RTUs Product Portfolio

ZIV RTUs

Modular HV RTU
for Primary Substations
Xcell

MV RTU integrated in the
new SF6 free smart RMU
2TCA-D

ZIV MV Flexible RTU for
multiple purposes
USP 20

ZIV XCELL 2 RTU

Advanced substation automation platform designed specifically for HV and MV substations

Launched in 2012 as modern version from Xcell 1 (launched in 1995)

15 slots

9 slots

ZIV XCELL 2 RTU

The Ideal Platform for New Substations

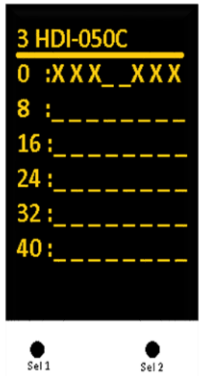
Its state-of-the-art technology provides real-time access to hardwired plant data, intelligent IEDs, networked IEC 61850 devices and smart meters. This makes it ideally suited for new substations or upgrade and integration of existing substations.

- Designed for use in Primary Substation applications
- Expandable Modular Downloadable Functionalities
- Multiple Racks can be networked
- Extensive Redundancy Options
- Wide range of IED Protocols
- IEC 61850 Client & Server (KEMA Certified for BCU)
- Secure DNP3/IEC104 (Compliant with IEC 62351 security standard)
- IEC 61131 Smart Logic
- Integrated Configurable and Extensible WebHMI

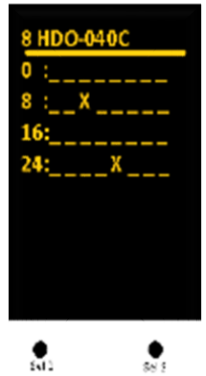
XCELL 2
Peripherals

- Very powerful processor
- 2 x Independent Ethernet Ports (RJ-45 connection)
- 5 x selectable RS-232/RS-422/RS-485
- Field Net Protocol inter-rack redundancy & multiple rack connections
- Support for multiple processor in the same rack
- Up to 15 I/O Cards
- Up to 8 Processor Cards
- Wide Temperature Range -20’C – 75’C
- Wide Input Voltage Range 18 – 72V
- Optional GPS time synchronization

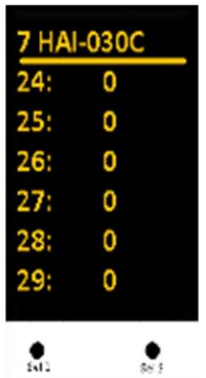
HDI
I/O Status



HDO
I/O Status



HAI
Values



XCELL 2
I/O Cards Peripherals

- Modular & Scalable
- 15 I/O modules or 8 processors per rack
- Wide voltage range 18 -160 VDC
- Wide Temperature Range -20’C – 75’C
- High Electric Noise Immunity
- Local and remote diagnostics

CPU
CPR-041-C

CPU (GPS)
CPR-041-GC

CPU (4 Eth)
CPR-041-QGC

Digital I/P
HDI-050-C
64 Ch

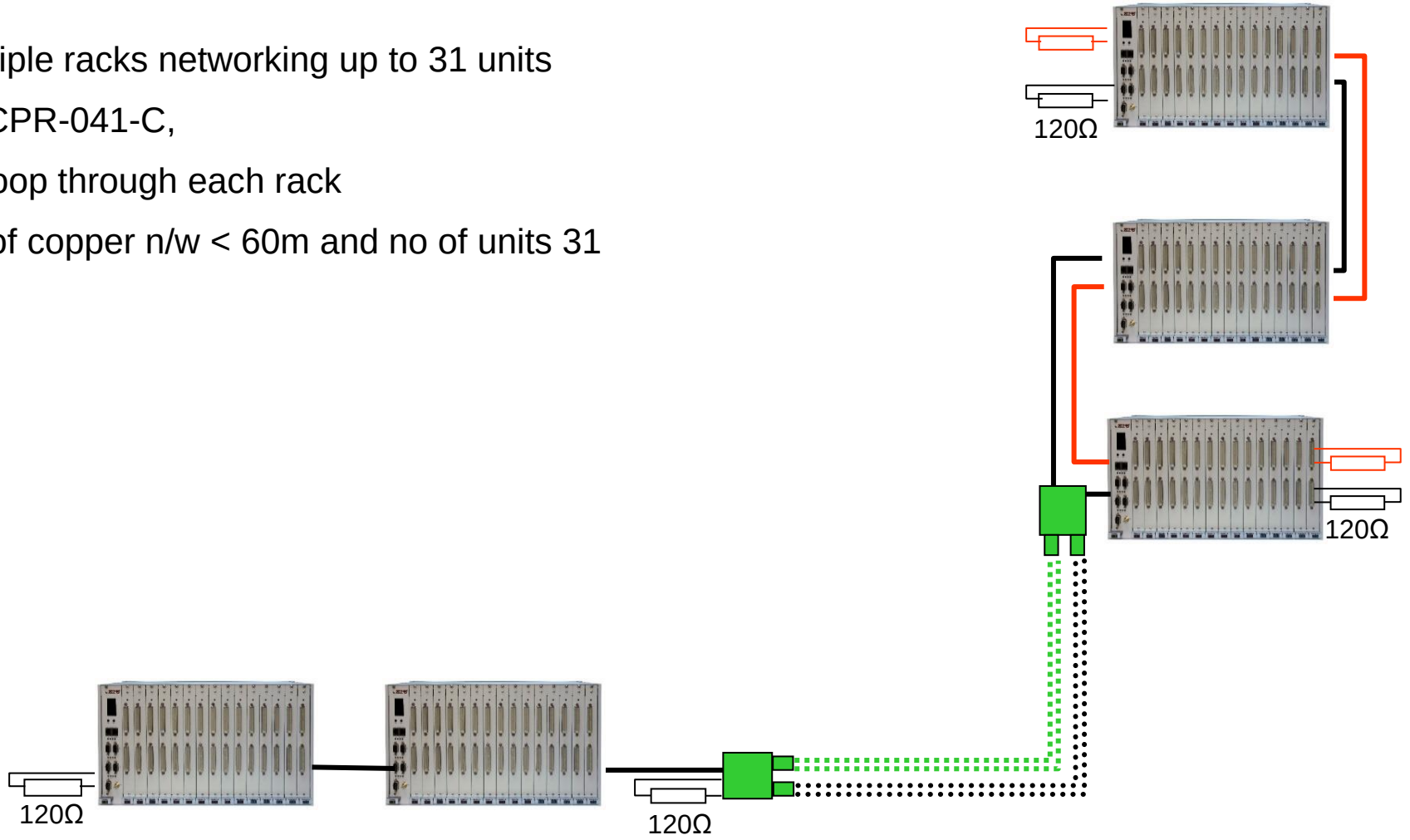
Digital O/P
HD0-040-C
32 Ch

Analog I/P
HAI-030-C
32 Ch

Analog O/P
HAO-010-C
8 Ch

XCELL 2
Making network connections

- Xcell 2 offers Multiple racks networking up to 31 units
- Dual network on CPR-041-C,
- The network will loop through each rack
- Maximum length of copper n/w < 60m and no of units 31



2TCA-D

RTU with built-in directional **Fault Passage Indicator** (up to 5 FPI) for **Overhead Load Break Switch** and **Extensible Switchgears**

Download PDF File · H0TCADE1807Iv00

2TCA-D Features

- Powerful programmable logic engin
- Up to 5 FPI functions per IED
- Up to 64 digital inputs
- 16 configurable digital outputs for alarm signalling or LBS control commands
- 24 analogue channels
- Voltage measurement supported: directly in busbar or installed in feeder bushings.
- 4000 event logger and oscillography recorder function (sample rate 4800 Hz).
- Diagnosis and Maintenance WebUI
- Fault Isolation Automatism (FIA)
- Cybersecurity: Authentication and encryption

RTU with built-in directional Fault Passage Indicator (up to 5 FPI) for Overhead Load Break Switch and extensible switchgears

Distribution Monitoring and Automation solution for extensible Switchgear in underground Distribution networks or pole-mounted Load Break Switches (LBS) in Overhead lines.

