



User manual

GB

HR 600

No. 0950-109

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Trykt på ACO Funki A/S

USER MANUAL

ACO Funki HR 600 is an IP54 clad climate control unit. The automatic control unit has IP54 class protection and is designed for the harsh agricultural environment.

Everyday use of the unit and a large number of technical parameters can be set and adjusted from the front panel, where a 2x16 character display enables the control unit to be set and adjusted in a clear and straightforward manner. 4 buttons are used to manoeuvre between the different menus, and a single push on the appropriate key will always return the display to its initial reading, e.g. display of the current temperature measured or similar. In everyday use only one or two menu items are used, whereas numerous parameters can be adjusted in the so-called "service menu".

HR 600 contains a 6A triac control with stop function in order to enable direct regulation of a 1-phase asynchronous motor. The stop signal is led out to the terminals in order to facilitate the connection of synchronous slaves, etc.

HR 600 also has a zero potential relay output, which can be set via the software to act as **heat** control or **alarm** with temperature limits.

HR 600 has two 0-10V DC outputs for the control of slaves, frequency converters, damper motors, drive stations or other equipment which can be controlled by a 0-10V signal for increased ventilation.

Both outputs can be max/min limited in relation to the ventilation.

Furthermore, both outputs can be offset and limited in relation to the current degree of ventilation.

Both outputs can be reversed for control of a thermal valve, if required.

HR 600 is a modern agricultural control unit, and the temperature can be regulated using the built-in PID regulator, which results in extremely precise control. It is possible to choose between a traditional P regulator, a pure I regulator, a PI regulator or a PID regulator.

Technical data

- 230 +/- 15V AC / 50 Hz supply
- 1 relay output 5A / 230V AC
- Built-in low-voltage fuse T6.3 A
- 6A built-in motor regulator (Triac)
- Analogue temperature input -50°C +50°C / 0.1°C
- 2 analogue outputs 0-10V / 10mA
- 1 stop output synchronised with onboard stop function
- Optional real-time clock with lithium battery backup
- Ambient temperature
- -5 – 45°C
- Humidity 5-95% RH, non-condensing
- Operation via front panel - 4 keys
- Clear, illuminated character display, 2x16 characters
- Protection class IP 54
- 2 x PG13 and 4 x PG9 screwed connections
- Connection through robust clamping terminals
- Clear marking on printed circuit board
- Fibox NMX 180x130x100mm ABS
- EMC 89/336/EEC LVD 73/23/EEC
- CE approval pending !

Operating instructions for HR 600

General

The control unit is used to regulate the climate in small stables, for heat exchangers, cattle stables or simply in rooms where the temperature must be very precisely controlled.

There is an option of connecting a 1-phase asynchronous motor, max. 6A, to the built-in TRIAC control.

The motor speed is regulated by the PID regulator according to changes of temperature.

There are two 0-10V outputs which can both be used to control either servo motors, drive stations, frequency converters, modulating thermal valves or indeed ANYTHING that can be controlled by 0-10V signals.

Both outputs can be customised in relation to the ventilation level, which is in turn the product of the PID regulator.

In addition, there is a zero potential relay output, which can be selected from a menu to act either as an ON/OFF heat control or as an alarm output for high or low temperature.

In this regard, it is IMPORTANT to recognise that the regulator produces a signal which is proportional to the measured temperature error. The temperature error is the difference between the measured temperature and the desired temperature !

THE DEGREE OF VENTILATION is -100 to +100%

where -100% corresponds to the addition of a large amount of heat and +100% corresponds to a high level of ventilation.

The built-in motor regulation is based on the 0-100% signal, whereas both 0-10V outputs can be offset and limited in relation to the WHOLE signal (-100% to +100%).

Daily use

Normally the display will show the measured temperature and the desired temperature. The RESET key on the right enables you to return to this display at any time, and is thus a sort of "return key" which causes the display to show the measured and desired temperatures.

Regardless of where in the numerous menus you find yourself, this key will act as "HOME". If this key is not pressed, the "HOME" function will automatically be effected after approximately 1 minute provided that no other keys have been pressed.

There are 2 levels of menu structure, the DAILY menu and a SERVICE menu.

