ATS22 OLF reset time

OLF description:

The thermal state of the motor is estimated:
-By calculating: (Imot/In mot) *(Imot/In mot)
-For a reference temperature (ambient temperature) of 40°C
-For the temperature rise of the frame (iron) and the temperature rise of the winding (copper)

The OLF fault can be enabled or disabled.

The thermal state is not calculated during braking or heating (the current measurement is insignificant).
Resetting the thermal state to zero is forced by ith=Off
The thermal state is not passed to HMI. It is internal variable.

Here are the trip values for OLF fault. Please not that there is extra trip level for 2 components, copper and iron.
OLF is triggered whichever component exceeds its trip level the first.

Thresholds for changing to thermal fault mode: Cu thermal state > 200% or Fe thermal state > 125%
This fault can only be reset if the copper thermal state < 170% and the iron thermal state < 110%.
This fault is stored in the EEPROM fault log.

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	C1	C2
Class	Copper	Iron
(tHP)	$t_{copperRESET}$(s)	$t_{ironRESET}$(s)
10	116	379
20	235	804
30	350	1256
Trip value	200	125
Fault reset	170	110

Table 1 – Cooling time for Cu and Fe from trip level to reset level

C1: $t_{copperRESET}$(s) is the time (second) to reset the fault condition due to copper.
The time (second) to reset the thermal fault could depend on the state of Iron.

C2: $t_{ironRESET}$(s) is the time (second) to reset the fault condition due to iron.
It is also the time (second) to reset the thermal fault.

In table 1, $t_{copperRESET}$(s) and $t_{ironRESET}$(s) are the reset times for OLF if the fault is due to only copper or only to iron thermal state, while second component is below fault reset threshold (Fe below 110% or Cu below 170%)

When OLF occurs and one of the Cu or Fe is at trip level, very often the second component is above the reset threshold. Therefore, it is difficult to calculate precise value. As soon as both Cu and Fe goes below their reset thresholds (170% for Cu and 110% for Fe) the fault reset is possible.

If both iron and copper thermal state achieves trip values, the prediction of waiting time is even more complicated. But definitely longer than $t_{ironRESET}$(s).

Fe therm state	120	115	112
Cu therm state	200	200	200
Class	Reset time	Reset time	Reset time
(tHP)	t_{iron}(s)	t_{iron}(s)	t_{iron}(s)
10	258	132	53
20	547	280	113
30	855	437	177

Table 2 – Cooling time when Cu state is at trip level and Fe state is above reset level

Values in table 2 shows the waiting time (reset time) when ATS has tripped with OLF due to exceeded Cu thermal state while Fe thermal state was above reset threshold. Table provides 3 different Fe thermal states.