Seminar
On
Industrial Measuring Instruments

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MEASURING INSTRUMENTS

The device used for comparing the unknown quantity with the unit of measurement or standard quantity is called a Measuring Instrument.

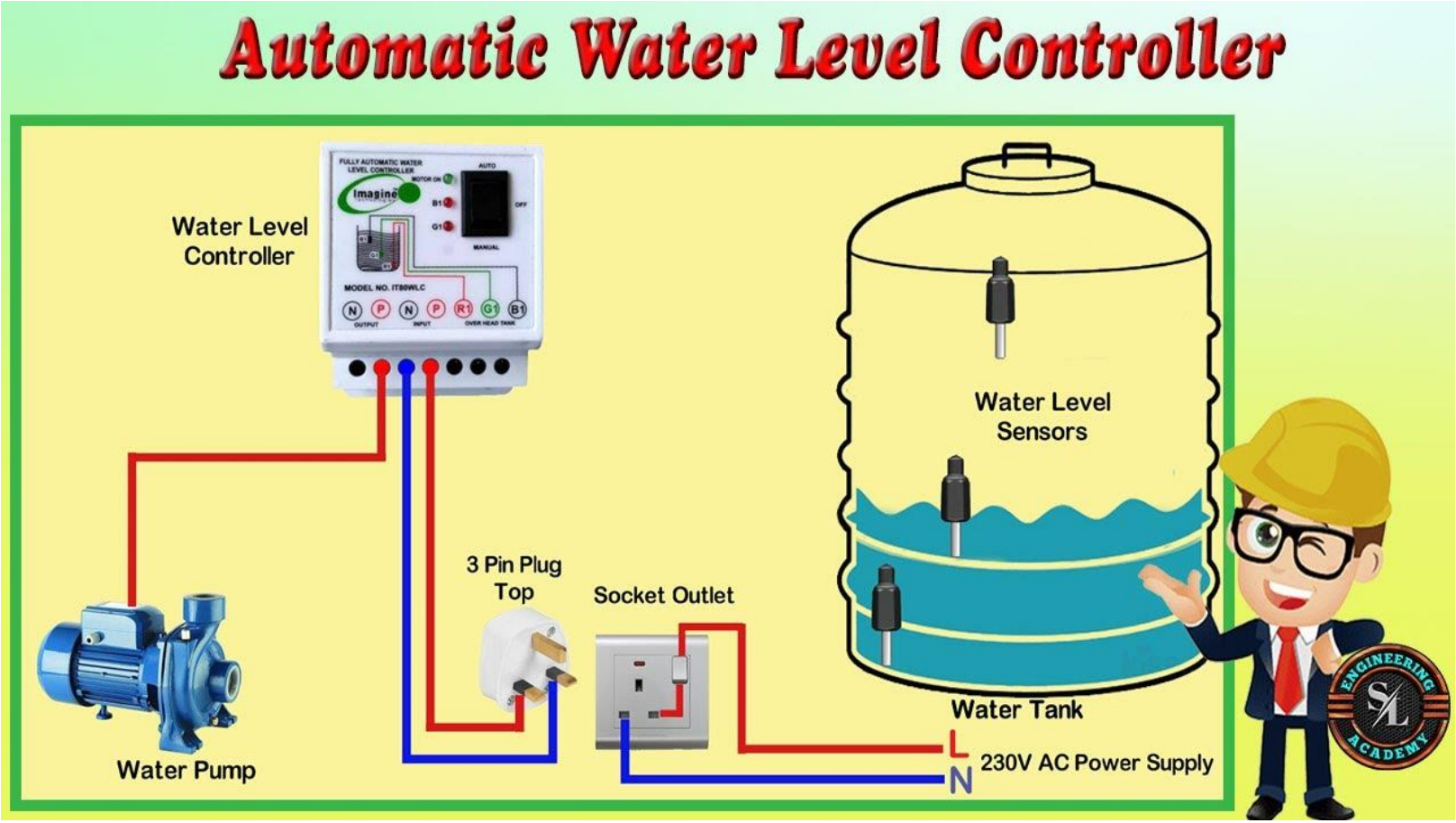
A measuring instrument is a device to measure a physical quantity. These measuring instruments are used in our day-to-day life for the measurement of various quantities like length, weight, temperature, pressure, current, voltage etc.

