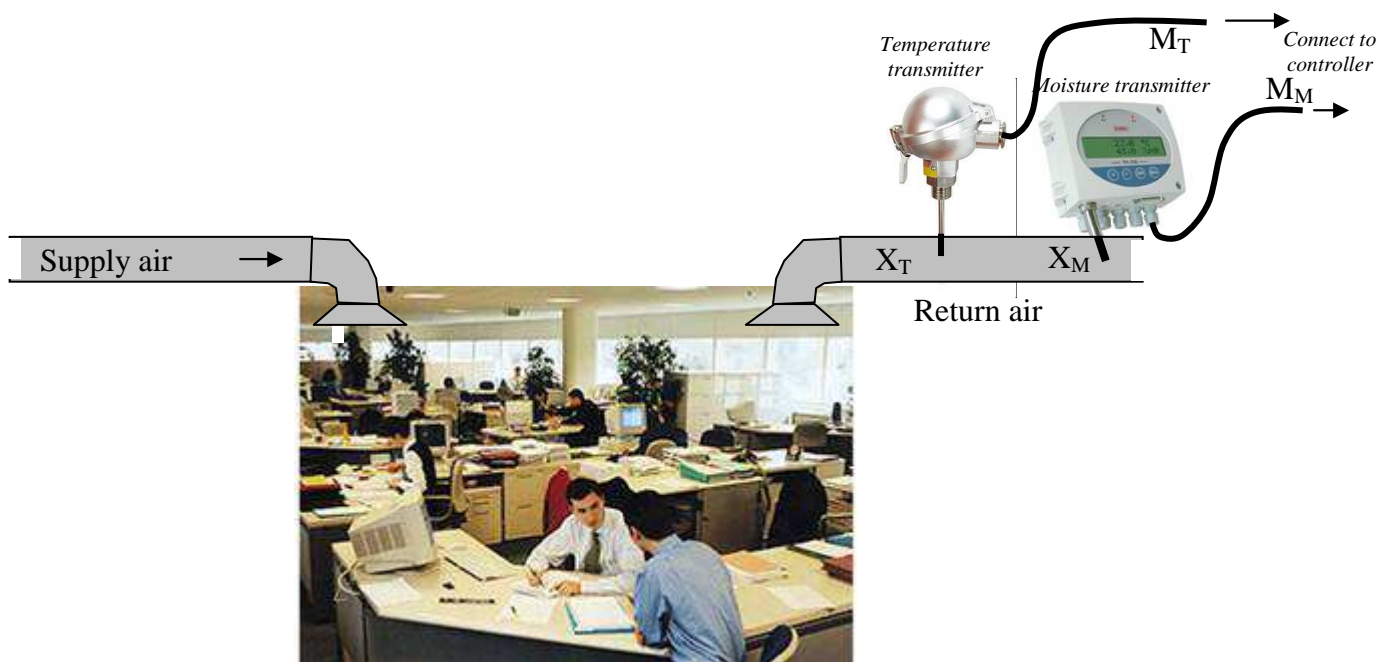




In the field of air conditioning and refrigeration, the HVAC technician cannot afford to overlook the opportunity to master control process tools such as measuring instruments and controllers.

In the following example, an air-handling unit provides occupants with comfortable climate whatever loads variations, as a result temperature and moisture need to be controlled.

The technician must be able to select, size, connect and adjust measuring instruments to meet required performances. He will have to keep up with new technology in order to propose clients reliable solutions, either for installing a new process or for upgrading a current system. He will also have to get to grips with software tools such as measurement recorders, spread sheet, etc in order to treat measurement data required for optimizing process efficiency.



### 1) Measurement generality

- **Physical quantity (X) also called Physical measure or process value (PV):** it's the parameter need to be controlled.
- **Measure (x):** that is the value treated by the transmitter and displayed on the screen.
- **Measuring signal:** It represents the physical measure transmitted to a controller by a transmitter.



2) a.

$M_M$



The measurement chain

- **Sensor:** The sensor measures the frequency, etc.
- **Central Processor:** The central processor and the display module are connected via a bus.
- **Interconnection:** The interconnection is according to the bus protocol and link adaptation.

**Notice:** I/O modules and RTD

b. Diff

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### c. Transmitter measurement range

Let's consider a 4-20mA temperature transmitter that converts temperature into a 4-20mA signal. The measurement range is the difference between the highest and lowest temperature the transmitter can measure.

