



Company:
NAVITAS ENGINEERING & AUTOMATION Ltd.
Sarajevo, Bosnia and Herzegovina

SPEAKERS:
ADNAN PAŠIĆ
ALEN BURDŽOVIĆ

Title:

EXPERIENCE WITH SIPROTEC 5 DEVICES OVER THE YEARS



YOUR PARTNER FOR POWER ENGINEERING & AUTOMATION

SHORT COMPANY PRESENTATION



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- *Navitas = lat. Energy*
 - *Navitas Engineering & Automation Co. Ltd. is small, private, multi-discipline company, founded and owned by the skilled professionals in the field of protection, control and SCADA systems for all kind of power electrical and industrial plants*
 - *Company employers are professionals with decades and decades of experience in Bosnian and market of Middle East (U.A.E., Oman, Saudi Arabia, Iraq, Turkey), Northern Africa (Egypt, Libya, Tunisia, Algeria), Albania, Italy, Portugal,...*



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- *Company Head Office: St. Bulevar Meše Selimovića no. 87B
Sarajevo, Bosnia and Herzegovina*
 - *Company web: www.navitas.ba*
 - *Company e-mail: info@navitas.ba*
 - *Company phone: +387 33 87 89 60 / 87 89 61 / 22 07 07*
 - *Company fax: +387 33 22 07 07*
 - *Company mobile: +387 61 48 22 37 / 92 86 42 / 21 48 66*



Adnan Pašić Ensar Kalajdžisalihović Alen Burdžović

Adnan Pašić, B.Sc.El.Eng. – University degree in Power Electrical Engineering, over 29 years of experience in the field of protection, control and SCADA systems in power electrical and industrial plants

Ensar Kalajdžisalihović, B.Sc.IT.Eng. – University degree in IT, over 12 years of experience in the field of SCADA systems in power electrical and industrial plants

Alen Burdžović, B.Sc.El.Eng. – University degree in Power Electrical Engineering, over 20 years of experience in the field of protection, automation and control systems in power electrical and industrial plants



DESIGN



ENGINEERING



TESTING AND COMMISSIONING



CONSULTING

Our services are mostly related to the following systems:

- *Protection*
- *Control*
- *Systems for remote supervision, control and data acquisition (SCADA)*

Facilities that are subject of our services are different kind of:

- *Power distribution*
- *Power transmission*
- *Power generation*
- *Industrial plants*



From Basic design, Tender design and Main design documentation, up to the As Built documentation for all kinds of power electrical and industrial plants from low, over medium, up to the high and very high voltage levels



Parameterization, Configuration and Installation of electrical and automation equipment for all kinds of power electrical and industrial plants.



Factory Acceptance Test (FAT), Site Acceptance Test (SAT) and start-up of all kinds of power electrical and industrial plants.



Comprehensive services in consulting like different kinds of Studies, Analysis, Tender design, Tender documentation, Trainings etc.



Today, we can say that over 70% of delivered goods and performed services by Navitas Engineering & Automation are based on SIEMENS products and systems, as follows:

- Control and Protection devices (IEDs)
- Station Control Systems
- SCADA HMI SW
- MV air insulated switchgears
- MV SF6 insulated switchgears
- LV equipment
- PLC equipment
- Etc.



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- After significant experience gained over years and years on-site engineering and commissioning with SIPROTEC 3 and SIPROTEC 4 IEDs, station control systems based on SICAM SAS and SICAM PAS, SCADA HMI WinCC, today NAVITAS Engineering & Automation is becoming an important, highly reliable and experienced partner in implementing the projects based on:
 - SIPROTEC 5 IEDs of all kinds and purposes
 - Station Control Systems and RTUs: SICAM AK3, SICAM A8000
 - SCADA HMI SICAM SCC



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- Over last several years we implemented numerous projects with SIPROTEC 5 devices of different kind and purposes.

Some of the most important reference projects for us will be shared on the following slides:



- Year 2016 - HPP Una Kostela, River Una, City of Bihać (Bosnia and Herzegovina)

Unit no. 1: 3.17 MVA / 6.3 kV \pm 5% / $\cos\phi=0.80$

Step-up transformer 35 \pm 2x2.5%/6.3 kV / 3.15 MVA / Y(N)d5

Project: Replacement of existing, old SIPROTEC 3 unit protection devices with single SIPROTEC 5 7UM85 machine protection device

Services covered by Navitas Engineering & Automation:

delivery of equipment, design, configuration and parametrization, on site installation, testing, commissioning and start up



- Year 2016 – S/S 110/x kV Visoko, city of Visoko (Bosnia and Herzegovina)

