



# Z-PC Line

Distributed automation and telecontrol



# Z-PC LINE, GENERAL FEATURES

## HIGHLIGHTS

- PLC based on standard programming ISAGRAF (IEC 61131), 7 languages and debug
- PPP, http, Ethernet, ModBUS TCP, SMTP, ftp protocols
- OPC Server software available (for SCADA supervisor )
- RTU (remote terminal unit) by PSTN, GSM, GPRS modem, e-mail...
- Web Server (Operation control by a Browser)
- Standard I/O's for generic use



**ModBUS**



## FEATURES

- Din rail mounting by a galvanic isolated modules able to supply the sensor by a 2 wires system
- Cost reduction using Z-PC cabling instead of conventional cabling
- Complete range of I/O, serial connection (RS 232/485), filter, counters, PID regulation, WEB management

## INCOMING FEATURES

- CODESYS IEC61131 programming software
- CANOPEN I/O modules
- IEC 870 protocols for electric power units

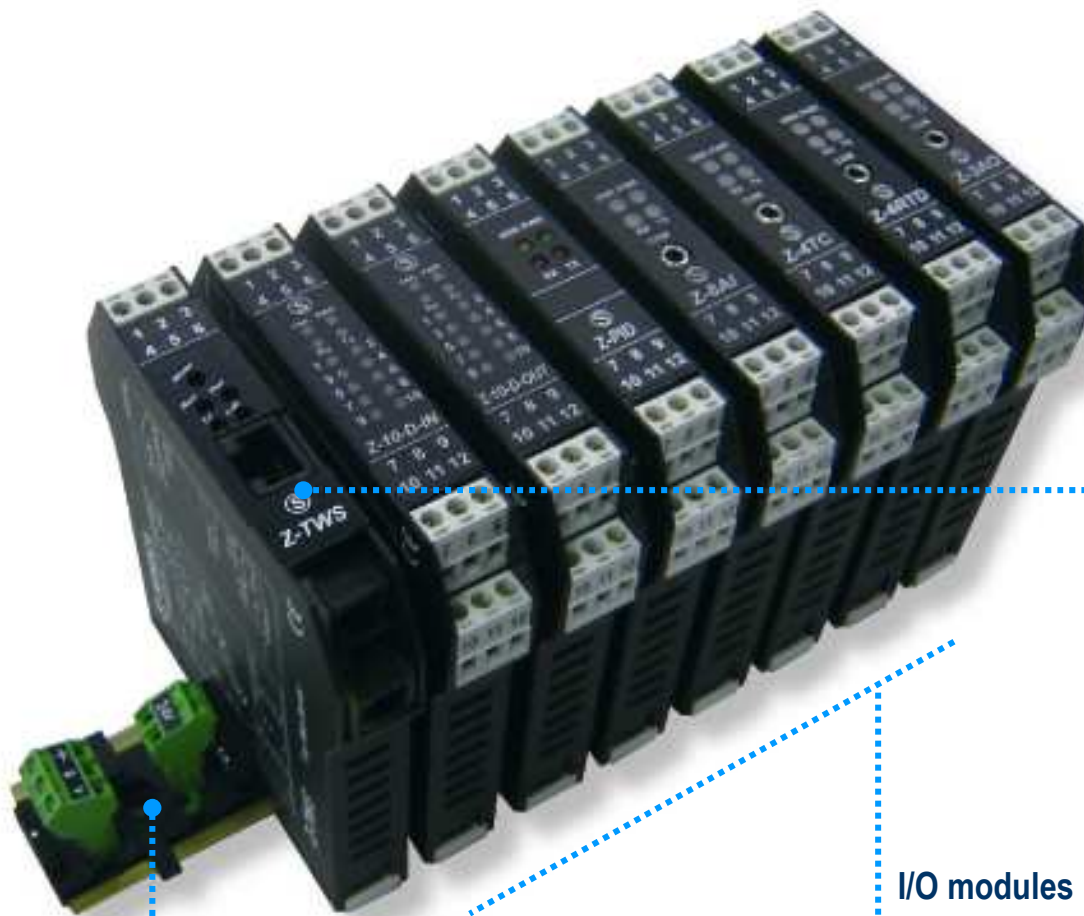


**CANopen**



# Hardware Modular system

# MODULAR SOLUTION



# CONTROL UNITS

## Z-TWS-02



### Control Unit-RTU

- CPU,  $\mu$ P RISC 32 bit
- 16 MB Flash Memory
- 8 MB RAM
- Backup battery, 32 retentive variables
- 2 RS485 ports (I/O bus)
- 1 Ethernet 10Base-T port
- 2 RS232/RS485 ports
- PLC (Isagraf), Web Server, Datalogger, RTU

## Z-TWS-64



### Control Unit-RTU RTU 64 bit

- CPU,  $\mu$ P MISC 64 bit
- 64 MB Flash Memory
- 32 MB RAM
- Backup battery, 64 retentive variables
- 2 RS485 ports (I/O bus)
- 1 Ethernet 10Base-T port
- 2 RS232/RS485 ports
- PLC (Isagraf), Web Server, Datalogger, RTU

## Z-LWS



### Micro PLC

- CPU,  $\mu$ P RISC 32 bit
- 512 KB Flash Memory
- 256 KB RAM
- Backup battery 1 RS485 port (I/O bus)
- 1 Ethernet 10Base-T port
- 1 RS232/RS485 port)
- PLC (Isagraf)

## Z-BRIDGE



### Bridge TCP/IP

- Serial converter from ModBUS RTU to ModBUS TCP/IP
- CPU,  $\mu$ P RISC 32 bit
- 512 KB Flash Memory 256 KB RAM
- Backup battery 1 RS485 port (Master)
- 1 Ethernet 10Base-T port
- 1 RS232/RS485 port (debug)

# DIGITAL I/O MODULES

## Z-D-IN



### 5 digital inputs / RS485 ModBUS RTU

- Inputs: N°5 optoisolated channels (reed, proximity, pnp, npn, dry contact) with self powered 24 Vdc
- 16 bit totalizer
- Fast counter up to 10 KHz
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-D-OUT

### 5 digital outputs / RS485 ModBUS RTU

- Output: N°5 relay SPST, 5A 250 Vac resistive or 2A inductive
- Possibility of setting relays as NO or NC
- Safety time settable from 50 to 2500 ms
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-10-D-IN



### 10 digital inputs / RS485 ModBUS RTU

- Inputs: N°10 optoisolated channels (reed, proximity, pnp, npn, dry contact) with self powered 24 Vdc
- Totalizers at 16 bit (N.8 100 Hz) and at 32 bit (N.2 10 KHz)
- Frequency measurement for 10 KHz inputs
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-10-D-OUT



### 10 digital outputs / RS485 ModBUS RTU

- N°10 mosfet outputs with samr common point, 0,5A inductive
- Safety time settable from 10 to 2000 ms
- Galvanic isolation @ 3 way
- Hot swapping system

# ANALOGUE I/O MODULES

## Z-DAQ



### Universal input module/ RS485 ModBUS RTU

- Input: N°1 universal analogue channel
- Input for TC ( J,K,E,T,R,S,B), PT100-Ni100 (2,3,4, wire), mA , V, Ohm (up to 15KOhm)
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-PID



### Input/output module with PID regulator

- Input: N.1 universal input (TC, PT100, Ni100, Ohm, V, I)
- Output: N.1 mA output
- Integrated PID controller
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-4AI



### 4 mA/V / RS485 ModBUS RTU

- Inputs:N.4 analogue inputs,  $\pm 10$  Vdc o  $\pm 20$  mA
- Resolution @ 14 bit
- Internal power for transducers
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-4TC



### 4 TC / RS485 ModBUS RTU

- Inputs: N.4 thermocouple input (J,K,R,S,T,B,E,N) or N.4  $\pm 80$  mVdc
- Resolution @ 14 bit
- Galvanic isolation @ 3 way
- Hot swapping system

# ANALOGUE I/O MODULES

## Z-4RTD-2



### 4 RTD (PT100, PT500, PT1000, Ni100) inputs

- Inputs: N°4 RTD: Pt100, Pt500, Pt1000, Ni100)
- Connection at 2,3,4 wire
- Address and baud rate setting via dip-switch
- Galvanic isolation @ 6 way
- Hot swapping system

## Z-8AI



### 8 mA/V (4 diff.) inputs / RS485 ModBUS RTU

- Inputs: N°4 RTD: Pt100, Pt500, Pt1000, Ni100)
- Connection at 2,3,4 wire
- Address and baud rate setting via dip-switch
- Galvanic isolation @ 6 way
- Hot swapping system

## Z-3AO



### 3 mA/V outputs / RS485 ModBUS RTU

- Inputs: N° 8 differential or N°4 'single-ended
- Sampling time settable for each channel between 10 ms and 75 ms
- Resolution @ 16 bit
- Galvanic isolation @ 3 way
- Hot swapping system

## Z-8TC



### 8 TC / RS485 ModBUS RTU

- Input: up 8 TC (J,K,R,S,T,E,B,N) sensors, couple isolated
- Fault detection
- mV or °C reading
- RS485 interface, ModBUS RTU slave protocol, half duple
- ModBUS RTU access on RS485 (back side connector) o RS232 (frontal jack)
- Point to point 6 way isolation
- Hot swapping



# SPECIAL MODULES

## Z-203



### Single-Phase Network Analyzer / RS485 ModBUS RTU

- INPUT: up to 500 Vac, 5 Arms
- OUTPUT: N.1 channel current 0..20, 4..20 mA or voltage 0..5, 0..10 Vdc and RS485 Modbus-RTU protocol
- Address and baud rate settings via dip-switch
- Galvanic isolation @ 3,75 KV
- Hot swapping system

## Z-SG



### Strain gauge converter / RS485 ModBUS RTU

- INPUT: 6-wire bridge connections, lowest value 87  $\Omega$  suitable for 1..4 loadcells (350  $\Omega$ ) or 1..8 loadcells (1000 K $\Omega$ )
- OUTPUT: N.1 channel current 0..20, 4..20 mA or voltage 0..10, 0..5 Vdc
- N.1 digital INPUT/ OUTPUT selectable for tare calibration or threshold weight
- Sensitivity from 1 to 128 mV / V
- Galvanic isolation @ 1,5 KV
- Hot swapping system

## Z-D-I-O



### ON-OFF controller 6 DI, 2 DO / RS485 ModBUS RTU

- N°5 dry contact input:
- N°2 relays output (alarms and comand)
- Different fucntions:
  - motor control
  - pneumatic valves control
  - motorised valve control
  - Input/Output
- Galvanic isolation @ 3 way
- Hot swapping system

# COMMUNICATION MODULES

## Z107

### RS232 ↔ RS485/422 serial converter

- Communication: RS232 on DB9 connector, RS485/422
- Half/full duplex function, point-to-point, multidrop up to 115.200 bps
- Flow control: Automatic or RTS line
- Galvanic isolation @ 3 way
- Hot swapping system

## S107P

### RS232 ↔ RS485/422 serial converter

- Communication: RS232 on DB9 connector, RS485/422
- Half/full duplex function, point-to-point, multidrop up to 115.200 bps
- Flow control: Automatic or RTS line
- Galvanic isolation @ 3 way

