MANUAL
Electronic Step Controller

For the drive of 1-8 fans (groups)

Series:

GSTS-V2.1
GSTS-V4.1
GSTS-V6.1
GSTS-V8.1
GSTS-V2x2.1
GSTS-V2x4.1
GSTS-V2x6.1
GSTS-V2x8.1

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Contents

Page

1. General 3
1.1 Accuracy notes 3
1.2 Use as agreed 3
1.3 Indication for the getting started 3
1.4 EMV adjusted installation 4
1.5 Manufacturer and delivering address 4

2. Operation of the regulator 5
2.1 Classification 5

3. Assembly 5
3.1 Assembly of the regulator 5
3.2 Line lying 6

4. Electrical connection 6
4.1 Power supply 6
4.2 Step relay 6
4.3 Sensor connection 6
4.3.1 Pressure transmitter 6
4.3.2 Standard signal 0..10V 6
4.3.3 Temperature sensor 6

5. Adjusting the controller 7
5.1 General explantation of the regulator function 7
5.2 The adjust potentiometer 7
5.2.1 Set point Xs1 7
5.2.2 Set point Xs2 7
5.2.3 P-Band Xp1 7
5.2.4 P-Band Xp2 8
5.2.5 Manual operation 8
5.2.6 Night Limit 8
5.3 Control inputs 8
5.3.1 Controller lock 8
5.3.2 Night Limit 8
5.3.3 Set point switch 9
5.3.4 Selecting the sensor type 9
5.3.5 Status LED's 9

6. Technical Data 10
7.1 Version protection class IP20 10
7.2 Version protection class IP54 11

7. Connection Diagram 12

Dear customer!

Be a straightforward installation and an interference-free operation ensured with that, please take the time and you carefully read through these operation instructions.

Reading the instructions is required also therefore to avoid damages to the controller or the installation which can arise by improper handling.

If you have further questions, you can reach us by phone under +49 (0) 8141 242-4810.

1. General

The details made in the operation instructions on hand are valid for the controller of the structure row of GSTS-V.

Added features are described separately. Always keep both papers together!

1.1 Accuracy notes

Work on the devices only may be exported to the avoidance of heavy bodily injuries or considerable damages to property by qualified persons. These persons must carefully read the manual before the installation and getting started. Besides the manual and the national obligatory rules to the accident prevention the recognised technical rules have to be adhered. (UVV, VBG, VDE etc.)

Repairs at the device may done only by persons, which are authorised by the manufacturer for the repair jobs.

The guarantee goes out at opening unauthorised and not qualified interventions!

The speed controllers are assembled in the steel sheet case (protection class IP54). This protection class is guaranteed only at inferred device!

Dangerous electrical voltages lie with open regulation device freely. The protection class of the open device is IP00! At work on regulation devices standing under voltage the valid national accident prevention prescriptions (UVV) have to be observed.

1.2 Use as agreed

Make sure that fuses may be replaced only in the said strength and not repaired or bridged. Voltage freedom may be checked only with a two-pole voltage indicator. The regulation device is exclusively meant for the tasks agreed in the job acknowledgement. A use which is other or this going beyond valid when not regulation appropriately. The manufacturer isn't liable for damages arising from this. Adhering to the approach described in this manual also is part of the use as agreed at packaging, mode and maintenance. Are the technical data as well as the details on terminal occupations to take from the types signpost and the instruction and to adhere absolutely.

In principle, electronic equipment's aren't loss safe! The user has to take care for this therefore that his installation is led into a sure status at loss of the device. Damages to body and life as well and assets don't lie in the responsibility of the manufacturer at no observance of this point and at improper use.

The electrical installation has to be executed after the appropriate prescriptions. Details going out are contained in the documentation on this. If the regulation device in a particular application area comes in use, then the standards demanded for this and regulations have to be adhered absolutely (e.g. EN 50014 and EN 50018).

1.3 Indication for the getting started

Before putting into service of the control equipment has to be checked, whether perhaps remains humidity scolded himself in this-cabinet has educated himself. The device has yes, so to be dried if. With larger condensed water crowds (Large drops of water on the walls or the components) these have to be removed manually. After the first getting started may the electrical power supply as well as the internal control voltage not switched out a longer time period any more be. Is this mode conditionally nevertheless required then a suitable humidity protection is to provide.