Project: Construction of new 110 kV OHL to new S/S 110/x kV Fojnica

New Bay Control Unit **SIPROTEC 5 6MD86**

New line distance protection **SIPROTEC 5 7SA87**

Services covered by Navitas Engineering & Automation:

Configuration and parametrization, Factory Acceptance Test, on site testing, commissioning and start-up

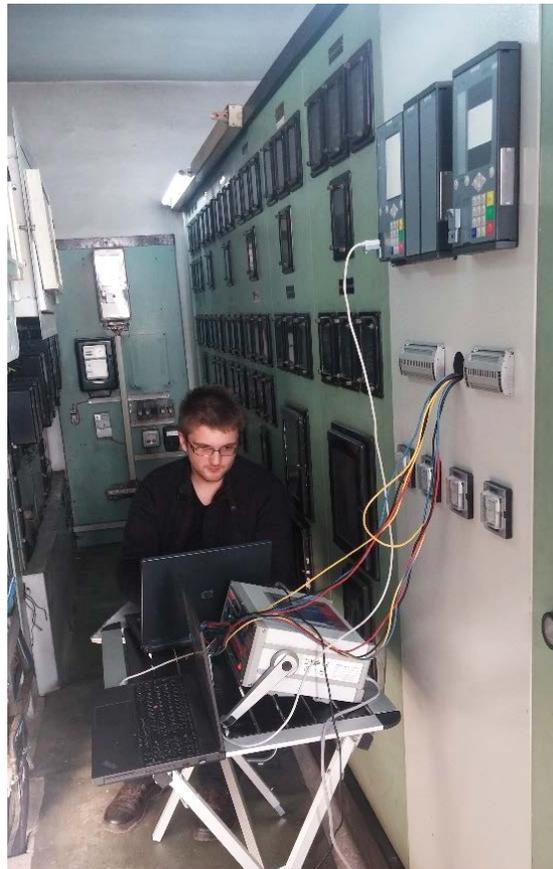
NOTE: New **SIPROTEC 5** devices **6MD86** and **7SA87** integrated by Navitas Engineering & Automation into the existing Station Control System based on **SICAM SAS** and **WinCC** over **USART-AD-1FO (FO)** module with communication protocol **IEC 60870-5-103**

For this purpose we used spare FO ports on expansion XF6 module of SICAM SAS and extended existing PlusTools and WinCC projects



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- Year 2016 – S/S 110/20 kV within Steel Factory PREVENT in city of Ilijaš, Bosnia and Herzegovina
Project: Installation of new power transformer HYUNDAI 110±10x1.5%/20 kV, 18.75/25 MVA, with:
 - new 110 kV bay equipment (ABB disconnectors, CB, CTs)
 - refurbished spare 20 kV incoming feeder with new CTs and protection device **SIPROTEC 5 7SJ82**
 - new transformer control and differential protection device with AVR functionality **SIPROTEC 5 7UT85**
 - new transformer 110 kV side backup O/C and E/F protection **SIPROTEC 5 7SJ82**
Services covered by Navitas Engineering & Automation:
delivery of control and protection devices **SIPROTEC 5**, desing, configuration and parametrization, on site installation of new control and protection equipment into the existing control and protection board, testing, commissioning and start-up of new power transformer with all belonging control and protection equipment

On site testing of new SIPROTEC 5 7UT85 and 7SJ82 installed into the existing C&P board for new power transformer 110/20 kV, 25 MVA





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- Year 2017 – S/S 400/x kV Tuzla 4, in vicinity of city of Tuzla (Bosnia and Herzegovina)

Project: Installation of completely new 35 kV air insulated switchgear with five new **SIPROTEC 5 7SJ82** control and protection devices

Services covered by Navitas Engineering & Automation:

configuration and parametrization, Factory Acceptance Test, on site testing, commissioning and start-up

NOTE: five new **7SJ82** devices integrated by Navitas Engineering & Automation into the existing Station Control System based on **SICAM SAS** and **WinCC** over **USART-AB-1EL (RS485)** module with communication protocol **IEC 60870-5-103**

For this purpose we used spare RS485 port on MCP module of existing SICAM SAS and extended existing PlusTools and WinCC projects

New SIPROTEC 5 7SJ82 devices installed inside LV compartment of new MV cubicles / Existing SICAM SAS extended with 5 new 7SJ82 devices