For Example , you need to measure Length of Room in Feet and you are using Measuring Tape/ Scale

IMPORTANCE OF MEASURING INSTRUMENT

Measuring Instrument in Process control ensures that the plant operates within defined parameters to produce materials of consistent quality and within the required specifications.

For Example , Automatic Water Level Controller to Measure Level and Control Level in Overhead Tank



MEASURING INSTRUMENTS TYPES

Measuring instruments may be divided into two categories,

1) Analogue Instruments
2) Digital Instruments

1) Analogue Instrument : The analogue instruments indicate the magnitude of quantity in the form of pointer movement. We can measure readings from such instruments since there are certain markings on the scale.

MEASURING INSTRUMENTS TYPES

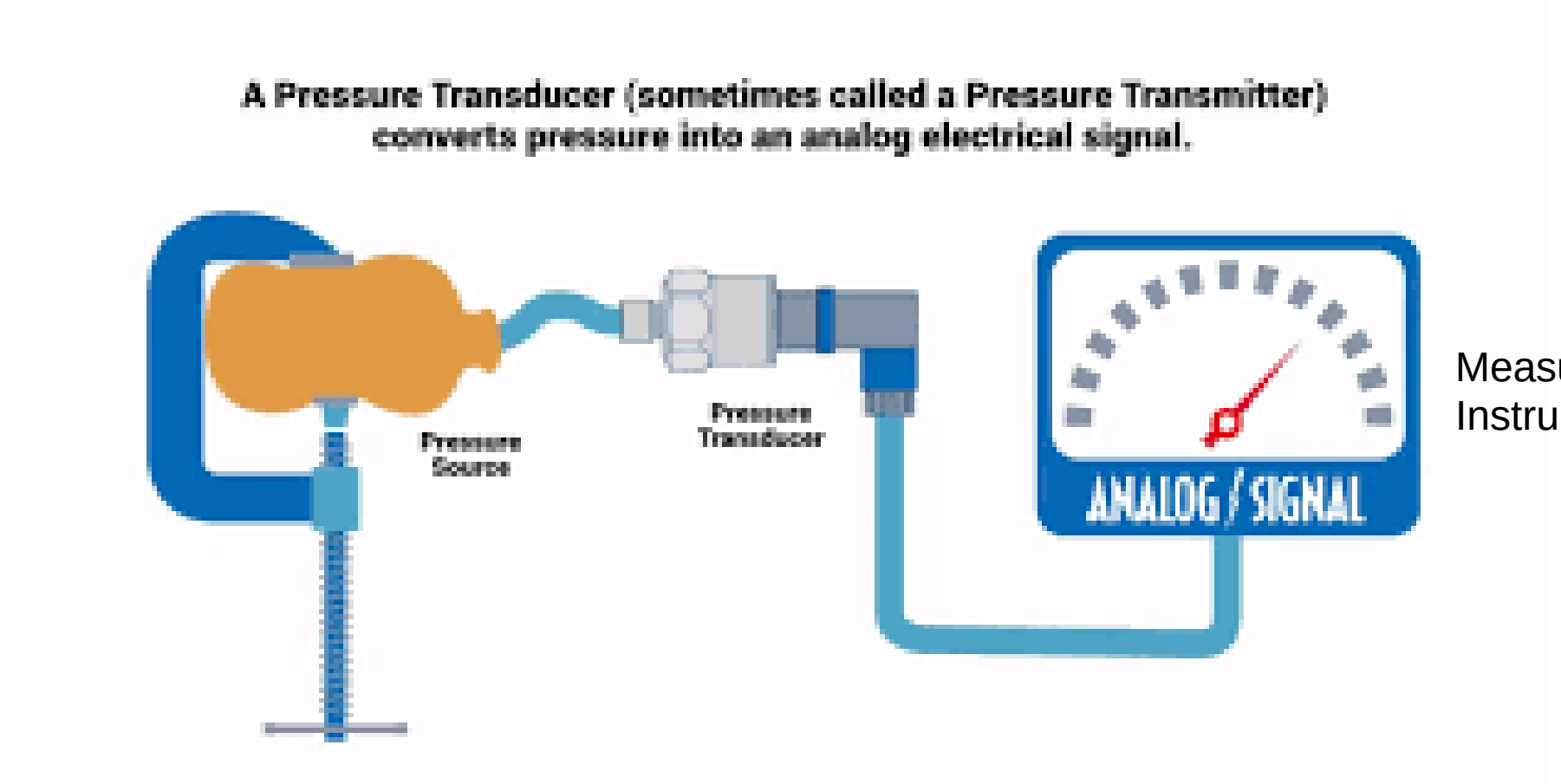
2) Digital Instrument :