8-feeder Switchgear Automation solution covered with only one Master and one Slave IEDs interconnected via IEC61850 protocol.

Suitable for single busbar as well as multiple busbar substations.

2TCA-D
Key Features

Expansions supported with Master-Slave role devices

In case of large installations not covered with a stand-alone device, it is possible to create a daisy chain of several devices: one device acts as master including the RTU function and the rest of devices behave as slaves, interchanging data relative to the feeders controlled by each one.

Diagnosis & Maintenance via WebUI

Single line diagram and the status of the different elements of installation can be monitored for diagnosis and maintenance tasks.

No proprietary software tools are required.

Communication Protocols & Cybersecurity

RTU function embedded in **2TCA** communicates with control centers or SCADA systems using the IEC 60870-5-104 communications protocol.

Remote firmware update, device configuration, remote commands execution and many other operations can be performed through WebUI or web services on the device.

Secure transport protocols like HTTPS or SSH.

Role-based access control via LDAP and TACACS+ protocols.

Automatic service restoration (FIA)

The **2TCA** devices have been designed to operate as part of an automatic service restoration system.

Settings and configurations can be adaptatively modified for optimal network operation.

ZIV MV Flexible RTU

Flexible & Modular **RTU / Controller**
Perfectly Suited to Secondary Distribution Automation

Retrofit

Download PDF File · HMVFLEXIBLERTUIv00

ZIV MV Flexible RTU Features

- RMU multiple Feeder Monitoring.
- Directional Fault Detection.
- Disturbance Recording.
- Selection of Sensor Interfaces.
- Setpoint Control of DERs.
- DER Net Power Management.
- DER Failsafe Operation.
- Gateway (protocols incl. 61850).
- Extensive Cyber Security Features.
- Secure Web Server HMI (SLD...).
- IEC61131-3 Logic Automation Tool.
- Integrated GPS Clock (Option).
- Two Ethernet & four Serial Ports.
- Certified to power utility standards.
- Multiple Master Stations connectivity.

- **MAC-020 · AC Analogue Module**
- **MAI-010 · DC Analogue Module**
- **MAO-010 · Analogue Output Module**
- **MCP-012 · Processor Module**
- **MDI-010 · Digital Input Module**
- **MDO-010 · Digital Output Module**
- **Cyber Security**
- **ZIV WebHMI and Web HMI Editor**
- **Technical Information**

ZIV MV Flexible RTU Features

Secondary Substation Platform

The ZIV MV Flexible RTU with its powerful processor and range of communications ports is the core component of any Secondary Substation Automation System.

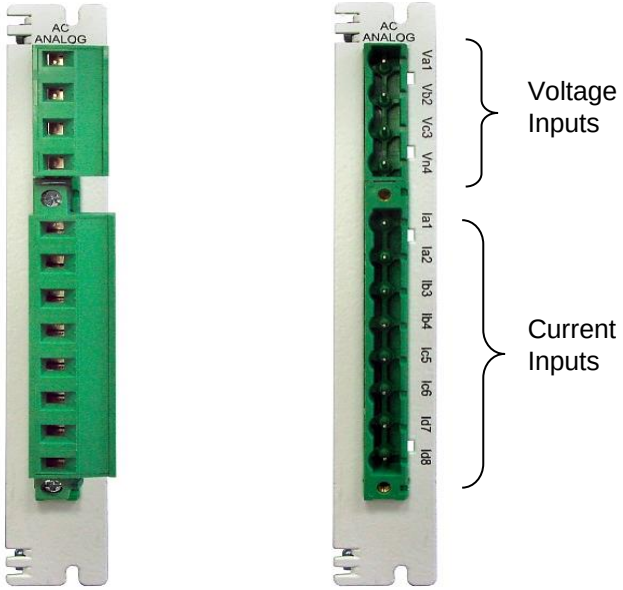
RMU Controller

The unit is used extensively as an RMU / Switch Controller based on its size, interface flexibility, fault detection and cybersecurity.

DER Controller

The ZIV MV Flexible RTU is widely used as a DER (Distributed Energy Resource) Controller based on its DER Management capabilities, setpoint controls, failsafe operation, interface flexibility and cybersecurity.

MAC-020 / AC Analogue Module



The MAC-020 is a high accuracy input module for AC metrics. It supports 3 AC voltage inputs and 4 AC current inputs.

The unit will provide RMS values, MW, MVar, MVA, frequency, phase angles, harmonic data and full protection algorithm support.

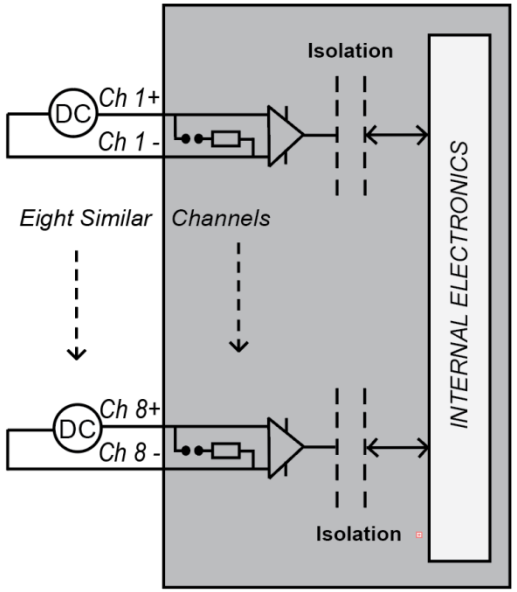
The input current range is 1 or 5 Amps and the input voltage range is 0-275 VAC although low voltage inputs from LEA (Low Energy Analogues) line-post sensors are also supported for both.

The 3 AC voltage inputs share a common VN4 (Vref).

Features

- RMU multiple Feeder Monitoring.
- 3 Voltage & 4 Current Inputs
- Power calculations based on paired Voltage and Current channels
- Derived Measurements: MV, MVar, MVA, Power Factor, Phase Angle & Frequency
- Supports Fault / Protection algorithms
- High Accuracy
- Fault passage detector and COMTRADE Oscillography functionality.

MAI-010 / DC Analogue Module



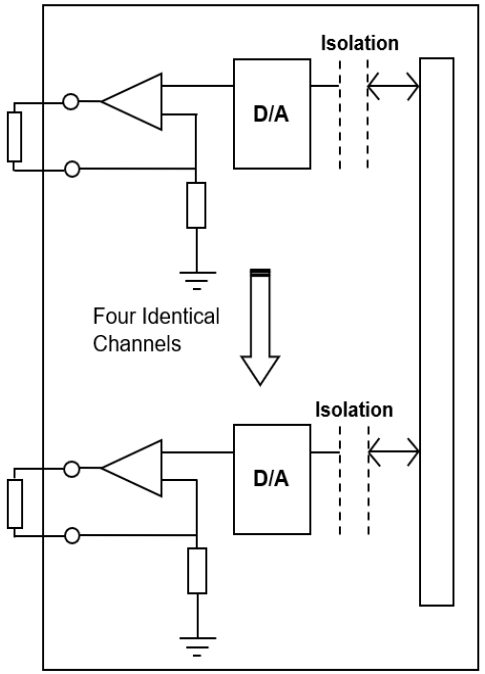
The MAI is an 8 channel DC analogue input module which provides the measurement options for 0-1V, 0-10V, ± 1V, ± 5V, ± 10V, ± 20mA and 4-20mA.