- Year 2017 – S/S 110/x kV HAK, in vicinity of city of Tuzla (Bosnia and Herzegovina)
 - Project:** Reconstruction and extension of S/S:
 - new building
 - new 110 kV equipment (ABB / ALSTOM)
 - one new power transformer HYUNDAI 110±10x1.5%/36.75/10.5(21) kV, 40/40/27 MVA, YNy0d5 (there is another existing transformer)
 - new switchgear ABB 36 kV (13 cubicles) with **SIPROTEC 5 7SJ82** control and protection devices
 - new switchgear ABB 24 kV (14 cubicles) with **SIPROTEC 5 7SJ82** control and protection devices
 - new 110 kV OHL C&P cubicles (2 pcs) with new BCU **SIPROTEC 5 6MD85** and line distance protection **7SA87**
 - new 110/35/10(20) kV transformer C&P cubicles (2 pcs) with new BCU **SIPROTEC 5 6MD85**, transformer differential protection with AVR functionality **7UT86** and backup self supplied O/C and E/F protection **7SJ45**
 - new 110 kV Bus coupler C&P cubicle (1 pcs) with new BCU **SIPROTEC 5 6MD85** and line distance protection **7SA87**
 - two new **SIPROTEC 5 7SJ82** devices in AC and DC sections (used only for collecting the alarm via BIs and measurements from AC and DC sections via mA inputs)
 - Station control system based on **SICAK AK3**, **RSG 2100** Ethernet switches, Meinberg NTP Server and **SCADA HMI SICAM SCC**
 - Implemented communication protocol **IEC 61850** with redundant **RSTP** protocol and **IEC 60870-5-101(104)** for remote control and supervision purposes (Control and supervision from three remote control centers)



Services covered by Navitas Engineering & Automation:

configuration and parametrization of complete control, protection and SCADA system,
Factory Acceptance Test, on site testing, commissioning and start-up of the entire system

In this project an intensive use of **GOOSE** messages system was implemented for the purposes of interlocking, CB failure protection, parallel operation of transformer, exchange of different alarms between the IEDs, etc.



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- First time for Navitas Engineering & Automation on this project was **successful implementation** of **AVR** functionality within **7UT86** with paralleling functionality of two power transformers
(**Master – Slave control logic**)



Specific for the Project:

Line distance protection **7SA87** within C&P cubicle of 110 kV Bus coupler has role of replacement protection for any of two OHLs in case where 110 kV Bus Coupler CB replaces 110 kV OHL's CB that is out of service for any reason

In this case, dedicated Setting Group is selected from SCADA HMI or locally on device, and **7SA87** of 110 kV Bus coupler replaces complete functionality of **7SA87** device of belonging 110 kV OHL

NOTE: Arised problem with reverse direction (Z1B and directional earth fault protection) combined with tele-protection 85-21 (POTT) and 85-67N (directional comparison). SIEMENS has got solution for this, as well



Photos of installed BCU SIPROTEC 5 6MD86 and Transformer differential protection with AVR 7UT86 inside belonging C&P cubicles





Photos of installed line distance protection **7SA87** and Station Control Cubicle with **SICAM AK3** and SCADA HMI Server (SEL industrial PC)





Screen shots of SCADA HMI (SICAM SCC) with two Monitors 24" (110 kV SWG SLD on the left, Event list on the right)

01.12.2017 10:31:40

Lista Događaja Alarm Lista POTVRDI SLIKU PREGLED 110KV-EO3 T10 35KV POSTROJENJE 10KV POSTROJENJE UPRAVLJANJE LOKALNO POLJE VP NADZOR SISTEMA 110KV-EO4 T10 110KV-EO5 T10 110KV-EO6 T10