1.4 EMV adjusted installation

The controller of the series GSTS fulfil the requirements of EMV- Interference immunity appropriate EN 50082-2 and disturbing emission appropriate EN 50081-1. The respectively stricter standard is fulfilled with that. To guarantee this EMV compatibility, the following points have to be observed:

- The device must be grounded well
- All of them measure- and signal lines must be screened. Using only measuring wires, e.g. LIYCY 3x0.5², no telephone lines!

  ⇒ The screening of the signal lines must single end to ground.
  ⇒ Grounding the screening of motor wires on both sides

Signal and control lines have to be transferred by main and motor wires separated, e.g. in separate cable channels.

1.5 Manufacturer and delivering address

If you have questions, suggestions or special wishes, you consult to

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2. Operation of the regulator

The controller of the GSTS works as PT_1- controller (Proportional controller with solid adjust time). This means, that proportional to the signal rise the number of switched stages increase and therefore more and more fans are working. Through this the rise in pressure is counteracted so that a constant value finally takes effect.

Principle conditional remains availably a deviation which cannot be eliminated. By adjusting the set point, however, the operating point can be moved so that the desired system value is held. Deviations are compensated for.

2.1 Classification

Electronic step control	***GSTS***
Full version	***V***
Number of switching contacts per step (only 2 contacts)	***2x***
Number of steps (2/4/6/8)	***4***

Examples:

GSTS V2	=	Step controller with 2 steps and one switching contact per step
GSTS V2x2	=	Step controller with 2 steps and two switching contact per step
GSTS V8	=	Step controller with 8 steps and one switching contact per step

Custom-built models aren't covered with this equipment key.

3. Assembly of the regulator, line laying

This section describes the correct assembly of the regulator and gives suggestions on the right on putting place.

3.1 Assembly of the regulator

If the device was taken from a very cool storage place, you let it rest at room temperature and open lid before the installation 1-2 hours. Possible rest humidity can escape so. Breakdowns are avoided so at the putting into operation. The Silicagel bag (desiccant) can be removed.

For the assembly drillings are appropriate at the case. The fastening may be carried out only there, e.g. (drill of new fastening holes) any manipulation at the case is forbidden. The assembly must be vertically carried out (standing), not lying.

The cable inlets must always be downward, an assembly with a cable inlet at the top lying more at the side or even is forbidden!

If all available cable inlets are used, then at least a cable gland can be provided with compensation opening so that an air exchange is ensured by condensed water to the avoidance.

Fit the regulator if possible so that no direct solar radiation is carried out and choose a sheltered place.

Up and below a minimum distance of 30 mm has to be kept so that the air circulation isn't hindered.

To avoid a heat concentration, max. 3 regulators may be fitted about each other. The assembly of arbitrarily much equipment is permitted besides each other (Minimum distance: 30mm).

Pay attention to good accessibility! For possible maintenance work the device must be attainable easily.

3.2 Line lying

In principle, sensor and control lines are separated from engine and mains power lines too in embarrassment therefore not in a common cable channel. A protected cable is recommended.

4. Electrical connections

The terminals for fan, supply, sensors, etc. are interpreted for a maximum line crosscut of 1.5 mm ². Larger crosscuts cannot be attached! At use of stranded wire wire-end sleeves have to be used.

4.1 Power supply

The power supply is carried out at the clamps:

L = Outer wire (Phase)
N = Neutral wire (Null)
PE = Protection wire (Earth)

The GSTS has a built-in fine protection **MT 0.5A** (5 x20mm) for unit protection. If you must replace it, use only MT 0.5A fuses!

4.2 Step relay

The relays for step 1-8 can switch 250V/1A. With these relays the ventilator contactors are usually switched, which add-on the respective engine or the engine group. If you have the controller version GSTS V2x2..8 each step has two contacts.

If you use fans with a here executed thermal contact (Klixon, bimetal), the engine supervision has to be realized by the regulator in the control cubicle separately

4.3 Sensor connection

There are 3 sensor types connectable to the GSTS-V. The selection is done with DIP switches.

