

In this slide deck you'll learn how the RMP works and how it's better than traditional impact transmitters

If you're in the **oil & gas or petrochemical industry**, your top priorities are to **ensure up-time and avoid catastrophic failures**. To do this, you typically monitor mechanical looseness on reciprocating compressors using sensors that easily connect to your PLC.

Find out how our industry-exclusive Reciprocating Machinery Protector (RMP) can help.



What is the RMP?

- RMP stands for Reciprocating Machinery Protector. It's a loop-powered device which detects mechanical shock events occurring *in* or *near* the machine's cylinder assembly
- RMP is a 4-20mA transmitter that's very sensitive to machine faults in their early stages of development



RMP parameters are programmed with USB programmer kit model 600A17.

How does the RMP mount?

RMP is mounted on the crosshead slipper, distance piece, or cylinder head perpendicular to the motion of the piston. One RMP is required per cylinder.

Typical installation of a **Reciprocating Machinery Protector (RMP)**

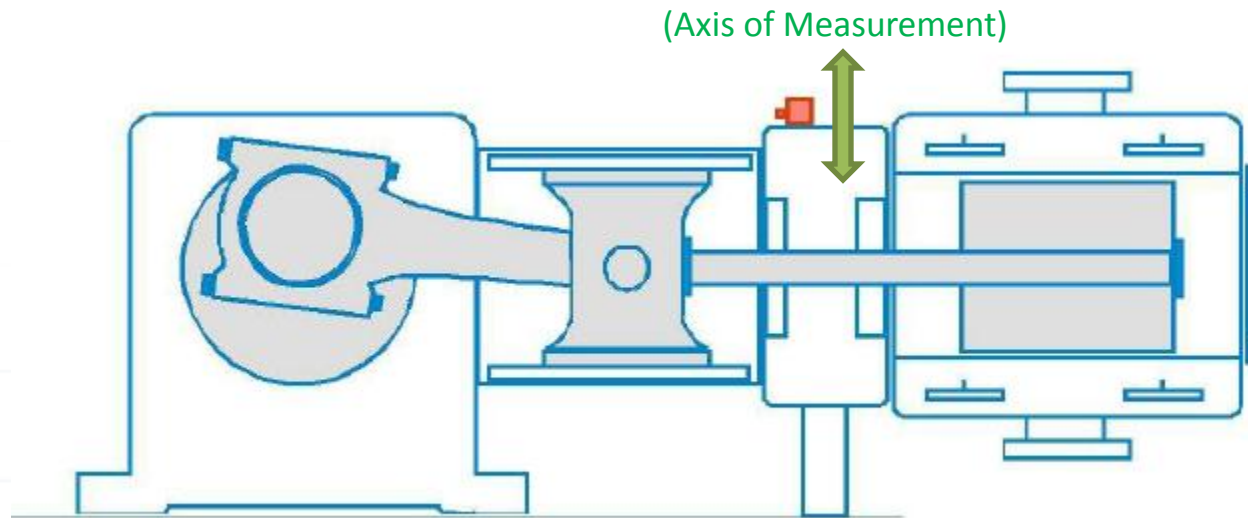


Image of a Reciprocating compressor illustrating typical sensor installation

What is RFI?

RFI is the Reciprocating Fault Index - a specialized 4-20 mA output which is designed to detect impacting in the machinery and raise an alarm accordingly.

