

The 4-20 mA signal 4-20mA 信号

What to do with the information of a sensor? 如何处理传感器的信息?

You have a sensor with a measured value, for example those: 你有一个测量值的传感器，例如：



Flow sensor 流量传感器
Measured value: 53,3 m³/h
测量值: 53,3 m³/h



Temperature sensor
温度传感器
Measured value: 22,3 °C
测量值: 22,3 °C

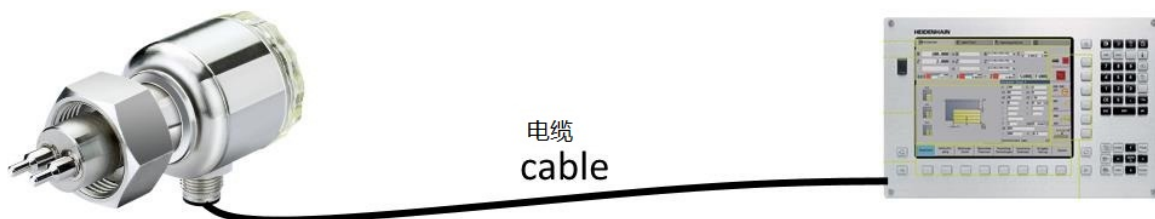


Pressure sensor 压力传感器
Measured value: 7,5 bar
测量值: 7,5 巴

What to do with the information of those sensors? Usually you want to connect the sensor with a control system, e.g. a PLC or a PC. The most common and easiest way to do that is to use the 4-20 mA output of the sensor. 如何处理这些传感器的信息? 通常你想要将传感器与控制系统连接起来，例如PLC或PC。最常见也是最简单的方法就是使用传感器的4-20 mA输出。

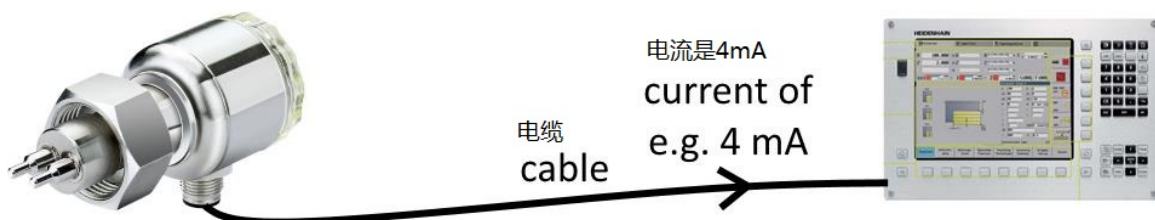
How can you do that? 你可以怎么做?

First of all you need to connect the 4-20 mA output of the sensor with the 4-20 mA input of the control. This is done by a cable. 首先，你需要将传感器的4-20 mA输出透过电缆连接到控制的4-20 mA输入。



How does it work? 它怎么工作?

The sensor sends a current between 4 and 20 mA through the cable. The 4-20 mA input of the control measures that current. 传感器通过电缆发送的4到20 mA之间电流。控制4-20 mA的输入部分量度电流。



How does the control know what the measured current means? 控制装置是如何知道测量电流的意思?

The initial value 4mA and the final value 20 mA are assigned to certain measured values of the sensor. For example those: 初始值4mA和最终值20 mA分配给传感器的某些测量值。例如那些:

Flow sensor流量传感器	Temperature sensor温度传感器	Pressure sensor压力传感器
4 mA = 0 m ³ /h	4 mA = 0 °C	4 mA = 0 bar
20 mA = 100 m ³ /h	20 mA = 100 °C	20 mA = 100 bar

The assignment must be the same in the sensor and in the control. This means, if the control measures 4mA, you know that your sensor measures 0 m³/h, 0 °C and 0 bar respectively.