## Z-LINK

### Radio modem 434 – 869 Mhz (license free)

- Communication: RS232, RS485
- Frequency: 434-868 Mhz
- Irradiated power: 10 mW
- Half-duplex connection
- Transparent for modbus protocol

## S-LINK

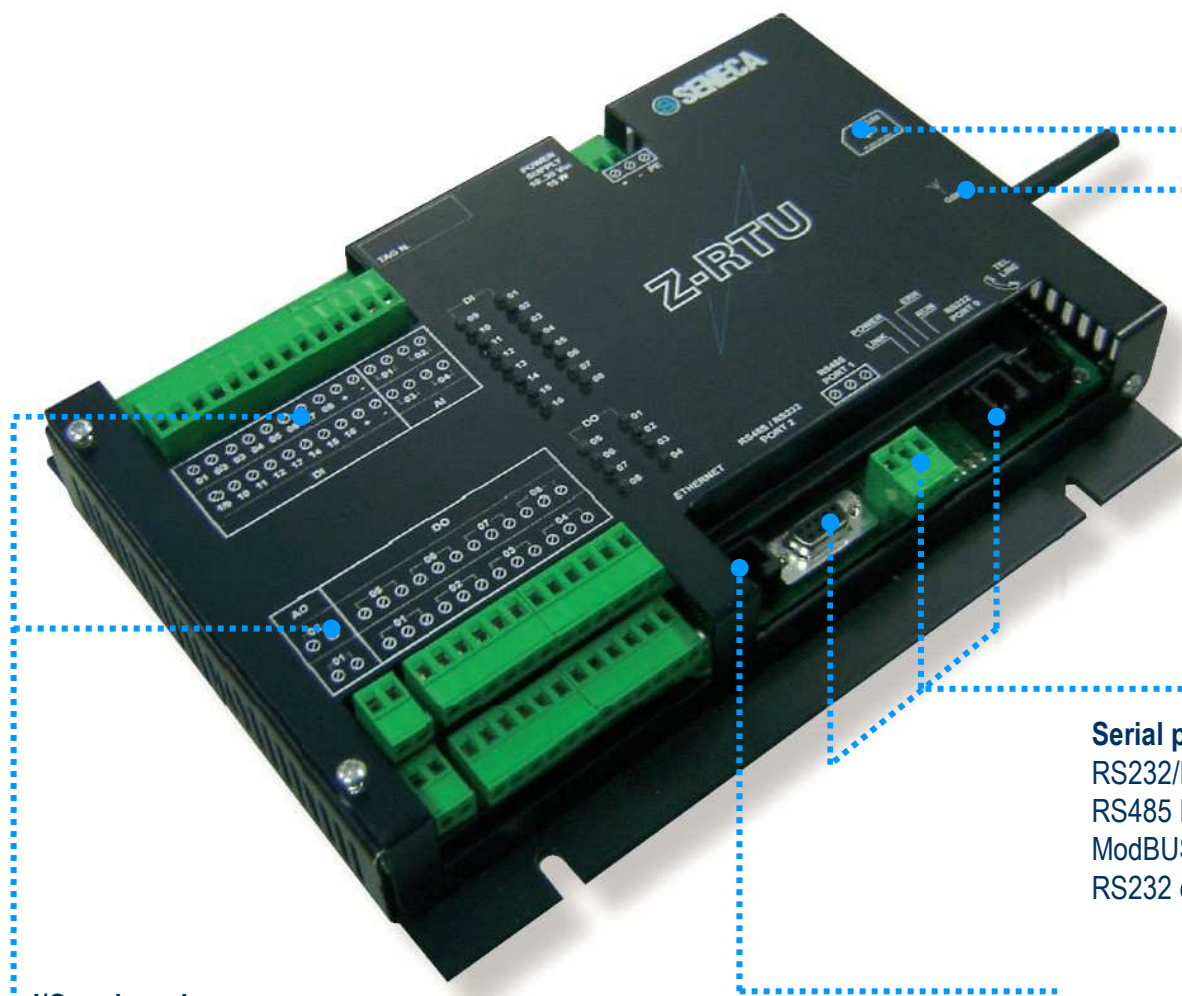
### Radio modem 434 – 869 (license free) portable

- Communication: RS232, RS485
- Frequency: 434-868 Mhz
- Irradiated power: 10 mW
- Half-duplex connection
- Transparent for modbus protocol



# RTU all-in-one

# Z-RTU, INTEGRATED SOLUTION



- ▶ I/O isolated on board 16 DI, 8 DO, 4 AI, 2 AO
- ▶ Expandible I/O by Z-PC line modules (or generic modbus slave)
- ▶ 3 serial ports + 1 Ethernet 10 Base-T
- ▶ GSM/GPRS Modem (PSTN as option)

**Remote communication**  
SIM + antenna GSM/GPRS  
PSTN port communication

**Serial ports**  
RS232/RS485 free programming  
RS485 ModBUS RTU (I/O communication, ModBUS RTU/Master or Slave)  
RS232 debug

**Ethernet 10 Base-T**  
Interface for SCADA by OPC or Java/VB/Windows application  
Utilizzo di altri protocolli di sistema quali ModBUS TCP/IP, ftp, http

## I/O on board

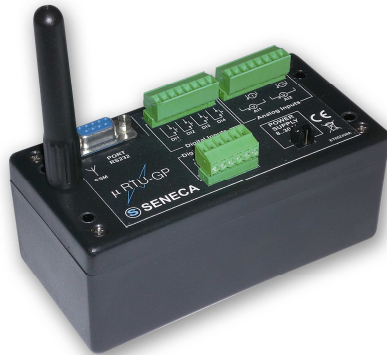
- 8+8 digital inputs (internal/external power supply)
- 2+2 analogue inputs (14 bit resolution, loop power supply)
- 4+4 digital outputs (SPDT relays, 5 A 250 Vac)
- 1+1 analogue outputs (12 bit resolution, voltage/current)

# M-RTU, BATTERY POWERED RTU

Micro RTU-PC



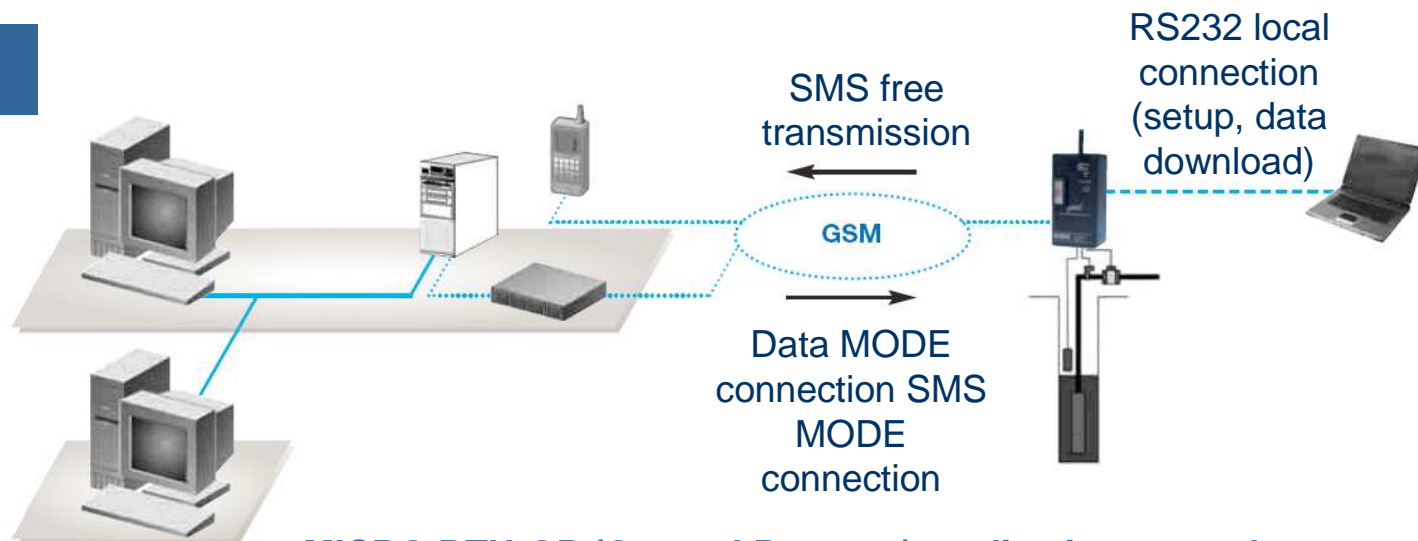
Micro RTU-GP



- ▶ Remote control of isolated sites
- ▶ Cathodic protection surveillance
- ▶ Configuration: 4 DI, 2 AI, 2 DO (GP version), 2 DI, 2 AI (PC version), GSM Full Type Approval
- ▶ Memories: 64 KB EEPROM, 2 MB flash
- ▶ Temporary turn on for sms receiving / sending
- ▶ Data transmission on event or on demand
- ▶ IP44 external case
- ▶ Tiny dimension (65 x 130 x 55 mm internal unit)
- ▶ 14,4 V battery power supply, 3 years life-time