See how RFI is used to protect reciprocating machinery



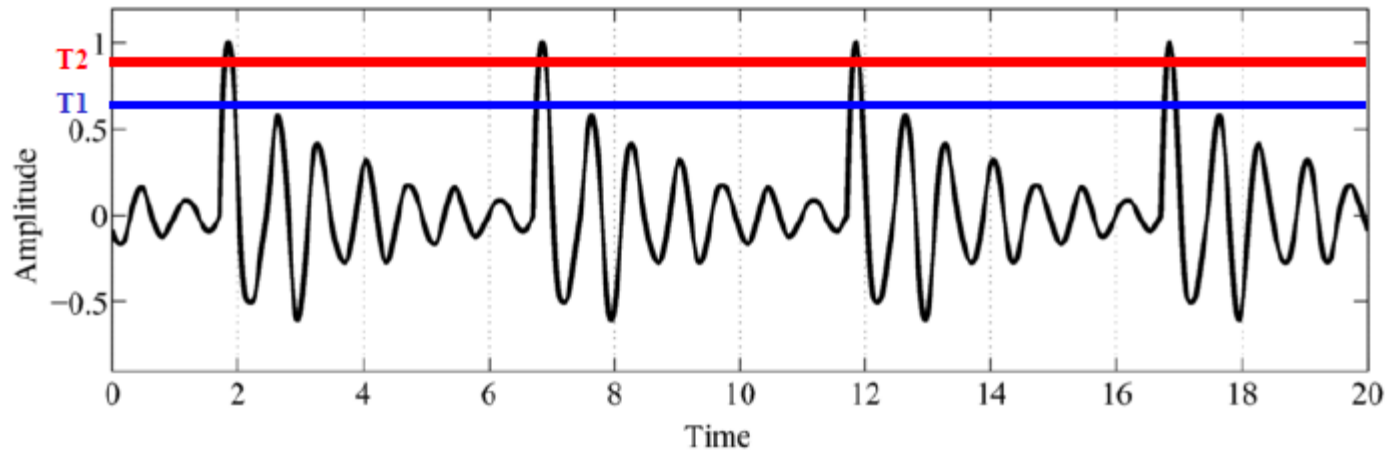
What does the 4-20 mA signal tell me?

The RMP 4-20mA signal is dependent upon a few parameters.




Let's start with setting *Threshold 1* and *Threshold 2*.

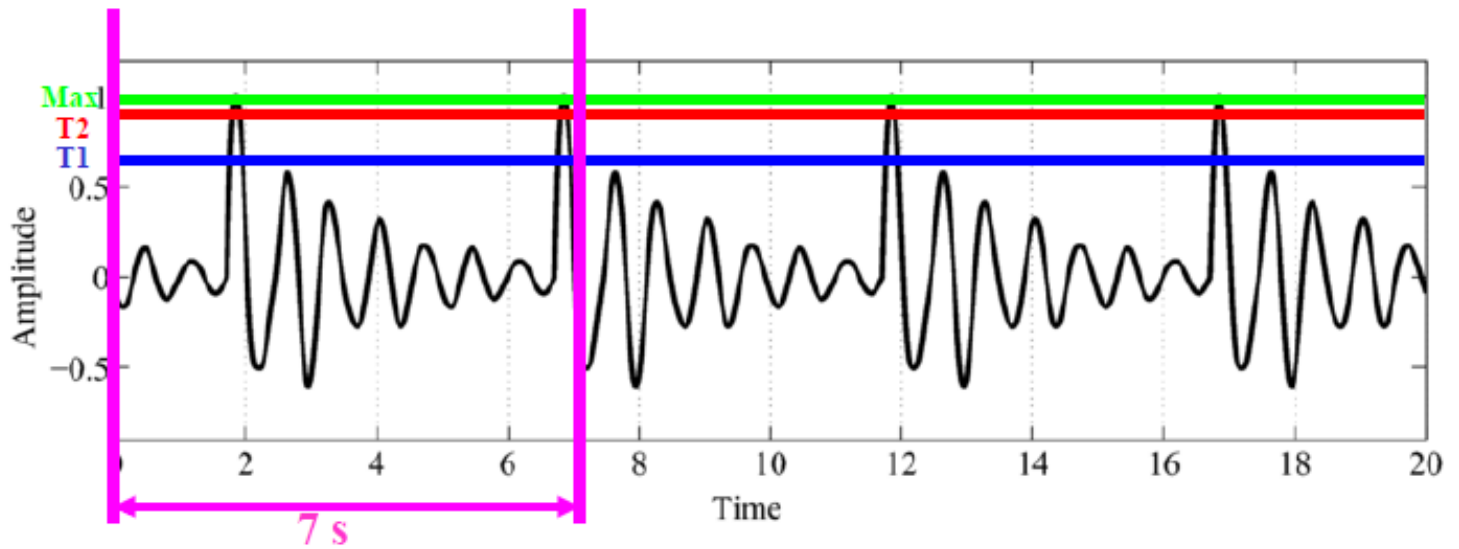
This is dependent upon the specific application, but in this case we will use:

$T1 = 0.6$ and $T2 = 0.9$ for the RFI.



