

NEO 3000 SYSTEM



NEO 3000 Substation System

THE FAMILY OF EQUIPMENT DEDICATED FOR POWER UTILITIES

Energy Sector



NEO 3000

Substation System

Introduction

The supply of electrical energy occupies an important position in the life of modern society. Operation of commerce, industry, transport, health service and private household are all dependent on regular and dependable supply of electrical energy. The quality of supplied electrical energy also depends on information about the state of power system. A successful power system operation therefore requires the use of state-of-the-art secondary equipment, which enables protection, monitoring, supervision and control of individual devices as well as whole power system.

Tradition, Know-how and Modern Technology

Iskra Sistemi has a long and outstanding tradition in the development, engineering, manufacture and marketing of protection, monitoring, control and communication systems in the field of power generation, transmission and distribution.

The Power System Protection and Control business area of Iskra Sistemi founded in 1949 began with the development and production of electro-mechanical protective relays.

Today the division continues the tradition of reliable and quality products with high-tech numerical protection relays and power control equipment. Individual access to the customer, wide range of applications, skilled experts, engineering, commissioning and maintenance of supplied systems are essential factors before investing in power systems. Continuous R&D, number of satisfied customers and several hundred domestic and international references makes Iskra Sistemi a trustworthy partner.

Family members

NEO 3000 Substation system is based on functionality of the following devices:

- MCE 940 SCADA software
- SCU 810 with IEC 61850 System Communication Unit
- FPC 680 Multifunctional Feeder Terminal
- CAU 380 Bay Computer
- CAU 36X Series pole-top RTU
- ECU032 Serial port extension unit

Additional

Turnkey installation of NEO 3000 Substation system requires additional auxiliary devices of own or third-party manufacture.

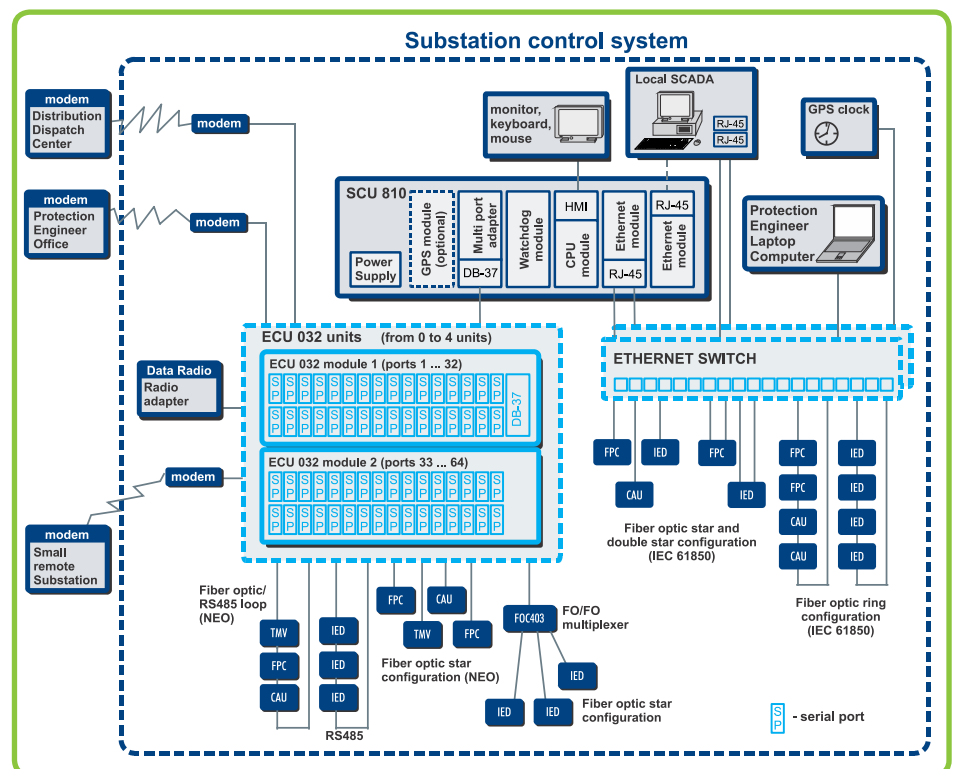
- Optical network switches
- GPS system clock
- Modems
- Inverters and UPS systems

Use

Modular design, simplified installation, scalability, easy maintenance, secure fiber optics connections and user friendly SCADA (System Control And Data Acquisition) software with local HMIs (Human Machine Interface) all together form a system that works in real life. Devices of NEO 3000, compatibility with wide range of NEO 2000 devices and third-party IEDs and proved auxiliary equipment makes turnkey projects possible.