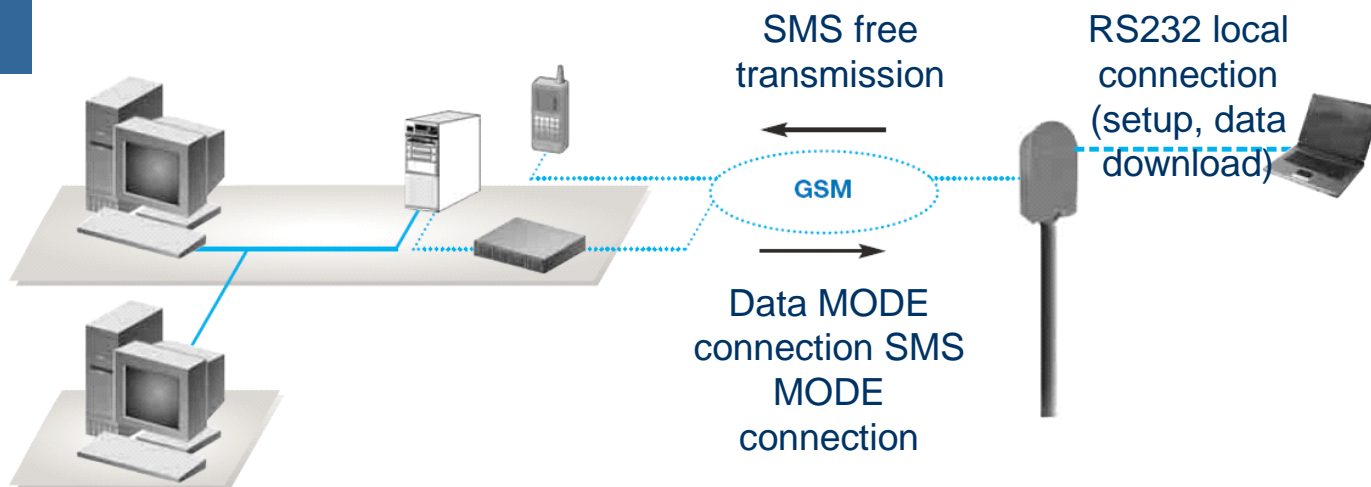
# M-RTU, BATTERY POWERED RTU

1



**MICRO RTU-GP (General Purpose) application example**

2



**MICRO RTU-PC (Cathodic Protection) application example**

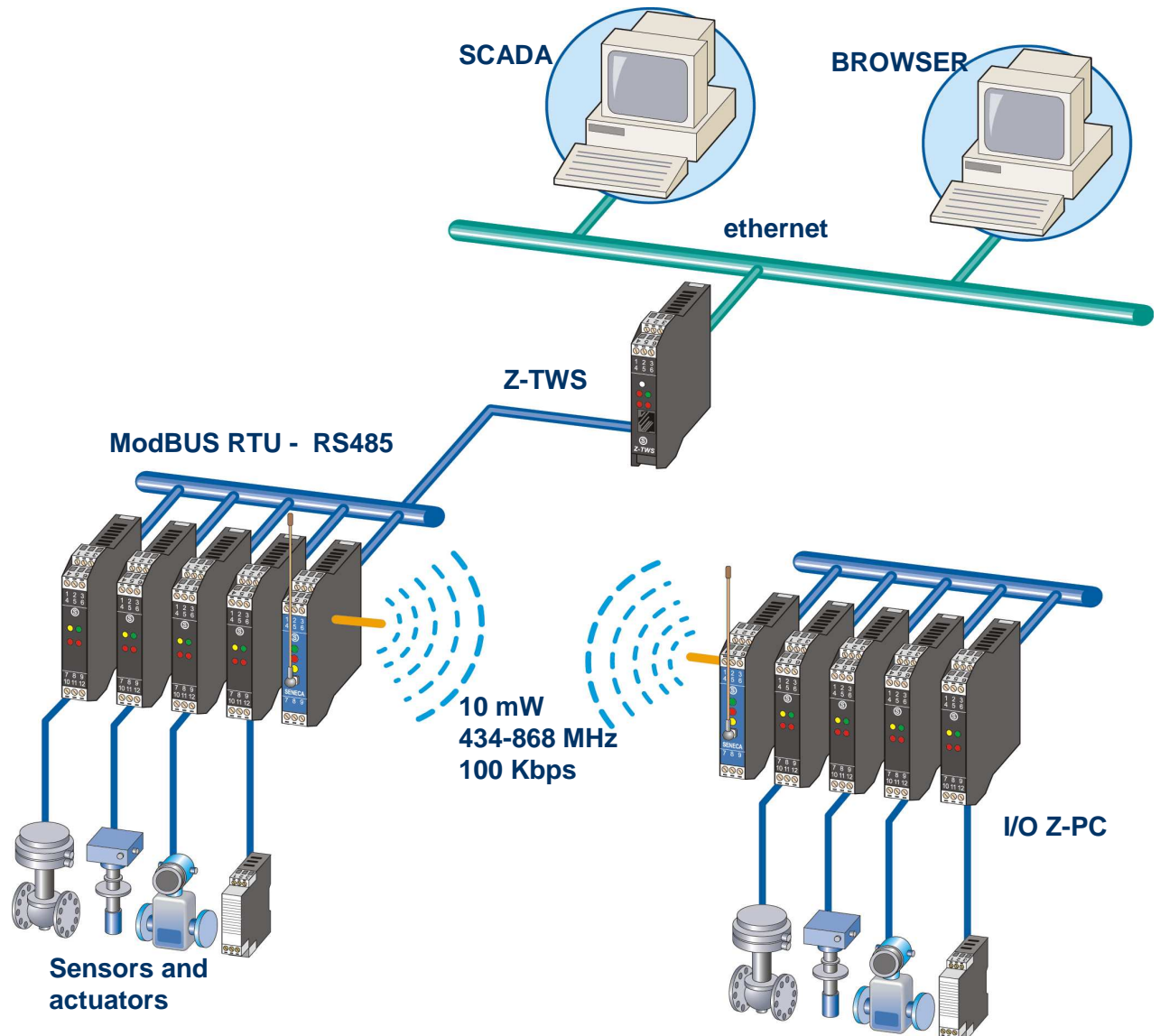


# Layout



# DATA ACQUISITION AND LOCAL CONTROL

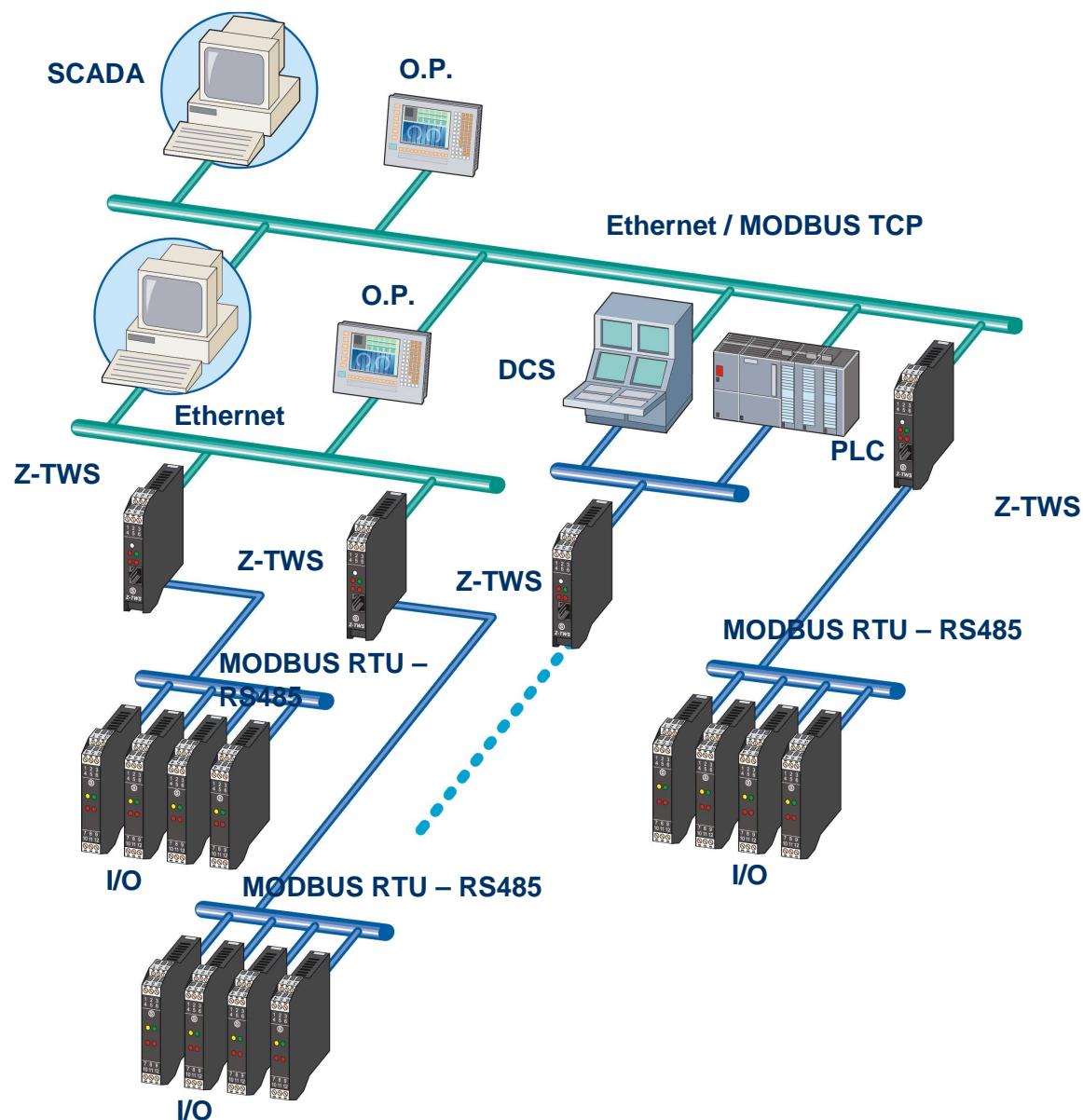
- Z-PC application for local control
- By RS232 or ethernet (OPC Server) Z-TWS can connect itself to acquisition system, html/java pages by a browser, debug and ISAGRAF PLC programming .
- By Z-LINK radiomodem (10 mW, 434-868 MHz, 9600 bps) it's easy to connect remote sensor to the acquisition system.





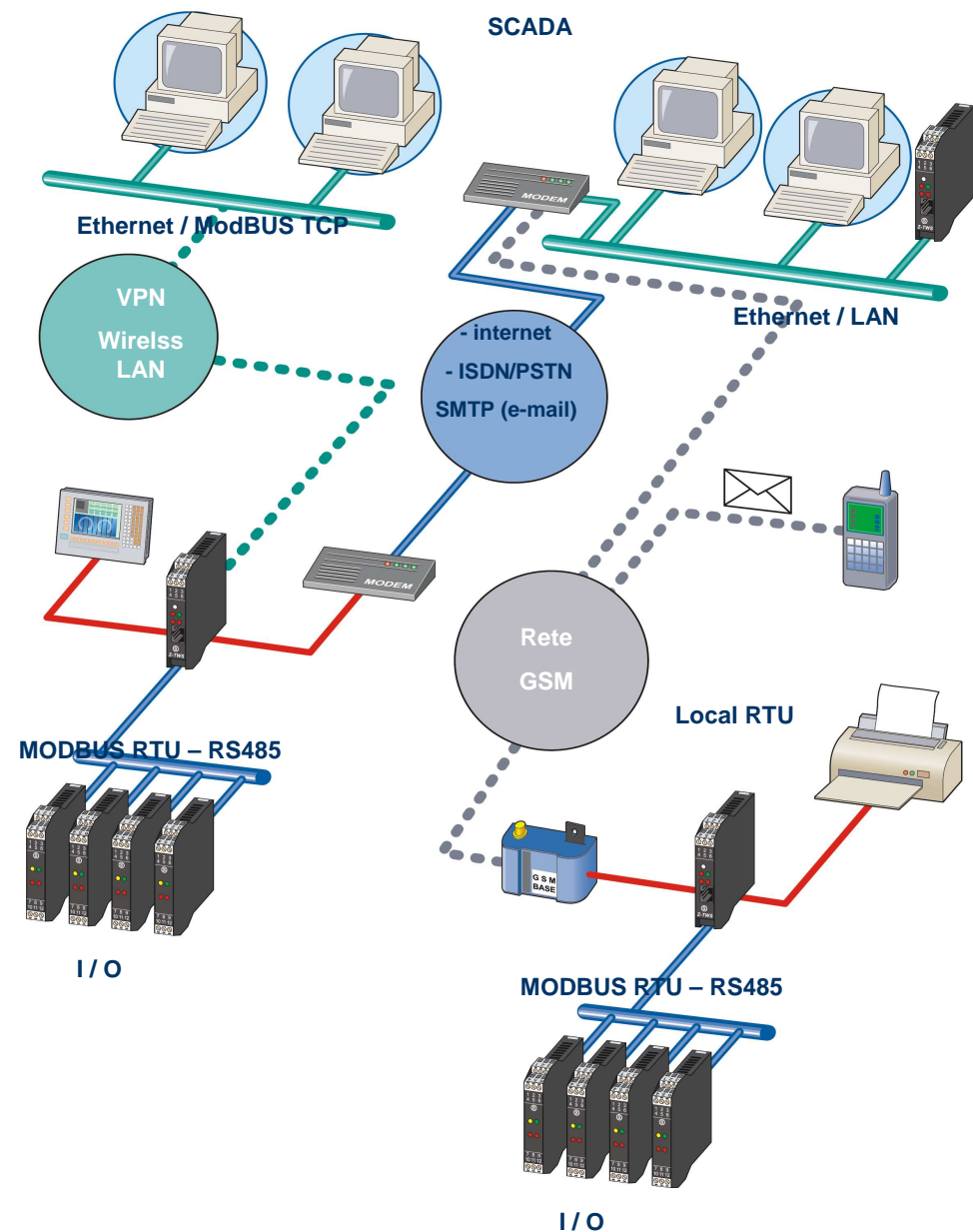
# DISTRIBUTED SYSTEMS

- **Decentralization** of control and acquisition units
- Building automation, process control and machine automation solution
- **Modularity**, expandability
- Interface with 3rd parts