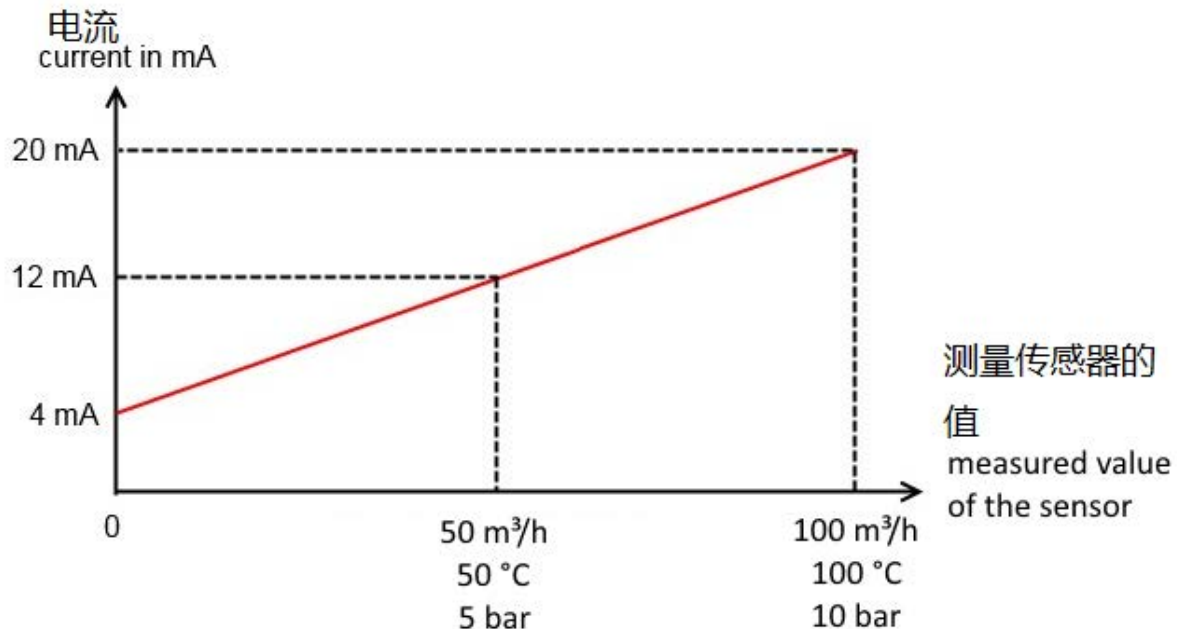
在传感器和控制中,任务必须是相同的。这意味着,如果控制测量是4mA,你可以分别地知道传感器测量0 m³/h, 0 °C和0巴。

What if the control measures a signal between 4 and 20 mA?

如果控制设施测量了4到20mA之间的信号怎么办?

The measured current is linear to the measured value of the sensor:

测量电流与传感器测量值呈线性关系:



For example if the control measures 12 mA (12 mA is exactly in the middle between 4 and 20 mA), you know that the measured value of the sensor is 50 m³/h, 50 °C and 5 bar respectively.

例如控制测量12mA(12mA正好是4-20mA之间),你知道传感器的测量值是50 m³/h,分别是50 °C和5巴。

If the control measures 20 mA, you know that the measured value of the sensor is 100 m³/h, 100 °C and 10 bar respectively. 如果控制措施达到20 mA,你知道传感器的测量值是100 m³/h,分别是100 °C和10巴

Exercise for you (you will find the solution on page 3):

练习(你会在第3页找到答案):

Which current does the control measure if the flow sensor measures 60,0 m³/h and the assignment is as follows: 4 mA = 0 m³/h, 20 mA = 100 m³/h ?

如果流量传感器测量60,0 m³/h及任务分配如下: 4 mA = 0 m³/h, 20 mA = 100 m³/h, 哪种电流控制测量,?

Solution:**结论:**

Which current does the control measure if the flow sensor measures 60,0 m³/h and the assignment is as follows: 4 mA = 0 m³/h, 20 mA = 100 m³/h ?

如果流量传感器测量60,0 m³/h 及任务分配如下: 4 mA = 0 m³/h, 20 mA = 100 m³/h , 哪种电流控制测量,?

$$60 \text{ m}^3/\text{h} / 100 \text{ m}^3/\text{h} = \mathbf{0,6}$$

$$\mathbf{0,6} * (20 \text{ mA} - 4 \text{ mA}) = 0,6 * 16 \text{ mA} = \mathbf{9,6 \text{ mA}}$$

$$\mathbf{9,6 \text{ mA}} + 4 \text{ mA} = \mathbf{13,6 \text{ mA}}$$

The control measures 13,6 mA.

控制测量13,6 mA