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ABSTRACT

CONTROL DEVICE AND METHOD OF CONTROL FOR THE DRIVE UNIT OF A WINDSCREEN WIPER SYSTEM

Described herein is a control device (160) for controlling a drive unit (120) for at least one wiper arm (140) of a vehicle windscreen wiper system (100), wherein the control device (160) is configured to determine at least one load quantity (L) of the drive unit (120) and to adjust the wiping frequency (WH) of the wiper arm (140) by means of a ratio of the determined load quantity (L) to at least one load threshold value (LS). In an embodiment, the control device (160) is configured to carry out an adjustment of the wiping frequency (WH) as a function of a current driving speed (v) of the vehicle.

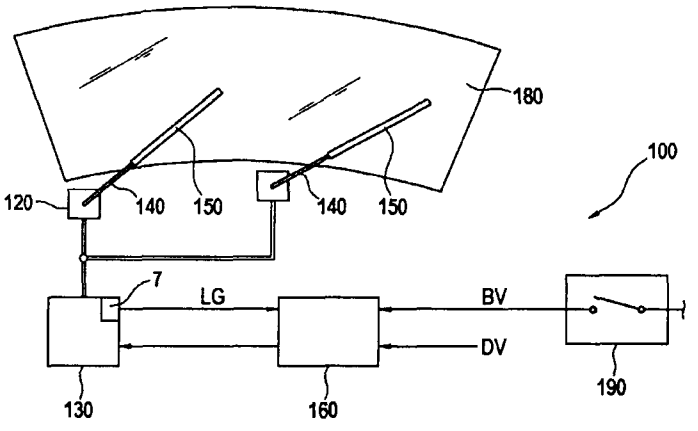

FIG. 1

I/We claim:

1. A control device (160) for controlling a drive unit (120) for at least one wiper arm (140) of a vehicle windscreen wiper system (100), wherein the control device (160) is configured to determine at least one load quantity (L) of the drive unit (120) and to adjust the wiping frequency (WH) of the wiper arm (140) on the basis of a ratio of the determined load quantity (L) to at least one load threshold value (LS);

characterized in that,

the control device (160) is configured to carry out the adjustment of the wiping frequency (WH) as a function of a current driving speed (v) of the vehicle.

2. The control device (160) as claimed in to claim 1, wherein the control device (160) is configured to determine the load threshold value (LS) as a function of the wind load acting on the wiper arm (140) at the current driving speed (v).

3. The control device (160) as claimed in one of the claim 1 or 2, wherein the control device (160) is configured to increase the load threshold value (LS1, LS2) with an increase in the driving speed (v) by an amount, which essentially corresponds to the wind load acting on the wiper arm (140) caused by the incremental increase in the driving speed (v).

4. The control device (160) as claimed in one of the claim 2 or 3, wherein the control device (160) is configured to carry out the speed-dependent adjustment of the load threshold value (S) only at higher driving speeds (v).

5. The control device (160) as claimed in one of the preceding claims 1 to 4, wherein the control device (160) is configured to reduce the wiping frequency (WH) with an increase in the driving speed (v) and an accompanying increase of the wind load acting on the wiper arm (140), in such a manner that as a result of this, the additional energy input required because of the increased wind load in the drive unit (120) is essentially compensated.

6. The control device (160) as claimed in one of the preceding claims, wherein the control device (160) is configured to automatically reduce the wiping frequency (WH) as soon as a predefined driving speed (v_1) is exceeded.

7. The control device (160) as claimed in one of the preceding claims, wherein the control device (160) is configured to determine the load quantity (L) with the help of a model, which simulates a current load condition of the drive unit (120) by means of empirical values, rules of physics, and/or determined reference values, wherein the control device (160) is further configured to reduce the wiping frequency (WH), if the load quantity (L) determined as a result, exceeds the predefined load threshold value (LS).

8. The control device (160) as claimed in one of the preceding claims, wherein the control device (160) is configured to reduce a thermal load of the drive unit (120) caused by a continuous wiper operation to switch over to an operation at intervals with interval cycles that can be freely parameterized.