*What is the full range of this transmitter?*

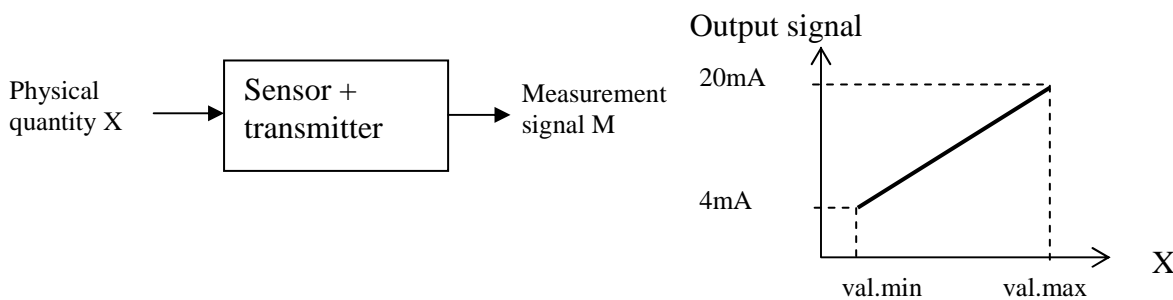


However, you have to distinguish the difference between full range and measurement range.

- Full range is the range the transmitter is able to measure without be damaged
- Measurement range is adapted to process requirements. Most transmitters include an adjustable range.