NEO 3000 Substation System

Substation control and protection system NEO 3000 Substation was designed with highest regard for security, dependability and the wide scope of functions. It consists of substation SCADA computer, system communication unit, numerical protection relays and acquisition and control modules. It is designed as distributed system with control levels from bay level to the distribution dispatch center (see below figure). NEO 3000 devices and third-party devices which support IEC 61850 are connected to system by optical ethernet (ring or star connection). Older NEO 2000 devices and third-party IEDs (Intelligent Electronic Device) can be connected via serial communication by optic or electric cables. NEO 3000 devices are assembled in accordance with international protection standards and can be fitted in control cabinets of the switchgear to capture process data close to the primary equipment. NEO 3000 Substation standard functions are GPS/NTP clock synchronization, power quality monitoring, interactive graphical system representation, system tools for local or remote configuring etc. System communication unit also utilize protocol converter function and therefore integration of third-party IEDs is not an issue.



NEO 3000

Substation System

FPC 680 Multifunctional Feeder Terminal

FPC 680 multifunctional feeder terminal is electronic device that comprise wide range of functions for protection and control of medium or low voltage feeders. Different types of modules are available to provide the complete solution for medium or low voltage switchgear protection and also backup protection of transformers and transmission lines.

FPC 680 is IEC 61850 certified by KEMA (Level A) independent laboratories.



Communication

- Communication via fiber optic or RJ45 Ethernet (optional serial communication – RS232, RS485 or optical)
- Front and/or back RJ45 Ethernet interface for NEO 3000® Power System Manager parameterizing and analysis tools®
- Communication using IEC 61850 (optional DNP3 or IEC 60870-5-10x protocols)
- System time synchronization over NTP/SNTP or through other comm. protocols

Application

Can be used in the following types of utility networks:

- Solidly earthed systems
- Resistor earthed systems
- Petersen-coil compensated systems
- Isolated systems

Control

- internal data acquisition (protection operation, automatic reclosing and other internal signalization)
- external data acquisition (switching elements, alarm devices) - up to 44 DI
- power relay outputs - up to 16 DO
- synchro-check- V, deg & Hz (25)
- time tagging (high resolution events)
- Local and remote setting

Monitoring and measurements

- Current, voltage, power, frequency and power factor measurements
- Energy metering
- Fault recording
- Event recording
- Transient disturbance recorder (DREC)
- Power Quality Monitoring
- Statistical data processing (operation counters of protection devices, automatic reclosing units and circuit breakers)
- Breaker I2t monitoring
- Trip circuit monitoring (TCM)
- Self-monitoring

Local Display Unit (LDU)