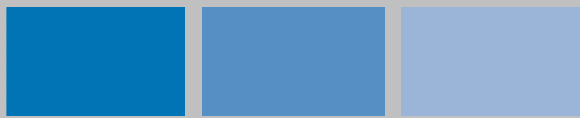
# TELECONTROL

- A multicomunication platform
- An internet compatible telecontrol unit
- An automatic alarm system
- An intelligent data logging system
- A protocol converter





# Layout

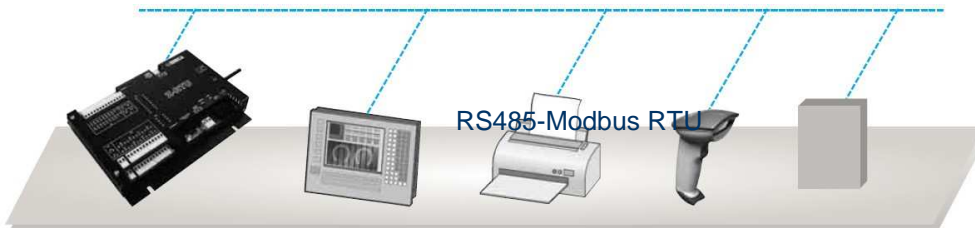
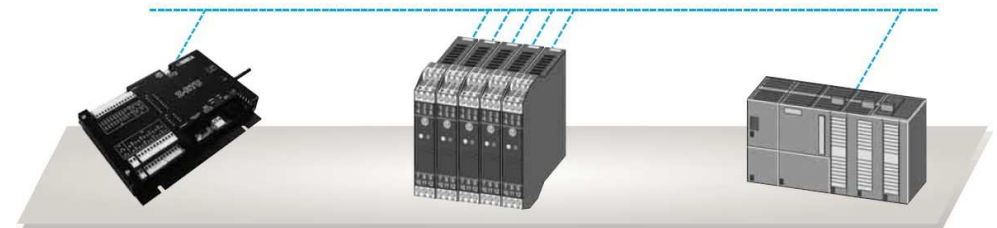


# SERIAL CONNECTION

RS485-Modbus RTU

I/O's / UP TO 32 MODULES

PLC / DCS



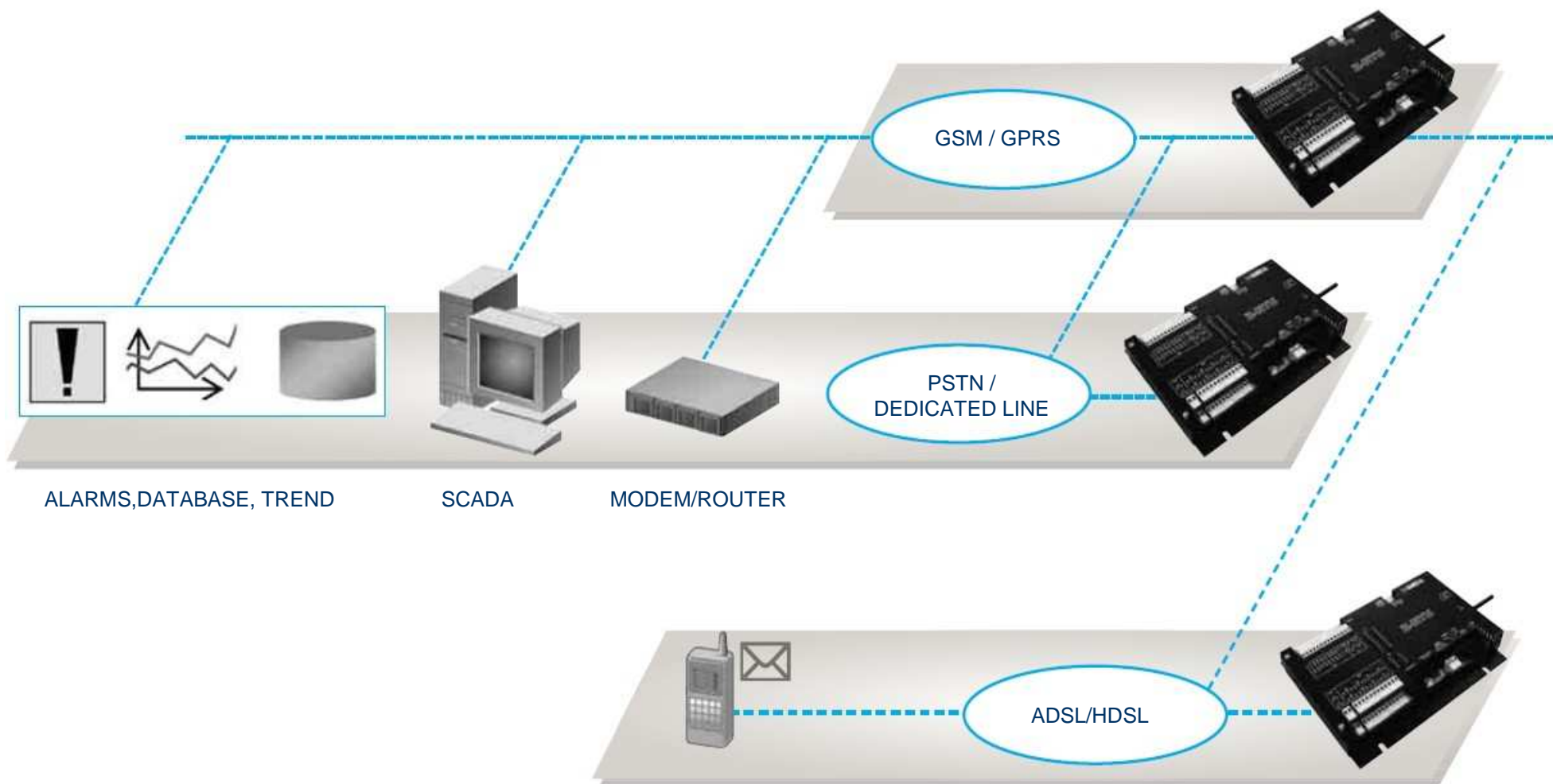
OPERATOR PANELS

PRINTER

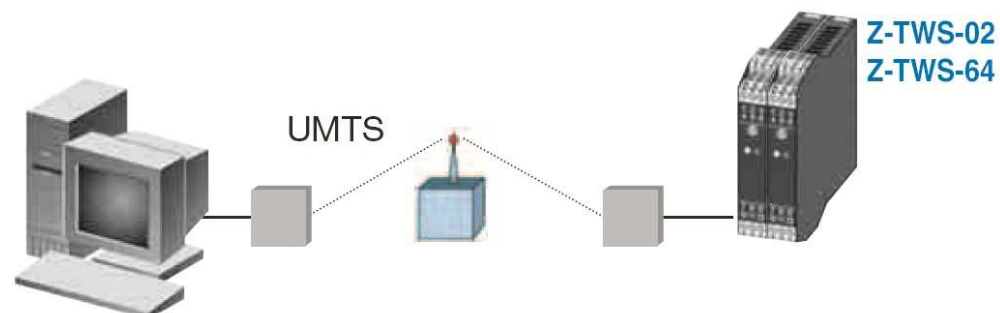
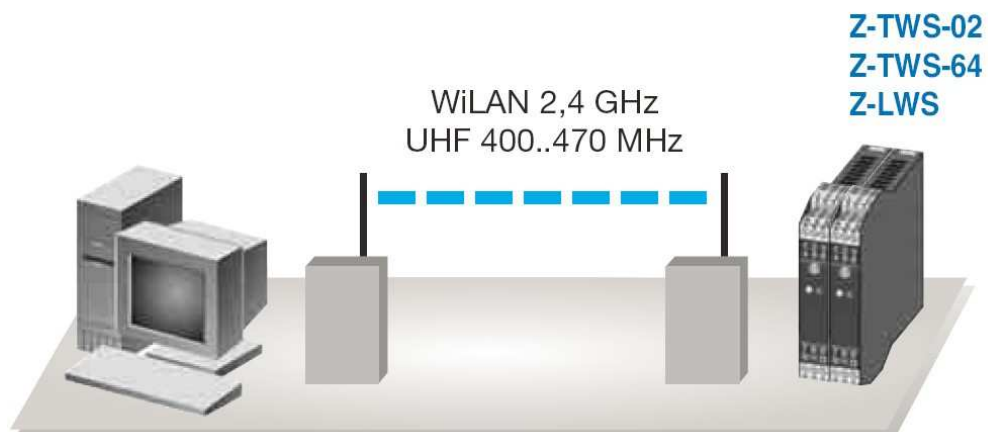
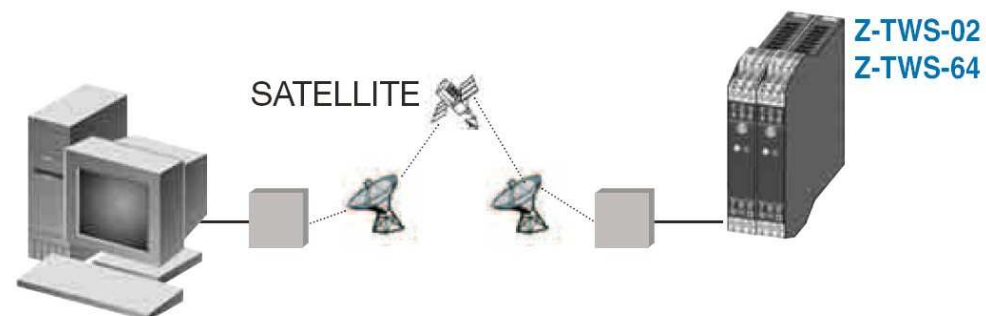
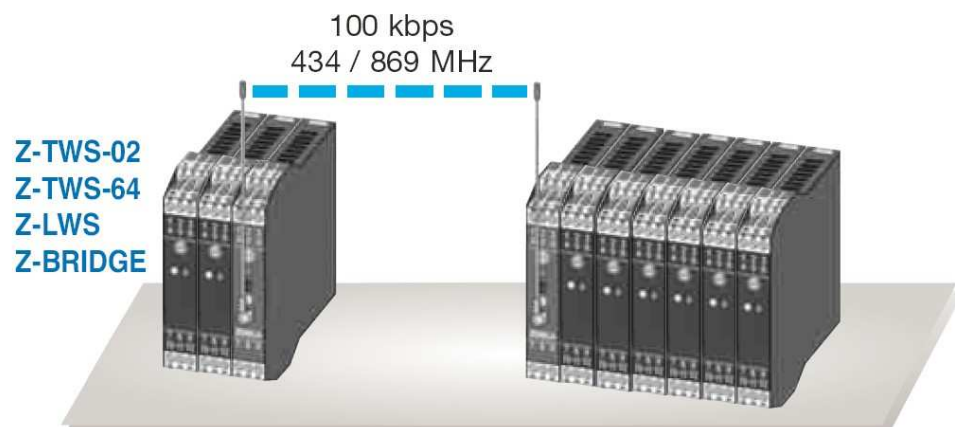
BARCODES

OTHER DEVICES

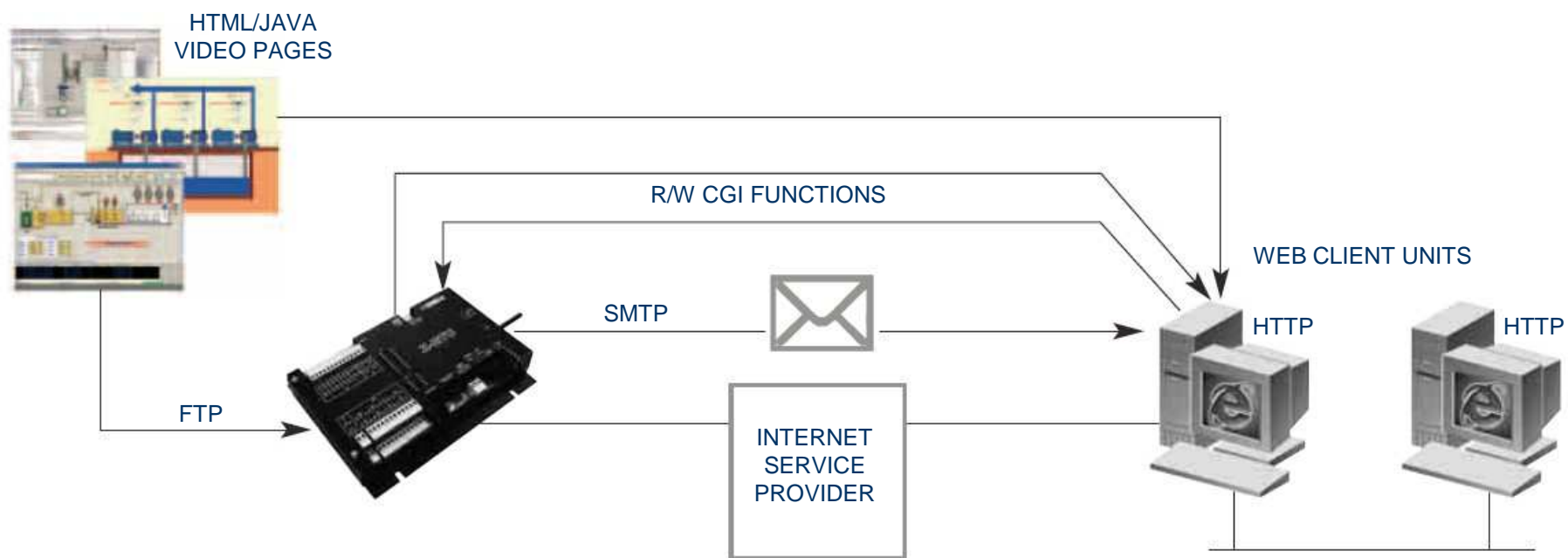
# REMOTE CONNECTION BY MODEM



# WIRELESS CONNECTION



# INTERNET / PPP CONNECTION





# Software



# STANDARD

## IEC 61131

IEC 61131 standardizes the programming languages, the interfaces between PLC and programming system, the sets of instructions and the handling and structuring of projects.

## OPC

Based on Microsoft OLE/COM technology, it promotes interoperability, including amongst different computing solutions and platforms both horizontally and vertically in the enterprise between control/automation and business/office applications.

## PPP

The Point-to-Point Protocol (PPP) provides a standard method for transporting multi-protocol datagrams by serial line

## SMTP

Simple Mail Transfer Protocol, a protocol for sending e-mail messages between servers. Most e-mail systems that send mail over the Internet use SMTP to send messages from one server to another

## ftp

The File Transfer Protocol (FTP) is a software standard for transferring computer files between machines with widely different operating system.

## http

HTTP stands for Hypertext Transfer Protocol. It's the network protocol used to deliver virtually all files and other data (collectively called resources) on the World Wide Web, whether they're HTML files, image files, query results, or anything else

## ModBUS TCP

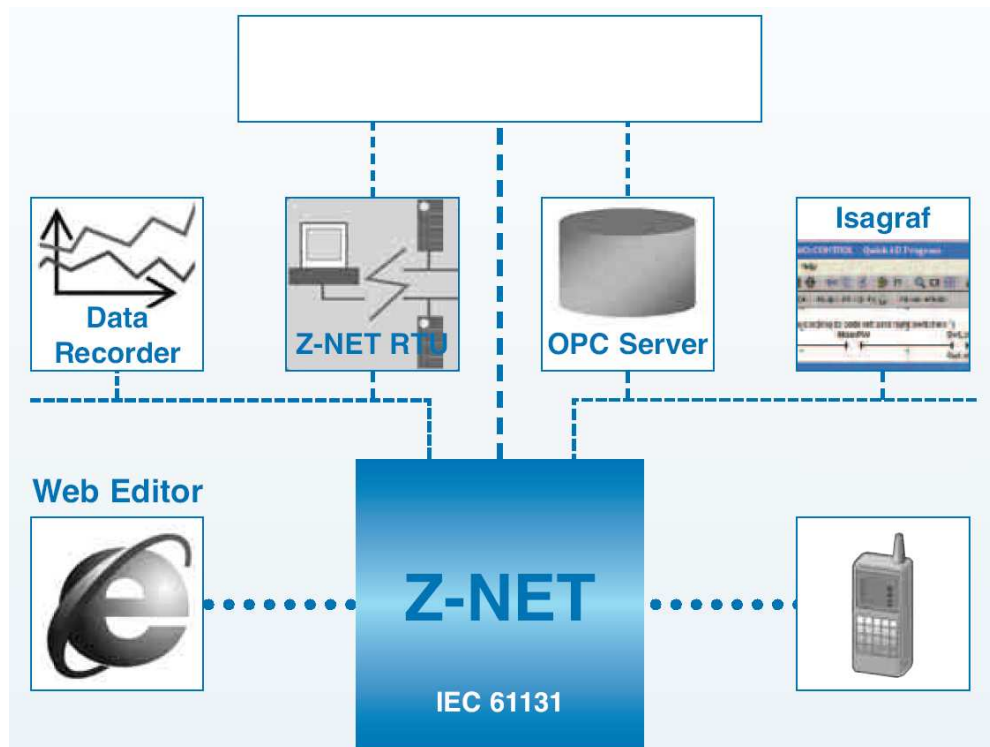
MODBUS/TCP is a variant of the MODBUS family of simple, vendor-neutral communication protocols intended for supervision and control of automation equipment. Specifically, it covers the use of MODBUS messaging in an 'Intranet' or 'Internet' environment using the TCP/IP protocols

## .Net

NET-connected solutions enable businesses to integrate their systems more rapidly and in a more agile manner and help them realize the promise of information anytime, anywhere, on any device.

# SOFTWARE ARCHITECTURE

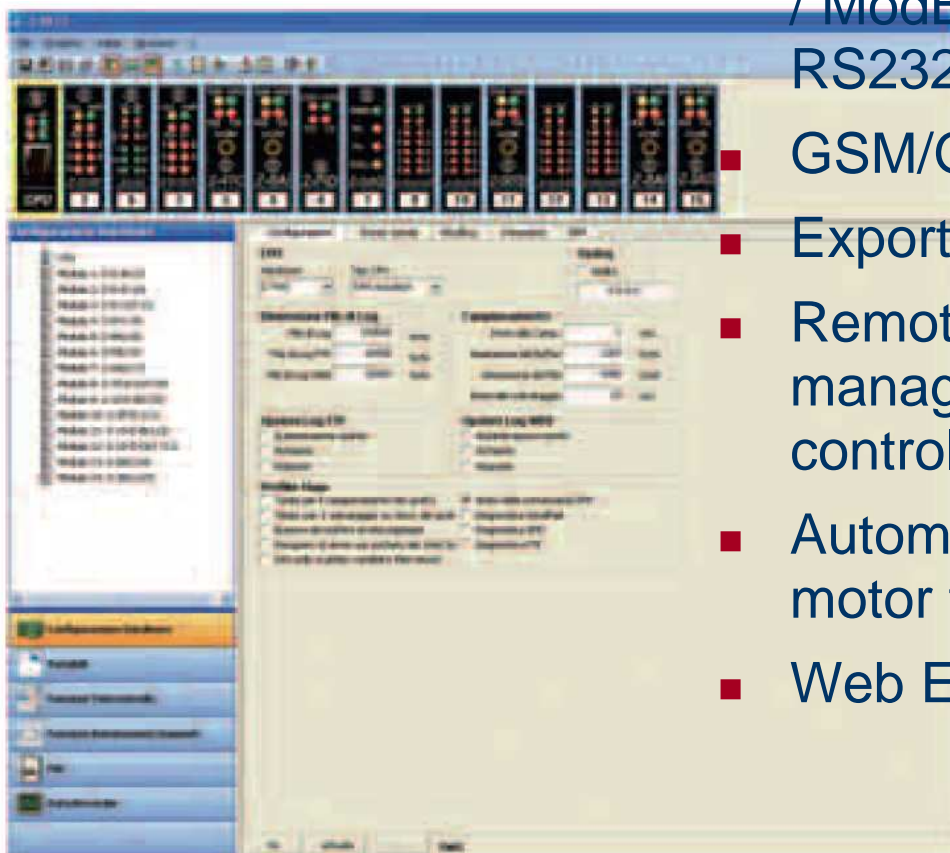
Scada & windows runtime application  
softwares