In the daily menu it is possible to SET the desired temperature and DISPLAY the degree of ventilation, voltage levels for the two 0-10V outputs and the heat requirement, if relevant. A LOG of various data can also be shown.

The forward and back arrow keys are used to browse through the menus. If it is possible to CHANGE a setting, a "*" will be displayed in the second line. If you wish to change the value, press the PROG key, the star will now **flash** and the arrow keys can then be used to adjust the setting ! Press the PROG key again in order to save the new setting.

The final item in the DAILY menu is SERVICE, which should be used to access the SERVICE menu.

If the PROG key is pressed here, the display will show BACK. You are now in the SERVICE menu, and if PROG is pressed once more you will return to the DAILY menu !

The SERVICE menu provides access to a large number of technical settings for the fan, 0-10V outputs, relay output and PID parameters, etc.

However, by pressing RESET once you can always return to the temperature display in the DAILY menu.

The display is illuminated when the keys are depressed, and will remain so for 1 minute after the last key has been depressed.

In the SERVICE menu the manual settings for all outputs can be found. If one of these menus is activated, the unit will not return to the main menu for approximately 10 minutes. When this occurs, the manual settings will be cancelled and the control unit will regulate the climate according to its settings.

LOG

A LOG can be found in the DAILY menu. The log contains information with regard to the occurrence of power failures, fluctuations in temperature, total operating hours and the number of occasions on which an alarm (relay) has been triggered for both high and low temperature.

The log can be browsed using the PROG key. The display will then show the various values stored, including the number of times the keys have been pressed !

The log can be RESET by holding down the PROG key for approximately 5 seconds. This will reset the number of alarms, key activation, power failures and temperature fluctuations (set to the current measured temperature). The meter recording the TOTAL running time CANNOT be reset.

Fan

As previously stated, the fan is controlled on the basis of the regulator signal 0-100%.

Settings such as MAX and MIN speed are set in the SERVICE menu. A relative temperature for when the fan shall STOP can also be set here if so required. If this parameter is set to -10°C the display will show ALWAYS ON, and the fan will never stop.

Otherwise the fan will stop completely when the temperature is at the set value below the desired temperature.

The fan will re-engage 0.5°C above this value in order to avoid frequent and repeated engagement/disengagement of the fan.

0-10V outputs

Both 0-10V outputs are controlled according to the regulator signal -100% to +100%.

Both outputs can be set to start and stop over this entire range, i.e. if a damper is to be controlled on one of the outputs, the start value can be set to, for example, 0% and the final value to 100%. In this case the servo motor will then automatically follow the fan.

If control of heat is required (shunt valve), the start value can be set to, for example, +20% and the final value to perhaps -80%. This means that heating will begin at 20% ventilation and will end at full heat at -80%.

Both outputs can also be limited at both ends, e.g. set to operate within the 2-8V range. All settings for the two 0-10V outputs are found in the SERVICE menu. In the DAILY menu the current output signals on the two outputs are shown.

Relay output

As previously mentioned, the relay in the SERVICE menu can be set to act either as HEAT or as ALARM.

If **HEAT** is selected, the 3 subsequent menu items will show appropriate heat settings. These are Heat Start, Cycle time and Minimum heat time.

Heat Start works in conjunction with the -100% to +100% signal, in which heating begins when the regulator falls BELOW the set value. Full heat will be supplied at -100% !

The heat relay functions as a variable ON/OFF relay where the ON time will be longer and longer if there is an increased heat requirement. The cycle time is the time which elapses from ON to ON. The minimum heat time ensures that the relay is engaged for x number of seconds. This could be useful in the case of a gas burner that must be pre-heated before heat is produced.

If the relay is selected as **ALARM** the 3 subsequent menu items will show appropriate alarm settings.

These are Low limit, High limit and Alarm Delay. The relay will normally be activated when the temperature is within the allowed range. If the temperature falls below the low alarm limit in relation to the desired temperature, or if the temperature rises above the high alarm limit in relation to the desired temperature, an alarm will be triggered.

However, the relay will not trip before the Alarm Delay period has expired. This prevents frequent alarms at and around the limiting values.