9. The control device (160) as claimed in one of the preceding claims, wherein the control device (160) is configured to reduce the wiping frequency to zero by a thermal load of the drive unit (120) caused by the wiping activity, and to resume the wiping activity again only as a result of a user input or on-board information.

10. The control device (160) as claimed in one of the preceding claims, wherein the control device (160) is configured to detect by means of the ratio of at least one load quantity (L) to a load threshold value (LS), whether a wiping process takes place on a dry windscreen or on a wet windscreen, and that the control device (160) is further configured to reduce the wiping frequency (WH) in case of a dry windscreen to such an extent that the thermal load of the drive unit (120) remains within a threshold value, starting from which, a thermal safety mechanism of the drive unit (120) is triggered.

11. A windscreen wiper system (100) for a vehicle comprising:

a drive unit (120) for at least one wiper arm (140); and

a control device (160) for the drive unit (120), wherein the control device (160) is configured to determine at least one load quantity (L) of the drive unit (120) and to adjust the wiping frequency (WH) of the wiper arm (140) by means of a ratio of the determined load quantity (L) to at least one load threshold value (LS);

characterized in that,

the control device (160) is configured to carry out the adjustment of the wiping frequency (WH) as a function of the current driving speed (v) of the vehicle.

12. A method for controlling a drive unit (120) of a windscreen wiper system (100) having at least one wiper arm (140) of a vehicle, the method comprising:

determining at least one load quantity (L) of the drive unit (120); and

adjusting the wiping frequency (WH) of the wiper arm (140) by means of the ratio of the determined load quantity (L) to a load threshold value (LS);

characterized in that,

the adjusting the wiping frequency (WH) is carried out as a function of the current driving speed (v) of the vehicle.

13. The method as claimed in claim 12, wherein the load threshold (LS) is defined as a function of the driving speed (v).

14. The method as claimed in claim 12 or 13 further comprises reducing the wiping frequency (WH) automatically when a predefined driving speed (v_1) exceeds.

Dated this 17th day of April 2012

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AGENT FOR THE APPLICANT

To
The Controller of Patents
The Patent Office at New Delhi

Applicant(s) Name: **ROBERT BOSCH GmbH** Sheet No.: 1

Application No.: Total No. of Sheets: 5

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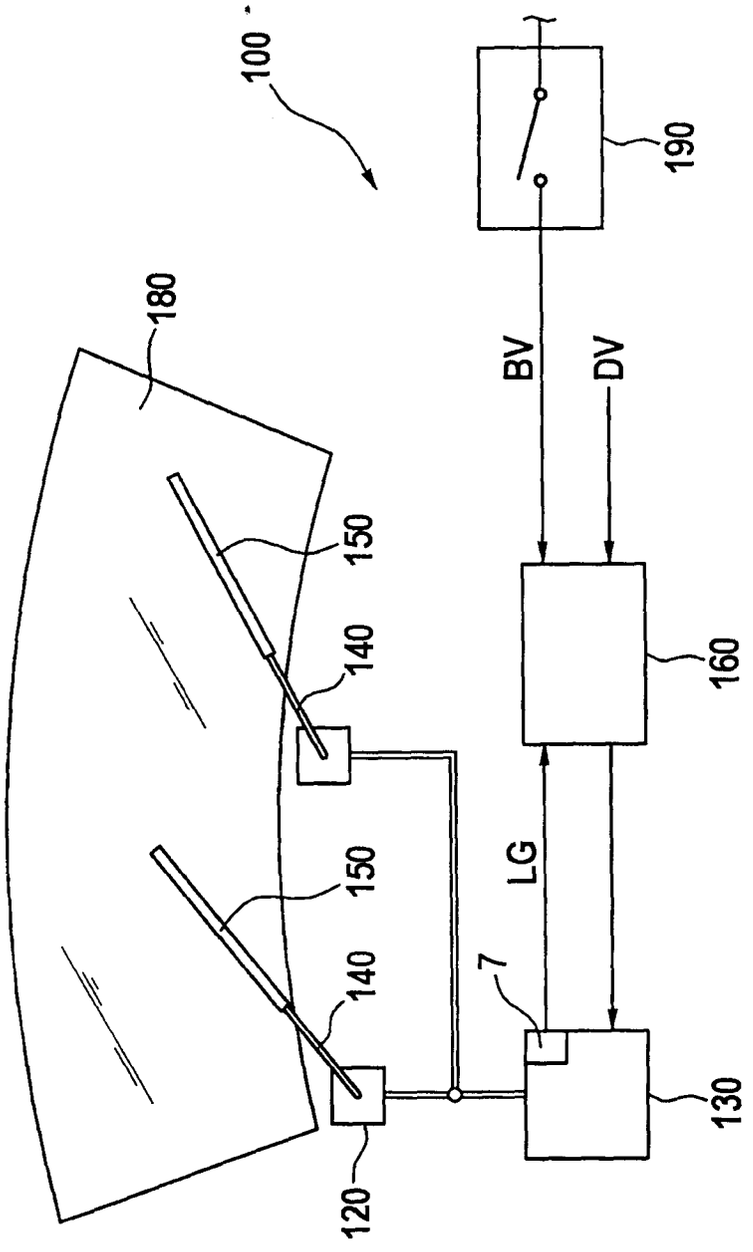