4.3.1 Pressure transmitter (4-20mA)

One sensor (2 wire sensor) can be attached:

+	= Supply voltage	(GS4003: red wire,	GSW4003: wire „1“)
B1	= Signal 0-25bar = 4-20mA	(GS4003: blue wire,	GSW4003: wire „2“)

Three wire sensors with a 4-20 mA signal exit also can be attached, however, need a ground connection in addition. You can connect it to clamp „**-**“.

4.3.2 Standard signal 0-10V

The connection of a standard signal (0-10 V) is always carried out at the clamps:

- = Ground
B2 = Signal input 0-10V

Look for the right polarity: Ground to “-“ and the signal to “B2”!

You also can alternatively attach a Güntner Handpoti GHP. You can provide the steps manually.

4.3.3 Temperature sensor

The connection of a temperature sensor is always carried out at the clamps:

- = Ground
B3 = Signal input

Not cares about the order of the wires. The Güntner temperature sensor **GTF201/GTF210** measures in the area of -30...+70 degrees Celsius.

5. Adjusting the controller

These chapter answers questions for the regulator attitude and parameter attitude.

5.1 General explanation of the regulator function

The regulation part of the GSTS works as a P-regulator.

5.2 The adjust potentiometer

For adjusting small potentiometer are scheduled:

5.2.1 Set point Xs1

The set point determines the cut-off of the regulation. As of this value the regulator starts to work and switches the steps. The first step is switched if the set point is exceeded a little. The last step is activates if almost reached the end of the regulation range is.

If a switching the first step more early is desired, the set point can be reduced.

The set point is adjustable in the area of 0-100 %. The set point refers to the measurement range of the attached sensor type:

Pressure transmitter 0-25bar:	0-100% = 0...25bar
Temperature sensor GTF201:	0-100% = -30...+70°C
Standard signal. 0-10V:	0-100% = 0...10V

Expect to which set point (pressure, temperature, voltage ...) which per cent number corresponds you for converting more easily simple as follows:

Conversion pressure:	bar	= % / 4	(e.g.: 40% = 10bar)
Conversion temperature:	°C	= % - 30	(e.g.: 40% = 10°C)
Conversion standard signal:	volt	= % / 10	(e.g.: 40% = 4V)

5.2.2 Set point Xs2

A second set point **Xs2** is availably at the complete version of the step controller. Exactly, the same is the function as described at Xs1 already.

This second set point is activated by connecting +24V ("P") to clamp "**Xs2**".

5.2.3 P-Band Xp1

With the P-Band (proportional) the field of work of the regulator is adjusted. *Starting out from the set point this value marks the end of the regulation range.*

Example: You have adjusted a set point of 12bar and a P-Band of 4bar. The field of work is 12-16 bar now. If the pressure exceeds 12 bars, step 1 switch. The number of steps switched on increases proportionally to the rise in pressure until all steps are finally switched on at 16 bars. The pressure rise is counteracted with that so that the plant pressure evens out approximately at the set point.

Since the regulator has a lasting deviation in principle, the value which actually adapts in the system is a little higher than the set point. When required you simply change the set point carefully until the desired value adapts in the system.

Just like at the set point the P-Band Poti is also scaled as a percentage and refers to the attached sensor type:

pressure transmitter 0-25bar:	0-100% = 0...25bar
Temperature sensor GTF201:	0-100% = 0...+100°C
Standard signal. 0-10V:	0-100% = 0...10V

Expect to which P-Band (pressure, temperature, voltage ...) which per cent number corresponds you for converting more easily simple as follows:

Conversion pressure:	bar	= % / 4	(e.g.: 40% = 10bar)
Conversion temperature:	°C	= %	(e.g.: 10% = 10°C)
Conversion standard signal:	volt	= % / 10	(e.g.: 40% = 4V)

5.2.4 P-Band Xp2

A second P-Band **Xp2** is availably at the complete version of the step controller. Exactly, the same is the function as described at Xp1 already.

This second P-Band is activated by connecting +24V ("P") to clamp "**Xs2**".