The DAILY menu can display which alarm has been triggered, if any, and this information will also be stored in the LOG.

Manual mode

In the SERVICE menu the final menu items are designated as Manual...- if just one of these menus is activated, the fan, 0-10V outputs as well as relay and fan relay will be set according to the MANUAL settings !!

In other words, it is possible to manipulate the signals manually whilst overriding the regulator, which is a great advantage when running-in the system, checking connections and checking the air in the stable.

Manual settings are saved in the same way as all other settings. Manual mode is cancelled after 10 minutes or by leaving the manual menu items. Alternatively "RESET" can be activated.

Manual PID override

The final item in the SERVICE menu concerns overriding the PID regulator.

This involves overriding the regulator signal from -100% to +100% !

This is used in order to simulate what happens at different regulator signals when it is actually started. For example, one can set the PID override to 50%, set min./max. for fan, set the two 0-10V outputs with their START and STOP functions, etc.

The PID override signal forces the PID regulator to maintain a chosen position.

It will therefore always be an advantage to run-in fans, servo motors, shunt valves, frequency converters, etc., using this function, since it will thus be possible to test the regulating range from 0-100%.

PID regulator

The PID regulator itself can be set and adjusted in the SERVICE menu.

It is possible to set a Proportional band, an Integration time and a Differential factor.

The input to the PID regulator will always be the difference in temperature in relation to the desired temperature.

The output from the PID regulator will always be the -100% to +100% as previously described. 0-100% is ALWAYS used for the built-in motor regulator.

The Proportional band is the change in °C required to produce a 100% change in the output.

The Integration time is the time that elapses between the output running up or down a little.

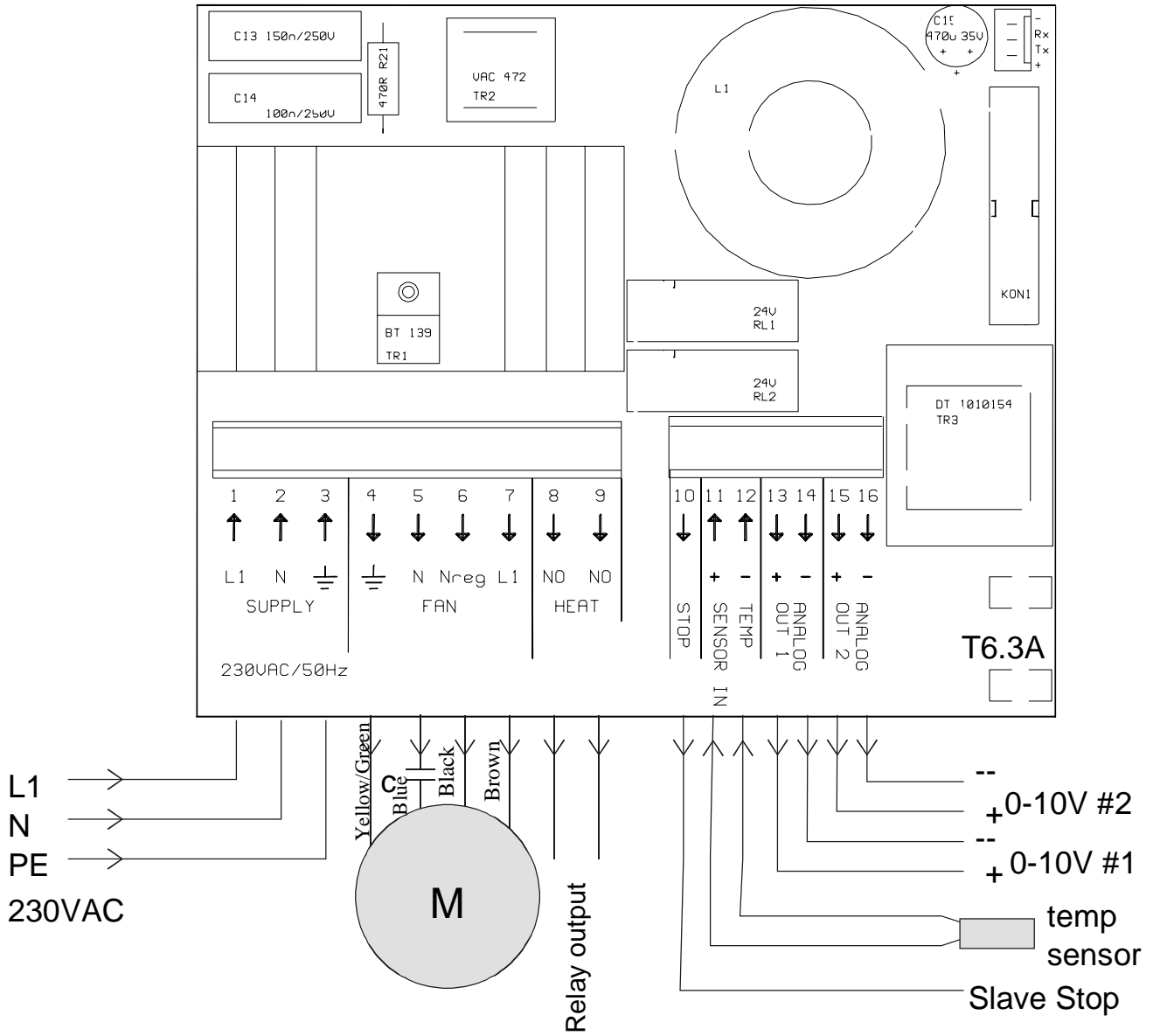
If there is a temperature error, a small amount will be added to each integration time at the output of the PID regulator.