Legend

-  RFI Threshold 1 = 0.6
-  RFI Threshold 2 = 0.9
-  RMP Vibration Signal






The RMP will sample vibration over a **7 second window**.

The RMP will choose the maximum peak (absolute value).

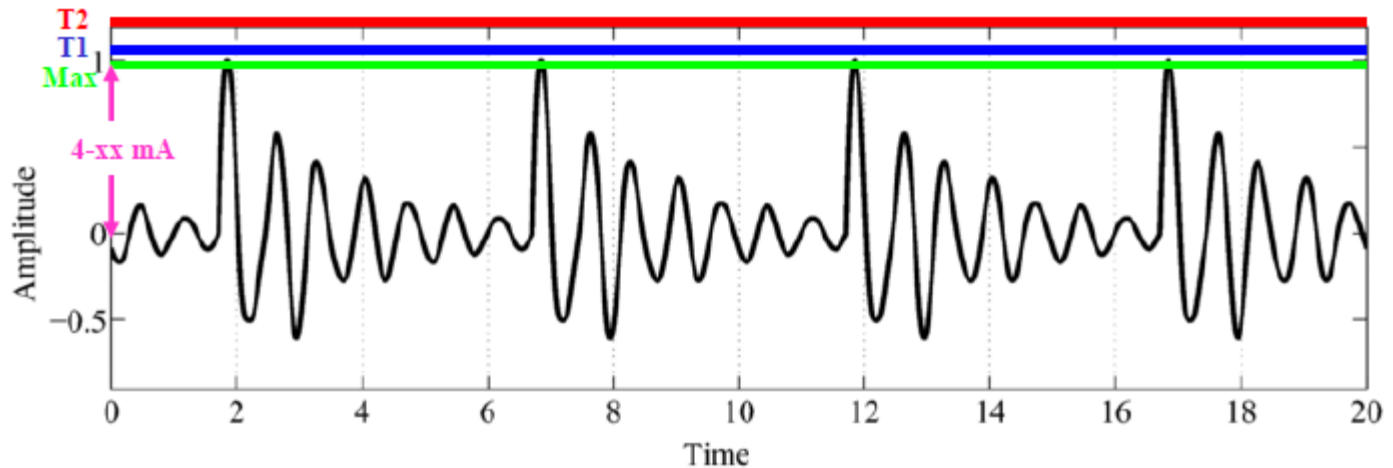
There are 3 possible scenarios:

- Max peak is less than both thresholds.
- Max peak is greater than T1 but less than T2.
- Max peak is greater than T1 and T2 (shown above).