5.2.5 Manual operation

With the Poti „Manual operation" you can switch on and the steps manually. This is for test and check (e.g. at the putting into operation). Since the steps remain switched on by the controller independently always, this Poti must stand for a normal regulation on 0%!

The Poti can be adjusted in the area of 0-100 %:

0%=no step **100%**=all steps on

5.2.6 Night Limit

With this Poti the number of steps switched on can be limited:

0%	= no limit	(All steps can be switched on)
100%	= full limit	(All steps off)

If you have for example a **GSTS-V 8** and the limitation stands on 50%, then the last 4 steps are closed.

However, you can adjust the limitation easily also without calculation:

- manual operation set to 100% (all steps switched on)
- Adjusting limit like desired
- manual operation back to 0%

The limitation must be activated externally! If clamp „**1**" is connected with +24V („**P**"), the limit function is activated. If clamp **"1"** is left open, the limit Poti is not active.

5.3 Control inputs

The GSTS can be deactivated with the control inputs. A second set point or the step limitation can be activated with the control inputs.

5.3.1 Controller lock

With clamp **"3"** the controller can be locked, i.e. all steps are turned off.

clamp „**3**" open:	controller activated
clamp „**3**" connected with„P":	controller locked (All steps off)

5.3.2 Night Limit

The limitation is activated with clamp **"1"**, therefore only the steps are switched up to the limitation.

clamp „**1**" open:	no limit
clamp „**1**" connected with „P":	limit active

5.3.3 Set point switch

With clamp **"Xs2"** you change on the second set point (Xs2).

clamp „**Xs2**“ open:	control system works with set point Xs1
clamp „**Xs2**“ connected with „P“:	control system works with set point Xs2

5.3.4 Selecting the sensor type

3 small DIP switches with which the sensor type is adjusted are on the controller. It only one switch may always be switched on, no more simultaneous!

DIP-switch 1 (left)	on:	Standard signal connected
DIP-switch 2 (middle)	on:	Temperature sensor connected
DIP-switch 3 (right)	on:	Pressure transmitter connected

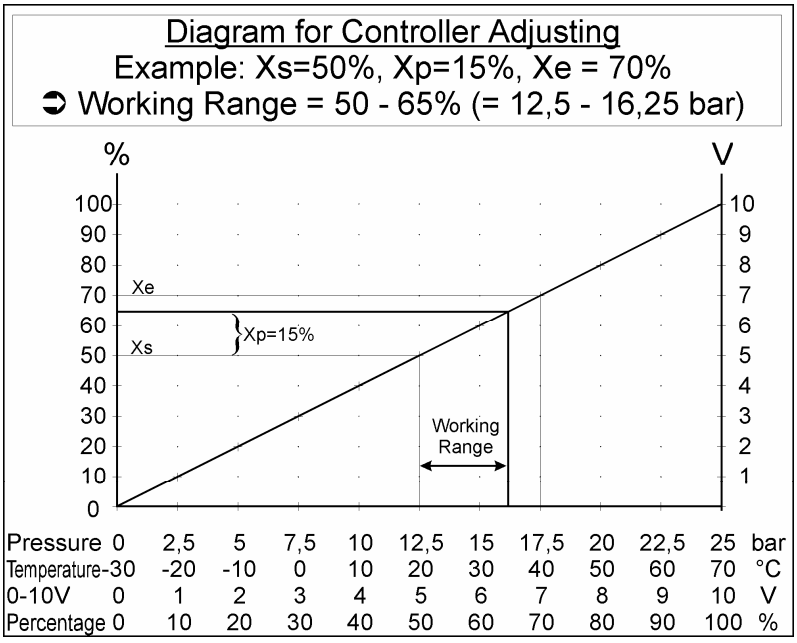
Take care that the sensor which was adjusted with the DIP switches is also actually attached. The controller otherwise doesn't work.

5.3.5 Signal of the operating states (Status-LED's)

The light-emitting diodes inform about the current controller status:

LED „Xs1“ (green)	ON = controller works with set point 1
LED „Xs2“ (green)	ON = controller works with set point 2
LED „Night limit“ (red):	ON = Night limit active
	OFF = no limitation

You see a graphic on the following illustration with which the attitude of the controller is simplified. You can directly read the regulation range for the attitudes of Xs and Xp.
Turned over you can find the parameters of Xs and Xp out for a desired regulation range.