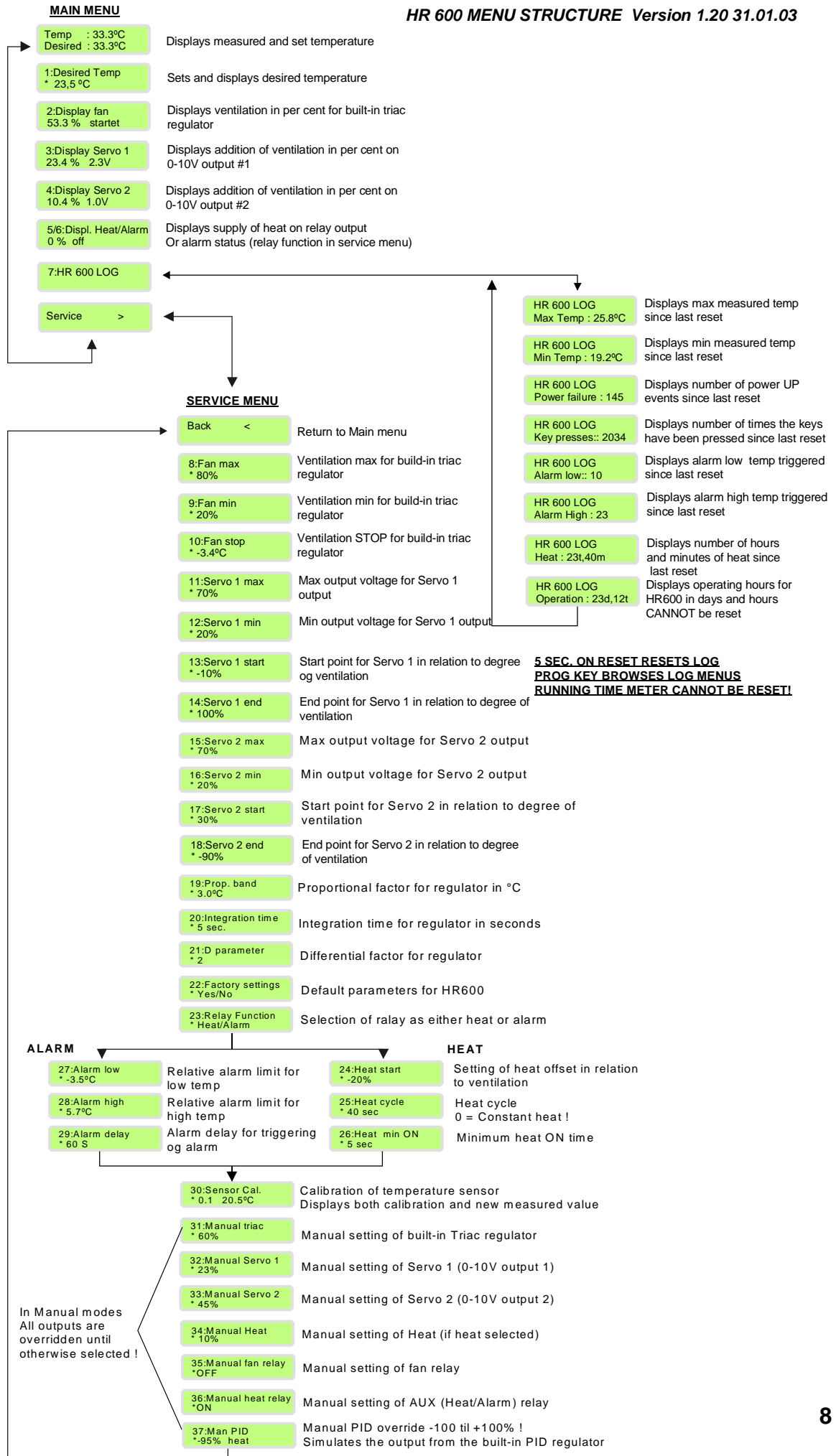
The amount added is proportional to the error in the temperature.