The digital measuring instruments indicate the measured value in digital format which will be in number and some times its unit. It is very easy to read digital Instrument compared to analogue instruments.

Anyone can easily measure and note the measured value by these digital instruments because it will indicate the measured value in numerical form. They can give the readings in one or more decimal place.

TRANSDUCERS

Measuring Instrument work in conjunction with Transducers so we need to first understand what is Transducers



Measuring Instrument

TRANSDUCERS

What is Transducer?

A transducer is an electronic device that converts a physical force into an electrical signal so that it can be easily handled and transmitted for measurement.

Types of Transducers - Transducers are classified into two types namely active & passive transducers.

1). Active Transducer

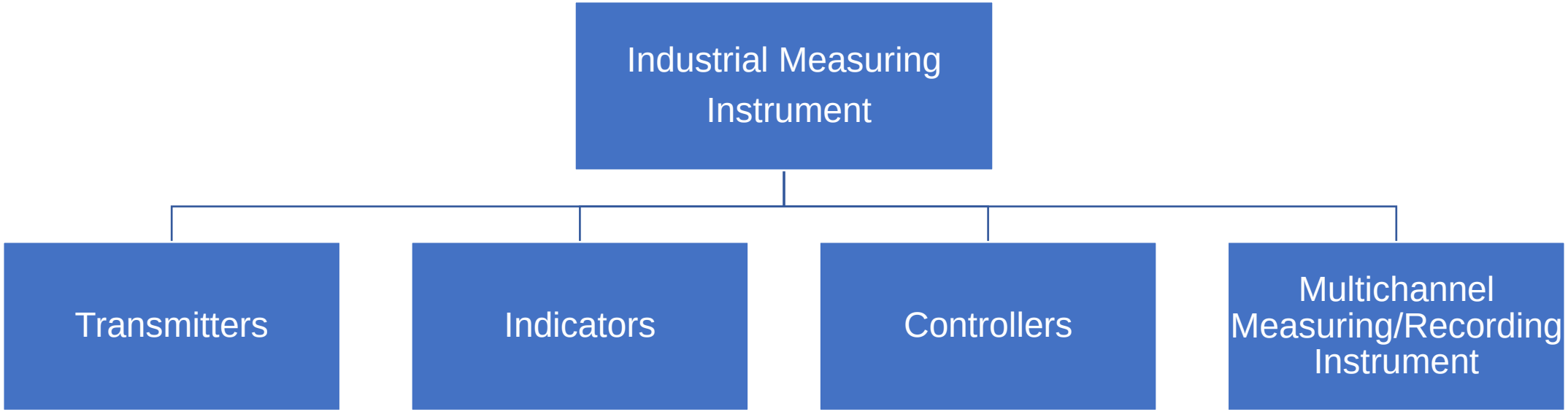
The active transducer does not use any external power source for producing the output, . The best examples of this transducer mainly include PV cell, thermocouple, etc.

2). Passive Transducer

The passive transducer requires the additional energy source for working. . The best examples of this transducer mainly include a differential transformer, resistance strain, etc.

MEASURING INSTRUMENTS

There are Various Types of Industrial Digital Measuring Instrument



There are Various Types of Industrial Measurement.

- Temperature
- Pressure
- Level
- Flow
- Voltage
- Current
- Weight
- Speed

There are Various Types of Measuring Parameters.