Selectable between current and voltage input. Consult the USP-020 User Manual for switch setting information and details. The unit also has an option for providing power for the RTD temperature sensors.

Features

- 8 DC analogue channels
- Supports voltage or current inputs
- Software selected input ranges
- High Accuracy and Stability
- Differential Input
- 5 kVDC Isolation
- 5.08mm pitch plugs/sockets

MAO-010 / Analogue Output Module



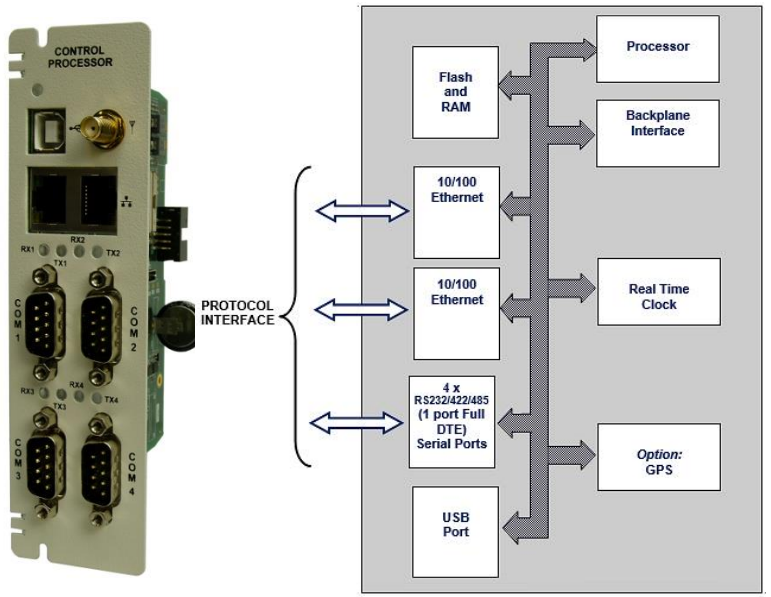
The MAO-010 is a 4-channel individually isolated analogue output module. The current output range is ±20mA with a build option providing for ±10VDC outputs. Both the current and voltage card variants feature 20% overrange.

The design allows for a loop resistance up to 1500 Ohms. Connections are via a single 8-way removable plug to a fixed card side socket. This greatly simplifies panel build and allows for easy connection/disconnection of plant wiring.

Features

- 4 Analogue output channels
- Individually isolated channels
- ±20mA output (optional ±10VDC)
- High Accuracy
- High Stability
- High noise immunity
- 5.08mm pitch plugs/sockets

MCP-012 / Processor Module



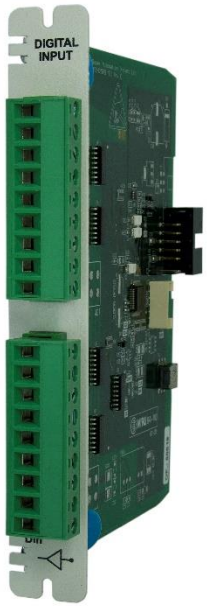
The MCP-012 module provides a range of communication options including Ethernet and four configurable RS-232 / RS-485 ports. It supports industry standard protocols including IEC61850, DNP3, IEC104, IEC101, IEC103 and Modbus.

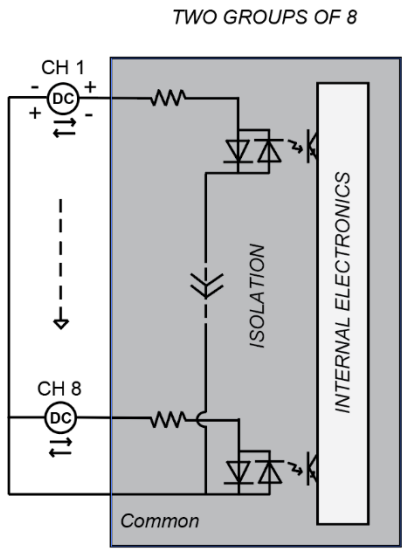
It supports a full range of I/O modules including Status Inputs, Control Outputs, DC Analogue Input, Analogue Outputs (Setpoints) and direct AC Analogues measurements (with option for fault detection).

Features

- 2 x 10/100 Ethernet interface
- 4 x RS-232/422/485 ports, one port full DTE interface
- USB configuration port
- Supports Analogue Setpoint and direct AC Measurement
- Multiple protocol support (IEC61850), IEC104, IEC101, IEC103, DNP, Modbus)
- Super-cap backed precision RTC
- On-board GPS option

MDI-010 / Digital Input Module





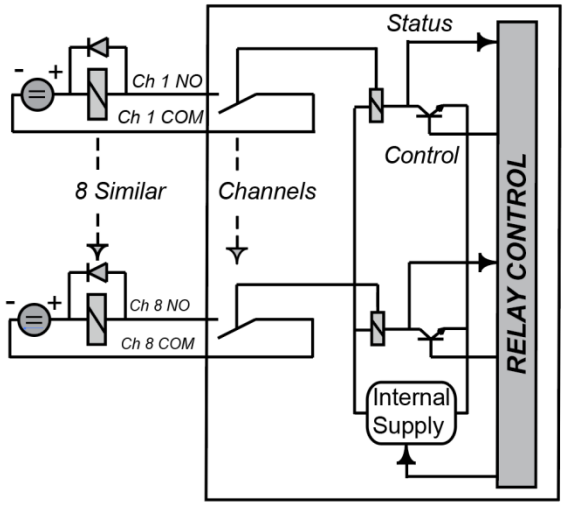
The MDI digital input module has 16 digital input channels organized as two groups of 8 with respective commons. It accepts bidirectional Voltage-Driven inputs and provides optically isolated input channels with field voltage ranges from 18 to 72V DC and 36 to 150V DC.

Connections are via a pair of 9-way removable plugs to fixed card side sockets. This greatly simplifies panel build and allows for easy connection/disconnection of plant wiring.

Features

- 16 Digital input channels
- Interrupt driven 1ms timestamp
- Voltage-driven operation
- Bi-directional inputs
- 18-72V or 36-150V input voltage
- High noise immunity
- 5.08mm pitch plugs/sockets

MDO-010 / Digital Output Module



The MDO is an 8 channel digital output module with a single normally open contact per channel. Suitable for 125VDC operation

The MDO offers secure control operation and supports both pulsed and latched output operations.

Connections are via a pair of 9-way removable plugs to fixed card side sockets. This greatly simplifies panel build and allows for easy connection / disconnection of plant wiring.

Features

- 8 normally open relay contacts
- Pulsed and latched operation
- Select, –Check, Execute & Control Output Functionality
- Suitable for 125V DC operation
- 5.08mm pitch plugs/sockets

Cyber Security

ZIV cybersecurity solution has been implemented considering the leading **cybersecurity standards** and **guidelines**, such as **IEC 62443**, **IEC 62351**, **IEEE 1686** and **NERC CIP**.

ZIV WebHMI and Web HMI Editor

The most efficient way to manage the substation

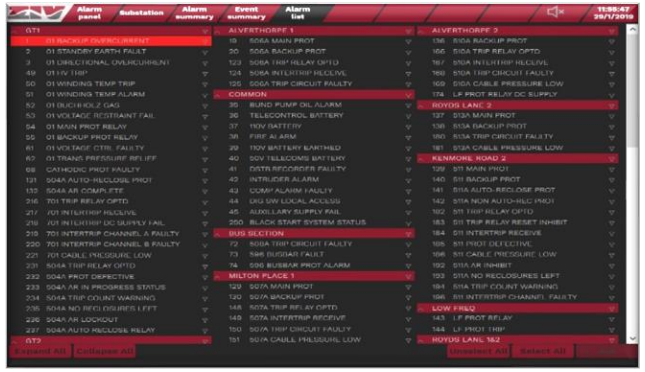
The **WebHMI** is an advanced browser application that offers a professional graphical interface that simplifies and enhances the ZIV Automation user experience.