Legend

-  RFI Threshold 1 = 0.6
-  RFI Threshold 2 = 0.9
-  RMP Vibration Signal




Max peak is less than both thresholds



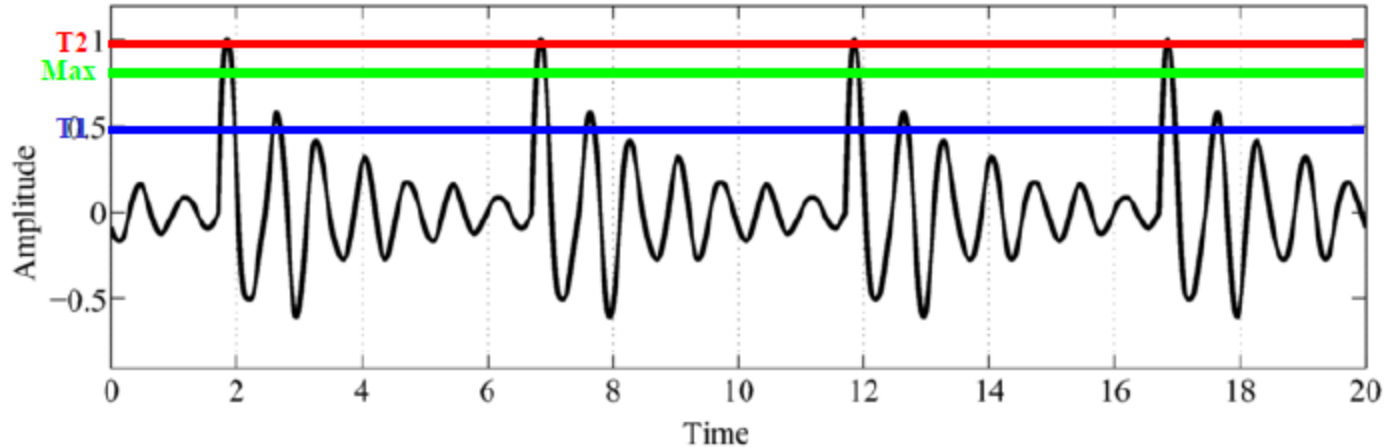
If the maximum peak is between 0 and T1 the RMP will provide a current signal *directly proportional to maximum peak (absolute value)*.

The signal range **4-xx mA** where xx is user specified (4-8 mA is default). This is analogous with a “normal” 4-20 mA signal.

Legend

-  RFI Threshold 1 = 0.6
-  RFI Threshold 2 = 0.9
-  RMP Vibration Signal

Max peak greater than T1, less than T2






Once the max peak exceeds **T1** the 4-20 mA signal is no longer proportional to the maximum peak.

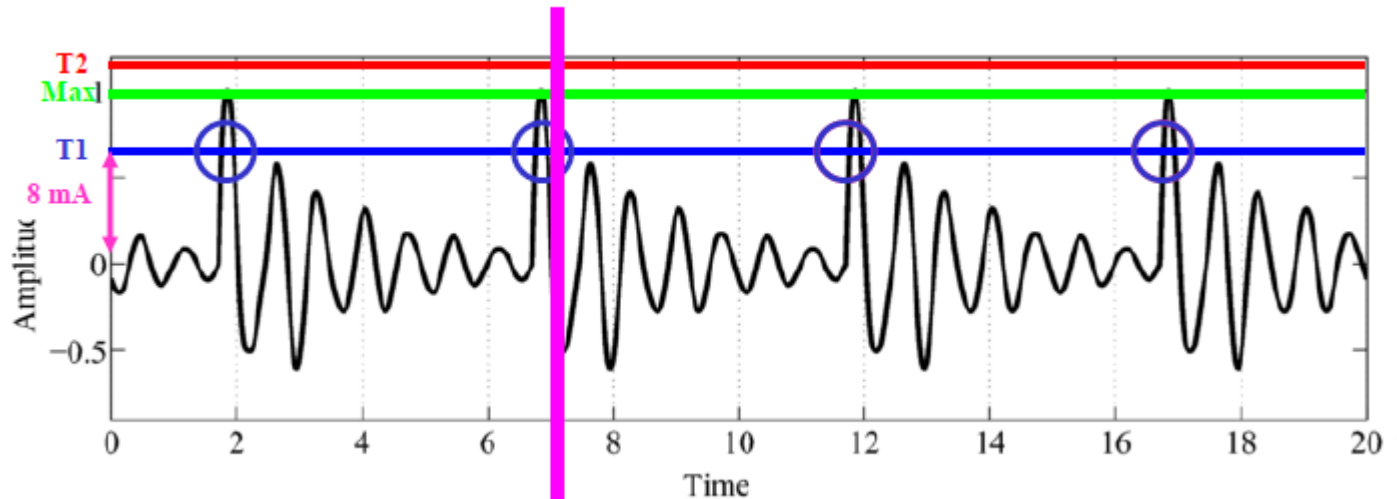
The 4-20 mA signal now corresponds to the *reciprocating fault index (RFI)*.

The (RFI) is not a measure of vibration, it is a quantity which gives insight into the overall health of the equipment.

Legend

-  RFI Threshold 1 = 0.6
-  RFI Threshold 2 = 0.9
-  RMP Vibration Signal

Max peak greater than T1, less than T2






We calculate the RFI by taking the value of T1 in mA (default 8 mA) and *adding A1* for every impact above T1.

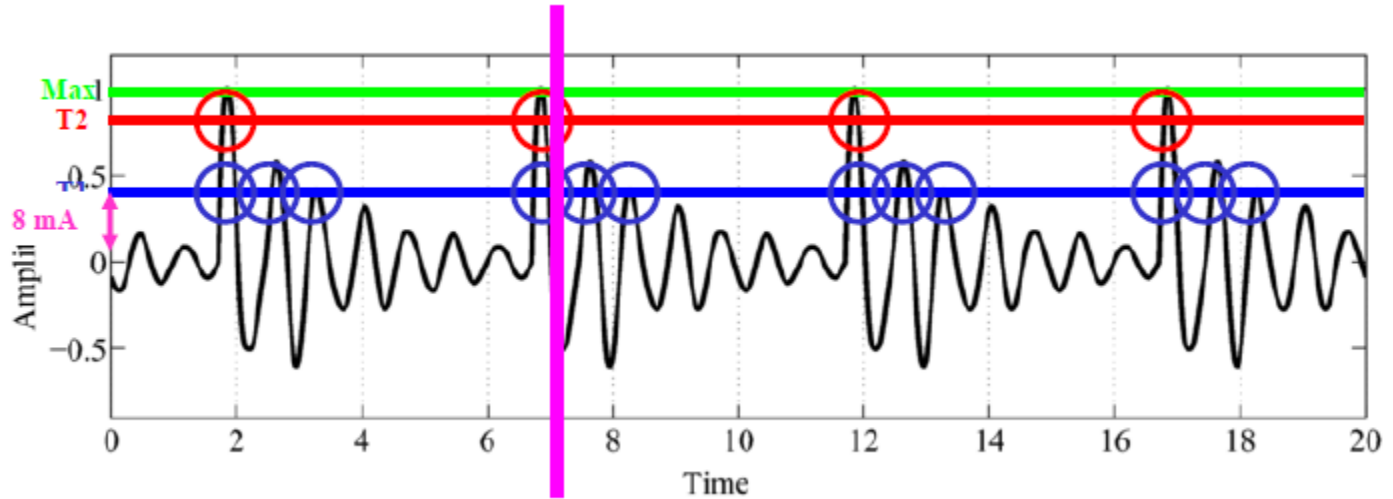
If A1 = 0.5 mA (Value is user specified)

In this example the output would be
 $8\text{mA} + (2) \times (0.5\text{mA}) = 9\text{ mA output}$

Legend

-  RFI Threshold 1 = 0.6
-  RFI Threshold 2 = 0.9
-  RMP Vibration Signal

Max peak greater than both T1 and T2






Now let's calculate the output for max peak > T1 and T2.

If $A1 = 0.5 \text{ mA}$ and $A2 = 2 \text{ mA}$

Remember if an impact exceeds T2 it still must be counted for exceeding T1 as well!

$$\text{Output} = 8\text{mA} + (4)(0.5\text{mA}) + (2)(2.0\text{mA}) = 14 \text{ mA}$$

Legend

-  RFI Threshold 1 = 0.6
-  RFI Threshold 2 = 0.9
-  RMP Vibration Signal

Other benefits include:

- Outperforms impact transmitters
- Provides early warning of faults and mechanical looseness
- Provides continuous peak acceleration trending
- Optimizes performance with field programmable set points and alarm levels
- Eliminates false trips
- Hermetically sealed
- Field programmable with USB interface (Model 070A89)

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