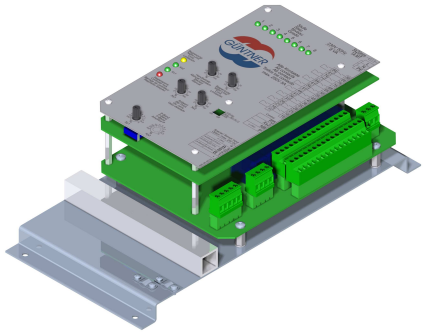
Xs is prepared for 50% and Xp on 15% in the example. You plumb from these two points to the right up to the diagonals and you can read the corresponding values on the horizontal axis for pressure, temperature or standard signal.

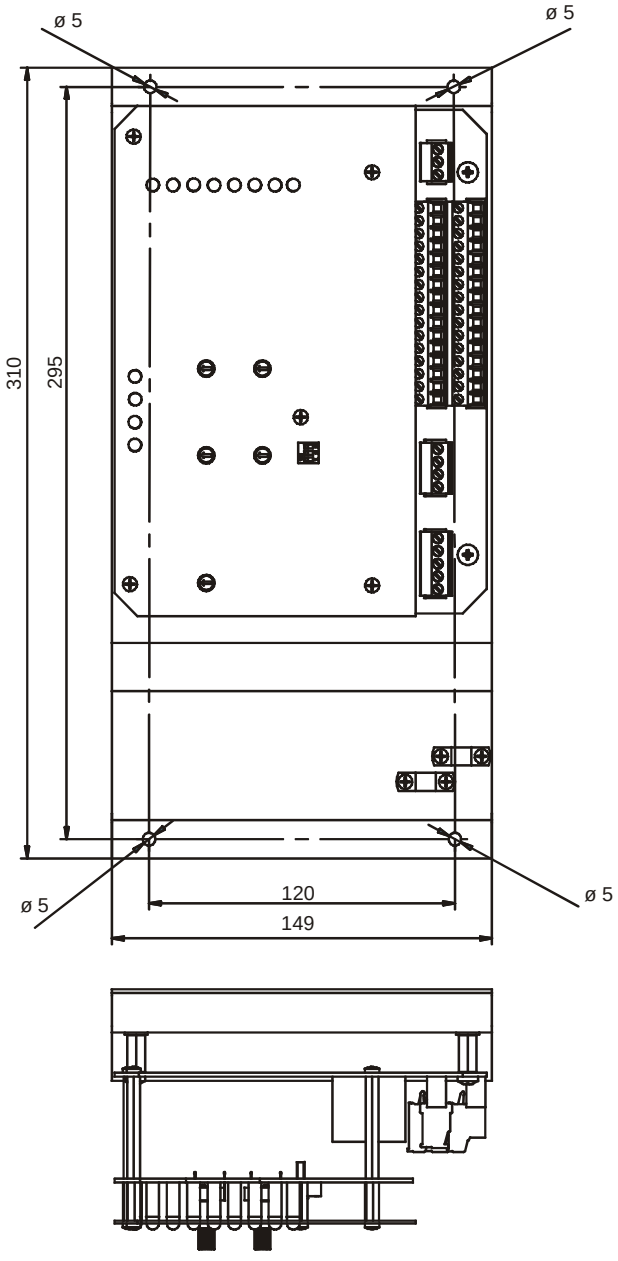
You can the other way round select your field of work on the horizontal axis and determine the values on the perpendicular for Xs and Xp correspondingly.