- Thermocouple(milli volt)
- RTD (Resistance)
- DC Voltage(0-10 VDC)
- **DC Current (4-20 mA)**
- AC Current
- AC Voltage
- Digital Input
- Pulse Input

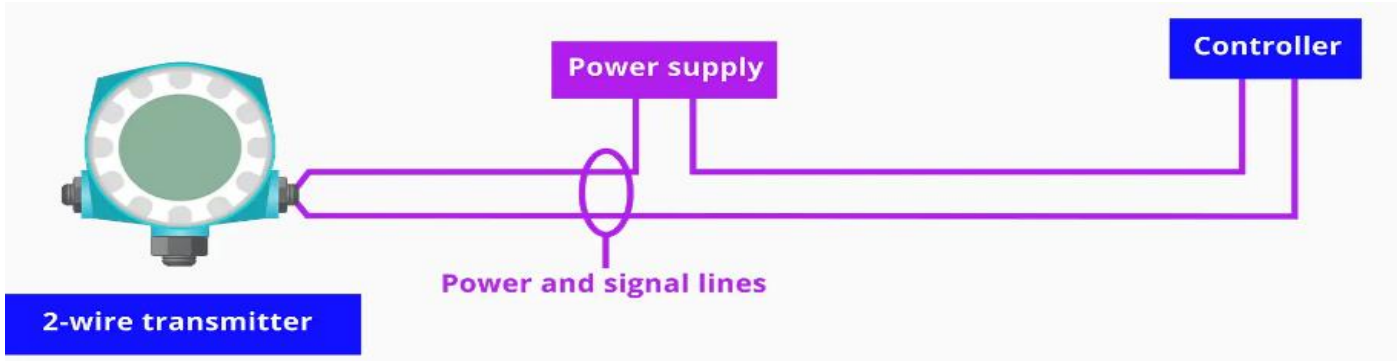
TRANSMITTER

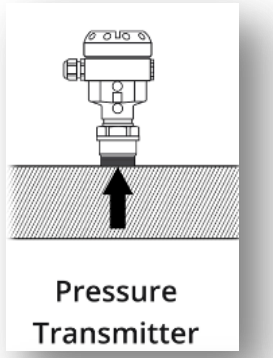
What is Transmitter?

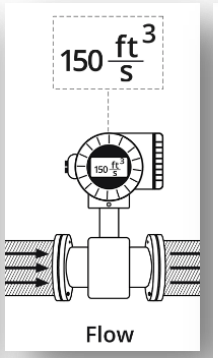
In the world of process control, a Transmitter is a device that converts the signal produced by a sensor into a standard instrumentation signal **4-20 mA** representing a process variable being measured and controlled.

Types of Transmitter

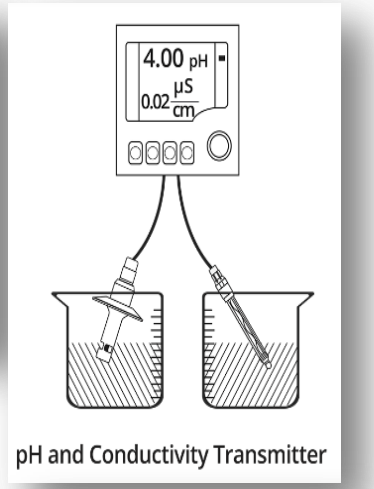
- Pressure Transmitter
- Level Transmitter
- Temperature Transmitter
- Flow Transmitter
- Position Transmitter
- Speed Transmitter
- PH & Conductivity Transmitter
- Vibration Transmitters