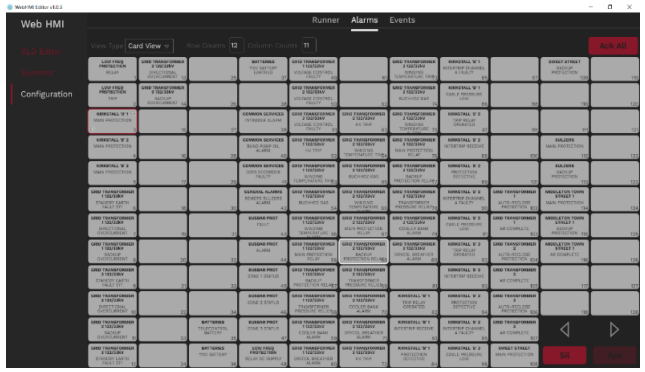
WEBHMI

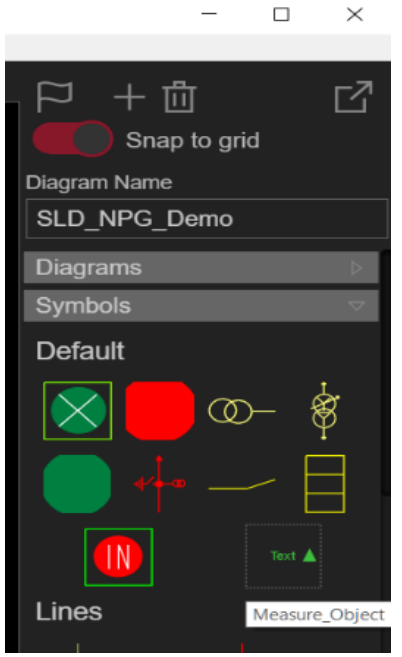
Substation Data Interface

- Standard Browser Based
- Multiple Single Line Diagram Displays
- Role Based Access
- Configured using the same Workbench Tool as the RTU
- Secure HTTPS Access
- User-Friendly Touch Screen Interface
- Control Operations

- Alarm Annunciator Display
- Alarm Summary Display
- SOE Display
- Diagnostics
- Dynamic updating
- Diagrams are fully Customisable
- Diagram & Symbols Editor
- Filters







Technical Information

Communications Interfaces	
Ethernet	2 x 10/100Base-TX (RJ-45 connections)
Serial Ports	4 x RS-232/485 (9 way Male D-Type) 1 x USB Port 1 x GPS Integrated Clock (Optional)
Number of I/O Modules	5, 8 or 12 I/O module variants are available (Plug & Play)
Power Supply Module	
Input Voltage Range	8-72 VDC or 36-150VDC
Power Consumption	Typically < 4W (refer to specific module datasheets) – Power Supply Rating 24W
Fault & Disturbance Functionality	
Directional Fault Indications	Directional/ Non-Directional Fault detection (ANSI 67, 67N,50/51, 50N/51N)
Disturbance Recording	Under-voltage / Over-voltage detection (ANSI 27, ANSI 59)
Voltage Presence/Absence detection	Undercurrent Detection (ANSI 37)
Fault Current Detection/Indication	LV Power quality -- Voltage dip / swell / interruption start / duration
Broken Conductor detection (ANSI 47)	LV Power quality -- Current unbalanced variation

Technical Information

DER Functionality	
Net Power Flow Management (Import/Export) Voltage Management PQ Envelope Management Hardwired / Serial DER Setpoint Controls Control-Feedback confirmation	Failsafe Operation (Hold, Pre-set, Disconnect Local Operator Panel available (Push-button / HMI) Multi-Master Station support (SCADA / ANM) Multi-Protocol Support Flexible measurement collection (Direct / Serial)
Other Functionality	
Cybersecure (TLSv1.3, IPSEC VPN, Secure LDAP, Radius, Secure SCADA Protocols, Signed Software/Hardware, Secure Syslog, …)	Secure Web Server HMI with complete substation line diagrams (option) IEC-61131 User Programming Application IED & SCADA Protocols (>70 Protocols incl. IEC 61850) Programmable Firewall (option)

Technical Information

DI Digital Input Module (multiple modules supported)	
Inputs	16 (one common for each 8 inputs)
Input Voltage	18-72 VDC or 36-150 VDC (Specified at time of order)
DO Digital / Control Output Module (multiple modules supported)	
Outputs	8 (Form A) normally open single pole outputs
Switching Current	5 A @ 250 VAC, 5 A @ 30 VDC 0.5 A @ 125 VDC
AC Measurement Module (multiple modules supported)	
Inputs	4 Current and 3 Voltage
Interface	CT/VTs; LEA (Low Energy Analogues); Rogowski; Line Post; Other LV input ranges
Measurements	V, I, Freq, MW, Mvar, PF
DC Measurement Module (multiple modules supported)	
Inputs	8
Nominal Range	0-1V, 0-10VDC, ±1V, ±5V, 10V, 20mA, 4-20mA
AO Analogue Setpoint Module (multiple modules supported)	
Outputs	4
Range	Configurable between +/- 20mA

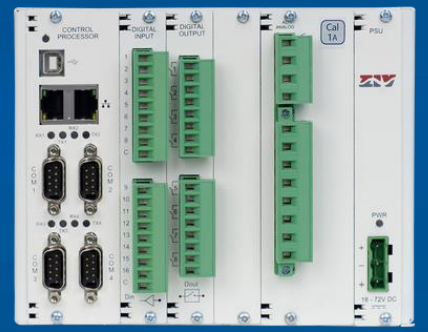
Technical Information

Environmental Conditions	
Temperature Continuous Operation	-20° to +70 °C standard - IEC 60068-2-1 & IEC 60068-2-2
Transport and Storage	-40° to +85 °C
Relative Humidity	0 to 95% non-condensing - IEC 60068-2-3 & IEC 60068-2-78
Vibration	IEC 60068-2-6 & 60255-21-1 Class 2
Drop & Shock	IEC 60068-2-31

Dimensions & Mounting	
Dimensions (W * H * D)	5 I/O Slots: 174 mm (W) x 136 mm (H) x 135 mm (D) (201 mm (W) incl. rear mounting flanges) • 8 I/O Slots: 235 mm (W) x 136 mm (H) x 135 mm (D) (262 mm (W) incl. rear mounting flanges) • 12 I/O Slots: 317 mm (W) x 136 mm (H) x 135 mm (D) (344 mm (W) incl. rear mounting flanges)

Xcell-2
&
MV Flexible RTU
Common Features

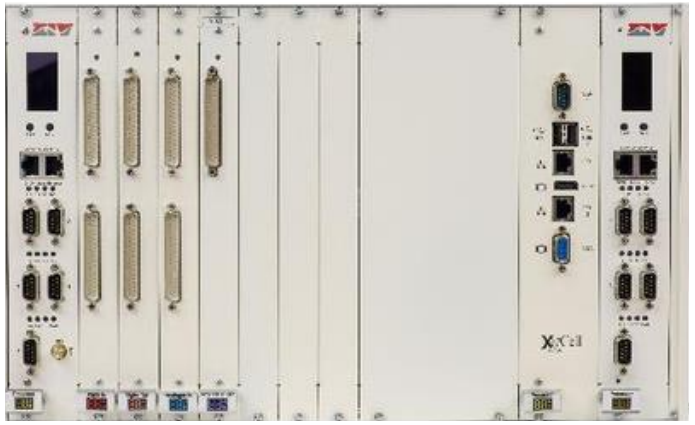
Xcell



MV flexible RTU

Existing large number of Standard and Proprietary Secure Protocols support

Xcell -2 & Flexible RTU Common Features



Slave Protocol	Master Protocol
IEC 870-5-T101	**IEC870-5-T 101**
IEC 870-5-T104 / Secure (IEC62351)	**IEC870-5-T 104**
DNP3 Serial	**DNP3 Serial**
DNP3 TCP/IP / Secure (IEC62351)	**DNP3 TCP/IP**
ABB RP570 Protocol	**Modbus RTU serial**
Landis & GYR 8979	**Modbus RTU TCP/IP**
Modbus RTU Serial	HNZ 66S15-11
Modbus RTU TCP/IP	ABB Indactic 33
WISP+	
WISP YEDL	**IED Protocol**
Harris 5000	**IEC61850 Ed 2 Client**
Harris 6000	IEC870-5-T103
HNZ 66S15-11	GEC K-bus
Foxboro Fieldbus Protocol	ABB Spabus
GI74 Protocol	PML Modbus
Leeds and Northrup Conitel - C300	Radio Clock Interface (NGTS 2.13)
Siemens 8FW 128 Protocol	Coopers Autorecloser Interface
Ferranti (UK) MkIIA protocol	Multilin Modbus
Ferranti (UK) MkIIIA protocol	P&B MPC
Ferranti (UK) MkIVA protocol	Merlin Gerin (Schneider) Sepam Relay
IEC61850 Ed 2 Server	DLMS
CDC Type II Slave 2.04	IRIG-B GPS
ABB Indactic 33	HOPF GPS Clock
SC1801	Alstom Kitz

Advanced Cybersecurity Features

Xcell -2 & Flexible RTU common features

COMMON RTU CYBERSECURITY FEATURES

- In-built Crypto Engine
- Asymmetric Encryption (Public/Private keys) and **X509 Certification encryption** support
- Secure Protocols **TLS** (Transport Layer Security) & **SSL** (Secure Socket Layer)
- **SSH** Secure Shell interface for diagnostics with **SFTP** (SSH File Transfer Protocol)
- **SNMP V3** (secure SNMP) for reporting alarms and equipment status
- **Radius** Client (Remote Authentication Dial in User Surface)
- **LDAPS** (Lightweight Directory Access Protocol) over SSL (Secure Sockets Layer)
- **HTTPS** – Secure HTTP – web access for WorkBench & WEBHMI
- **Secure DNP3** (**DNP3-SAv5**) Protocol with & **Secure IEC101/104**
- **Port Hardening**
- **Configurable password complexity**
- **Security Alarms**

ADVANCED CYBERSECURITY FEATURES

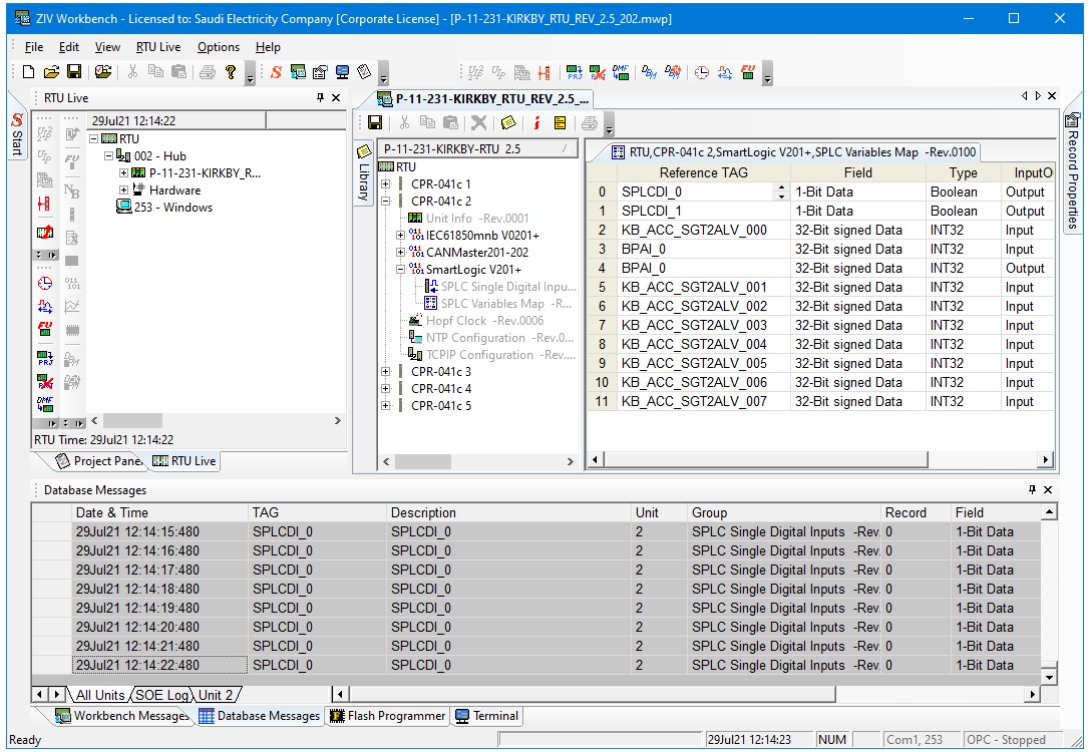
- **HW Signature**, only genuine hardware modules are accepted by the processor
- **Firmware Signature**, only authorised software can run on the device Binary obfuscation
- **Advanced Password Complexity** like password age, password reuses checks, etc.
- **Role Base Access** with configurable Roles Privileges, in line with IEC62351
- **Two Factor Authentication** with LDAP support
- **IPSec VPN Client** and **Server**
- Advanced **Programmable Firewall**
- **TLSv1.3** Support
- **NAND Encryption**
- **X509 Certificates** full chain validation checks
- **PKI infrastructure** support with **OCSP** and **CLR** protocol support
- Cybersecurity **Audit Logs** with all the relevant Cybersecurity activities
- Military OS security robustness

Workbench

Configuration & Testing tool

- Designed for the **configuration, testing, and maintenance** of ZIV Automation's substation automation products.

- A **user-friendly interface** for configuring and testing the various components, including protection relays, bay controllers, and communication devices



Features

Device configuration, monitoring, and diagnostics,

Data management and analysis.

Create and modify device settings.

Monitor device performance in real-time and diagnose faults and errors in the system.

RTUs Product Roadmap

2024 - 2026

New Products

ZIV Centralised Manager

Is a server designed to centralise the complete RTUs management,

simplifying the customer life.