Integrated automation & remote  
control functions

# Z-NET

## Software configurator

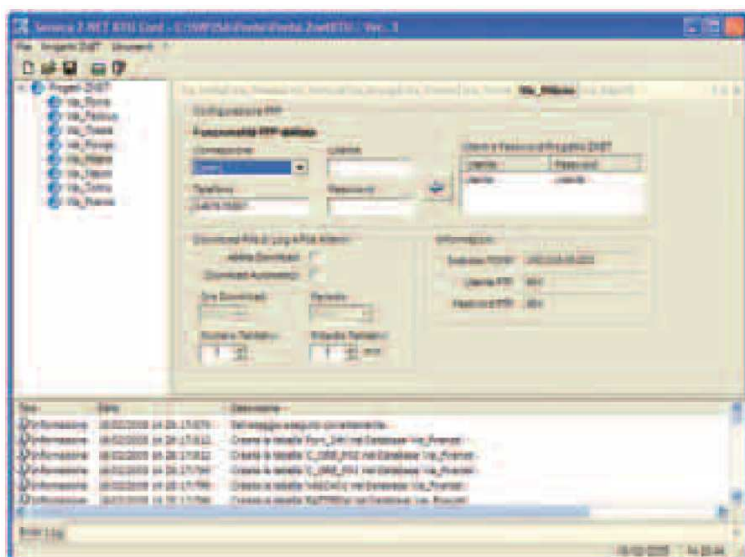


- Project creation and hardware configuration
- Settings communication parameters on Ethernet / ModBUS-TCP, PPP, ModBUS RTU, RS232/RS485
- GSM/GPRS remote connections settings
- Export and internal databases creation
- Remote control functions: log, alarms management, SMS and e-mail sending; SMS controls, e-mail, file transfer via ftp etc.
- Automation functions: working hours counting, motor turnover, flow calculation
- Web Editor: HTML / JAVA screen pages editor

# Z-NET-RTU

## Remote Control Manager

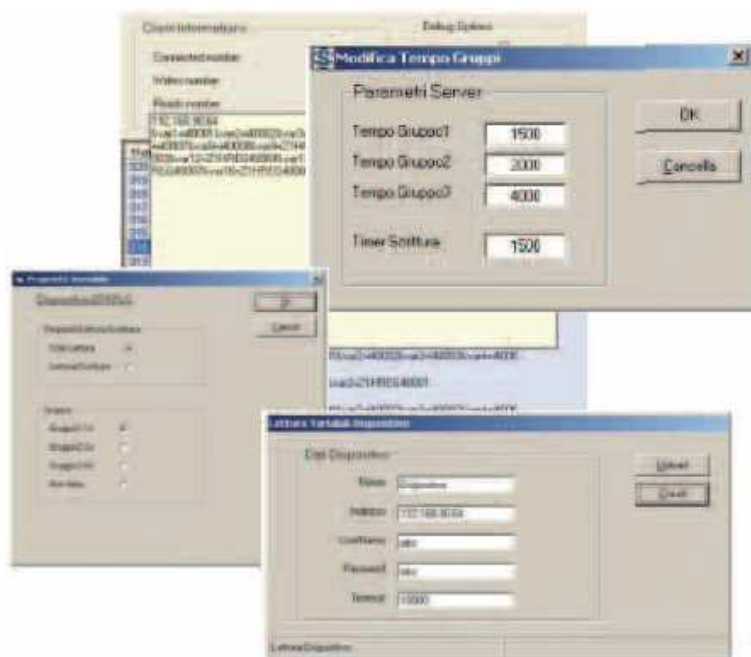
- Software integrated suite for data management and remote control functions
- Data recording on remote stations (based on Z-TWS or Z-RTU)
- Automatic data download
- Data log and alarms visualization



# OPC SERVER

## Remote Control Manager

- VERSIONS: stand-alone, MB Slave, I/O
- Data export in Microsoft standard format and interexchange with SCADA
- Variable management and real-time communication with client applications
- Reading and configuration variable of ethernet connected devices
- Server diagnostic
- Upgrading variables with different time groups

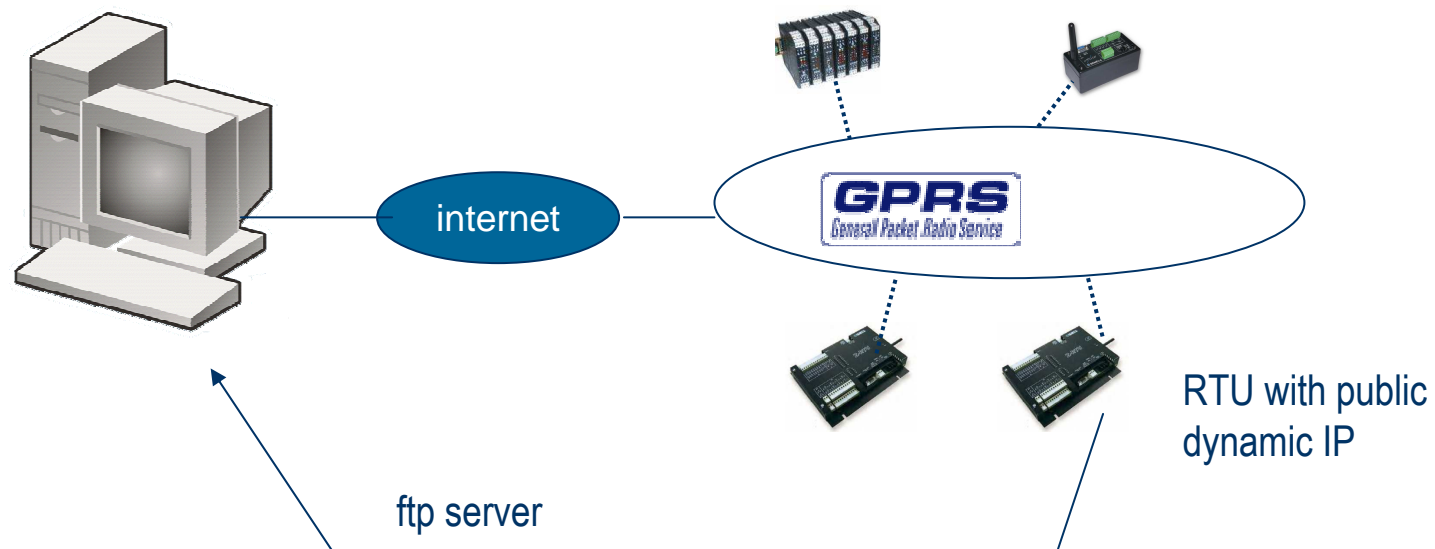


# OPC SERVER

	OPC SERVER Z-TWS	OPC SERVER I/O	OPC SERVER MB SLAVE
Z-TWS	X	X	X
Z-RTU		X	X
M-RTU		X	X
GSM		X	
GPRS TIM		X	
GPRS Vodafone			X
Standard	Data Access 2.05	Data Access 2.05	Data Access 2.05
Protocols	http	ModBUS TCP, ModBUS RTU	ModBUS TCP Slave

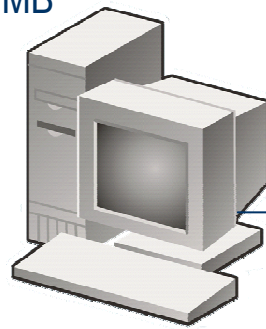
# TELECONTROL SOLUTION WITH GPRS TIM phone provider

Scada  
OPC Server I/O



# TELECONTROL SOLUTION WITH GPRS VODAFONE phone provider

Scada  
OPC Server MB  
Slave



internet



**GPRS**  
General Packet Radio Service

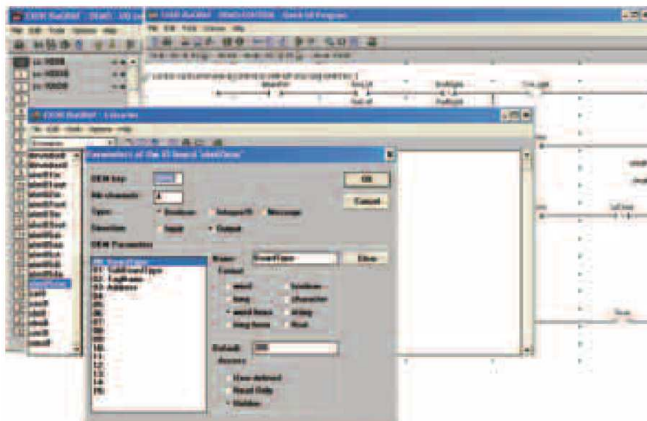


Master RTU with public  
dynamic IP and input locked  
gates



# ISAGRAF

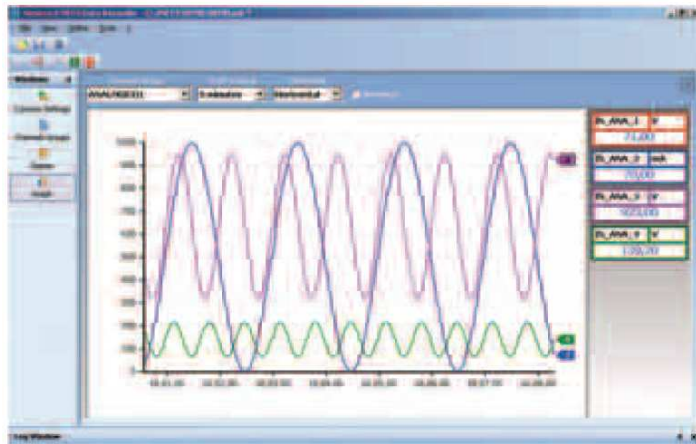
## IEC 61131 programming toolkit



- Debug & programming toolkit based on IEC 61131 standard; 7 programming languages: ladder diagram (LD), flow chart (FC), function block (FDB), sequential flow chart, (SFC), structured text (ST), instruction list (IL)
- Advanced functions: parameters setup and advanced parametrization and Modbus RTU Master driver use
- Remote access functions libraries, file exchange, I/O manager

# DATA RECORDER

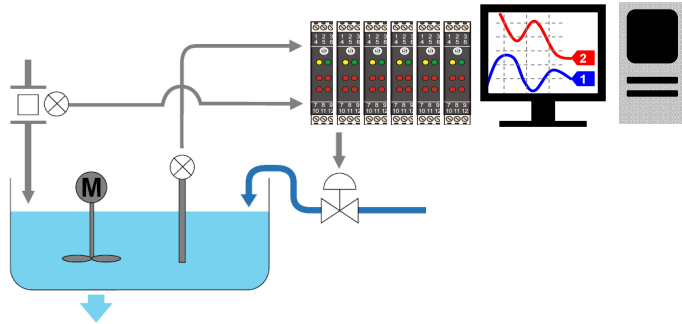
## Data acquisition software



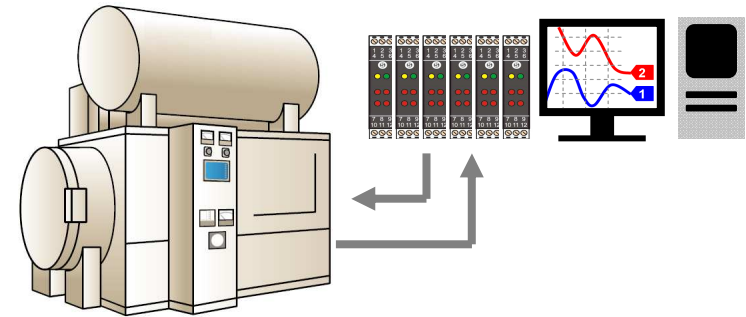
- Paperless PC Windows recorder
- Multithread 32 bit software integrated on Z-NET (IEC 61131) configurator
- Data acquisition from Z-PC line I/O modules and ModBUS RTU slave devices
- Visualization 2 ...64 analog, digital, calculated channels
- Graphic representation: one-multi pen tracks, digital display
- On-line historical data, data export in standard format, high level storage