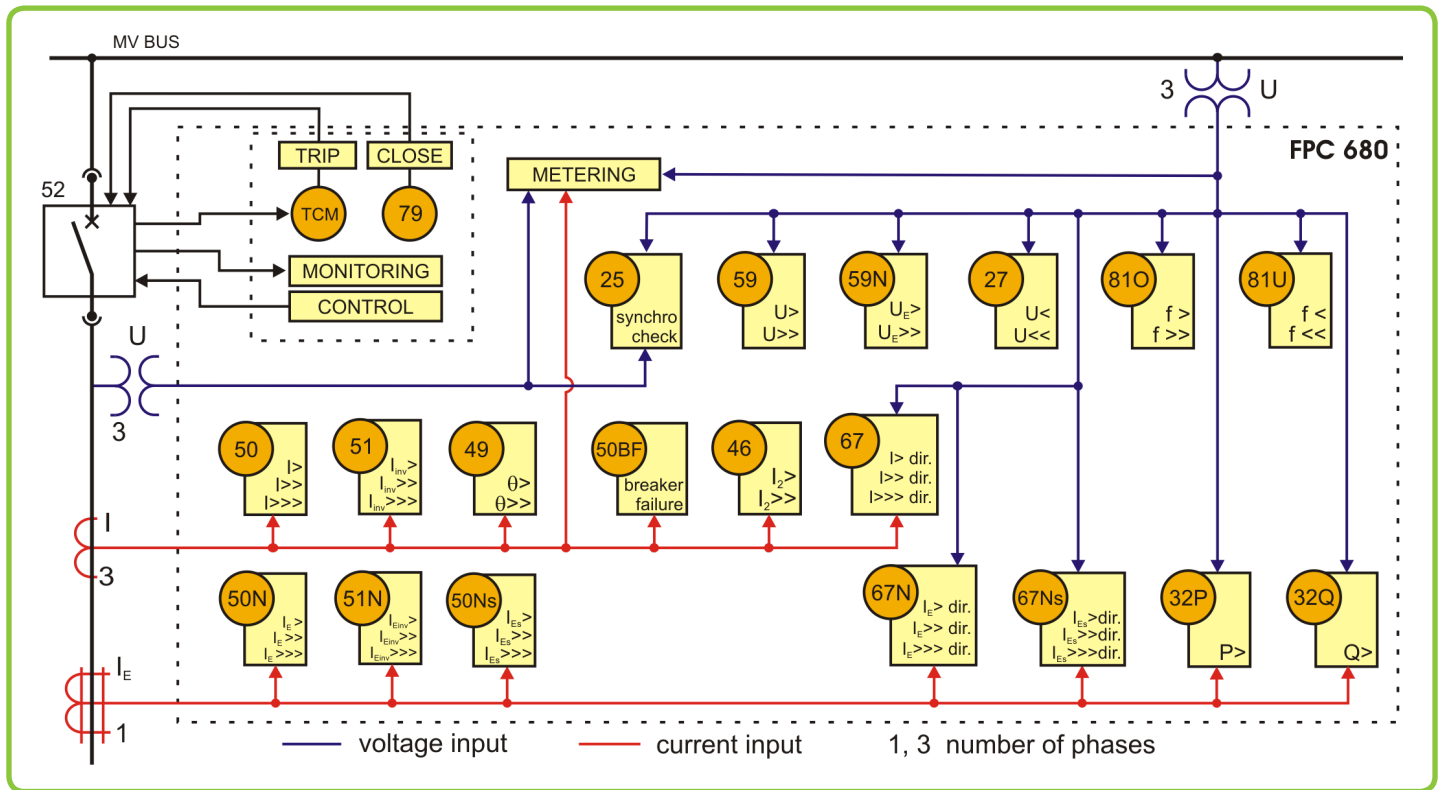
- Graphic LCD display with single line diagram
- Control for switching elements
- Showing measurements and alarms
- Event list
- Local/Remote switch with LED indication
- Easy to use navigation keys
- Open/Close control keys
- Ready LED + Alarm LED + 16 programmable LEDs
- 6 programmable function keys
- Front Ethernet RJ-45 communication port for local connection to device

Protection

- Three-phase overcurrent directional/non directional protection with definite/inverse time operation (50,51,67)
- Earth-fault directional/non directional protection with definite/inverse time operation, Var/Watt-metric method (50N,51N,67N,32N)
- Sensitive earth-fault directional/non directional protection with definite time operation, Var/Watt-metric method (50Ns,51Ns,67Ns,32Ns)
- Over/under voltage protection (59/27)
- Under/over frequency protection (81U/81O)
- Residual voltage protection (59N)
- Thermal overload protection (49)
- Negative sequence overcurrent protection (46)
- Auto-recloser (79)
- Circuit breaker failure protection (50BF)
- External protection
- Multiple protection setting groups

NEO 3000

Substation System



Main features

Total feeder protection functionality

Phase, earth-fault and negative sequence overcurrent with definite and inverse time directional/non-directional protection elements. Over/under-voltage, over/under-frequency, thermal overload protections and auto-recloser function.

Complete feeder control

Local and remote control of feeder switching elements applied through configurable interlocking.

Measurements and energy metering

Complete range of voltage, current, frequency, active and reactive power and power factor measurements with reactive and apparent double tariff forward/reverse energy metering.

Fault and event recording

Fault recording with 1 ms resolution time tagging.

Disturbance recorder and power quality monitoring (PQM)

Disturbance recorder with capability of 8 recordings, 6 seconds each. Monitoring of parameters such as THD, sags and swells is up to 40th harmonic order.