The differential factor will ensure that the regulator reaches the correct value more quickly.

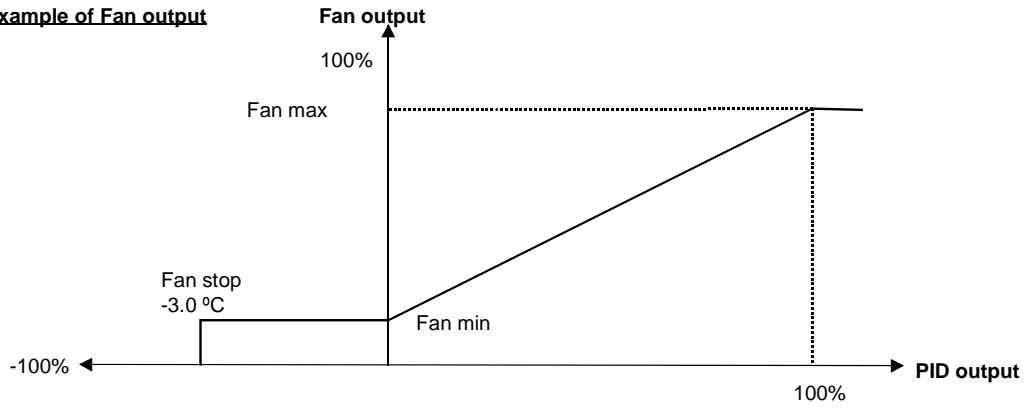
For example, if there is a temperature error, the Integrator will continually add a little, as before, but if the error is suddenly LESS, i.e. closer to the desired temperature, a small amount will be deducted from the output.