FIG. 1

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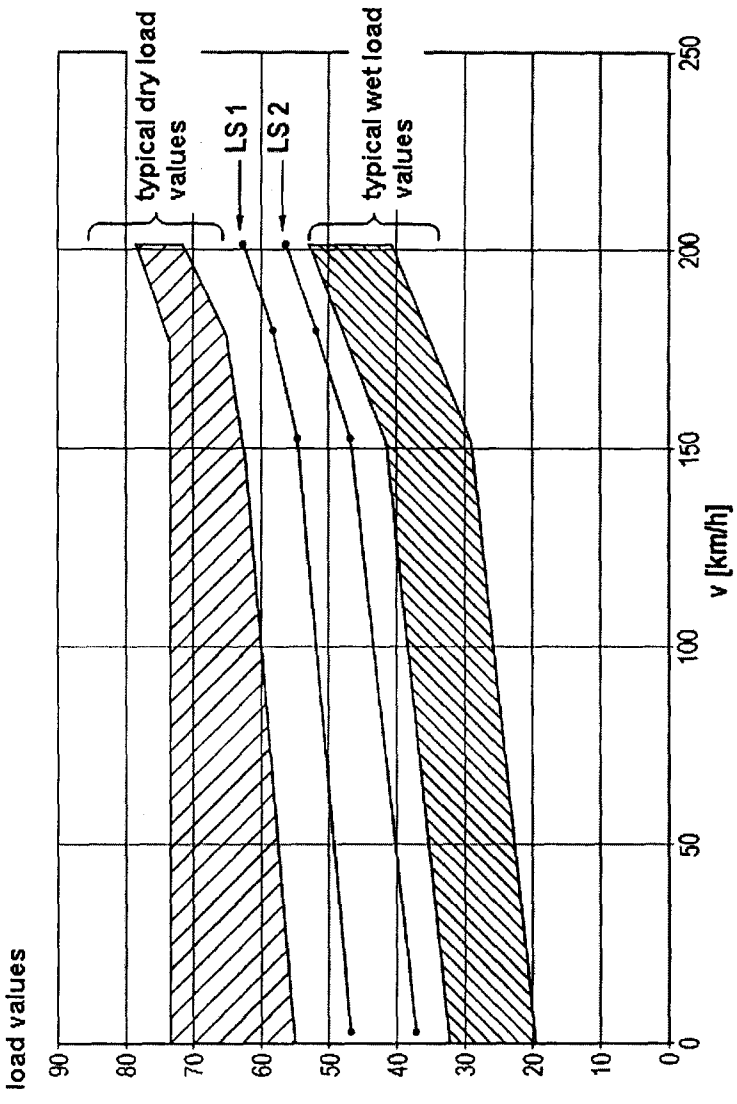