Communication capabilities

Easy integration of the module within substation control and protection system through IEC 61850 protocol, (optional DNP3 and IEC 60870-5-10x protocols).

Legend:

25	Synchrocheck
27	Undervoltage protection
59	Overvoltage protection
32P	Directional Active Power protection
32Q	Directional Reactive Power protection
46	Negative Sequence Overcurrent protection
49	Thermal overload protection
50BF	Breaker Failure protection
50, 50N	Phase/Neutral Definite time Overcurrent protection (two stages)
51, 51N	Phase/Neutral Inverse time Overcurrent protection (two stages)
52	Circuit breaker control
59N	Neutral Overvoltage protection
67, 67N	Directional Phase/Neutral with Definite/Inverse-time Overcurrent protection
67Ns/50Ns	Directional/non directional sensitive earth fault Overcurrent protection
81 O/U	Over/Underfrequency protection
TCM	Trip circuit monitoring
79	Auto-reclosure

NEO 3000

Substation System

CAU 380 Bay Computer

CAU 380 bay computer is designed for data acquisition, processing and transmission of process data as well as for local automation tasks in the substations. Modular design, scalability and PQM functions are the essential qualities to meet the novel power system control standards. Various models of different sizes and functionality are available.

CAU 380 is IEC 61850 certified by KEMA (Level A) independent laboratories.



Control

- internal data acquisition
- external data acquisition (switching elements, alarm devices) - up to 110 DI
- power relay outputs - up to 24 DO
- synchro-check- V, deg & Hz (25)
- Voltage regulation
- Fault current detection
- Time tagging (high resolution events)
- Local and remote setting

Local Display Unit (LDU)

- Graphic LCD display with single line diagram
- Control for switching elements
- Showing measurements and alarms
- Event list
- Local/Remote switch with LED indication
- Easy to use navigation keys
- Open/Close control keys
- Ready LED + Alarm LED + 16 programmable LEDs
- 6 programmable function keys
- Front Ethernet RJ-45 communication port for parameterizing

Monitoring and measurements

- Current, voltage, power, frequency and power factor measurements
- Energy metering
- Event recording
- Transient disturbance recorder (DREC)
- Power Quality Monitoring
- Statistical data processing (circuit breakers)
- Self-monitoring

Communication

- Communication via fiber optic or RJ45 Ethernet (optional serial communication – RS232, RS485 or optical)
- Front and/or back RJ45 Ethernet interface for NEO 3000® Power System Manager parameterizing and analysis tools®
- Communication using IEC 61850 (optional DNP3 or IEC 60870-5-10x protocols)
- System time synchronization over NTP/SNTP or through other comm. protocols

Application

Control and data acquisition for the following cases:

- HV transmission lines
- HV coupling and measuring bays
- HV and MV transformers
- MV feeders
- MV capacitor banks
- Utility applications (gas, water, district heating etc.)

NEO 3000 Substation System

IEC 61850 Certificate Level A by KEMA



IEC 61850 Certificate Level A¹

Page 1/2

International Usersgroup
No. 74100480-MOC/INC 11-1588

Issued to:
Iskra Sistemi, d.d.
Slegne 21
Ljubljana 1000
Slovenia

For the product:
NEO 3000 FPC 680
Hardware version: FPC 680-F03
Software version: 1.0

Issued by: **KEMA**

The product has not shown to be non-conforming to:
IEC 61850-6, 7-1, 7-2, 7-3, 7-4 and 8-1
Communication networks and systems in substations

The conformance test has been performed according to IEC 61850-10 with product's protocol, model and technical issue implementation conformance statements: *FPC680_FICS doc ver. 1.1; *FPC680_MIC3 doc ver. 1.1; *FPC680_TICS doc ver. 1.1; and product's extra information for testing: *FPC680_PINT doc ver. 1.1.

