, supply and assembly of electrical equipment for bridge crane
MUTA Slovenia- production, supply and assembly of electrical equipment for 20 tons bridge cranes
YTONG ZAGORJE Slovenia- production, supply and assembly of electrical equipment for a KIPP Kran
DAIMLER CHRYSLER Germany - production, supply and assembly of electrical equipment for a warehouse
ACRONI JESENICE Slovenia- production, supply and assembly of electrical equipment for an EMDK 16 t x 21 m , 8 t/16 t 27,5 m bridge crane
BAKU STEEL COMPANY Azerbaijan - production, supply and assembly of electrical equipment for 150 ton bridge cranes
SAVA POWER PLANT Slovenia- electrical equipment for an HE MOSTE bridge crane
ĐURO ĐAKOVIČ Croatia - electrification of bridge cranes for IRAK
BAKU Azerbaijan - resistors for 150 and 100 ton bridge cranes
VIKTOR LENAC Croatia - electrical equipment for portal cranes
PRAHOVO - control desks for bridge cranes
ISKRA IMPULS - TEMA Port Ghana Africa - electrical equipment for a port gantry crane at Tema - Ghana
"ROC" VARAŽDIN Croatia- production, supply and assembly of electrical equipment for a floating dredger

PROJECTS OF START-UP CONTROL AND SPEED ADJUSTMENT FOR ELECTRIC MOTORS

REK BITOLA Macedonian - start-up resistors up to 500 kW electric motors
RUDIS VELENJE Slovenia - resistors for belt drive stations of electric motors
REVOZ NOVO MESTO Slovenia - resistors for 40 t frequency regulators
STEEL FACTORIES BAKU, EX YU - start resistors for bridge, portal cranes
KEK Kosovo - slip ring staring resistors up to 500 kW

Short Reference List

PROJECTS OF AUTOMATION IN INDUSTRIAL PROCESSES

SAVA KRANJ Slovenia- electrical installations on the PU15 packaging machine
TERMO ŠKOFJA LOKA - EUROVEK Slovenia - electrical cabinet, installation for new factories in Russia, Kazakhstan, - manufacturing stone wool thermal insulation under the market brand name TERVOL®
SAVA KRANJ Slovenia- electrical installations on NG 99/1 machines
SAVA KRANJ Slovenia- electrical installations for the B48 line
REVOZ NOVO MESTO Slovenia - production and assembly of equipment for floor and overhead conveyor belts
REVOZ NOVO MESTO Slovenia - assembly of automation systems in the car-body shop
VETRON- UNIS TOS Germany - manufacture of electrical cabinets for FIAT
REVOZ NOVO MESTO Slovenia- supply and installation of main switches
SAVA KRANJ Slovenia - electrification of a V - 26 double roller table
SAVA KRANJ Slovenia - electrification of the sheet cutting machine
CIMLEC S.A. France - assembly of the power supply system
SAVA KRANJ - electrification of oil dosing on the M4 in M5 mixers
TERMO d.d. Škofja Loka - manufacture, supply and assembly of the electrical equipment for a longitudinal saw
BEMA FRANCE - power supply installations in Revoz
MVT Germany - production and assembly of electrical equipment for different transport and lift systems (cabinets, installation, power resistors for frequency inverters)
MERKER ITALY Italy - electrification of conveyors in the trailer plant
SAVA KRANJ Slovenia - assembly of an NG99/2 machine
SAVA GOODYEAR Slovenia - renovation of the Fischer R2 cutting line
OLJARICA KRANJ Slovenia - manufacture and assembly of control desks
TERMO ŠKOFJA LOKA Slovenia - equipment for the new Trata mixing plant
GTIE FRANCE - electrification of the press for Revoz
SAVA TECH Slovenia - production and assembly of electrical equipment for the ILECAMP press
SAVA GOODYEAR Slovenia - production and assembly of electrical equipment for the PK and PU109 conveyance systems
RENAULT - REVOZ NOVO MESTO Slovenia - assembly of robots for car assembling
ABB Spain - production, supply and assembly of electrical equipment for the RENAULT - PARIS robot cell
KOVINARASKA KRŠKO Slovenia - production and assembly of equipment for asphalt-mixing plants

Notes

Notes

Iskra®
Iskra MIS

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