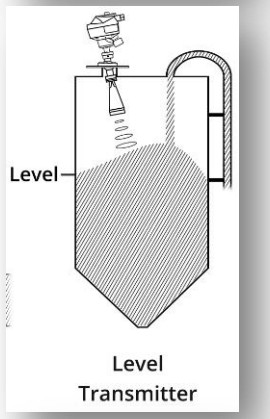

Pressure Transmitter



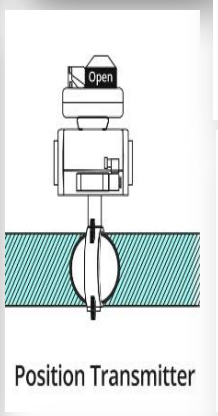
Flow



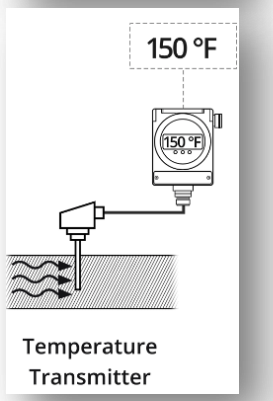
pH and Conductivity Transmitter



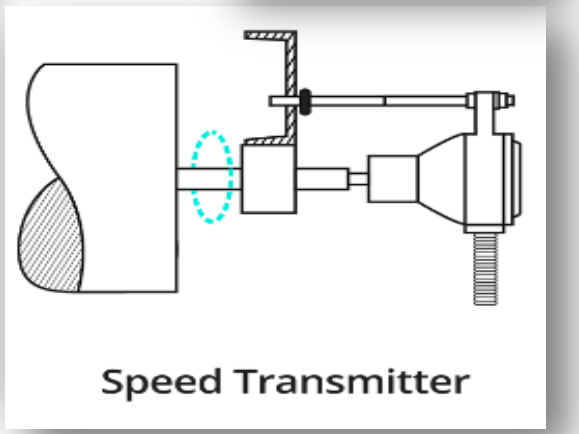
Level Transmitter



Position Transmitter



Temperature Transmitter


Speed Transmitter

RANGE OF TRANSMITTER

Transmitter O/P is 4-20 mA corresponding Process Range configured in the Device. There are two important Parameter in Transmitter

- Range -> is minimum value to maximum value
- Span -> is the difference between range values. (Maximum to a minimum)

For Example :

Pressure Range : Lower Range Limit = 0 Kg/Cm2
Upper Range Limit = 10 Kg/Cm2
Range : 0 to 10 Kg/Cm2
Span = URL- LRL = 10 - 0 = 10 Kg / Cm2

SN	Pressure Kg/Cm2	mA Reading
1	0	4
2	2.5	8
3	5	12
4	7.5	16
5	10	20

RANGE OF TRANSMITTER

Temperature Transmitter Range : -200 Deg C to 800 Deg C

LRL = -200 Deg C URL = 800 Deg C

Span = URL- LRL = 800 - (-200) = 1000 Deg C

SN	Temperature Deg C	mA Reading
1	- 200	4
2	50	8
3	300	12
4	550	16
5	800	20

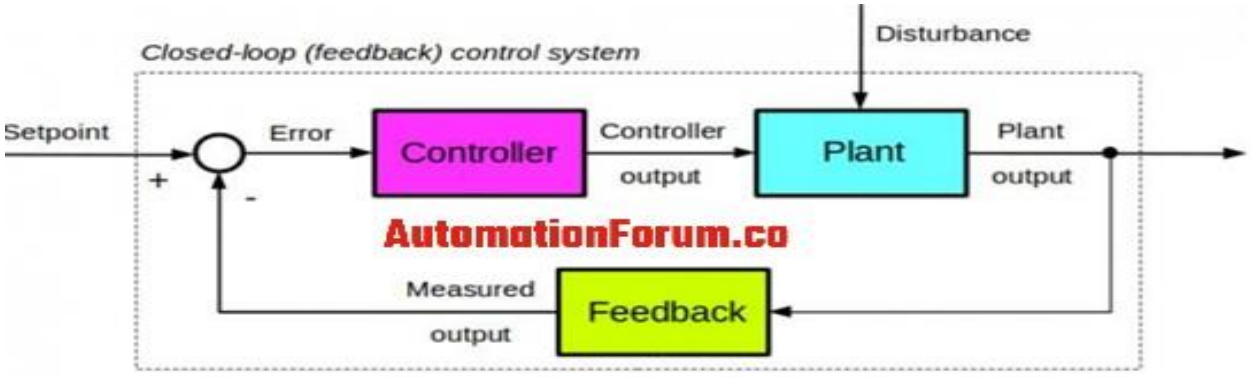
CONTROLLER

What is Controller?

