AUTOMATION AND CONTROL

SUPERVISED DIDACTIC SYSTEM OF TRANSDUCERS, SENSORS, AND SIGNAL CONDITIONER
DL TSCLP-04

Didactic system developed for a complete practical/theoretical training, where the use in practical applications is simulated through demonstrations of the principles and applications of sensor and controller technology used in the industry. The system includes a Human Machine Interface (HMI) for viewing graphic screens, value screens and animation screens. Composed of a bench panel, the system allows the study of the operation, parameterization, response measurements and conversion of an analog signal to a digital output.

THE PANEL

The panel is made of treated formica sheet, on which the schematic representations of the sensors and transducers and the symbols of the inputs and outputs are laser engraved. Sensors and transducers to be used in banana-type circuits are secured to this panel by brackets. Suggested circuits are for typical manufacturing automation and process control applications. The system is protected at the rear by a suitable cover.

TEACHING ACTIVITIES:

The system allows the following main learning activities to be carried out:

- Identification of sensor types
- Transducer type identification,
- Identification of types of signal conditioners,
- Development of PLC programs and monitoring and control screens.

DESCRIPTION OF THE MAIN ELEMENTS (PERIPHERALS)

The following items describe in detail the peripherals for your applications.

Digital capacitive sensor
A 24Vcc powered digital capacitive sensor with a metal body. It has two PNP transistor type digital outputs, one normally open (NO) and one normally closed (NC).

Digital Inductive Sensor

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Digital inductive sensor energized at 24Vcc with metal body. It has a PNP transistor type digital output, being normally open (NO).

Digital Reflective Optical Sensor
A 24Vcc powered digital reflective optical sensor with a metal body. It has a PNP transistor type digital output, being normally open (NO).

Digital Optical Barrier Sensor
A digital light barrier sensor with a 24 VDC power supply and plastic body. It has an emitter and a receiver for its operation. It has a PNP transistor type digital output, being normally open (NO).

Digital Hall Effect Sensor
24Vcc-powered digital hall effect sensor with metal body. It has a PNP transistor type digital output, being normally open (NO).

Smoke sensor
A plastic bodied smoke sensor powered by 24 VDC. It has a PNP transistor type digital output, being normally open (NO).

Gas Sensor
A gas sensor with a 24 V DC supply with a plastic housing. The gases that can be detected are: LPG (Butane, Methane, Propane) and Natural Gas.
It has a PNP transistor type digital output, being normally open (NO).

Linear Encoder
Incremental linear encoder with rail-coupled phototransistor to generate pulses as a function of motorized rail travel. The pulse output of the ENCODER is 24Vcc of the SOURCE type.

Rotary Encoder
Incremental rotary encoder with phototransistor coupled to the motor rotary disc to generate pulses depending on the displacement of the motorized rail. The encoder pulse output is 24Vcc Source type.

Magnetic level sensor
Four normally open (NO) dry contact level magnetic sensors:
These sensors have the function of indicating the current water level in the tanks.

End of Run sensor
Two Normally Open (NO) Dry Contact End of Run Switches: These sensors have the function of indicating that the load is at the end of the motorized rail.

Analog capacitive sensor
A 24Vcc-powered capacitive analog sensor with a metal body. It has an analog output of 0 to 10Vcc proportional to the detected object.

Analog inductive sensor
24Vcc-powered inductive analog sensor with metal body. It has an analog output of 0 to 10Vcc proportional to the detected object.

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Analog Ultrasonic Sensor
An analog ultrasonic sensor powered by 24 VDC in a plastic housing. It has an analog output of 0 to 10Vcc proportional to the distance of up to 200 mm between the sensor and the detected object.

Temperature and relative humidity sensor
A temperature and relative humidity identification sensor has a plastic body and two analog outputs from 0 to 10Vcc, one proportional to temperature and one proportional to humidity.

F/V converter
A frequency-to-voltage converter. The pulse amplitude voltage should be +24Vcc, with a frequency of up to 1kHz (kilohertz), and the output voltage should be proportional to 0 to 10Vcc.

V/F converter
A voltage-to-frequency converter. The input voltage is 0 to 10Vcc, and the pulse width voltage at the output is +24Vcc with a frequency of 10 to 10kHz (kilohertz), depending on the input voltage.

PT-100 temperature sensor
A PT-100 type positive coefficient temperature sensor, with access to both resistance and voltage measurements.
The output voltage from 0 to 10Vcc is directly proportional to the resistance value.

NTC temperature sensor
A NTC type negative coefficient temperature sensor, with access to both resistance and voltage measurements.
The output voltage from 0 to 10Vcc is directly proportional to the resistance value.

Analog pressure gauge
A 100 kPa analog gauge in a metal body.

Digital Manometer
A 100 kPa adjustable digital pressure gauge in a plastic body. It has two PNP type digital outputs, with NA24Vcc-type activation.
Note: Both pressure gauges are attached to a pressure float.
Temperature gauge
A digital temperature indicator in degrees Celsius with adjustable full scale. It has an NC contact for activation depending on the set temperature.

Programmable Logic Controller Including programming software
It has:

- Digital inputs, which can act as Sink and Source type,
- 16 NPN transistor digital outputs,
- 4 analog inputs for voltage reading from 0 to 10Vdc,
- 4 RTD analog inputs,
- Four analog outputs from 0 to 10Vdc,
- One RS-485 communication port,
- One USB port
- One Ethernet communication port, allowing OPC UA communication.

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Human Machine interface
A 7-inch touchscreen HMI with RS485, USB and Ethernet type data bus for data transfer connection, and also enables OPC UA communication.

Emergency button
Mushroom type pushbutton with NC contact.

Pushbuttons
Two pushbuttons with 1 NO and 1 NC each, one red and one green.

LED indicators
Three 24Volt LED-type indicators, color coded red, yellow and green.

Buzzer with LED
A 24-Volt red LED buzzer and a buzzer that sounds an alarm every second.

Command elements

Hydraulic pump
A hydraulic pump with power up to +12Vcc.

Cooling system
A ventilation cooling system with +24Vcc activation.

Heating system
A resistance heating system with +24Vcc activation.

Motorized rail
A motorized rail with a DC motor attached to a gearbox. Features speed control and turning direction control.

12 VDC power supply
A +12 Volt / 1 Amp power supply, with access terminals.
24 VDC power supply
A +24 Volt / 1 Amp power supply, with access terminals.

0 to 24Vcc power supply
An adjustable power supply from 0 to 24 volts / 1 amp displaying used voltage and current.

Pumping and lifting system

Deposit Set
A set with two water tanks each with two magnetic level sensors. The lower tank has a Hydraulic Pump for water. Capacity approximately 7 liters each.

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