



4-20mA scaling calculator

4-20 mA signals are used to transfer a physical value such as a temperature, pressure, liquid level or other physical quantity. The current in the loop represents the corresponding physical value.

Example:

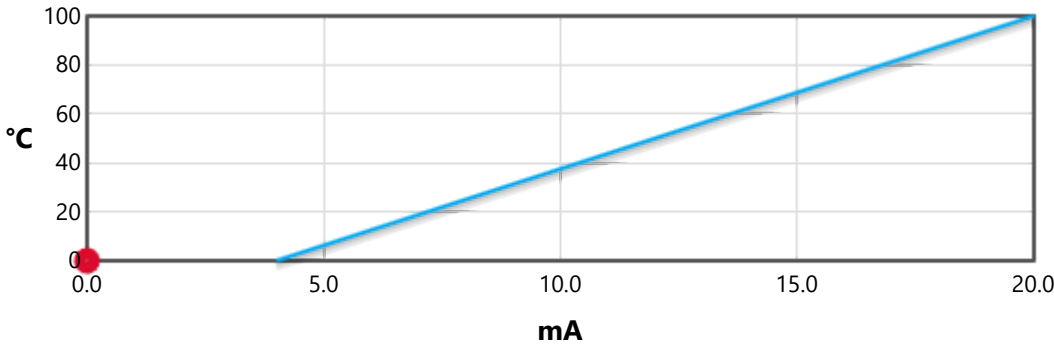
A 4-20mA temperature transmitter with a range of 0 tot 100 degrees Celsius measures a temperature of 20 degrees. Then a current of 7,2 mA will flow in the loop.

The current corresponding to a measured physical value is converted with the 4-20mA scaling calculator below:

4-20mA

Temperature (°C)

<div>4.00</div> <div>mA</div>	↔	<div>0.00</div> <div>°C</div>
<div>20.00</div> <div>mA</div>	↔	<div>100.00</div> <div>°C</div>
<div></div> <div>mA</div>	↔	<div></div> <div>°C</div>



The 4-20 mA scaling calculator is based on the following formulas:

Conversion from a physical value (Pv) to a current (I) formula:

$$I = \frac{I_{high} - I_{low}}{Pv_{high} - Pv_{low}} \cdot (Pv - Pv_{low}) + I_{low}$$

Conversion from a current (I) to a physical value (Pv) formula:

$$Pv = \frac{Pv_{high} - Pv_{low}}{I_{high} - I_{low}} \cdot (I - I_{low}) + Pv_{low}$$

Scaling in this article is used as the link between an electrical current value and a physical value “field value” (mA) -> “process value” (e.g. Temperature, Pressure, Level).

The conversion form the electrical current loop signal to a physical value is based on an linear characteristic. This characteristic is used to describe the relationship between the current signal and physical value.

Special attention is needed by the conversion from a physical value with a starting value other then zero. For example a pressure signal from -1 to 1 bar. When the pressure is 0 bar, the current is 12 mA. Due to the 4 mA starting current the characteristic between the physical value and current is not logical the use of a scaling calculator is recommended in this situation.

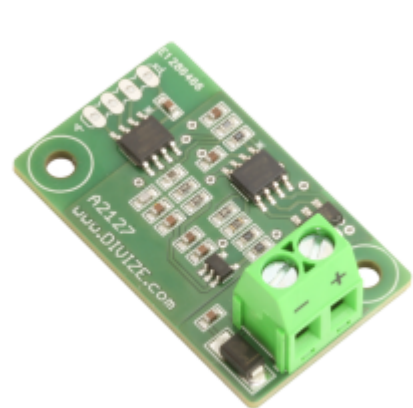
Other common examples of measurement transmitters with this challenge are a temperature signal from -80 to 20 degrees Celsius or pH sensor.

If you are dealing with practical situations it might be necessary to use a [4-20 mA simulator](#) or [4-20 mA potentiometer](#) to test your setup. The simulator allows to control the current in the loop manually which makes it very easy to verify and check the scaling. Information on [how to connect the 4-20 mA simulator is available on our current loop connection page](#).

4-20 mA simulators



4-20 mA simulator with indicator M12 connector
€192.70



PWM controlled 4-20 mA simulator
€28.21



4-20mA current loop tester, Namur NE43 panelmount
€47.60