Controllers maintain the output of process variables such as temperature, pressure, flow, or level within a pre-set range. They use feedback from sensors to identify any deviation from a setpoint and automatically adjust output until parameters are back within range

Types of controller

- Flow Controllers
- Level Controllers
- Pressure Controllers
- Programmable Logic Controllers
- Universal Process/Temperature Controllers



VARIOUS INDICATORS

Process Automation

409 4IN

409 6IN

40005E

408 2IN

LPI-1-LED

406

1008S-XP

LPI-1-XP-LED

Industry 4.0/ IIOT

409

408-M

1006H

LC5296H

1008S

Pharma Sector

CDU LED

CDU LCD

FDU

MULTICHANNEL MEASURING INSTRUMENT







Available in Multiple
Universal Analog Inputs
4-Channels to 128-Channels

RS485/ Ethernet/ USB/ ZigBee/
DNP3.0/ Profibus Options

RTD/TC/Current/Voltage Scanners and Datalogger

Application :

Motor Protection / Gen-Set Protection / RTU / Transformer Protection / Remote IO - PLC/DCS / Water & Wastewater / Boiler Tube Temp. Recording / Pump-Fan-Blower protection / Multi-Channel Alarm/Trip Module / Heat Tracer Monitoring & Control

CASE STUDY OF MULTI CHANEL TEMPERATURE SCANNER 85XX+

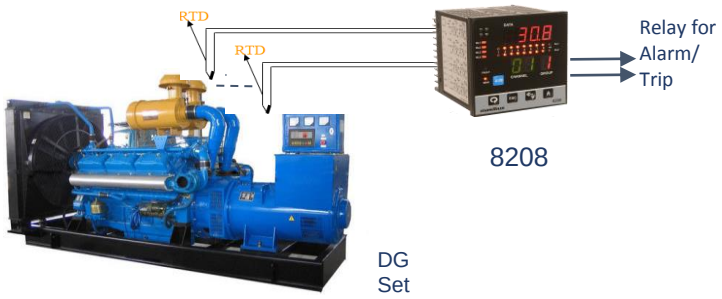
A temperature scanner is a microprocessor/microcontroller - based device that measures and displays the temperature.

A multi-channel temperature scanner is a device that measures and displays the temperature of each channel one by one up to the last channel and then returns to the first channel and continue the process cyclically. This continuous cyclic process of measurement is calling scanning.