Monitor 1 Monitor 2 Monitor 1 Monitor 2

TS 110/35/10 kV HAK - Monitor 1

STOP

TS 110/35/10 kV HAK - Monitor 2

PREGLEDNA SCHEMA 110KV

Stufa: 17
T nam: 5.00
T uja: 9.00

Lista događaja

Datum	Vrijeme	Grupa	Informacije	Vrijednost	Uzrok	Jednica	Lokacija	Status (Validir)
940	01-12-2017	10KV-EO3 T10	110KV-EO3 T10 ODVOJNA CELIJA 7.5J	KVAR UREDJAJA	PRE STANAK	SPORTANO	...	VALIDNO
947	01-12-2017	10KV-EO3 T10	DC RAZVOD 7.5J	RF KVARI SPAD AUTOMATA 10 KV POSTROJENJE	PRE STANAK	SPORTANO	...	VALIDNO
948	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	OPRUGA PREDKADICA OD NENAVJERNA	PRE STANAK	SPORTANO	...	VALIDNO
949	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NADZOR NAPONA KVAR	PRE STANAK	SPORTANO	...	VALIDNO
950	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	RSTP KANAL 1 KVAR	PRE STANAK	SPORTANO	...	VALIDNO
951	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	RSTP KANAL 2 KVAR	PRE STANAK	SPORTANO	...	VALIDNO
952	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	MEHANIČKI KVAR PREDKADICA OD	PRE STANAK	SPORTANO	...	VALIDNO
953	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KONKRETO PREDKADICA OD IZVUCEN	PRE STANAK	SPORTANO	...	VALIDNO
954	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	ISPAD AC/DC AUTOMATA CELIJE	PRE STANAK	SPORTANO	...	VALIDNO
955	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KOLICA PREDKADICA OD MEĐUPOLOZAJ	PRE STANAK	SPORTANO	...	VALIDNO
956	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	PREDKADICA OD MEĐUPOLOZAJ	PRE STANAK	SPORTANO	...	VALIDNO
957	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NOZ ZA UZEMLJENJE OS MEĐUPOLOZAJ	PRE STANAK	SPORTANO	...	VALIDNO
958	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	PRELAZAK IZ IZNAJ 90%	PRE STANAK	SPORTANO	...	VALIDNO
959	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NADZOR STRUJNA KVAR	PRE STANAK	SPORTANO	...	VALIDNO
960	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	UPRAVLJANJE	DALJINSKI	SPORTANO	...	VALIDNO
961	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	BL OKVADE ISKLJUČENJE	PRE STANAK	SPORTANO	...	VALIDNO
962	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	UREĐAJ U TEST MODU	PRE STANAK	SPORTANO	...	VALIDNO
963	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KVAR UREDJAJA	PRE STANAK	SPORTANO	...	VALIDNO
964	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	VREMENSKA SINHRONIZACIJA KVAR	PRE STANAK	SPORTANO	...	VALIDNO
965	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KONTROLA ISKLJUČENOG KRUGA - GLAVNI KALEM	PRE STANAK	SPORTANO	...	VALIDNO
966	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KONTROLA ISKLJUČENOG KRUGA - REZERVNI KALEM	PRE STANAK	SPORTANO	...	VALIDNO
967	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	GENERALNO ISKLJUČENJE	PRE STANAK	SPORTANO	...	VALIDNO
968	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	PREDKADICA OD	ISKLJUČEN	SPORTANO	...	VALIDNO
969	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KOLICA PREDKADICA OD	ISKLJUČEN	SPORTANO	...	VALIDNO
970	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NOZ ZA UZEMLJENJE OS	ISKLJUČEN	SPORTANO	...	VALIDNO
971	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	J01 7S.382 GREŠKA KOMUNIKACIJE	PRE STANAK	SPORTANO	...	VALIDNO
972	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	J01 7S.382 GREŠKA KOMUNIKACIJE	PRE STANAK	SPORTANO	...	VALIDNO
973	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	OPRUGA PREDKADICA OD NENAVJERNA	PRE STANAK	SPORTANO	...	VALIDNO
974	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NADZOR NAPONA KVAR	PRE STANAK	SPORTANO	...	VALIDNO
975	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	RSTP KANAL 1 KVAR	PRE STANAK	SPORTANO	...	VALIDNO
976	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	RSTP KANAL 2 KVAR	PRE STANAK	SPORTANO	...	VALIDNO
977	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	MEHANIČKI KVAR PREDKADICA OD	PRE STANAK	SPORTANO	...	VALIDNO
978	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KONKRETO PREDKADICA OD IZVUCEN	PRE STANAK	SPORTANO	...	VALIDNO
979	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	ISPAD AC/DC AUTOMATA CELIJE	PRE STANAK	SPORTANO	...	VALIDNO
980	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KOLICA PREDKADICA OD MEĐUPOLOZAJ	PRE STANAK	SPORTANO	...	VALIDNO
981	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	PREDKADICA OD MEĐUPOLOZAJ	PRE STANAK	SPORTANO	...	VALIDNO
982	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NOZ ZA UZEMLJENJE OS MEĐUPOLOZAJ	PRE STANAK	SPORTANO	...	VALIDNO
983	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	NADZOR STRUJNA KVAR	PRE STANAK	SPORTANO	...	VALIDNO
984	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	BL OKVADE ISKLJUČENJE	PRE STANAK	SPORTANO	...	VALIDNO
985	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	UREĐAJ U TEST MODU	PRE STANAK	SPORTANO	...	VALIDNO
986	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KVAR UREDJAJA	PRE STANAK	SPORTANO	...	VALIDNO
987	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	VREMENSKA SINHRONIZACIJA KVAR	PRE STANAK	SPORTANO	...	VALIDNO
988	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KONTROLA ISKLJUČENOG KRUGA - GLAVNI KALEM	PRE STANAK	SPORTANO	...	VALIDNO
989	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	KONTROLA ISKLJUČENOG KRUGA - REZERVNI KALEM	PRE STANAK	SPORTANO	...	VALIDNO
990	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	GENERALNO ISKLJUČENJE	PRE STANAK	SPORTANO	...	VALIDNO
991	01-12-2017	10KV-EO3 T10	10KV-EO3 T10 ODVOJNA CELIJA 7.5J	RF KVARI SPAD AUTOMATA 10 KV POSTROJENJE	PRE STANAK	SPORTANO	...	VALIDNO
992	01-12-2017	10KV-EO4 T10	110KV-EO4 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	LOKALNO	SPORTANO	...	VALIDNO
993	01-12-2017	10KV-EO4 T10	110KV-EO4 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPORTANO	...	VALIDNO
994	01-12-2017	10KV-EO4 T10	110KV-EO4 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPORTANO	...	VALIDNO
995	01-12-2017	10KV-EO4 T10	110KV-EO4 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	LOKALNO	SPORTANO	...	VALIDNO
996	01-12-2017	10KV-EO4 T10	110KV-EO4 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPORTANO	...	VALIDNO
997	01-12-2017	10KV-EO4 T10	110KV-EO4 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPORTANO	...	VALIDNO
998	01-12-2017	10KV-EO5 T10	110KV-EO5 SPOJNO POLJE 6MD	BL OKVADE ISKLJUČENJE	PRORADA	SPORTANO	...	VALIDNO
999	01-12-2017	10KV-EO5 T10	110KV-EO5 SPOJNO POLJE 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPORTANO	...	VALIDNO
1000	01-12-2017	10KV-EO5 T10	110KV-EO5 SPOJNO POLJE 6MD	BL OKVADE ISKLJUČENJE	PRORADA	SPORTANO	...	VALIDNO