The following IEC 61850 conformance blocks have been tested with a positive result (number of relevant and executed test cases / total number of test cases as defined in the IEC International Users Group Device Test procedures v2.2b):

1 Basic Exchange (20/24)	1a GOOSE Publish (9/12)
2 Data Set (0/0)	1b GOOSE Subscribe (10/10)
2+ Data Set Definition (23/23)	12a Direct Control (7/11)
5 Unbuffered Reporting (15/15)	12b Enhanced SBO Control (12/10)
6 Buffered Reporting (17/20)	13 Time Synchronization (4/5)

This Certificate includes a summary of the test results as carried out at Iskra Sistemi in Slovenia with UniCApm 61850 version 3.23.02 with test suite 3.23.00 and UniCA 61850 analyzer 4.21.03. The test is based on the IEC International Users Group Device Test Procedures version 2.2b. This document has been issued for information purposes only, and the original paper copy of the KEMA report: No. 74100480-MOC/INC 11-1588 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to KEMA by Iskra Sistemi. The manufacturer's production process has not been assessed. This Certificate does not imply that KEMA has certified or approved any product other than the specimen tested.

Amhem, June 15 2011

M. Adriaens
Regional Director Management & Operations Consulting

P. S. Naayen
Test Engineer

¹ Level A - Independent Test lab with certified ISO 9000 or ISO 17025 Quality System

Copyright © KEMA Nederland B.V., Amhem, the Netherlands. All rights reserved. Please note that any electronic version of this KEMA certificate is provided to KEMA's customer for convenience purposes only. It is prohibited to update or change it in any manner whatsoever, including but not limited to dividing it into parts, in case of modifications for electronic version and the original paper version issued by KEMA will prevail.

KEMA Nederland B.V.
Utrechtseweg 310, 3612 AR Amhem P.O. Box 9035, 6800 ET Amhem, The Netherlands
T +31 26 366 20 25 F +31 26 351 36 83 sales@kema.com www.kema.com



Page 2/2

Applicable Test Procedures from the IEC 61850 Certificate Level A 1

Conformance Block	Mandatory	Conditional
1: Basic Exchange	Ass1, Ass2, Ass3, AssN2, AssN3, AssN4, AssN5 Srv1, Srv2, Srv3, Srv4, Srv5, SrvN1abcd, SrvN4	Srv6, Srv7, Srv8, SrvN1e, SrvN2, SrvN3
2: Data Set	DataSet1, DataSet10a, DataSet11a	
2+: Data Set Definition	DataSet2, DataSet3, DataSet4, DataSet5, DataSet6, DataSet7, DataSet8, DataSet9 DataSetN10d, DataSetN11, DataSetN12, DataSetN13, DataSetN14, DataSetN15	
5: Unbuffered Reporting	Rpt1, Rpt2, Rpt3, Rpt4, Rpt7, Rpt10 RptN1, RptN2, RptN3, RptN4	Rpt5, Rpt6, Rpt8, Rpt9, RptN5
6: Buffered Reporting	Brt1, Brt2, Brt3, Brt4, Brt7, Brt8, Brt9, Brt12 BrtN1, BrtN2, BrtN3, BrtN4, BrtN5	Brt5, Brt6, Brt10, Brt11
8a: GOOSE publish	Goop2, Goop3, Goop4, Goop7	Goop1, GoopN1
8b: GOOSE subscribe	GoS1a, GoS2, GoS3, GoS4, GoS1N1, GoS1N2, GoS1N3, GoS4, GoS5, GoS6, GoS9	GoS1b
12a: Direct control	CoN3, CoN8 CoCn1, CoCn3	CoI2, CoI7, CoIN11
12b: Enhanced SBO control	CoS, CoN1, CoN2, CoN3, CoN4, CoN9	CoI2, CoI7, CoIN11
13: Time sync	TSync1, TSyn2, TSyn3	TSyn3

All configuration files and data model tests have been successfully performed for the product variants using the same hardware and software version: NEO 3000 CAU 380



CAU 36X Series Remote Terminal Unit

CAU 36X is a family of devices intended for use in Distribution Automation Systems. The device combines all functions of feeder data acquisition, data processing, load-break switch control and communication functions.

The most distinctive advantage of the CAU 36X devices is their built-in over-current and earth-fault detection functions. Faults on the feeder are detected by means of protection-class algorithms that are based on Digital Signal Processing technology. In order to prevent false detection, a number of digital measurements have been taken through the possibility of accurate parameter setting and exact monitoring of feeder state.

CAU 36X devices can collect analog data from a distribution feeder by means of the majority of CTs available on the market. The use of transducers is not required since they are already a constituent part of the CAU 36X devices. Additional equipment such as fault detectors or indicators is no longer required.