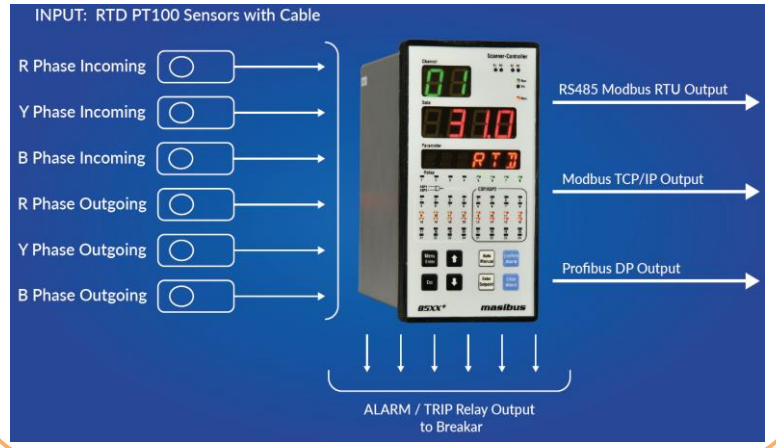
Features

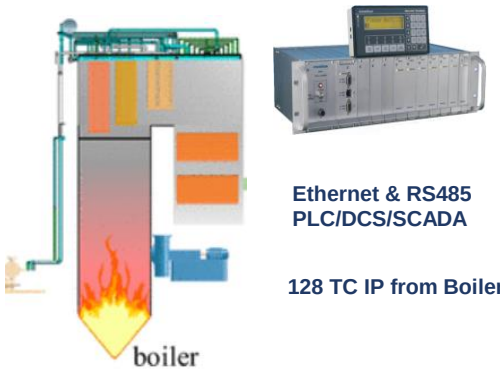
- Alpha-Numeric display
- 24 Channel Universal Analog Input Module (Thermocouple , RTD , Voltage ,Current)
- 16 Channel Digital Input Module
- 8 Relay Output Module
- 24 Open Collector Output Module
- Analog Output
- Fast sampling and generation of Alarm/Trip
- RS485 Serial port
- 1X Ethernet port
- 1X USB port (logged data retrieval)
- 1X Profibus-DP port

APPLICATION OF SCANNER



DG Set Protection and Monitoring

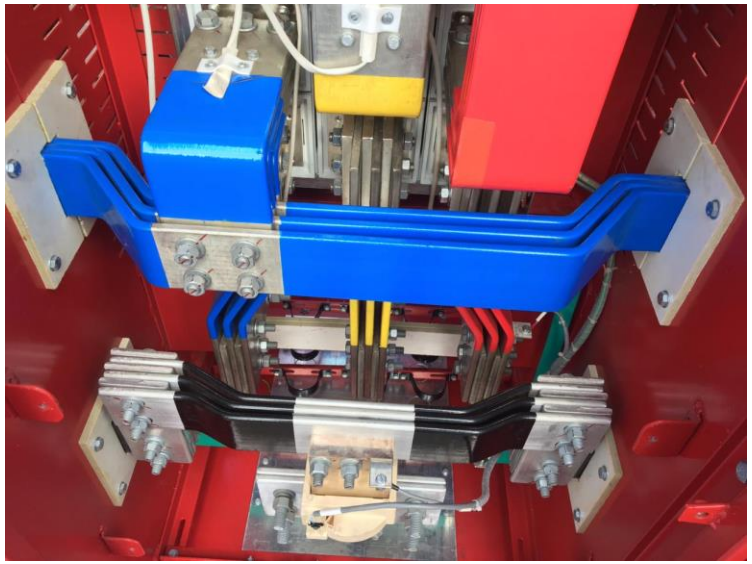




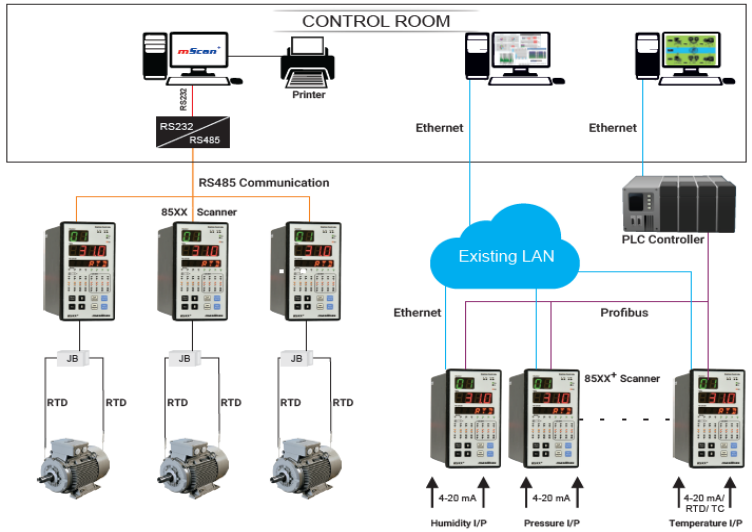
Ethernet & RS485
PLC/DCS/SCADA

128 TC IP from Boiler Unit

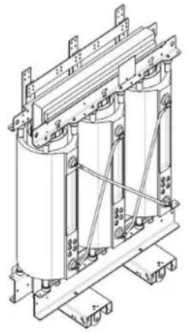
Boiler Tube Temperature Monitoring



Busbar Temperature Monitoring



Motor Temperature Measurement / Protection



RS485 to Remote PLC/Gateway

Relay For Alarm/Trip & Fan Control

8 RTD for Winding/Core/Enclosure/Oil Temperature

Transformer Protection Relay

THANK YOU