# DATA RECORDER APPLICATION EXAMPLES

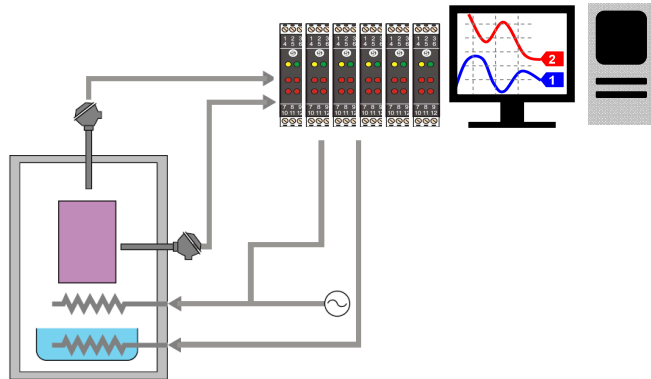
## WATER TREATMENT CONTROL



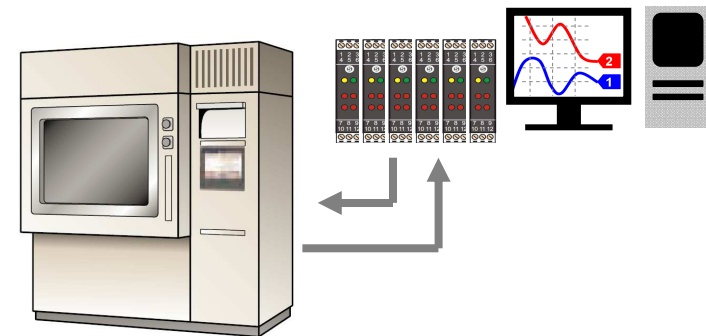
## CLEANING MACHINE DATA RECODING



## TEMPERATURE & HUMIDITY MONITORING



## CLIMATE ROOM MONITORING



# Applications

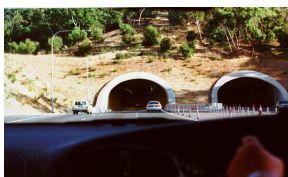
# APPLICATIONS

## Water treatment



- Treatment works,
- Chemical stations, filters, etc.

## Signalling



- Traffic light control, locks,
- Railways, underground transport, etc.

## Environmental monitoring



- Meteo station
- Monitoring gas station

## Water distribution



- Water towers, pumping station
- Valve rooms, remote reading of meters, etc

## Energy



- Consumption and data detecting
- Low, medium and high voltage cabins
- Remote reading

## Gas



- Gas telecontrol, volume converters,
- Distribution, transport, storage,
- Regulation etc.

# APPLICATIONS

## Oil and chemicals



- Pipelines
- Storage tanks
- Delivery station

## Building Automation



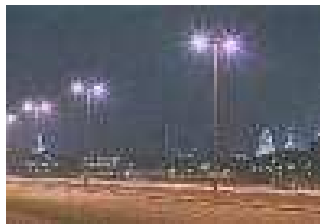
- Air conditioning
- Heating
- Car parks
- Access control

## Swimming pools



- Measurement of chlorine concentration, pH and temperature

## Public utilities



- Public lighting, tunnels
- Urban heating
- Watering of public gardens, fountains
- Public toilets, etc.

## Agriculture



- Poultry farming,
- Greenhouses, irrigation etc.

## Climatic engineering



- Boiler rooms, incinerators
- Refrigerator monitoring
- Cold rooms
- Refrigerating circuits



# Telecontrol

## Highlights and & References

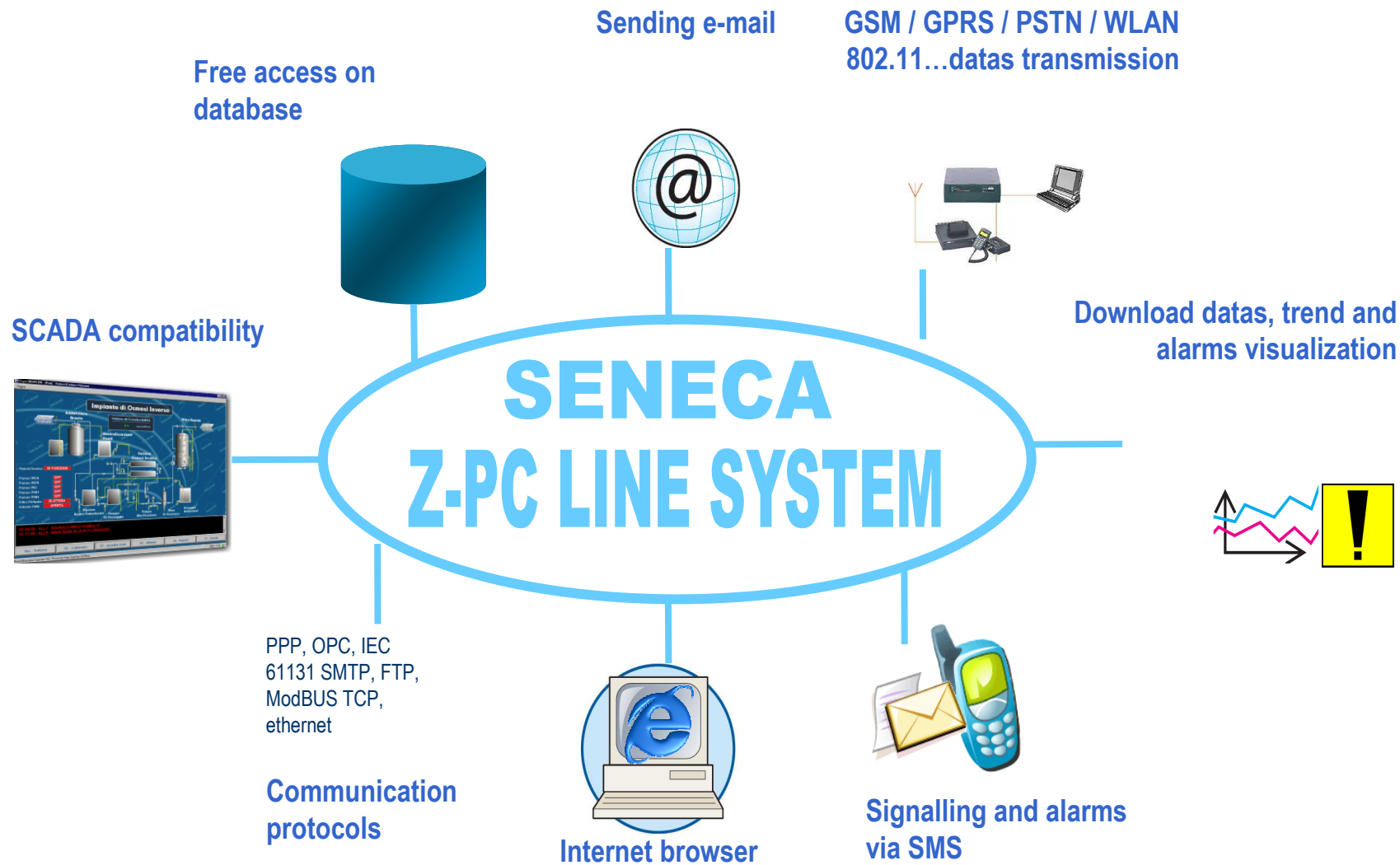


## HIGHLIGHTS

- **Openness** toward other systems by standard technologies: PPP, OPC, IEC 61131 SMTP, FTP, Modbus TCP, Ethernet.
- **Communication timeliness** (???) through serial and Ethernet ports for monitoring, debug, maintenance, remote programming
- **High connectivity** by modem (GSM, PSTN, ADSL...), remote access with PPP. Sending and receiving data from / to central unit and peripheral units.
- **Remote alarms management**, sending SMS, e-mail, digital events / out of range files to the central unit
- **Data logging and data** (variables) export on free-access standard databases through automatic polling of peripheral units. Available memory up to 12 Mb.
- **Web server and OCX technologies** for displaying and supervision without any specific software tool.
- **ISAGRAF libraries** available for remote connection and other applications (sending e-mail/SMS, log files)
- **Remote control software** (Z-NET RTU) for data acquisition, peripheral units polling, displaying log and real time variables and alarms



# HIGHLIGHTS





# REMOTE CONTROL Success Stories

# Z-PC SUCCESS STORY

**Telecontrol system for sewer pipe and water treatment, population: 122.000, flow: 9.000.000 cube meters per year**



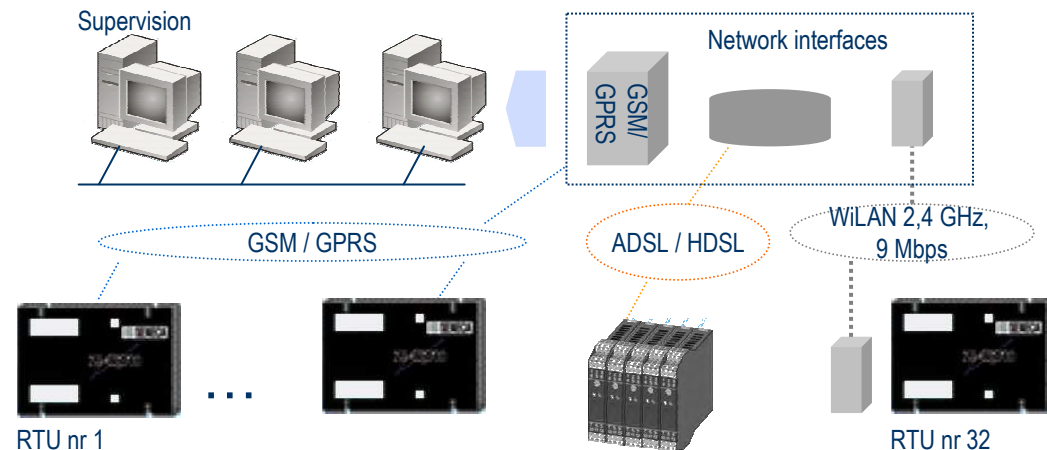
## SOLUTION

<b>I / O</b>	Approx 700
<b>RTU</b>	Nr 32 peripheral station based on Z-PC Line hardware
<b>Communication</b>	Hybrid Network GSM/GPRS, ADSL, HDSL, WiLAN IEEE 802.11
<b>Supervision</b>	iFix + Z-NET RTU: trends, communication management, database integration, HMI synoptics

## BENEFITS

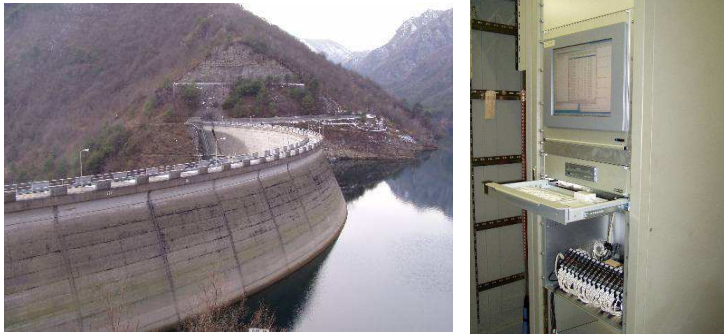
- ❑ Data acquisition, storage and automatic transmission to supervision center
- ❑ RTU self-diagnostic
- ❑ SMS alarms management and automatic calling to operators
- ❑ Real-time fault signaling
- ❑ Centralizing historical data
- ❑ Energy saving