Functions

Each CAU 36X provides a variety of functions. They are used according to project needs. Since SW is modular it is easy to add new modules which can be developed upon customer needs. Beside common functions (transducer-less measurement collection, power calculations, SOE ...), we provide some special functions:

Fault detection

CAU 36X provides fault current detection function, which follows ARC function in substations and independently signals excursion over set values and follow reclosures (up to 5). It will also detect direction of fault.

Voltage regulation

Voltage regulation function is also integrates. Voltage is regulated over RAISE/LOWER commands. Function will compare current voltage with requested voltage and execute regulation according to predefined limits and conditions. It will also signal if the limits are reached or the commands are blocked by any reason.

Scheduler

Scheduler provides possibility to program up to 20 time dependent operations.

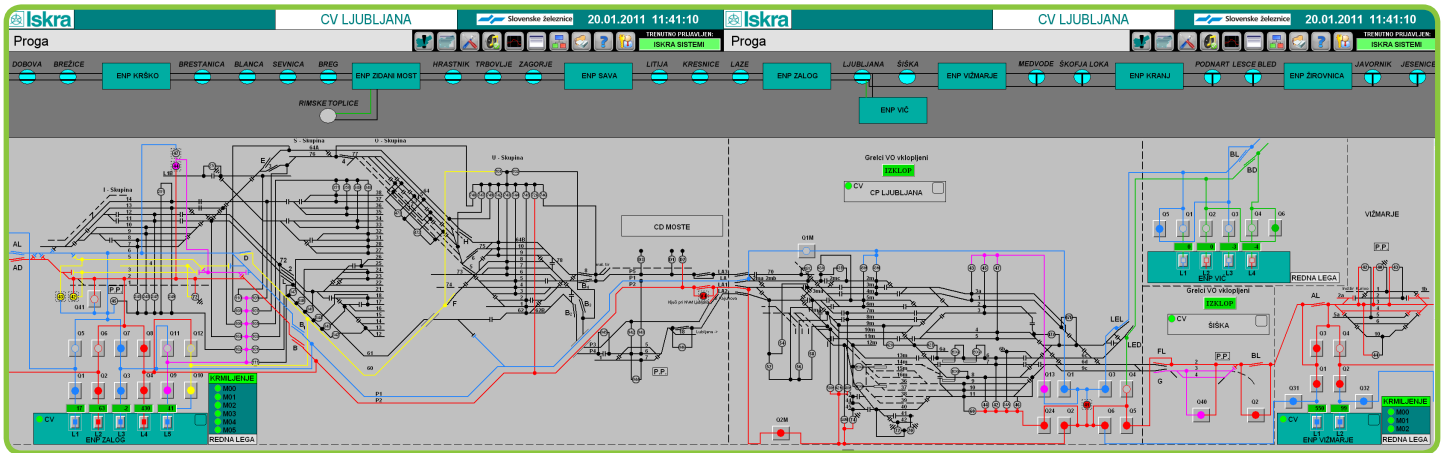
NEO 3000

Substation System

MCE 940 SCADA

MCE 940 is used for real time process monitoring and control on different control levels, specially designed for power utilities. Control over the system is granted with real time interactive power system display that comprehends voltage, current and demand metering. Control secured by interlocking, events presented with single or group alarms and continuous archiving of historical data into the database are the most common features of the MCE 940 SCADA. Statistical data of protection relays and circuit breakers are stored in the database and can be displayed at any time for maintenance activities.

MCE 940 SCADA is built on open design basis so it can offer great applicability. Desires of the customer can be reached with functional, graphical and statistical adaptations.

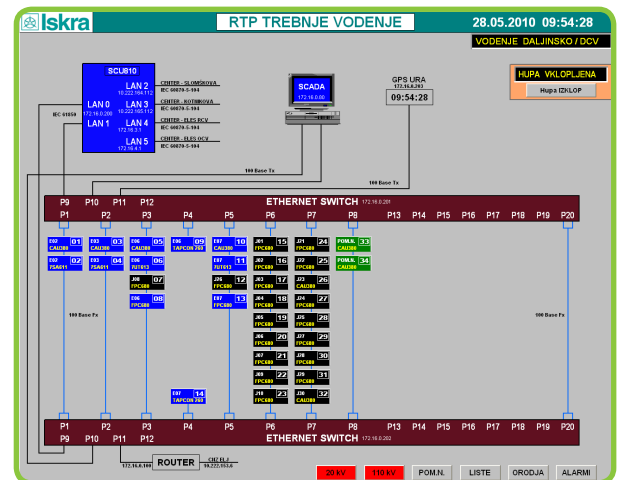
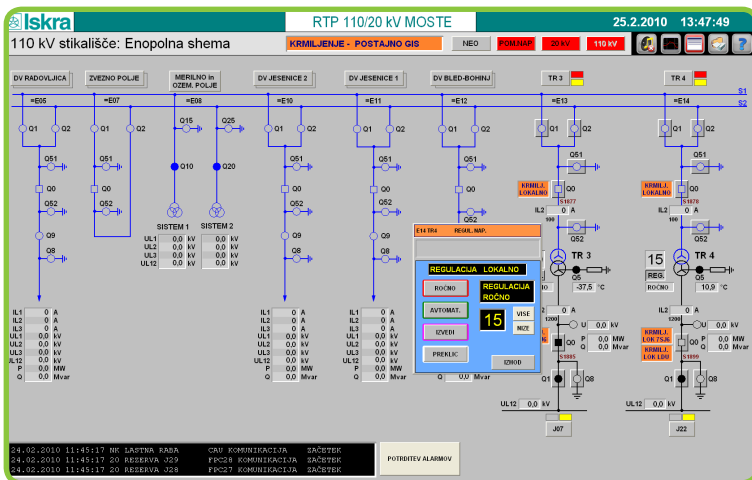


Application

- Substations
- Distributions control centers
- Transmissions control centers
- Industrial/traffic power supplies control centers

Features

- Distributed, Client/Server Architecture
- MCE 940 is designed for both small stand-alone and network applications.
- Share data with Oracle, SQL Server, Access and other SQL based databases.
- Supported communication protocols:
 - IEC 61850
 - IEC 60870-5-104 protocol
 - OPC,
- Security system enables control of access to data and application.



NEO 3000

Substation System

SCU 810 with IEC 61850 – System Communication Unit

The SCU 810 module is a complex communication device intended for the interconnection of any intelligent electronic device (IED) of Iskra Sistemi's NEO 3000 (NEO 2000) Substation Control and Protection System and of any third-party vendors. IED is considered as numerical protection relay, bay computer, intelligent RTU, energy counter and alike, that is used within the substation.

The SCU 810 device covers communication functions needed within substation and functions of data handling, world time synchronization and substation automation. It can serve also as interconnection gateway between hierarchically different control system levels from substation to utility dispatching centers, where data from geographically spread substations are grouped into a single database that forms an integrated supervision system of a wider area power system.

SCU 810 is a multi-protocol device that enables simultaneous communication with different IEDs connected on separate communication ports using various protocols. Hardware extension of communication ports is possible by using ECU 032 extension unit that provides up to 64 ports.

For communication with devices over IEC 61850 there can be used optical network with star or ring configuration.

SCU 810 also supports number of inevitable automatic functions when it is used as a master automation controller in Distribution Automation System.



Application

The SCU 810 device can be implemented anywhere where the basic function of a communication gateway is needed and/or integration of IEDs is required. The typical applications are:

- Central communication device in HV and MV substations and for Distribution Automation Systems
- The communication interface in either a control or maintenance center
- Integration of IEDs into substation or central SCADA systems
- Communication gateway for Protection Management Systems (PMS)
- Protocol conversion in all communication directions

Features

- Basic communication node to communication between IEDs and control centers of different manufacturers
- Support of backup communication paths
- Support of communication protocols supported by different manufacturers
- Remote control, monitoring and configuration of IEDs
- Support of internal and external GPS or DCF clock or over NTP time synchronization
- PLC functions (acc. to IEC 61131)
- Non-volatile memory (for drives, application data, etc.)
- Set point facility
- Self-supervision and watch dog
- Integrated diagnostic software

Additional

SCU 810 can also interconnect devices with serial optical and electrical ports. Depending on application, number of ports may exceed the port capacity of the unit. In that case one or two ECU 032 (Extension Communication Unit) are used to increase the number of serial ports. In that way up to 64 serial ports can be implemented with single SCU 810 unit.