FIG. 2

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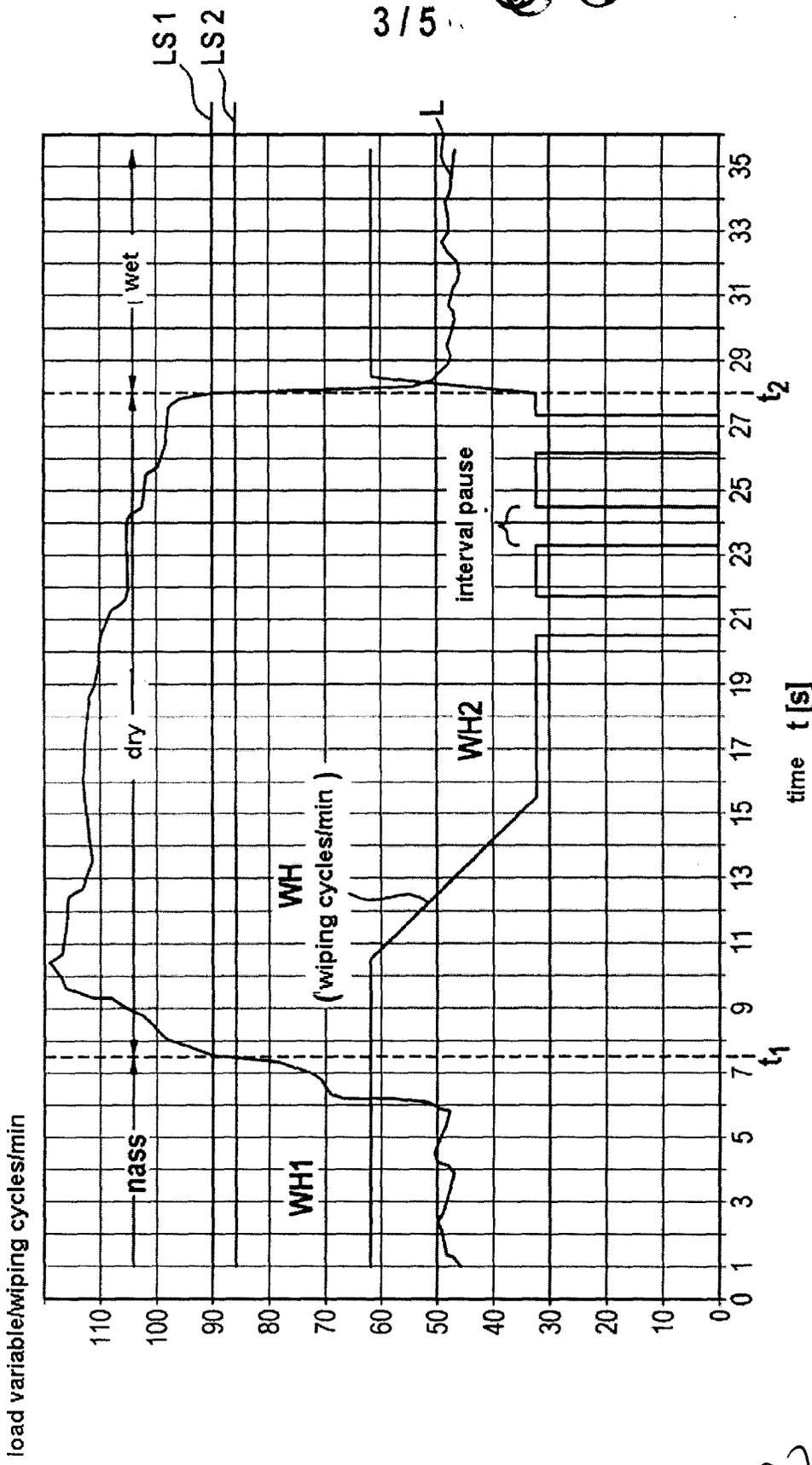