Screen shots of SCADA HMI (SICAM SCC) with two Monitors 24" (10 kV SWG SLD on the left, Event list on the right)

01.12.2017 10:32:35

Lista Događaja
Alarm Lista
POTVRDI TRUBU
POTVRDI SLIKU
PREGLJED
110 KV POSTROJENJE
35 KV POSTROJENJE
10 KV POSTROJENJE
UPRAVLJANJE DALJINSKI
POLJE VP
NADZOR SISTEMA

110KV-001 TUZLA 4
110KV-001 SP
110KV-003 T20
110KV-004 TE TUZLA
110KV-005 T10

TS 110/35/10 kV HAK - Monitor 1

PREGLJEDNA SCHEMA 10kV

TS 110/35/10 kV HAK - Monitor 2

Lista događaja

—	Datum	Vrijeme	Grupa	Informacija	Vrijednost	Uzrok	Jednica	Lokacija	Status (Validity)
946	01-12-2017	10:20:34.375	10KV-001 ODVOJNA CELIJA 7.SJ	KONEKTOR PREDKADA Q0 IZVUCEN	PRESTANAK	SPONTANO	—	—	VALIDNO
947	01-12-2017	10:20:34.377	10KV-001 ODVOJNA CELIJA 7.SJ	ISPAD ACDC AUTOMATA CELIJE	PRESTANAK	SPONTANO	—	—	VALIDNO
948	01-12-2017	10:20:34.378	10KV-001 ODVOJNA CELIJA 7.SJ	KOLICA PREDKADA Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
948	01-12-2017	10:20:34.384	10KV-001 ODVOJNA CELIJA 7.SJ	PREDKADA Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
950	01-12-2017	10:20:34.385	10KV-001 ODVOJNA CELIJA 7.SJ	NOZ ZA UZEMLJENJE Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
951	01-12-2017	10:20:34.386	10KV-001 ODVOJNA CELIJA 7.SJ	PREDKADA Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
952	01-12-2017	10:20:34.388	10KV-001 ODVOJNA CELIJA 7.SJ	NADZOR STRUJNA KVAR	PRESTANAK	SPONTANO	—	—	VALIDNO
953	01-12-2017	10:20:34.389	10KV-001 ODVOJNA CELIJA 7.SJ	UPRAVLJANJE	DALJINSKI	SPONTANO	—	—	VALIDNO
954	01-12-2017	10:20:34.390	10KV-001 ODVOJNA CELIJA 7.SJ	BLOKADA ISKLJUČENJE	PRESTANAK	SPONTANO	—	—	VALIDNO
955	01-12-2017	10:20:34.392	10KV-001 ODVOJNA CELIJA 7.SJ	UREĐAJ U TEST MODU	PRESTANAK	SPONTANO	—	—	VALIDNO
956	01-12-2017	10:20:34.401	10KV-001 ODVOJNA CELIJA 7.SJ	KVAR UREĐAJA	PRESTANAK	SPONTANO	—	—	VALIDNO
957	01-12-2017	10:20:34.402	10KV-001 ODVOJNA CELIJA 7.SJ	VREMENSKA SINHRONIZACIJA KVAS	PRESTANAK	SPONTANO	—	—	VALIDNO
958	01-12-2017	10:20:34.403	10KV-001 ODVOJNA CELIJA 7.SJ	KONTROLA ISKLJUČENJA KRUGA - GLAVNI KALEM	PRESTANAK	SPONTANO	—	—	VALIDNO
959	01-12-2017	10:20:34.405	10KV-001 ODVOJNA CELIJA 7.SJ	KONTROLA ISKLJUČENJA KRUGA - REZERVNI KALEM	PRESTANAK	SPONTANO	—	—	VALIDNO
960	01-12-2017	10:20:34.406	10KV-001 ODVOJNA CELIJA 7.SJ	GENERALNO ISKLJUČENJE	PRESTANAK	SPONTANO	—	—	VALIDNO
961	01-12-2017	10:20:34.407	10KV-001 ODVOJNA CELIJA 7.SJ	PROBLEMA Q0	ISKLJUČEN	SPONTANO	—	—	VALIDNO
962	01-12-2017	10:20:34.408	10KV-001 ODVOJNA CELIJA 7.SJ	KOLICA PREDKADA Q0	ISKLJUČEN	SPONTANO	—	—	VALIDNO
963	01-12-2017	10:20:34.408	10KV-001 ODVOJNA CELIJA 7.SJ	NOZ ZA UZEMLJENJE Q0	ISKLJUČEN	SPONTANO	—	—	VALIDNO
964	01-12-2017	10:20:34.412	10KV-001 ODVOJNA CELIJA 7.SJ	001 7.SJ02 GREŠKA ROMBINGACIJE	PRESTANAK	SPONTANO	—	—	VALIDNO
965	01-12-2017	10:22:55.157	10KV-001 ODVOJNA CELIJA 7.SJ	001 7.SJ02 GREŠKA ROMBINGACIJE	PRESTANAK	SPONTANO	—	—	VALIDNO
966	01-12-2017	10:22:55.158	10KV-001 ODVOJNA CELIJA 7.SJ	OPHRANA PREDKADA Q0 NEVAJLJENA	PRESTANAK	SPONTANO	—	—	VALIDNO
967	01-12-2017	10:22:55.160	10KV-001 ODVOJNA CELIJA 7.SJ	NADZOR STRUJNA KVAR	PRESTANAK	SPONTANO	—	—	VALIDNO
968	01-12-2017	10:22:55.161	10KV-001 ODVOJNA CELIJA 7.SJ	RSTIP KANAL 2 KVAR	PRESTANAK	SPONTANO	—	—	VALIDNO
969	01-12-2017	10:22:55.163	10KV-001 ODVOJNA CELIJA 7.SJ	RSTIP KANAL 2 KVAR	PRESTANAK	SPONTANO	—	—	VALIDNO