Mobile interface

WEB HMI plugins (AC Metrics, etc)

+

Configuration through WEB HMI

Advanced Cybersecurity Features

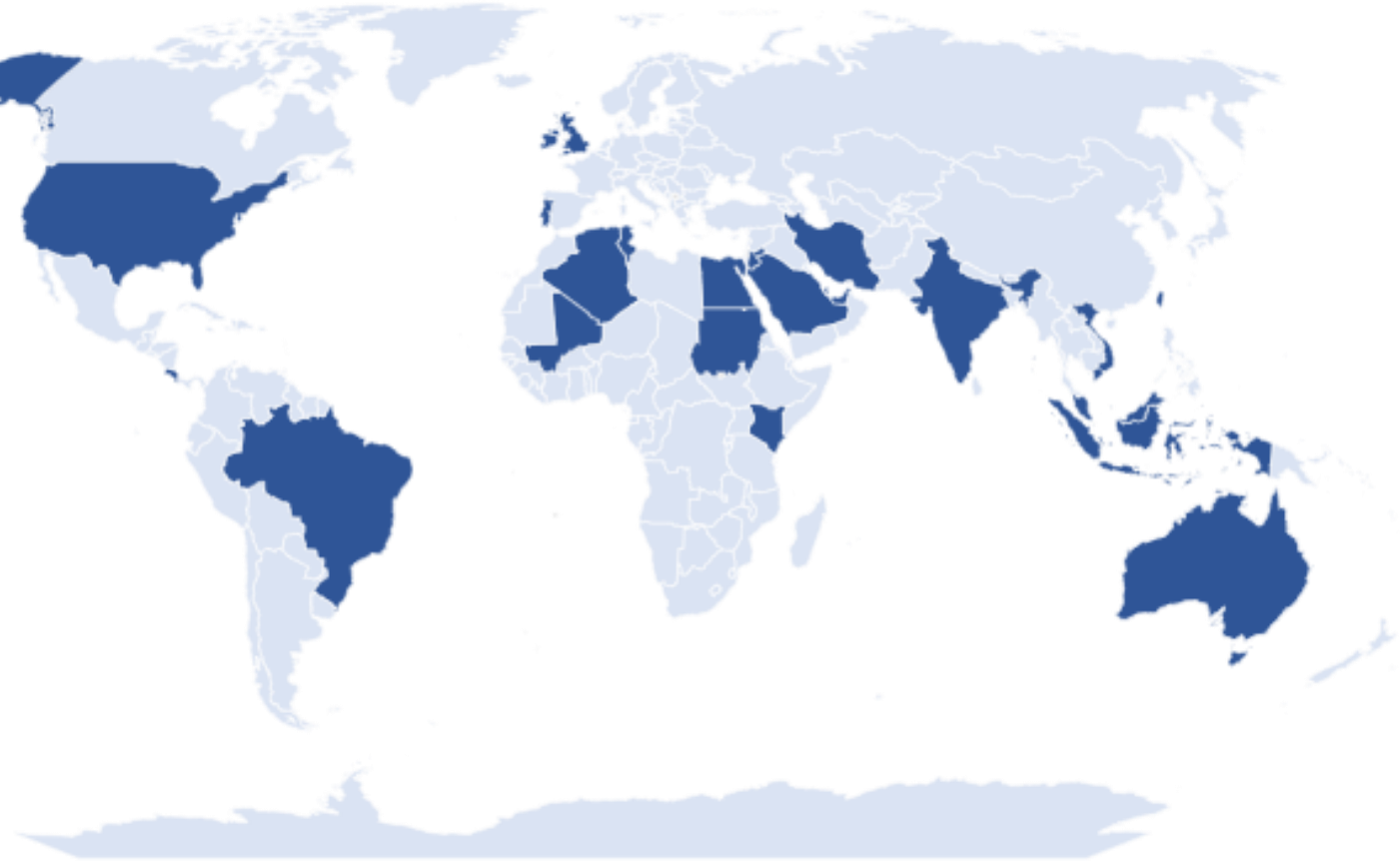
HW & FW Signature

Role Base Access & Two Factor Authentication

IPSec VPN Client and Server

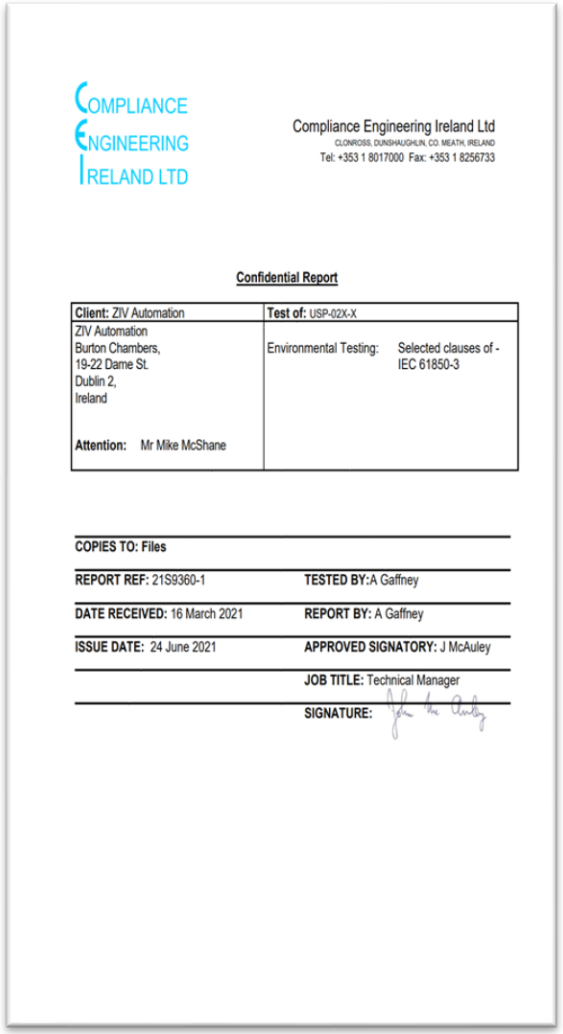
RTUs
References

Over 10,000 units sold since 2022



Over 1,000 units sold since 2022

RTUs
Certifications



COMPLIANCE ENGINEERING IRELAND LTD

Compliance Engineering Ireland Ltd
CLONROSS, DUNSHAUGHLIN, CO. MEATH, IRELAND
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Confidential Report

Client: ZIV Automation	**Test of:** USP-02X-X
ZIV Automation Burton Chambers, 19-22 Dame St. Dublin 2, Ireland **Attention:** Mr Mike McShane	Environmental Testing: Selected clauses of - IEC 61850-3

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REPORT REF: 21S9360-1 **TESTED BY:** A Gaffney

DATE RECEIVED: 16 March 2021 **REPORT BY:** A Gaffney

ISSUE DATE: 24 June 2021 **APPROVED SIGNATORY:** J McAuley

JOB TITLE: Technical Manager

SIGNATURE:

Our RTUs undergo rigorous type testing by authorized certifying agencies to ensure that they meet the highest standards of quality and performance.

Additionally, we take security seriously and make sure that our RTUs are annually certified by a third-party penetration testing company against cybersecurity threats.

With our commitment to quality and security, customers can rest assured that our RTUs will meet or even exceed their expectations.

rm INFORMATION SECURITY

Security testing certificate

RM Information Security have conducted manual application penetration testing of the following:

Client: ZIV Automation

Device names: XCell RTU & USP RTU

Test Completion Date: 18/02/20

Scope: All protocols including SCADA/ICS protocols were manually analysed and tested for vulnerabilities. Specifically high level protocol analysis and fuzzing of the Ziv Workbench protocol, DNP3, IEC 60870-5-104 and IEC 61850 were carried out.

Key objectives

This document provides a summary of the penetration testing carried out against the target system above. The key objectives of the testing were to:

- Provide an independent security assessment.
- Conduct full manual penetration testing in-line with industry good practice.
- Cover all applicable vulnerability classes using the output from organisation such as CWE, OWASP, OSSTMM, SANS and WASC as a baseline.
- Identify any weaknesses that an attacker may exploit to compromise the confidentiality, integrity or availability.
- Use open source reconnaissance to identify and interrogate data sources that may be used to gain information about the target systems and users as part of a targeted attack.
- Provide assurance that security standards and good practice are being met.
- Quantify and present any vulnerabilities in a manner which enables risks to be mitigated appropriately utilising CVSS.