FIG. 3

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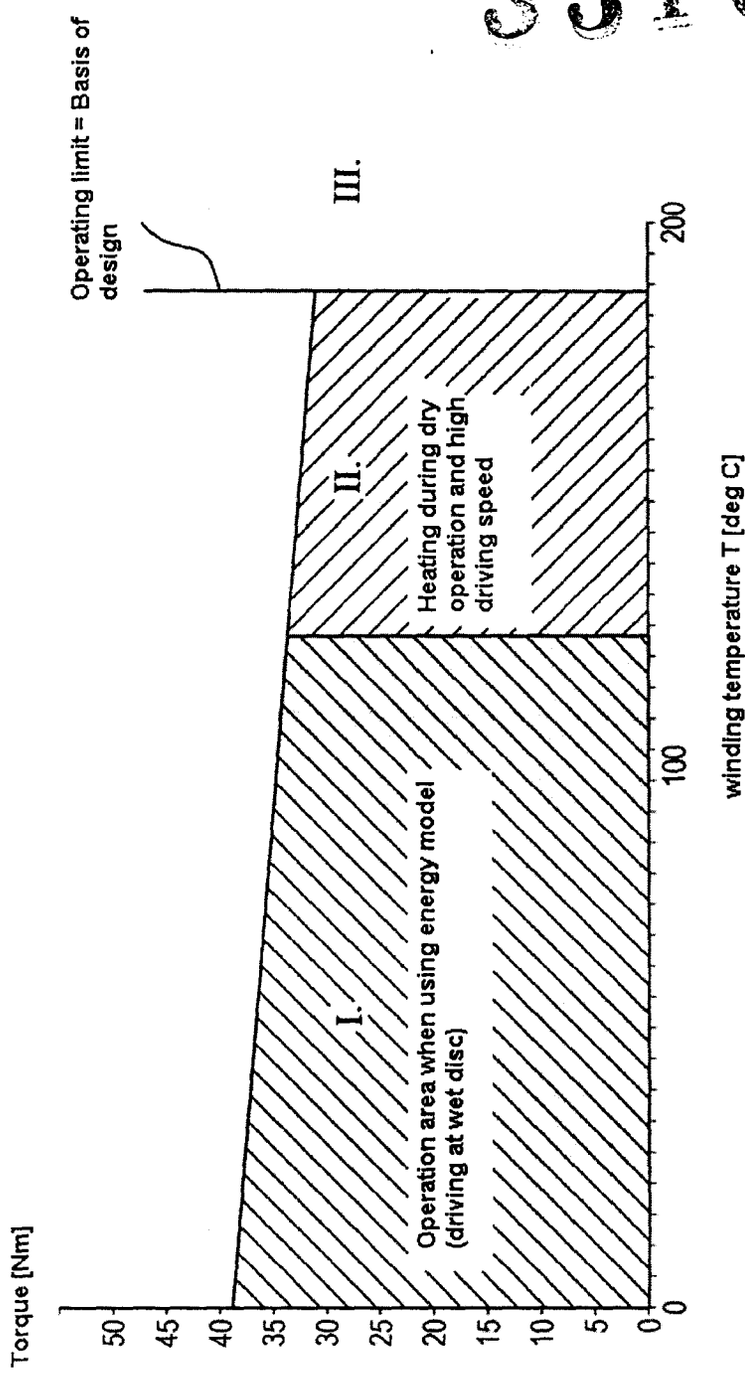