CONNECTION

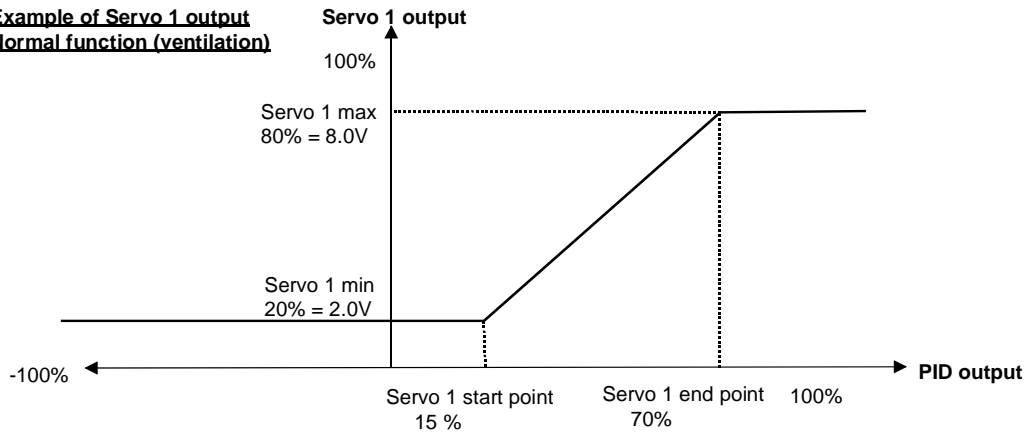




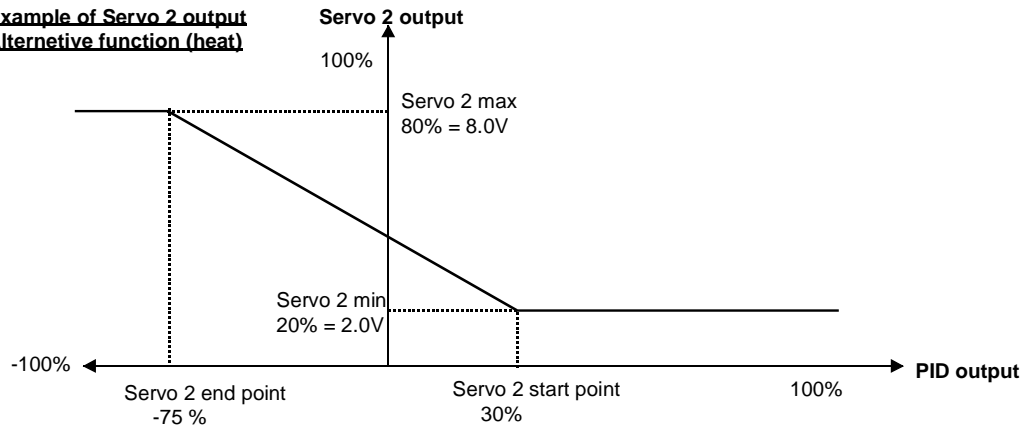
Example of Fan output



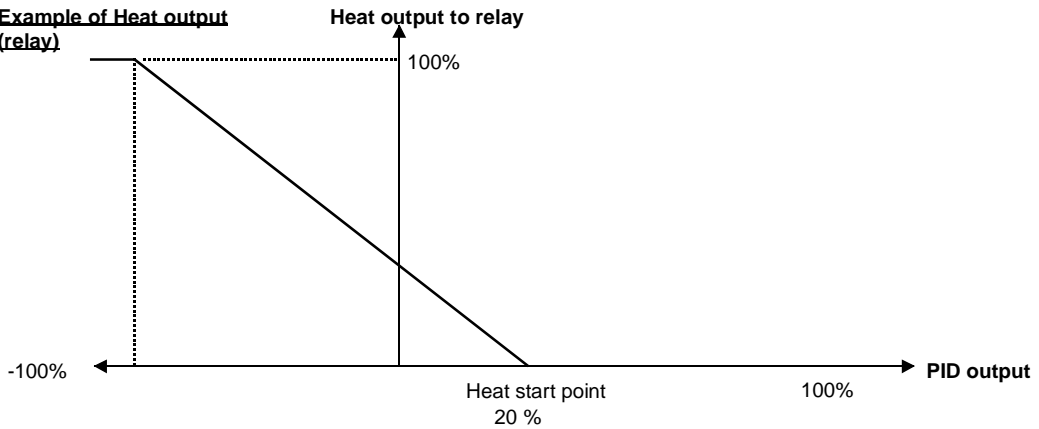
Example of Servo 1 output
Normal function (ventilation)



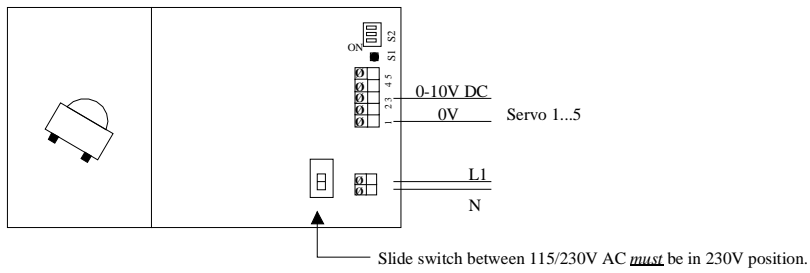
Example of Servo 2 output
Alternative function (heat)