$$\text{Measurement range} \leq \text{Full range}$$

### d. Transmitter transfer function

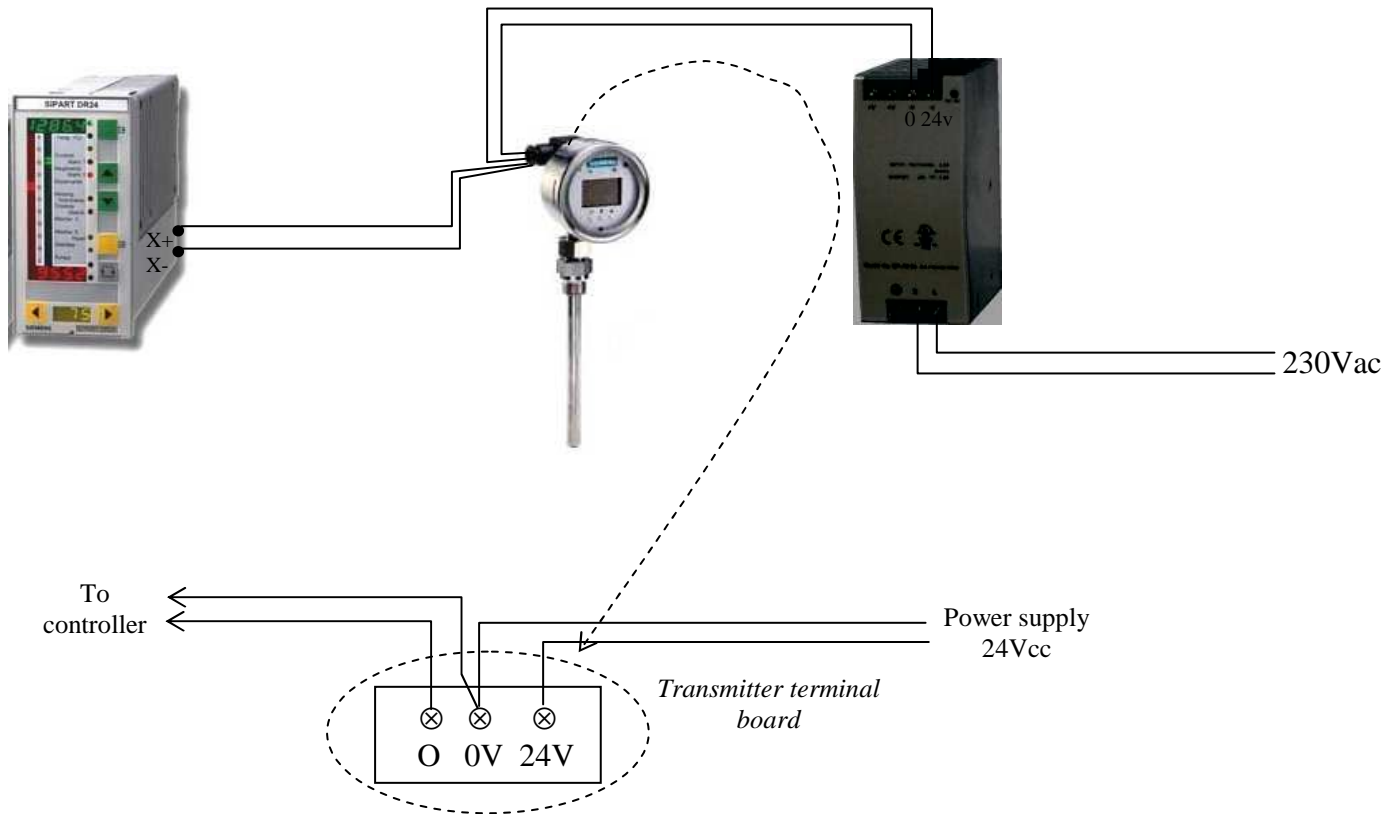


*Let's consider a temperature transmitter whose measurement range is -10 to 20°C, the LCD display indicates 5.6°C: Deduce the output current value in [mA].*

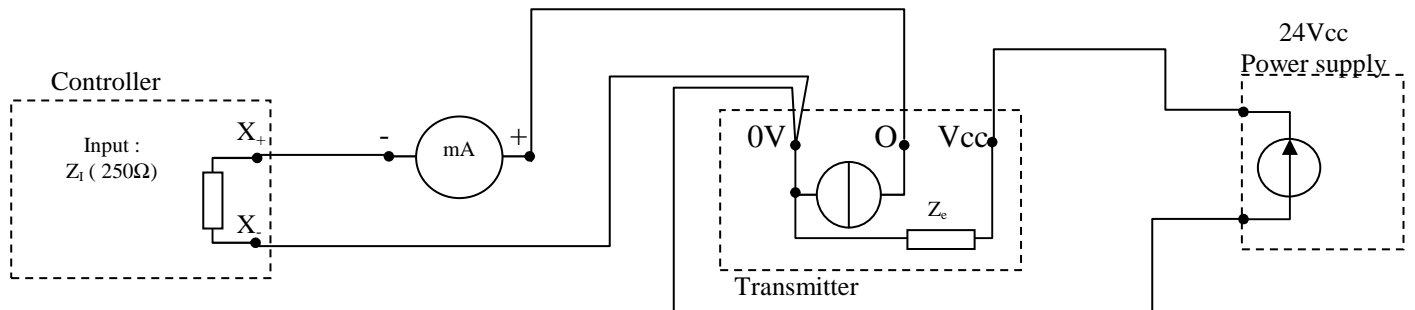




○ **Connecting 4 wires 4-20mA transmitter:**



Four wires current loop electrical diagram:





## KIMO Humidity-Temperature Transmitters

### Sensor-transmitter class 50

- IP30 Case
- Range 0 to 100%RH
- Accuracy : guaranteed accuracy limits  $\pm 2.95\%$  from 18 to 28°C
- RS232 communication for software configuration



Code	Description	Price
	Humidity transmitter, output 4-20mA, 18-30Vdc, 2 wire	\$ 230
	Humidity transmitter, output 0-10V, 24Vac/dc, 3-4 wire	\$ 230
<b>transmitter class 100</b>		
Case		
or without 5 digits display (alternates between humidity and temperature)		
e 0-100%RH, 0 to +50°C (adjustable range, standard model or -20 to +80°C		
stable range for duct or remote models), -50 to +50°C, 0 to +100°C; °C or °F		
table ranges via software or micro-switches		
t 4-20mA or 0-10Vdc, supply 24Vac/dc (2-3-4 wire)		
y $\pm 2.95\%$ between 18 and 28°C and $\pm 1\%$ of reading		
from 5 to 80°C; $\pm 2\%$ of reading from -20 to 5°C		
ut		
V :	24 Vac/dc 0-10 V	\$ 310
A :	18..30 Vdc 4-20 mA	\$ 310
O :	with display	\$ 50
N :	without display	\$ 0
S :	standard	\$ 10
A :	duct mount	\$ 10
D :	remote (2m)	\$ 0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- What are respectively humidity and temperature full range?
- Does this instrument include adjustable range? By which means do you adjust range?
- What is the temperature measurement accuracy?
- You read 5.1°C, what might be the real temperature value?
- The temperature is -10°C, you read 72%, what might be the real relative humidity?
- You need to purchase this transmitter for a HVAC installation. The selecting consideration are:
  - 
  -

e mounted on the supply air duct.

r code and calculate the price in Euros considering a 25%  
thful clients.