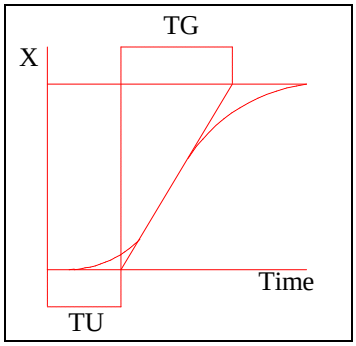
Calculating the PID values for D1C \ Redox controllers

$$XP = \frac{X}{Y} \times \frac{TU}{TG} \times \frac{Y\ max}{X\ max} \times 100\%$$



X = Change of RH

Y = Metering rate

TU = Distance of velocity lag in seconds

TU is influenced by the distance between the metering point and the point where the measuring water is extracted, the length of the measure water line and the velocity of flow. These factors cause a certain time to pass until the RH change is registered at the controller.

TG = Compensating time in seconds

The RH value will now increase for some time after the so-called compensating time TG, it will seek a new balanced RH value.

Y max = Metering rate = 100%

X max = RH = + 1999 mv

In the following example, metering was started with a stroke rate of 25%. After 14 seconds, we can see the first reaction at the controller. After another 50 seconds, the RH value remains almost steady. The newly set RH value is 100 mv above the initial value.

$$XP = \frac{100\ mv}{25\%} \times \frac{14\ seconds}{50\ seconds} \times \frac{100\%}{+1999\ mv} \times 100\% = 6\%$$

$$XP = \frac{X}{Y} \times \frac{TU}{TG} \times \frac{Y\ max}{X\ max} \times 100\%$$ **(Proportioning band)**

PI Controller = 3 x TU (14 seconds) = 42 seconds Proportional band (6%) x 1.25 = 7 %
Set the Integral for 42 seconds and the proportional band for 7%

PD Controller = .25 x TU (14 seconds) = 3.5 seconds Proportional band (6%) x .83 = 5 %
Set Derivative for 3.5 seconds and proportional band to 5%

PID Controller = TI= 2 x TU (14 seconds) 28 seconds
TD= .42 x TU (14 seconds) 6 seconds
Proportional band = .83 x 6% = 5 %