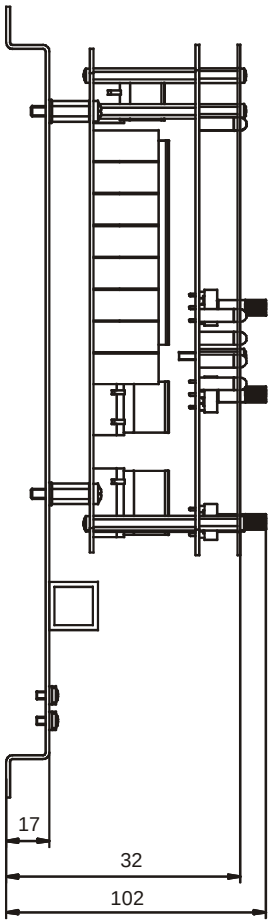
6. Technical data

7.1 Version protection class IP20

Supply voltage:	230V 50Hz
Step relay:	1 (2) contact(s) per step, max. 250V/1A
Sensor connection:	Pressure transmitter 4-20mA (0-25bar) *or* Temperature sensor TF201/TF210 (-30...+70°C) *or* Standard signal 0-10V
Environmental temperature:	-10...+40°C
Weight:	1,6 kg
Protection class:	IP20

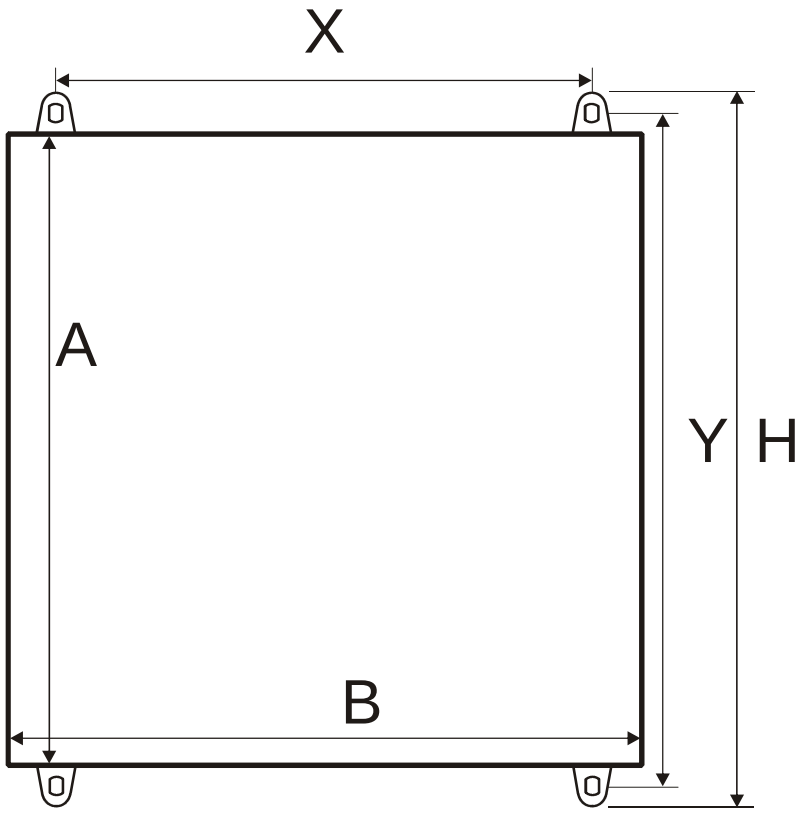






7.2 Version protection class IP54

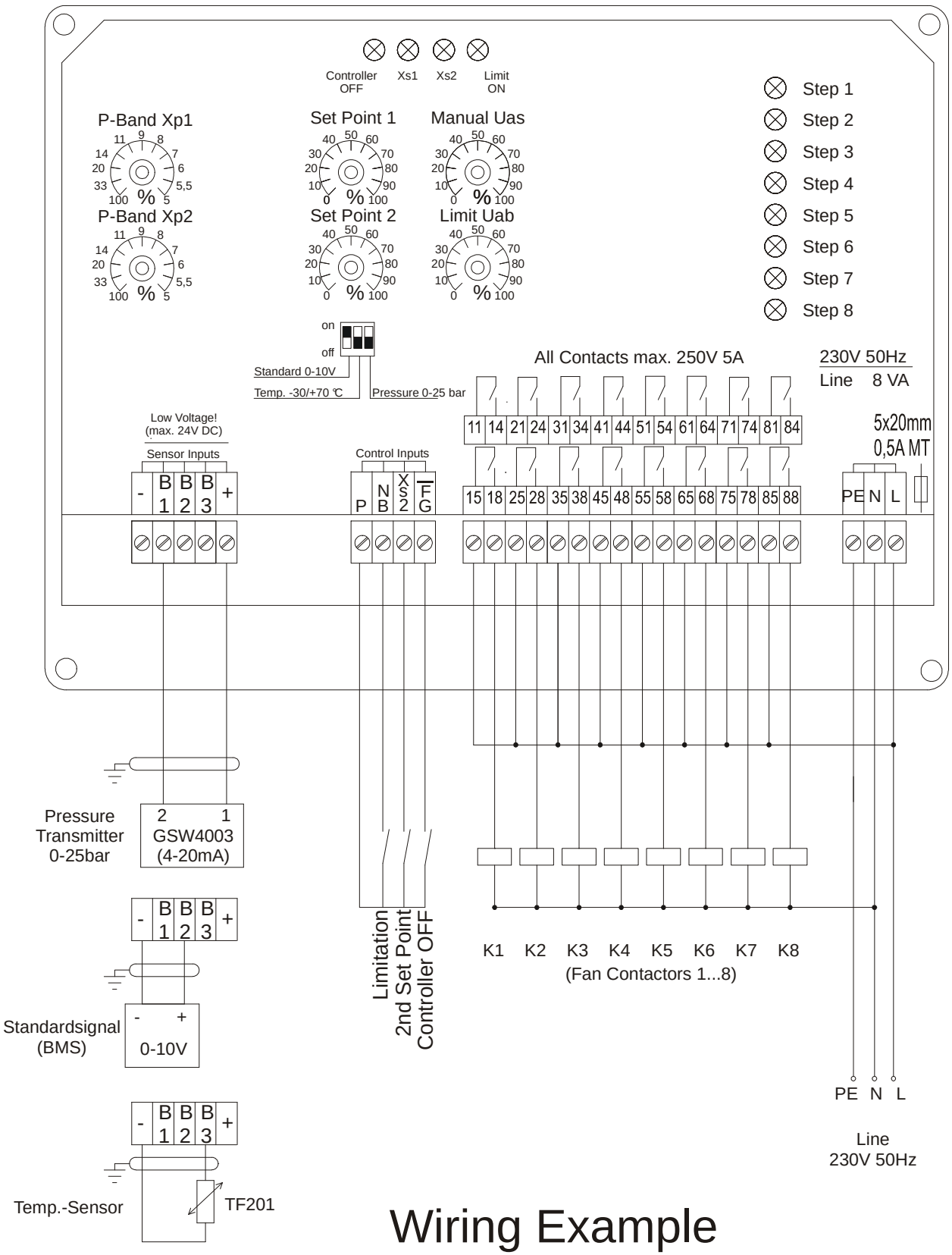
Supply voltage:	230V 50Hz
Step relay:	1 (2) contact(s) per step, max. 250V/1A
Sensor connection:	Pressure transmitter 4-20mA (0-25bar) *or* Temperature sensor TF201/TF210 (-30...+70°C) *or* Standard signal 0-10V
Environmental temperature:	-20...+40°C
Weight:	5 kg
Protection class:	IP54



Steel sheet case dimension (shade RAL 7032 Structure)

Device type	A	B	X	Y	Depth	H
GSTS	238	224	174	243	130	260

All dimensions in mm



Wiring Example
Step Controller GSTS-V8

Example for connection the relay-outputs with motor- or controlcontactors

7. Connection Diagram

INDEX

A

Adjustment table 9
Assembly 5

C

Classification 5
Connection Diagram 12
Control inputs 8
Controller lock 8

D

Dimension IP20 10
Dimension IP54 11

H

Humidity protection 3

L

Line lying 6

M

Manual operation 8

N

Night Limit 8

O

Operation 5

P

P-Band 7
Power supply 6
Pressure transmitter 6

S

Sensor connection 6
Sensor selection 9
Set point 7
Set point switch 9
Signalisierung 9
Standard signal 6
Step relay 6

T

Technical Data 10
Temperature sensor 6