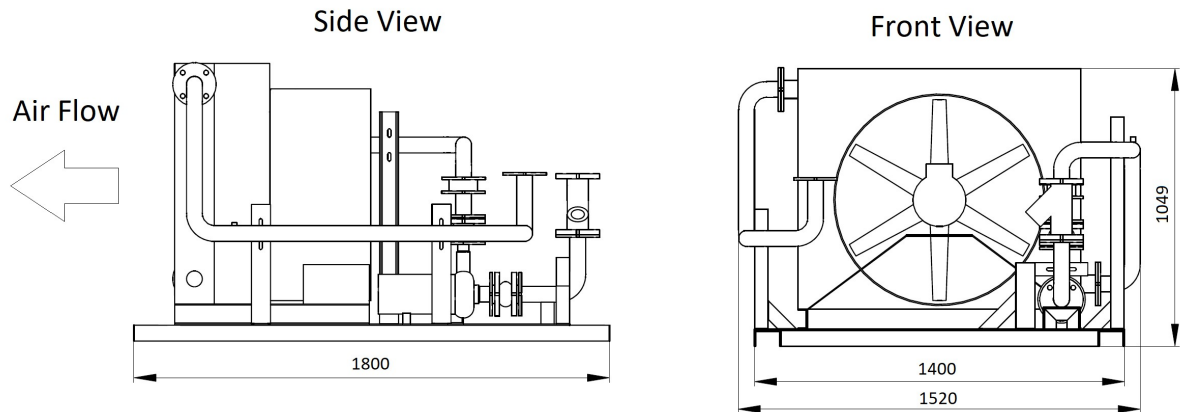


# Universal LRS Electrolyte Air-blast Cooler (UAC)

## Data Sheet



The SDG Technologies UAC is utilized as part of a temperature control scheme where the LRS electrolyte temperature is controlled at a constant temperature higher than ambient with heaters, see application note. The electrolyte temperature is described by:

$$T = (T_{work} + T_{inc} - T_{ambient})e^{-t/\tau} + T_{ambient}$$

Where

$T$  is the water temperature as it cools down after the start-up.

$T_{work}$  is the constant working temperature at which the water is controlled by the heaters.

$T_{inc}$  is the incremental increase in water temperature after each mill start-up.

$T_{ambient}$  is the ambient temperature at the LRS.

$t$  is the time after the start-up in minutes.

$\tau$  is the time constant of cooling.

In the case of a 5000 liter EPM4 LRS, the UAC improves the time constant of cooling  $\tau$  to 82 minutes, in comparison to a  $\tau$  of 1580 minutes for the same tank with only stirring applied.

A typical 7MW ball mill increases the water temperature by typically 3°C per start-up. The following table therefore illustrates the improvement in starts per hour achieved for such a mill, assuming a constant ambient temperature:

For $T_{inc} = 3^{\circ}C$ , i.e. time to cool 3°C after start to the same temperature as before the start:		
$T_{work} - T_{ambient}$	Without Cooler ( $\tau \approx 1580$ )	With Cooler added ( $\tau \approx 82$ )
5°C	743 minutes = 0.08 starts per hour	38.5 minutes = 1.6 starts per hour
10°C	416 minutes = 0.14 starts per hour	21.5 minutes = 2.8 starts per hour

$T_{work}$  of 43°C has been successfully deployed in Mali, Ivory Coast, and DRC on 7MW and 8MW mills, yielding good results with high ambient temperatures, while 37°C has typically been used at other sites.

It should be noted that the electrolyte concentration needs to be specified for the  $T_{work}$  being used. Also, the LRS should have adequate time to attain the working temperature at the end of a shut to avoid starting at a too low starting torque, please see application note.

When used in combination with LRS dipper movement control, considerably higher start-up rates can be achieved at high ambient temperatures.