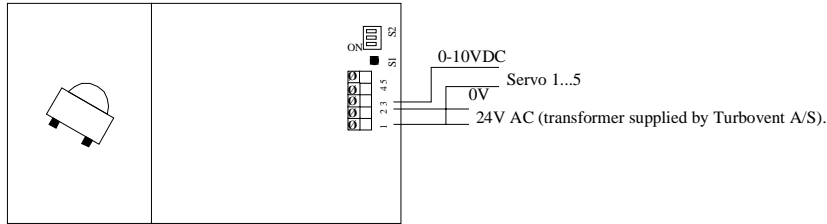
Example of Heat output
(relay)



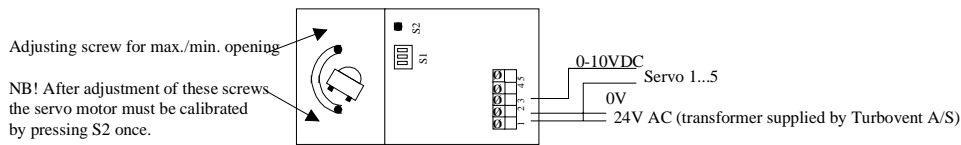
Neptronic RBMHV 6360A



Neptronic LDM 4060A



Neptronic BBM 2060A

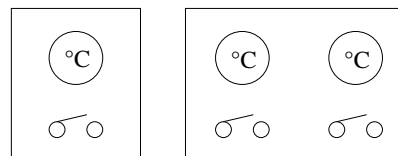


S1: Reset button. When the electrical connection and dip switch settings on S2 have been carried out, press S1 once (the power must have been connected for at least 20 seconds), after which the servo will run to the end stop positions and save these settings.

- S2: 1 Direction of rotation.
 2 Fail safe (direction).
 3 Not used.

NB: On Neptronic 2060 the designation of S1 and S2 is the reverse of the other models.

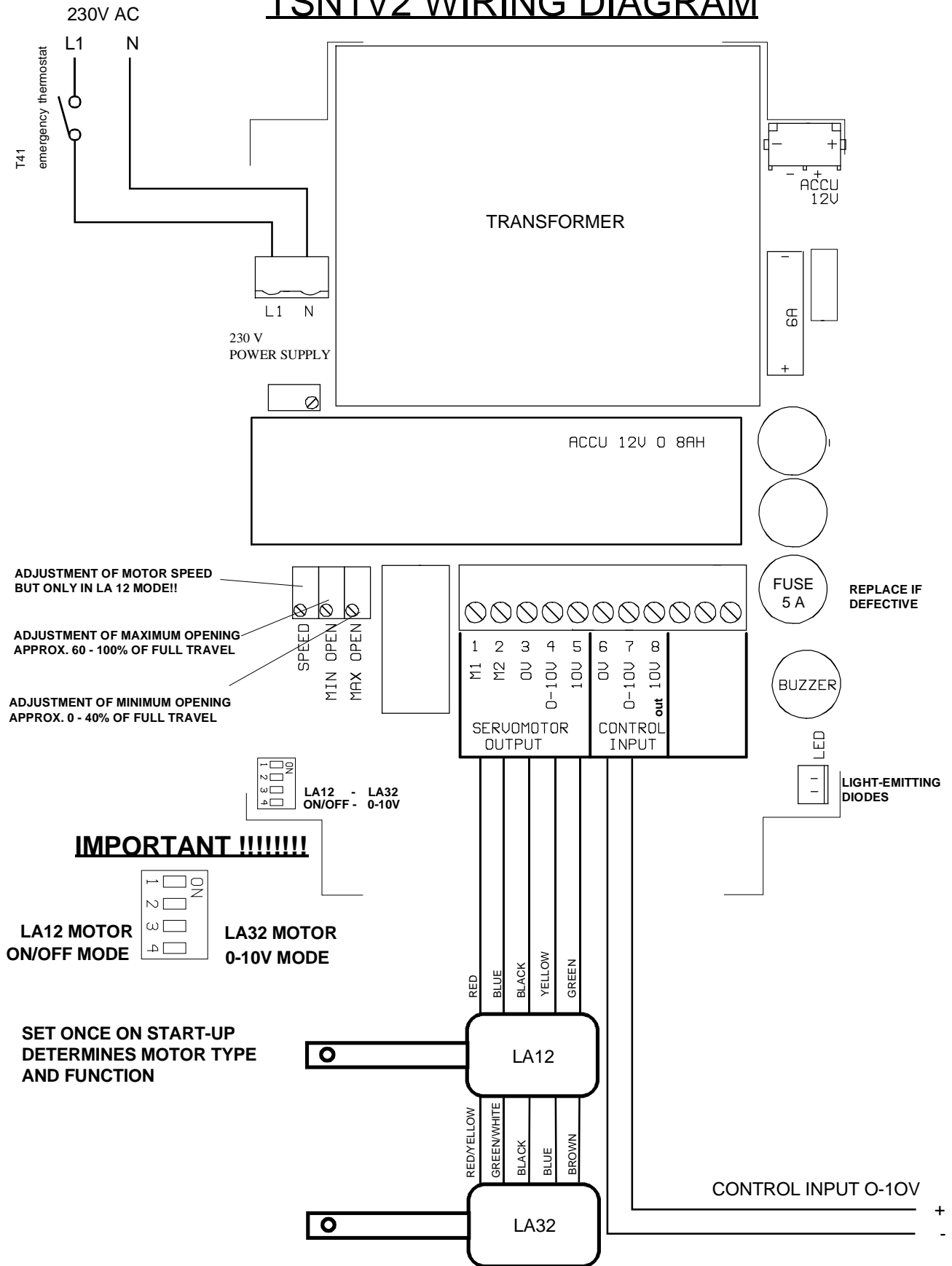
Temperature fail safe can be fitted by putting T41/T42 in series with the supply.