970	01-12-2017	10:22:55.164	10KV-001 ODVOJNA CELIJA 7.SJ	MEŠANCI KVAR PREDKADA Q0	PRESTANAK	SPONTANO	—	—	VALIDNO
971	01-12-2017	10:22:55.166	10KV-001 ODVOJNA CELIJA 7.SJ	KONEKTOR PREDKADA Q0 IZVUCEN	PRESTANAK	SPONTANO	—	—	VALIDNO
972	01-12-2017	10:22:55.167	10KV-001 ODVOJNA CELIJA 7.SJ	ISPAD ACDC AUTOMATA CELIJE	PRESTANAK	SPONTANO	—	—	VALIDNO
973	01-12-2017	10:22:55.168	10KV-001 ODVOJNA CELIJA 7.SJ	KOLICA PREDKADA Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
974	01-12-2017	10:22:55.169	10KV-001 ODVOJNA CELIJA 7.SJ	PREDKADA Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
975	01-12-2017	10:22:55.171	10KV-001 ODVOJNA CELIJA 7.SJ	NOZ ZA UZEMLJENJE Q0 MEĐUPOLOZAJ	PRESTANAK	SPONTANO	—	—	VALIDNO
976	01-12-2017	10:22:55.172	10KV-001 ODVOJNA CELIJA 7.SJ	NADZOR STRUJNA KVAR	PRESTANAK	SPONTANO	—	—	VALIDNO
977	01-12-2017	10:22:55.173	10KV-001 ODVOJNA CELIJA 7.SJ	BLOKADA ISKLJUČENJE	PRESTANAK	SPONTANO	—	—	VALIDNO
978	01-12-2017	10:22:55.174	10KV-001 ODVOJNA CELIJA 7.SJ	UREĐAJ U TEST MODU	PRESTANAK	SPONTANO	—	—	VALIDNO
979	01-12-2017	10:22:55.175	10KV-001 ODVOJNA CELIJA 7.SJ	KVAR UREĐAJA	PRESTANAK	SPONTANO	—	—	VALIDNO
980	01-12-2017	10:22:55.177	10KV-001 ODVOJNA CELIJA 7.SJ	VREMENSKA SINHRONIZACIJA KVAS	PRESTANAK	SPONTANO	—	—	VALIDNO
981	01-12-2017	10:22:55.178	10KV-001 ODVOJNA CELIJA 7.SJ	KONTROLA ISKLJUČENJA KRUGA - GLAVNI KALEM	PRESTANAK	SPONTANO	—	—	VALIDNO
982	01-12-2017	10:22:55.179	10KV-001 ODVOJNA CELIJA 7.SJ	KONTROLA ISKLJUČENJA KRUGA - REZERVNI KALEM	PRESTANAK	SPONTANO	—	—	VALIDNO
983	01-12-2017	10:22:55.180	10KV-001 ODVOJNA CELIJA 7.SJ	GENERALNO ISKLJUČENJE	PRESTANAK	SPONTANO	—	—	VALIDNO
984	01-12-2017	10:23:04.977	DC 002000 7.SJ	DC 002000 7.SJ	PRESTANAK	SPONTANO	—	—	VALIDNO
985	01-12-2017	10:30:23.034	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	LOKALNO	SPONTANO	—	—	VALIDNO
986	01-12-2017	10:30:23.032	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
987	01-12-2017	10:30:29.211	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
988	01-12-2017	10:30:29.211	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	LOKALNO	SPONTANO	—	—	VALIDNO
989	01-12-2017	10:30:29.674	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
990	01-12-2017	10:30:55.492	110KV-002 SPOJNO POLJE 6MD	UPRAVLJANJE	LOKALNO	SPONTANO	—	—	VALIDNO
991	01-12-2017	10:30:55.492	110KV-002 SPOJNO POLJE 6MD	BLOKADA ISKLJUČENJE	PRESTANAK	SPONTANO	—	—	VALIDNO
992	01-12-2017	10:31:20.433	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
993	01-12-2017	10:31:28.435	110KV-002 SPOJNO POLJE 6MD	PROGRADA	SPONTANO	SPONTANO	—	—	VALIDNO
994	01-12-2017	10:31:46.116	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	LOKALNO	SPONTANO	—	—	VALIDNO
995	01-12-2017	10:31:46.163	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
996	01-12-2017	10:31:46.268	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
997	01-12-2017	10:31:46.268	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	LOKALNO	SPONTANO	—	—	VALIDNO
998	01-12-2017	10:31:46.679	110KV-004 DV TE TUZLA 6MD	UPRAVLJANJE VN APARATA	DALJINSKI	SPONTANO	—	—	VALIDNO
999	01-12-2017	10:32:31.866	SIEMENS SICAM AK3	NIVO UPRAVLJANJA PROBLEMA	1	KOMANDA	—	—	VALIDNO
1000	01-12-2017	10:32:31.880	SIEMENS SICAM AK3	NIVO UPRAVLJANJA	1	SPONTANO	—	—	VALIDNO

