

ANALOG OUTPUT PARAMETER FOR WIND SENSORS IN TUNNELS AND CRANES

WMT700 version 2.08 introduces a new way of using analog outputs in road and rail tunnel applications as well as in crane applications.

The analog output parameter for getting horizontal and direction data is `aout_map`, which defines how analog output signals are used. WMT700 provides the following analog outputs:

- `aout1` for wind speed data
- `aout2` for wind direction data

aout_map Value	Definition
0	<code>aout1</code> , wind speed <code>aout2</code> , wind direction (default)
1	<code>aout1</code> , north-south, x component <code>aout2</code> , west-east, y component
2	<code>aout1</code> , wind speed <code>aout2</code> , wind speed alarm A digital output: hi when wind speed > <code>aout2_o</code>

Note that the wind direction offset (`WndDirOffset`) affects analog output the same way as the reported wind readings.

The following table shows the relationship between polar presentation and the x and y vector components.

Table 1 Wind y and x Components at Different Wind Direction Angles

Wind Speed	Wind Direction	x component	y component
1	0	-1	0
1	90	0	-1
1	180	1	0
1	270	0	1

Tunnel Application

In the tunnel application, airflow can be presented with one mA output channel, because airflow goes along the tunnel. Typically, a relatively long average time (time constant) for wind speed parameter is applied.

The sensor must be installed in a tunnel so that the sensor's North is aligned with the tunnel. The a_{out1} channel (x-component) provides the airflow in the tunnel. The following figure shows a typical WMT700 installation in a tunnel.

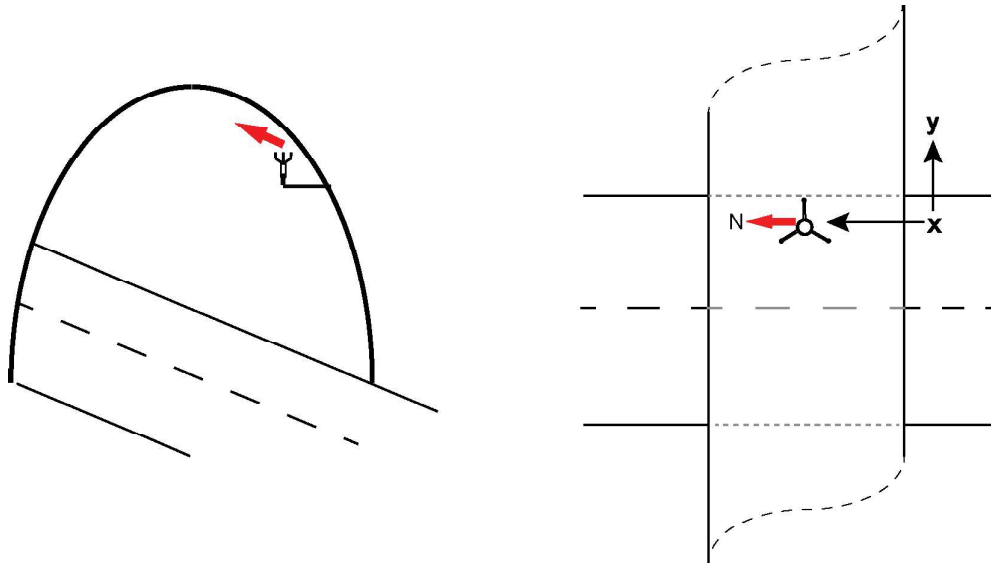


Figure 1 Typical WMT700 Installation in Tunnels

The following figure shows the 4...20 mA output as a function of airflow. The zero value is in the middle of the output scale (12 mA). When airflow increases from 0 m/s towards North, mA output reduces from 12 mA linearly resulting in 4 mA with 20 m/s wind. Similarly, when airflow increases from 0 m/s towards South, mA output increases from 12 mA linearly resulting in 20 mA with 20 m/s wind.

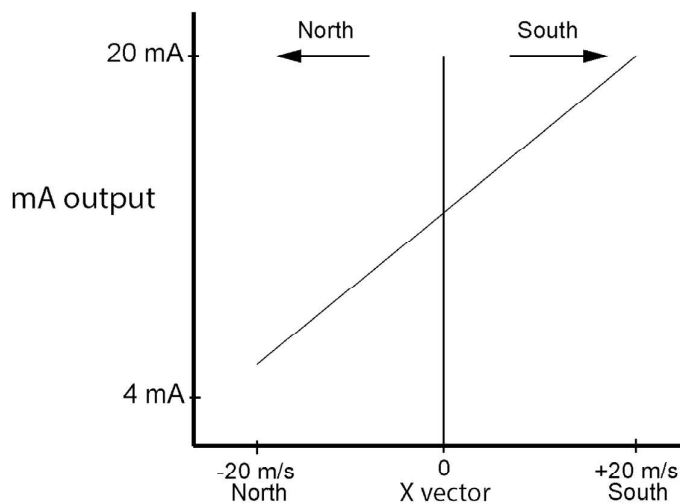


Figure 2 mA Output in Tunnels

The parameter `aout_map` with setting 1 is used to get the North-South component of wind.

```
s aout_map,1
```

The North-South component to `aout1`, the current output, -20 ... 20m/s to 4 ... 20mA, `aout2` disabled:

```
s aout1_g,0.0004
s aout1_o,0.012
s aout1maxv,0.020
s aout1minv,0.004
s aout1mode,0
s aout1err ,0.002
s aout2mode,7
```

Crane Application

In crane applications, WMT700 can provide wind speed values and drive alarm signals with 2 mA output channels. The WMT00 alarm output signal can be connected to external audible or visible devices to trigger wind speed alarm for user-defined limits.

Two analog channels are required for this application:

- Channel 1 provides the wind speed value
- Channel 2 provides the alarm signal

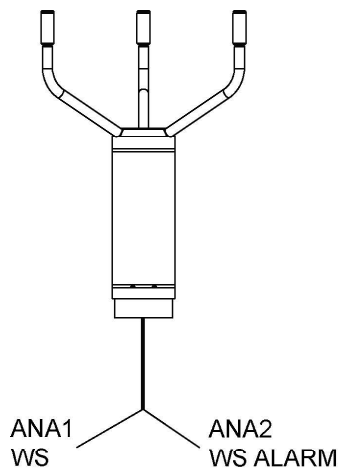


Figure 3 Analog Output for Wind Speed and Wind Speed Alarm

The wind speed value can be scaled according to the sensor's measurement range. The alarm signal operates with on/off-mode. The alarm threshold can be adjusted.

The following figure shows the relation between outputs.

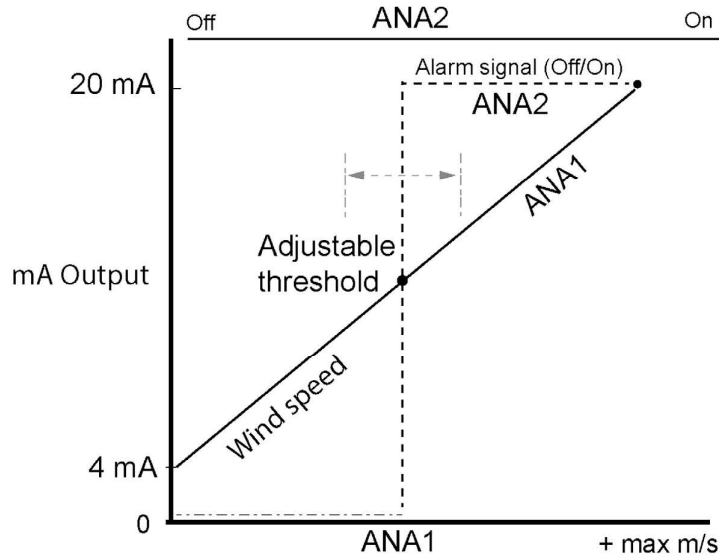


Figure 4 mA Output in Cranes

The `aout_map` with setting 2 is for getting the wind speed value and the alarm signal. The wind speed value in the `aout1` channel activates the wind speed alarm when the wind speed value exceeds the set limit value.

```
s aout_map,2
```

The analog output 2 works as digital output. `aout2_o` sets the threshold wind speed (`ws_tresh`, unit [m/s]) to 20 m/s:

```
s aout2_o,20
s aout2_g,1
```

To invert the logic signal, type:

```
s aout2_g,-1.
```

`aout1` gives wind speed 4 ... 20 mA output. `aout2` gives 0 mA when the wind speed is < 20m/s, otherwise 20 mA.

```
s aout_map,2
s aout1_g,0.000044444
s aout1_o,0.004
s aout1maxv,0.020
s aout1minv,0.004
s aout1mode,0
s aout1err ,0.002
s aout2_g,1
s aout2_o,20
s aout2maxv,0.020
s aout2minv,0.000
s aout2mode,4
s aout2err ,0.00
```