## ARCHITECTURE



# Z-PC SUCCESS STORY

## Dam monitoring automatic system



### SOLUTION

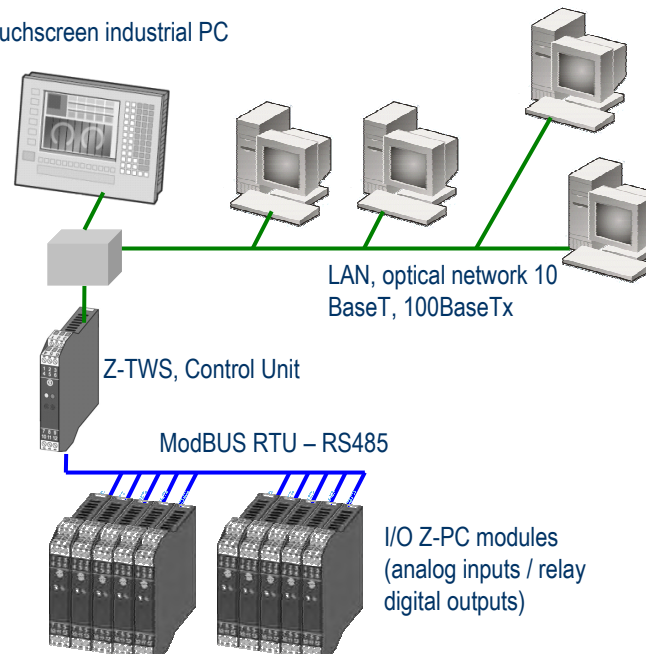
I/O	Approx 50
HW	N°1 Z-TWS (control unit) + N°10 Z-PC I/O modules (alarms, diagnostic, RTD, TC, flow, gray level etc) N°1 industrial PC (local control and LAN interface)
Communication	Data transmission via Ethernet
Supervision	Property system, centralized monitoring based on OPC technology

### BENEFITS

- ☐ Real-time data monitoring on PC
- ☐ Settings parameters (alarm threshold of analog measurements)
- ☐ Local diagnostic
- ☐ Historical data management
- ☐ Shared database with supervision system

### ARCHITECTURE

Touchscreen industrial PC



# Z-PC SUCCESS STORY

## Power units GSM monitoring



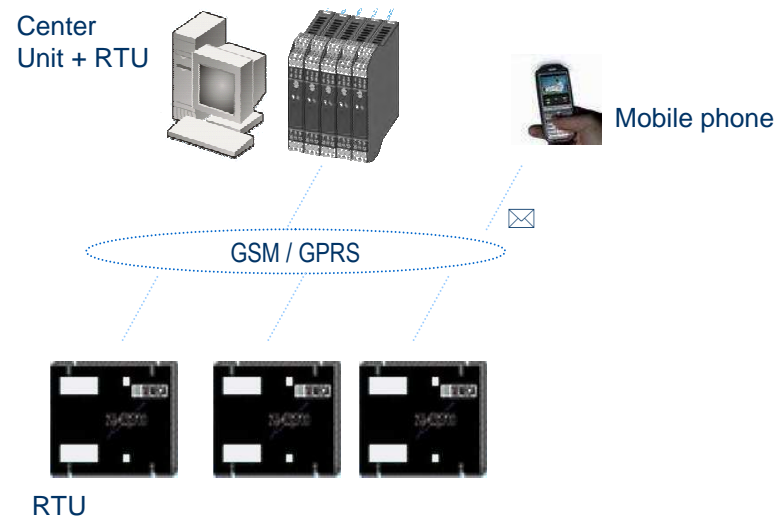
### SOLUTION

I / O	Approx 40
RTU	Nr 4 peripheral station based on Z-PC Line hardware
Communication	GSM/GPRS
Supervision	Z-NET / Z-NET RTU, Seneca platform IEC 61131

### BENEFITS

- ☐ Real time warning to center unit in case of alarm or status variation of peripheral units
- ☐ Industrial maintenance and servicing with mobile phone
- ☐ Power monitor database (compliance to norms)
- ☐ Switch and actuators control

### ARCHITECTURE



# Z-PC SUCCESS STORY

## Radio control system of hydric network



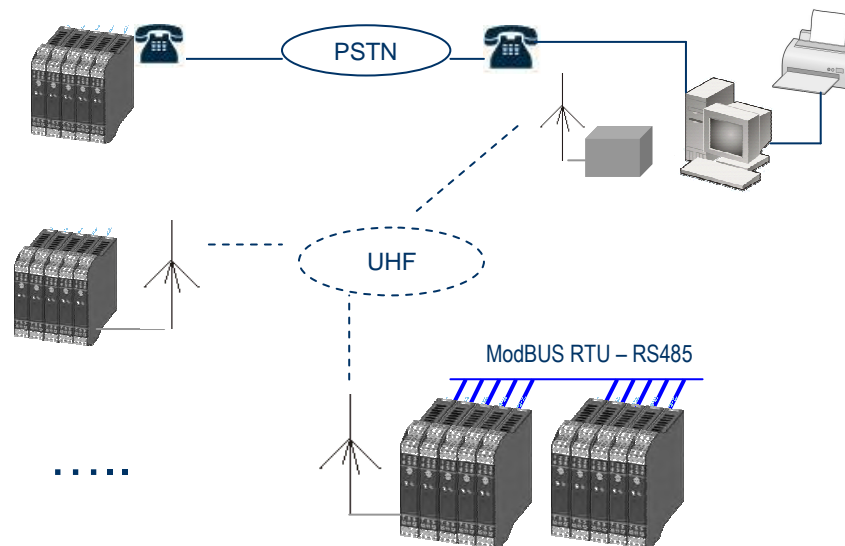
### SOLUTION

I / O	Approx 100
HW	Nr 6 RTU based on Z-PC Line hardware Nr 4 radiomodem Modbus RTU RS485 or RS232 interface
Communication	Radio UHF, PSTN
Supervision	Property SCADA

### BENEFITS

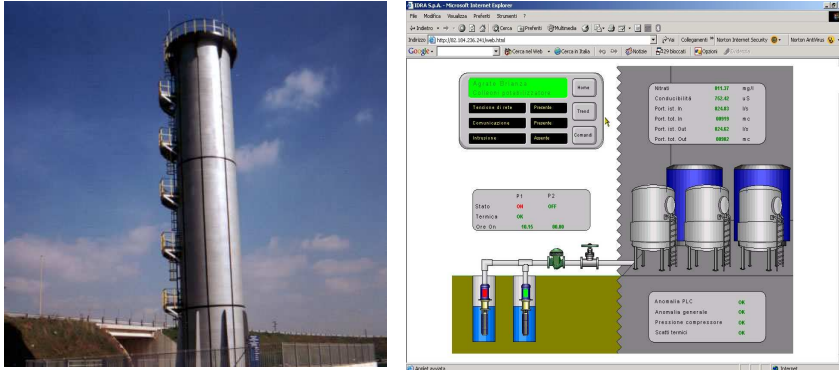
- ☐ Communication “always on”
- ☐ Direct management of field devices
- ☐ Motors control logic based on tanks level measures
- ☐ Analog variables acquisition (i.e. flow, level) for graphic registration on 24 hours and energy saving
- ☐ Maintenance cost reduction
- ☐ Effective asset management

### ARCHITECTURE



# Z-PC SUCCESS STORY

## Water distribution web control system



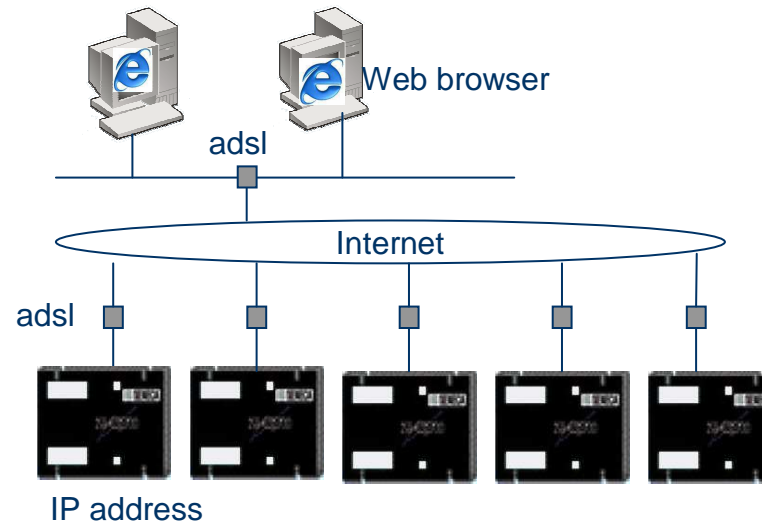
### SOLUTION

I / O	Approx 50
RTU	Nr 5 peripheral station based on Z-PC Line hardware
Communication	Internet / ADSL
Supervision	HTML / Java application uploaded on web server (Z-TWS) and looked up via browser

### BENEFITS

- ❑ RTU direct control of PPP (Point to Point Protocol)
- ❑ Remote control communication over system protocol (http, ftp, MODBUS TCP) between Web Server (Z-TWS) and Client (PC)
- ❑ CGI (Common Gateway Interface) functions: data acquisition, read / write files and IP address, reports print
- ❑ Light supervision based on html pages, java technologies and Seneca libraries

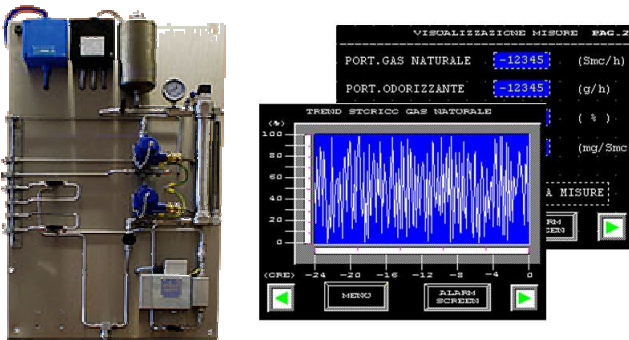
### ARCHITECTURE





# Z-PC SUCCESS STORY

## Odorizing gas remote monitoring



### SOLUTION

I/O	Approx 30
HW	N°1 Z-TWS (control unit) + N°10 Z-PC I/O modules (alarms, diagnostic, RTD, TC, flow, gray level etc), N°1 industrial PC (local control and LAN interface), N°1 PLC (local control)
Communication	Data transmission via Ethernet
Supervision	Property system, centralized monitoring based on OPC technology

### BENEFITS

- ☐ Alarms control
- ☐ Dosing historical data visualizing
- ☐ Odorizing gas flow regulation
- ☐ Serpoint-measure variation control
- ☐ Interface with PLC (control logic)
- ☐ Sending / printing daily reports

### ARCHITECTURE