T41 max. temp.
Max. 4 amp.

T42 max./min. temp.
Max. 4 amp.

TSN1V2 WIRING DIAGRAM



TSN1V2 FUNCTIONAL DESCRIPTION

- * TSN1 V2 is a modern automatic control unit used to control LINAK actuators. Using an actuator, the control unit will set a damper at a position corresponding to the input voltage 0-10V. This voltage can come from a DIGITRON or other temperature regulator.
- * The damper position is determined from the input voltage, measured reference position and Max and Min set on the trimmers in the automatic control unit. 2 types of actuators, LA12 or LA32 can be used. LA12 is a high-speed servo with a current limit of 1.4A, LA 32 is a slow servo with greater torque and a current limit of approx. 4A.
- * Emergency opening on built-in battery and charging circuit for the battery. Automatic stop at limits, also on battery back-up.
- * Light-emitting diode indication of operating condition, including faulty connection and failure at current limits.
- * Battery monitor indicates visually and audibly that the battery must be replaced.
- * Option for slave operation, On/Off function from external automatic control unit determines open/close function.
- * Automatic detection of interrupted control signal, opens if cable connections are broken.
- * Adjustment of speed to motor with LA12 operation, enables more precise regulation around set point.
- * Dip switch sets function and motor type, see wiring diagram.
- * T41 thermostat in series with power supply 230V will ensure emergency opening in the event of circuit being broken.
- * Technical specifications:

Input	230V AC +/- 10%
Output	5-24V DC max 4A
Battery	12V / 0.7AH
Charging	Fixed 13.8V
Emergency opening	Relay/Battery, stops in the event of excessive current.
Control	0-10V DC
Current limit	1.5A for LA12, 4A for LA32
Audio	Built-in beeper in the event of failure, etc. (see table)
Lamp	Built-in light-emitting diodes for open/close/failure
Certification	CE marked
Settings	Motor speed, Max opening, Min opening, actuator type, control mode.
- * Visual and audio indicators in various situations:

Situation	Light-emitting diodes	Beeper	Remarks
Motor stopped	off	off	normal situation
Emergency opening	off	off	electronics off
Short-circuit	rapid push-pull	rapid beep	must be switched off before new operation !
Interrupted control signal	rapid push-pull	rapid beep	automatic reclosing
Battery flat	slow push-pull	slow beep	wait until recharging is complete
Current limit	medium push-pull	off	If continues, replace battery direction change resets failure