# edibon

**Technical Teaching Equipment**

# Industrial Controllers Networking

## CRCI

## INTRODUCTION

Nowadays, the new industrial plants grow in number of controlled industrial process and in space required. The large distances between the elements of the process can be a problem.

The industrial controllers network is a solution for avoided the attenuation and noise in the signals that come from different sensors in large installations (induced for the use of too long cables).

A common configuration of industrial controllers network is composed of two or more industrial controllers, a central process system (computer PC) and field buses cables for connect all the elements. The networking of industrial controllers technologies provides the operator an easy and efficient way to control many industrial process.

The EDIBON Industrial Controller Networking "CRCI" allows student the familiarization with the function and operation of an industrial process controller network, managed by a central process controller (computer PC).

The CRCI Unit enables to take the first steps in process automation using field buses, and provide the students the material for analyze a full operative industrial controllers network. It demonstrates the operation of a process control system based on a simple application.

The "CRCI" unit is based on a modular design structure whose functionality is divided into different modules to allow the student a better understanding of the unit. The modules provided with the unit are: two Industrial Controllers, Set Point Generator, Interface Card (to be placed in a computer slot) and Control Configuration Software.

- 2 Industrial Controllers modules, each one is composed of: an industrial controller with 2 analog inputs and an analog/digital output. The analog inputs are used to connect the process variable value (PV) and set point value (SP) signals respectively. The analog/digital output is used for deliver the output process value (OP). The controller also has two relays. The industrial controller is connected via field bus (Profibus DP) through an interface card with a computer (PC).

- Set Point Generator module: it allows to generate a step signal by switching between two different selectable voltages. The voltage levels can be adjusted using two potentiometers.

- Interface Card (to be placed in a computer slot): it allows the controllers signals to be available for a computer PC, for further processing.

- Software, composed of:

    The OPC server configuration drivers: allows the modules data to be available for others programs.

    The Control Configuration Software: allows to set the industrial controllers parameters. Several functions such as recorders and alarm logs enable a simple control room function to be simulated.

## DIAGRAMS AND UNIT ELEMENTS ALLOCATION



Industrial Controllers

Analog Inputs/Outputs
&
Digital Inputs/Outputs

Set Point Generator

Field Bus Connections
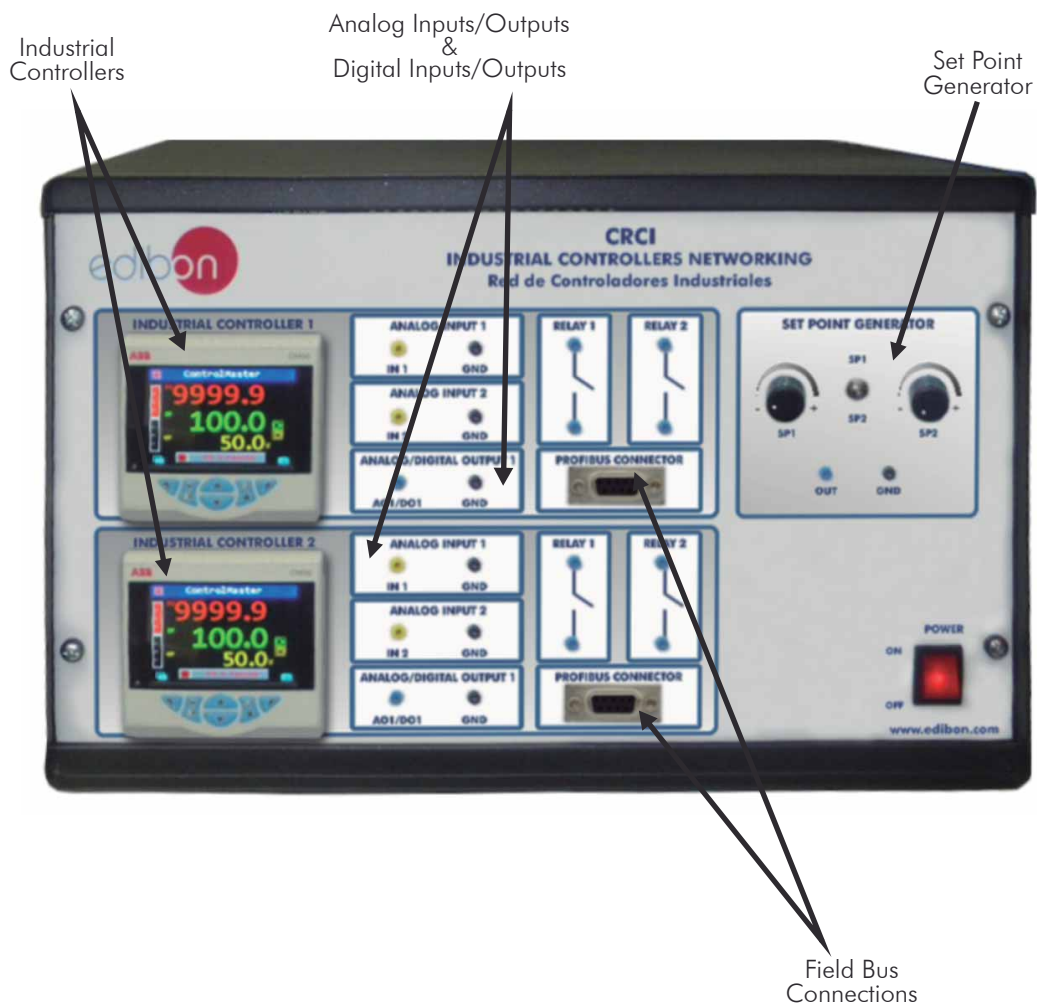
CRCI is composed of:

  Unit (in metallic box), including:

    2 Industrial Controllers modules. Each module is composed of:

      Industrial Controller:

        ABB Controller CM30.

        Display: color 1/4 VGA TFT, liquid crystal display (LCD) with built-in backlight.

        Language: English, German, French, Italian and Spanish.

        Operator keypad: 6 tactile membrane keys.

        Password protection: Basic/Advanced user-assigned password protection.

        Trend display:

          Recording of 2 variables.

          Configurable sample rate (1 second to 5 minutes).

        Control parameters:

          Proportional band: 0 to 999.9 %.

          Integral: 0 to 10000 s.

          Derivative: 0 to 999.9 s.

          Manual Reset 0.0 to 100 %.

        Autotune: On-demand calculation of control settings.

        Process alarms:

          Number: 8.

          Types: High/Low process and High / Low latch.

          Acknowledgement: Via front panel keys or digital signals.

          Source: Fully configurable (for example, PV, analog input, math block inbuilt, OP control loop deviation).

          Hysteresis: Level and time.

          Alarm enable: Enable/Disable of individual alarms via a digital signal.

      Analog inputs:

        Number: 2.

        Complete configurable process input: voltage (V or mV), current (mA), resistance (ohms), Thermocouple, 3-Wire RTD, frequency, pulse, volt-free digital input and 24V digital input.

        Selectable set points via software (remote from the computer) or front panel.

      Analog/Digital output:

        Number: 1.

        Type: configurable as analog or digital pulse.

        Analog range: 0 to 20 mA (programmable).

        Control output types (Configurable through software):

          Current proportioning/Voltage proportioning (using resistor).

          Time proportioning.

          On/Off.

          Motorized valve with feedback.

          Motorized valve without feedback.

          Split output with combinations of relay digital O/P and current O/Ps.

      Relays:

        Number: 2.

        Type: N/O.

        Contact rating: 5A, 240V.

      Communication (PC): RS-485 connector (Profibus DP).

    Set Point Generator module:

      2 Voltages selectable through a switch, which allows generate a step signal.

      Amplitude: 0 to 10Vdc.

    All process variables are accessible as analog signals at lab jacks.

    Possibility of connection of external instruments via lab jacks (for example: line recorder, oscilloscope, etc).

  Interface card, with RS-485 connector, to connect the industrial controllers through a field bus (Profibus DP) with the computer (PC).

  Software: it includes the OPC server drivers and the Control Configuration Software for the Industrial Controllers.

  Cables and Accessories, for normal operation.

  Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

## EXERCISES AND PRACTICAL POSSIBILITIES

1.- Installation, connection and familiarization with the software.

2.- Familiarization with the navigation of an industrial controller (operator page screen, trend display screen, etc).

3.- Setting up an industrial controller to accommodate the analog inputs/outputs signals types and engineering and electrical units.

4.- Function of a digital industrial controller.

5.- Configuration of analog inputs/outputs signals of the industrial controller (electrical range, engineering units, fault detector, etc).

6.- Setting alarms and diagnostics generation.

To learn and to familiarize with the operation and structure of a process control system under Profibus DP:

7.- Layout of a field bus system using the Profibus DP field bus.

8.- Study of OPC (OLE for Process Control) server function.

9.- Configuration of an industrial controllers networking through the software: Master and slave assignment.

10.- Reading control variables and PID parameters and displaying them on computer (PC) monitor.

11.- Scaling displays.

12.- Setting of an industrial controller using the front panel (configuration level, parameter level, operation control level, etc.).

13.- Remote setting of an industrial controller using the control configuration software (configuration level, parameter level, operation control level, etc.).

## REQUIRED SERVICES

-Electrical supply: single-phase, 220V. / 50Hz. or 110V. / 60 Hz.

-Computer (PC).

## DIMENSIONS & WEIGHT

-Dimensions: 490 x 330 x 310 mm. approx.
(19.29 x 12.99 x 12.20 inches approx.).

-Weight: 12 Kg. approx.
(26.4 pounds approx.).

✱Specifications subject to change without previous notice, due to the convenience of improvements of the product.

REPRESENTATIVE: