WMF Active Cooling Function

APW

METTLER TOLEDO

Engineering Note

1 Introduction

WMF weigh modules can be connected to an active cooling concept, which can help to reduce the internal temperature of weigh modules in multiline applications. This function might be necessary when the distance between two weigh modules is less than 10 mm. Once activated, it helps to cool down the weigh module and thus ensures to maintain best performance.

The supplied air is circulated inside the bottom plate to cool down the electronics of the weigh module. This means, there is no access of this air pressure to the interior of the weigh module.

Activate if d < 10 mm
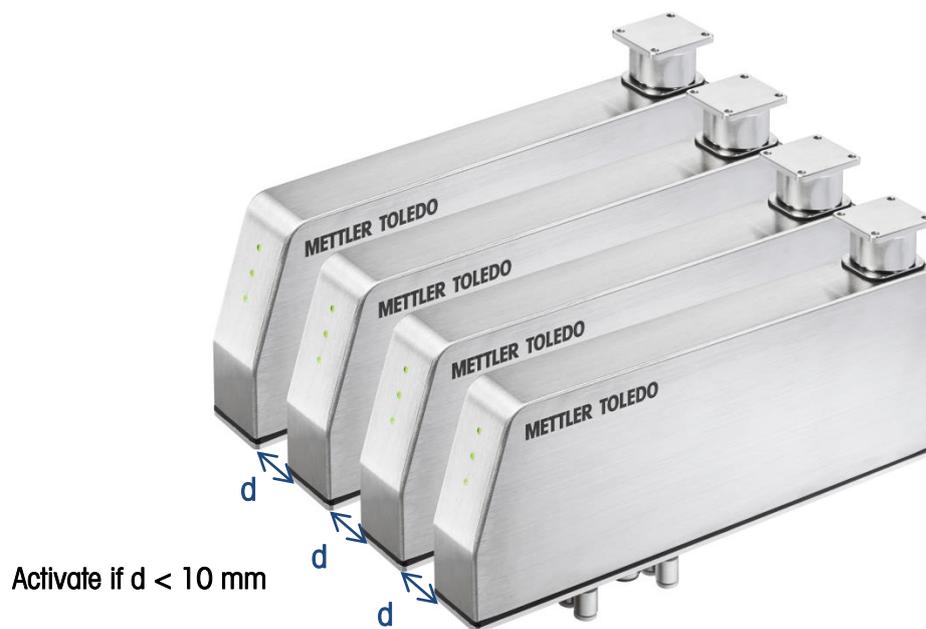
2 Installation & Operation

Active cooling function can be activated by supplying a continuous airflow to the air inlet located at the bottom plate of the weigh module.

A <u>continuose</u> airflow is mandatory for an accurate temperature compensation (Do not switch on/off or regulate the airflow during the process to avoid temperature drift).
If the airflow is activated or deactivated during a weighing process, the warm-up time (45 min) must be applied and an adjustment executed after the warm-up time in order to have stable weighing results.

Another air connector next to the air inlet is used to transfer this airflow to the outside.

Air used for this function should have the following qualities for optimum performance:

- Compressed air
- Maximum pressure: 1bar(g)

> For an optimum performance of the cooling function, please make sure that the compressed air is clean and does not cause accumulation of deposits (oil, dirt etc.) in the air channel.
>
> This can compromise free flow of the air in the channel and thus the cooling function.

In the below drawing, you can find the positions of the air connectors for the cooling function.

Air connectors for cooling function
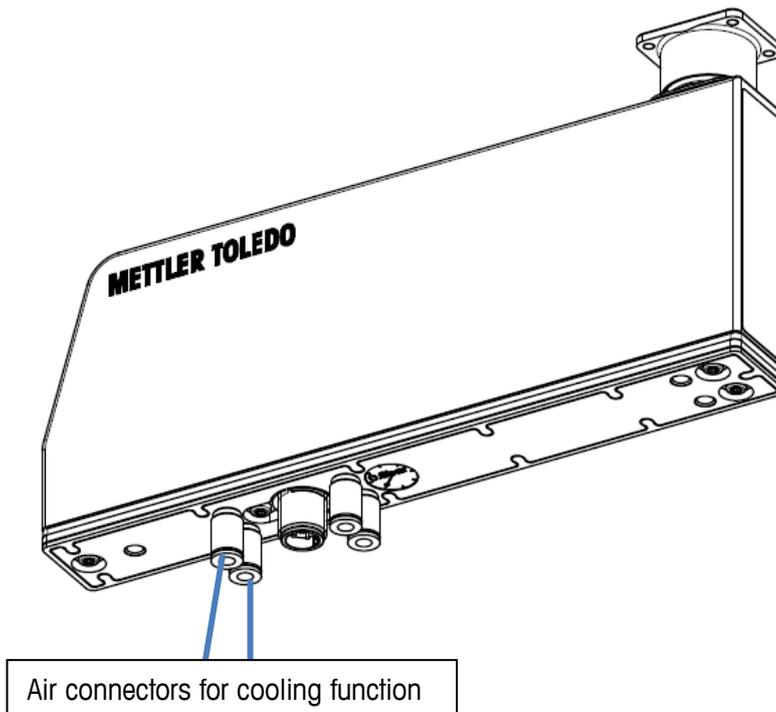
These air connectors can be purchased as an accessory with the following order number:
30307194

> ⚠️ If the air cooling function is used in combination with a 90° sensor cable, the sensor cable connector will conflict with the air pipes. Therefore, install **90° air connectors available from external suppliers** to avoid collision.
>
> Order information: (connection thread: M3 x 0.5)

These air connectors can be installed in the field. For this purpose, an Allen wrench (no. 1.5) can be used to remove the two hexagon screws, which seal the threaded holes for the air connectors. Then, air connectors can be installed at these threaded holes by turning them gently in clockwise direction.

2.1 Star Topology

In the following topology, air is supplied to all weigh modules separately. This method has the advantage of providing a low air pressure to keep enough airflow for all weigh modules in the network. The air inlet should be supplied with 0.6 bar(g) (air flow of 15 ± 2 liter / minute per weigh module) in order to activate the cooling function.

The air outlet should be left open to transfer the circulating air to the outside.
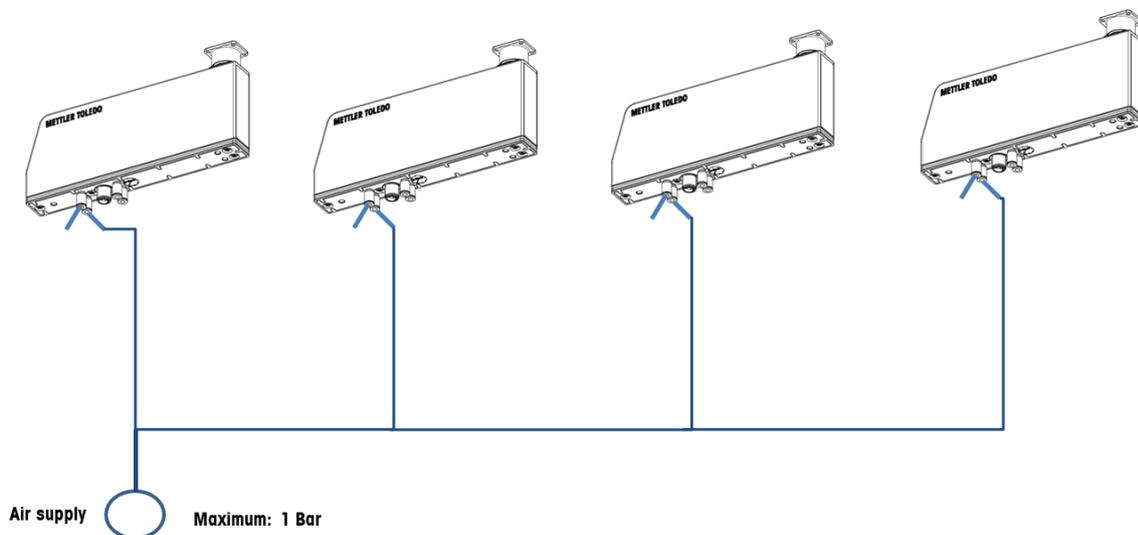
Air supply **Maximum: 1 Bar**

Typically, an air pressure of 0.6 bar can be applied in order to create an air flow of 15 liter / minute per weigh module. The temperature range of the supplied air should be between 10°C - 30°C.

2.2 Ring Topology

In this topology, air is transferred from one weigh module to the other, thereby saving air pipe material and facilitating the installation. The air outlet of the last unit should be left open to transfer the circulating air to the outside (see drawing below).

The air outlet of the first weigh module can be connected to the air inlet of the second weigh module in a daisy chain fashion. The same connection type can be repeated for all the other weigh modules.
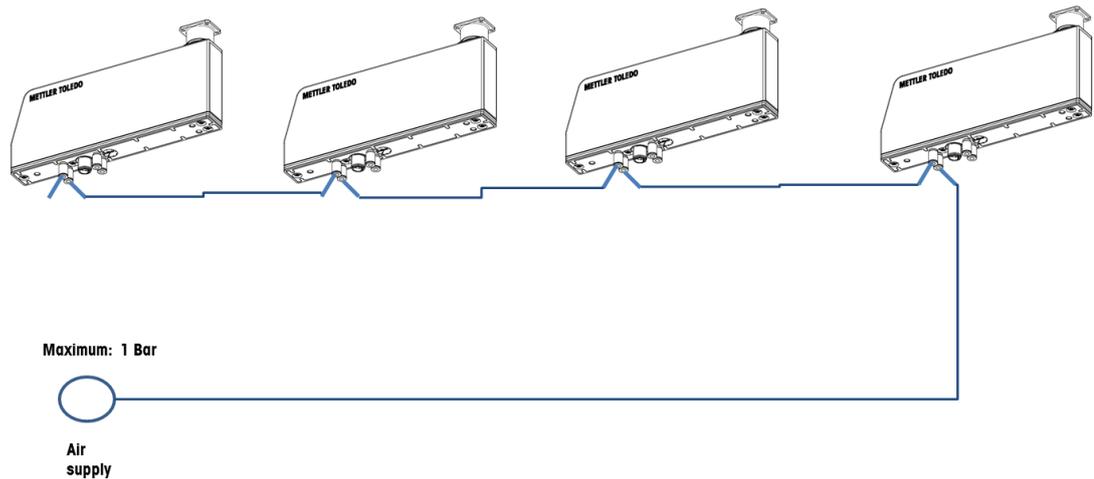
Maximum: 1 Bar

Air
supply

Typically, an air pressure of 0.6 bar can be applied in order to create an air flow of 15 liter / minute per weigh module. The temperature range of the supplied air should be between 10°C - 30°C.

Air pressure should be increased by approximately 0.1 bar for every new weigh module in this configuration.

Please be aware that in this configuration, the temperature of the supplied air can increase at every weigh module, which can potentially compromise the effectiveness of the cooling function.

Therefore, we recommend connecting maximum 4 weigh modules to a single air supplier in this configuration. If more weigh modules are to be connected in this configuration, we recommend using an air pressure distributor.

3 Temperature Limits

WMF weigh modules monitor their internal temperature value with a sensor placed at the electronics.

3.1 Diagnostic LED

When certain threshold values are exceeded, this is displayed by the diagnostic status LED as follows:

Diagnostic LED

Diagnostic LED status	Meaning	Internal Temperature Value
Green, solid	Normal operation	$T < 35\ °C$
Red, blinking	**Warning:** still functional, but weight results not reliable (outside compensated weighing range)	$T \geq 35\ °C$
Red, solid	**Error:** weighing not possible, check the corresponding error status	$T \geq 47\ °C$

3.2 Communication Protocol

MT-SICS (via TCP/IP interface): MT-SICS protocol is transmitted over the TCP/IP serial channel and can be used to communicate with the device using a PC or laptop.

Warning / error conditions are transmitted with the following codes in this protocol:

Condition	Communication Status
Normal operation	Weighing possible
Warning	Weighing possible No error code is transmitted
Error	Weighing **not** possible Error code "**104**" is transmitted instead of the weight value

Temperature value of the weigh module can be requested with the M28 command. For more details, you can refer to MT-SICS reference manual on mt.com (see 6, other reference documents).

SAI (via PROFINET or EtherNet / IP interface): SAI protocol is transmitted over the Industrial Ethernet interface and can be used as communication protocol between the weighing module and an industrial control system (e.g. a PLC).

Warning / error conditions are transmitted with corresponding SAI status bits in the status block.

- If status block command 0 (default) or status block command 1 is selected, temperature errors are indicated through bit 10 in status group 1 (temperature error).
- If status block command **21** is sent, the weigh module in case of a temperature alarm sets following alarm monitor bit-set.

For more details, you can refer to SAI reference manual on mt.com (see 6, other reference documents).

4 Troubleshooting

Below in the table, you can find the potential solution methods in order to react to warning or error conditions:

Condition	Solution Methods
Normal operation	No intervention needed
Warning	Check the temperature of the electronics (with M28 command) and the working status of the active cooling system. Check the pressure of the air supply and the integrity of the air pipes. Adjust the air pressure and repair the air pipes if necessary.
Error	Switch off power (PoE -> off) to prevent any potential damage to the unit.

5 Conclusion

Internal temperature condition of WMF weigh modules can be continuously monitored by the control system with corresponding warning/error status bits and LED signals.

If a **warning** condition is active, this means that weight results are not reliable due to high temperature value. In this case, cooling function should be activated and supplied with enough air pressure to bring the weigh module back to permissible temperature range.

If an **error** condition is active, this means that the internal temperature value is too high which can damage electronic components. In this case, power to the weigh module should be disconnected immediately to prevent any potential damage. Cooling function can also here be activated to bring the weigh module back to permissible temperature range.

6 Other Reference Documents

- WMF user manual, 30297182, WEU
- WMF installation manual, 30275981, en
- MT-SICS reference manual, 11781363, en
- Standard Automation Interface reference manual, 30324925, en

All reference documents can be downloaded from:

www.mt.com/ind-wmf-documents