Lead test consultant:

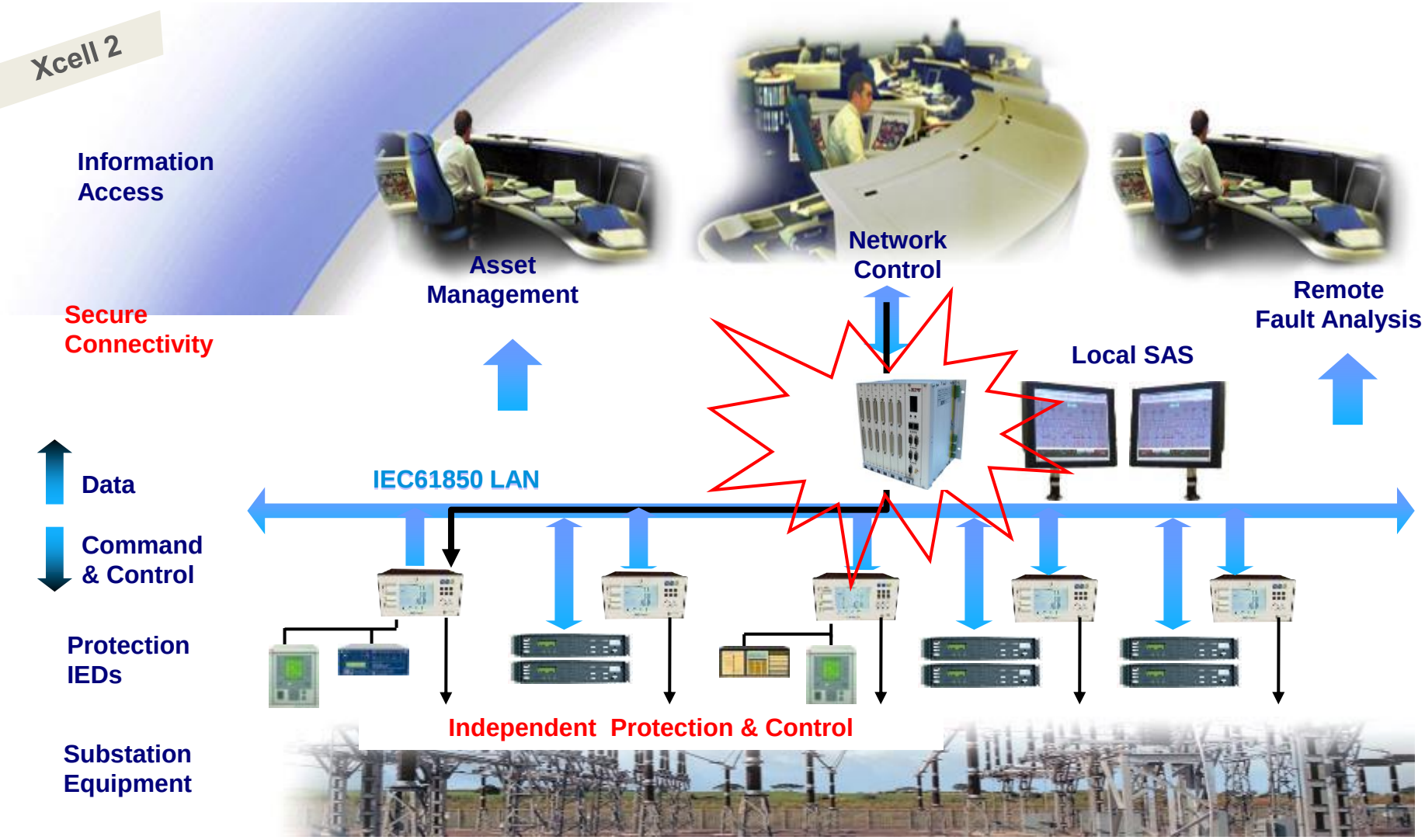
Mark Wityszyn

RM Technical Director

Page 1 of 4

RTUs

Use Cases / References



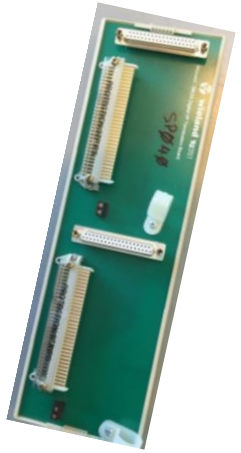
RTUs
Retrofit Solution

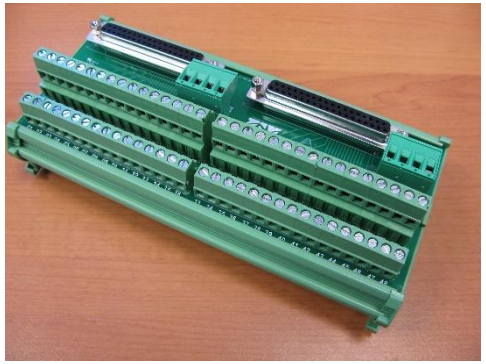
Xcell 2

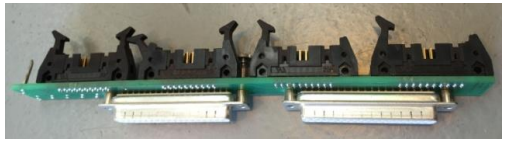
Up to fifteen plant
interface modules

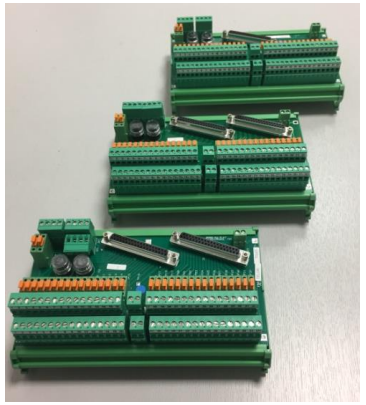
CPR041C

IO Modules
with interface boards





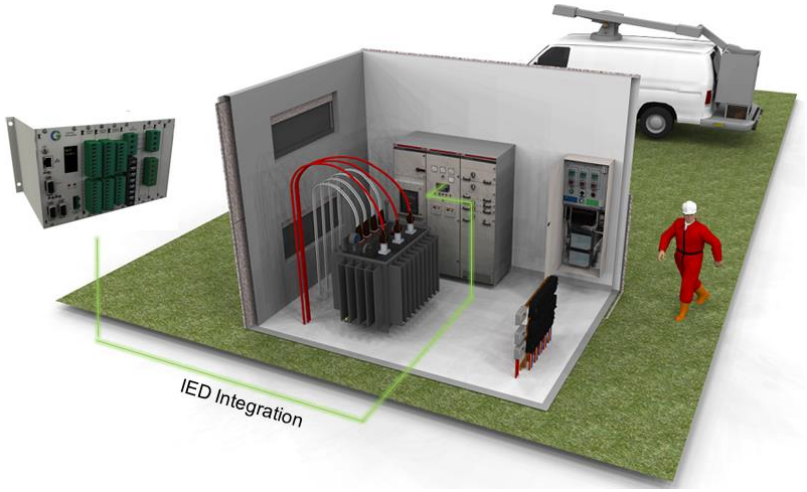




RTUs
Use Cases / References

TCP/IP

IED / Device Integration

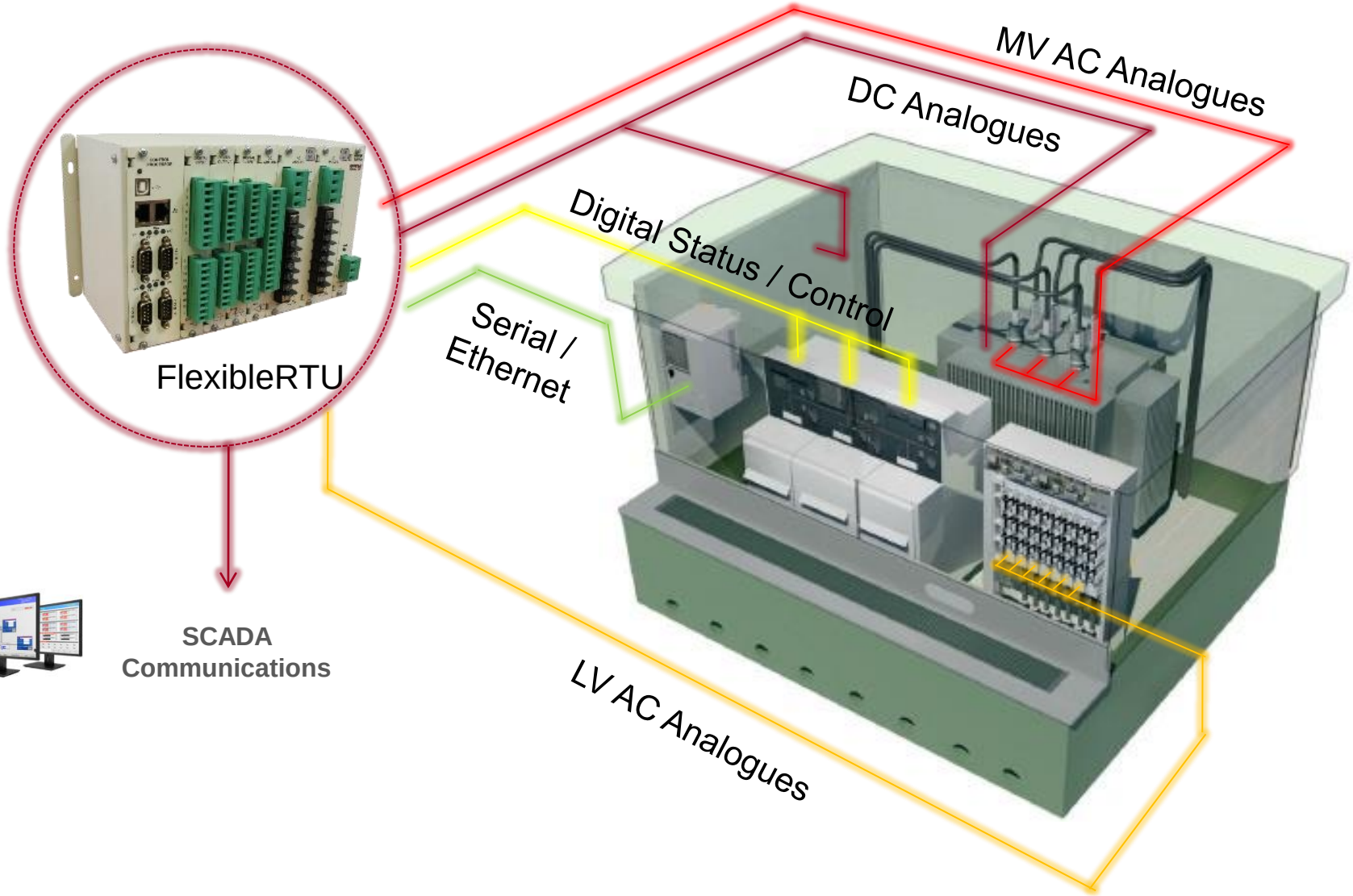


RS485

RS232

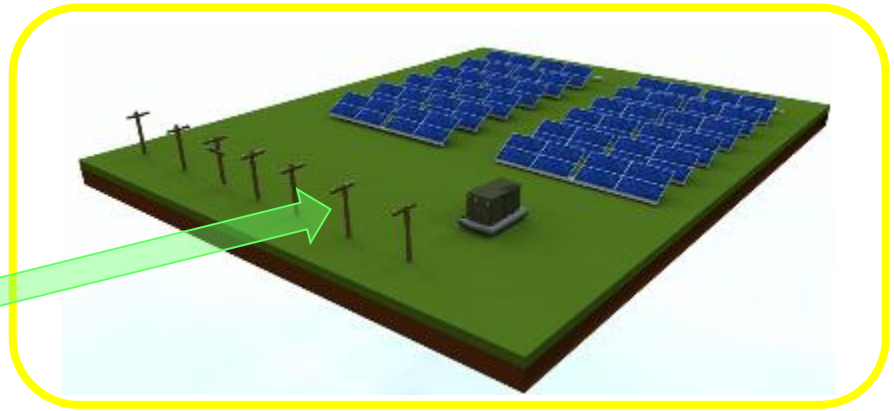
RTUs

Use Cases / References



Best Solution for MV/LV Secondary Substation Gateways

RTUs