01-Dec-17 10:32 (LOC) List: 44 Window: 0 Ack: 3

01-Dec-17 10:32 (LOC) List: 44 Window: 1000 Ack: 3



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- Year 2019 – TPP Kakanj (3 Units, in total 450 MW), 110 kV SWG, city of Kakanj (Bosnia and Herzegovina)
Project: Supply and installation of six new line distance protection devices **SIPROTEC 5 7SA87** instead of existing, old ABB REL 511 (in operation since 1998)

Services covered by Navitas Engineering & Automation:

delivery of equipment, design, setting study, configuration and parametrization,
on site testing, commissioning and start-up

NOTE: six new **7SA87** devices integrated by Navitas Engineering & Automation into the existing Station Control System based on SICAM SAS and WinCC over **USART-AB-1EL (RS485)** module with communication protocol **IEC 60870-5-103**

For this purpose we used spare RS485 port on MCP module and extended existing PlusTools and WinCC projects



Specific for this project:

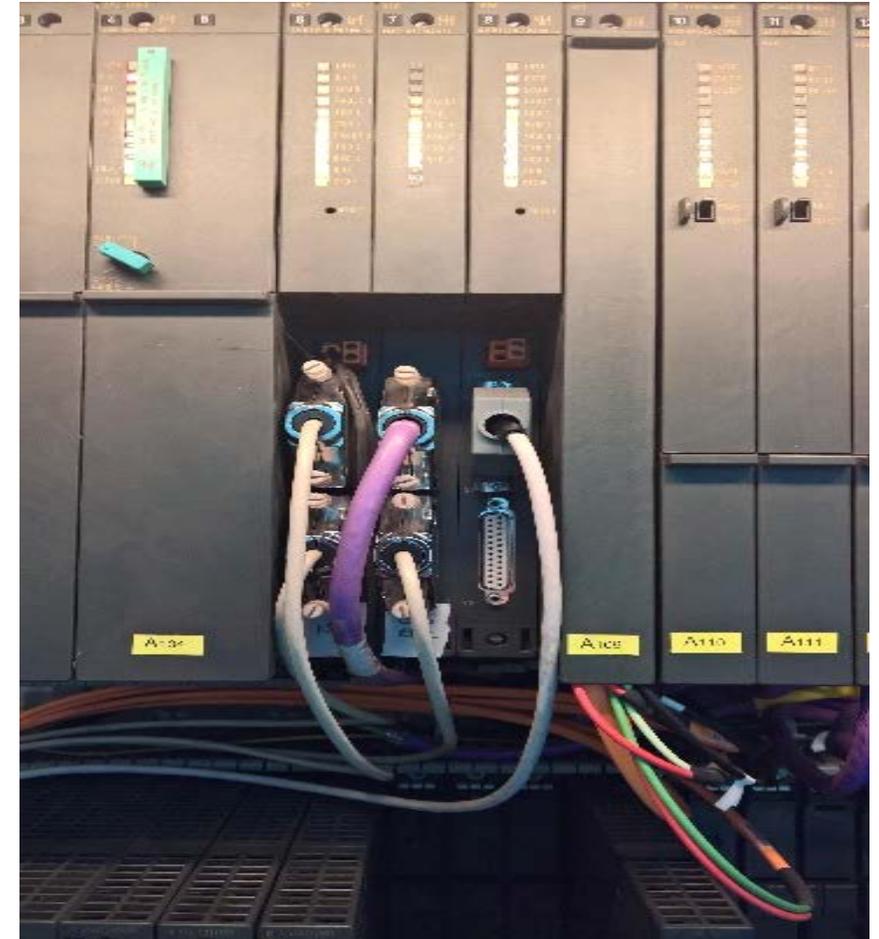
- 110 kV switchgear inside TPP Kakanj has one „Reserve“ bay that could be used to replace any 110 kV OHL
- Reserve bay is equipped with its own disconnectors, CB, CTs and VTs and line distance protection
- Before this project there was SIPROTEC 4 7SA611 device, with only **four** setting groups
- Reserve bay in TPP Kakanj is used to replace **five** OHLs and to operate as well as regular 110 kV Bus coupler bay
- For this purpose, its requirement is to have min. **six** setting groups (five setting groups for each 110 kV OHL and one setting group for regular Bus coupler operation)
- Implementing new **SIPROTEC 5 7SA87** device with max. **eight** setting groups, this problem will be easily solved

Operation of replacing 7SA87 in Reserve bay:

- Automatically when Reserve bay is selected to replace specific any of 110 kV OHLs, dedicated setting group inside new 7SA87 device of Reserve bay will be selected, and this device will be fully ready to replace complete protection functionality of original 110 kV OHL bay



Photos of existing C&P cubicle for 110 kV OHL with new **7SA87** device / enlarged photo of new **7SA87** device / existing SICAM SAS Station Control System extended with six new line distance protection devices 7SA87 over IEC 60870-5-103





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- DIGSI 5 is a tool that makes the creation of protection solutions
 - Quicker (e.g. copy/paste, templates, easy handling...)
 - Cheaper (Less steps and less time needed)
 - Safer (Integrated Test Suite and Function chart (CFC) tracing)
 - IEC 61850 - simply usable

 - SIPROTEC 5 protection devices are
 - Modular (Perfectly tailored hardware and functionality - Safety CT-Plug)
 - Safer (Integrated monitoring and supervision)
 - Designed to communicate



THANK YOU VERY MUCH FOR YOUR ATTENTION !

NAVITAS E&A TEAM WISH YOU A LOT OF SUCCESS IN FUTURE BUSINESS ACTIVITIES AND PLANS !