FIG. 4

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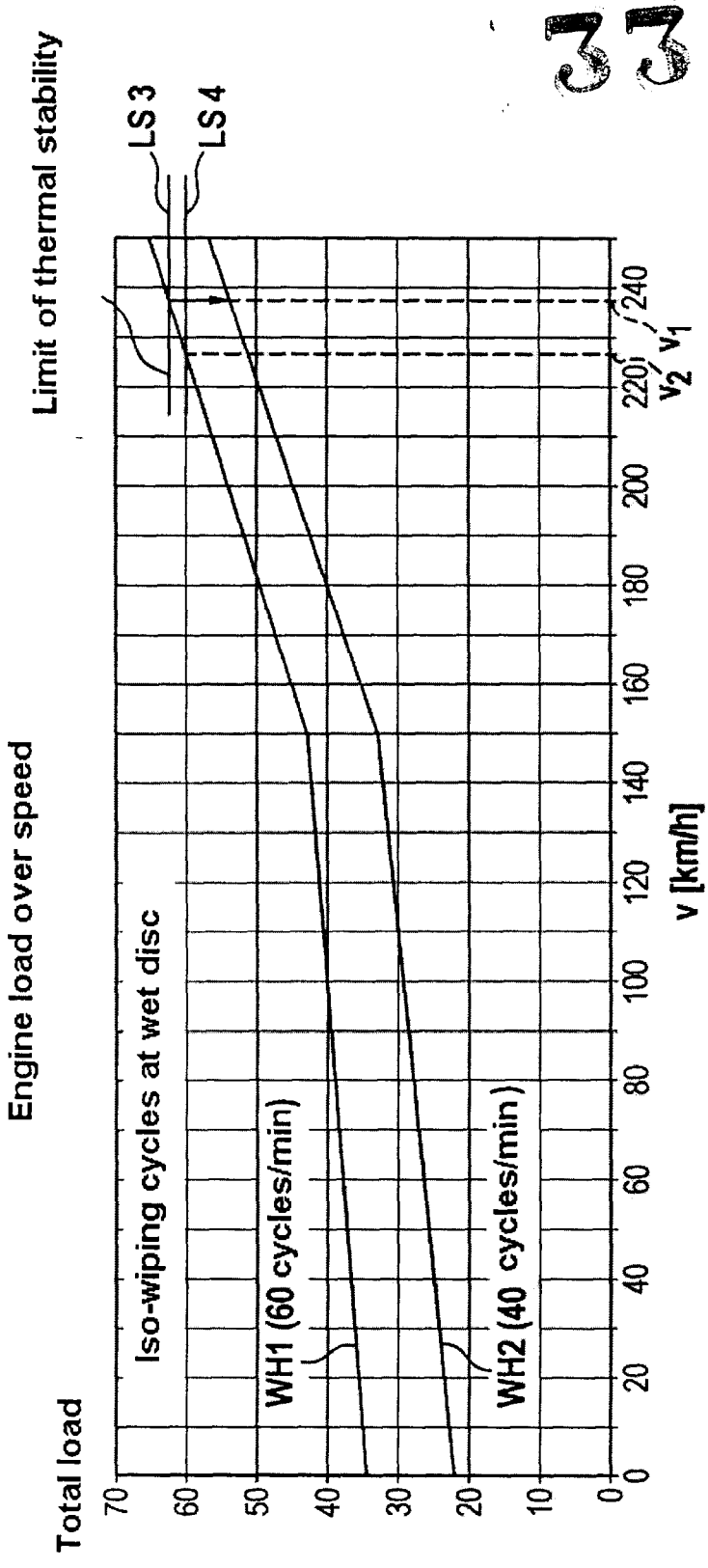

FIG. 5

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TECHNICAL FIELD

The present subject matter relates to a control device for a drive unit of a windscreen wiper system, particularly of a windscreen wiper system for a motor vehicle. The present subject matter further relates to a method for controlling such a drive unit and the corresponding windscreen wiper system.

BACKGROUND

Windscreen wipers are used in different types of vehicles, including as front- and rear windscreen wipers in motor vehicles. Typical windscreen wiper systems include one or more wiper arms provided with wiper blades, which are cyclically moved over the windscreen to be cleaned, in order to wipe the moisture from the windscreen. An electronically controlled electric motor, typically a rotating motor, serves as a drive unit for a wiper arm, the movement of which is converted into the desired wiper movement, either directly or via a corresponding gear. Therefore, the motor must apply varying amounts of torques, according to the operating condition, in order to move the wiper arm over the windscreen with the desired wiping speed. In particular, the wiper operation on a dry windscreen therefore represents relatively high load of the motor due to the higher frictional forces acting between the windscreen surface and the wiper blade. Since the power to be applied by the drive unit is, in principle, associated with an energy input to the drive unit and the resulting thermal load on the motor components, the windscreen wiper motors are usually equipped with special safety functions, which cause a disconnection of the motor while exceeding a critical temperature. As a result of the temperature rise in the motor, its maximum torque also reduces by a measurable amount. In order to ensure that the desired torque and with this, even the windscreen wiper function is available as such in each operating condition, the peak loads of the motor, which realistically occur in the windscreen wiping operation, must be taken into account during the dimensioning of the drive unit. For example, motors with higher power than necessary must be used, where appropriate, in order to ensure a longer operation, even on a dry windscreen without activation of the motor safety function as far as possible. However, the desire for a highly powered windscreen wiper drive conflicts with the endeavor to make the vehicle components, such as the windscreen wiper motor, as compact