Generator Constraint Controller



800 units

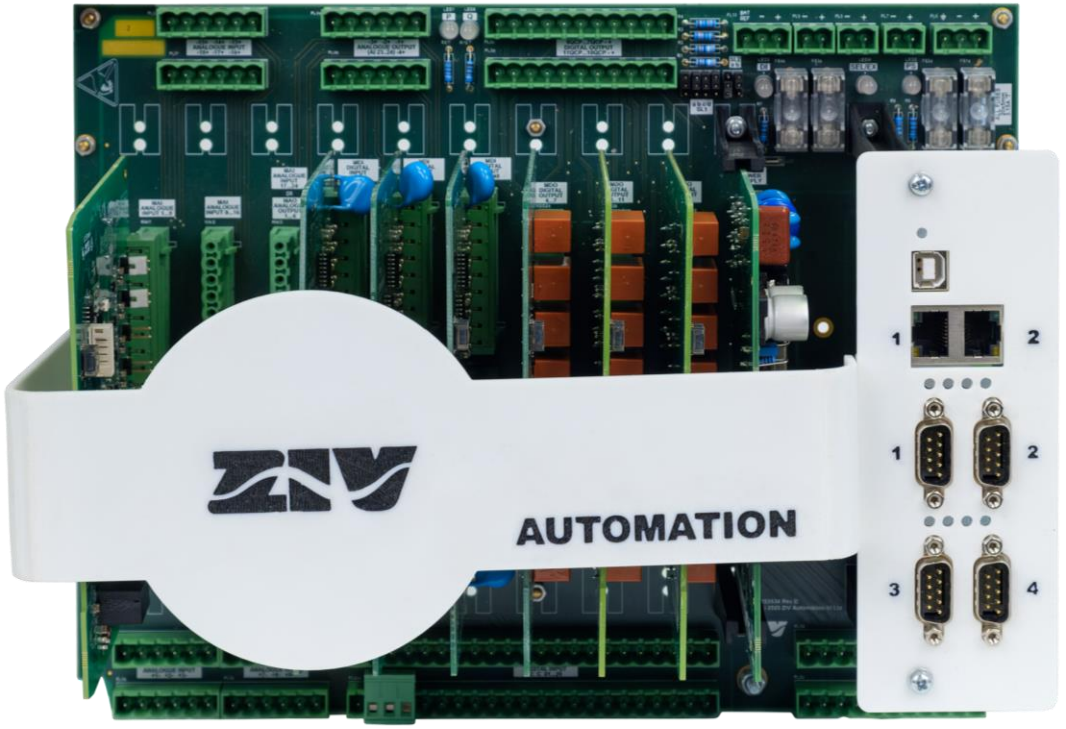
FlexibleRTU Core

Generator Constraint Controller

- Standalone / Integrated Controllers at the connection point for Renewable Generation
- Automatically regulating the voltage at the grid connection point
- Multi-stage constraint levels
- Regulate generation based on local loads
- Regulates generation based on grid faults

RTUs
Highlights

- Plug in replacement.
- The customer needed to replace existing RTU’s requiring a specific configuration.
- This also had to fit within a specific footprint.
- ZIV worked with the customer to design and build a variant to their requirements.



1500 Units











Contact us now for further information ziv@zivautomation.com