



According to
the low voltage
directive:
2006/95/EC /
the EMC directive:
2004/108/EC

EN USER GUIDE

Speed controller for single phase voltage controllable motors.

Technical data

Voltage: 230 Vac - 50 Hz

Article code	Current range	Fuse
TE150-30-DT	0,3-3,0 A	F 5,0 A-H
TE150-60-DT	0,5-6,0 A	F 10,0 A-H
TE150100-DT	1,0-10,0 A	F 16,0 A-H

Enclosure: plastic R-ABS, UL94-V0, grey RAL 7035, IP54

Measurement range: -30...70 °C

Minimum ambient temperature: 0 °C

Maximum ambient temperature: 40 °C

For indoor use, no condensation!

The TE15 digitally controls the rotational speed of single phase 230 Vac/50 Hz voltage controllable motors according to temperature; manually or by real-time clock setting. The device consists of a control unit and a power unit.

1. MOUNTING

1.2. Power unit

Inputs

Sensor: temperature sensor, FLTSP-500-010/ROTSP-500

Remote control (INP): 12 Vdc up to 24 Vdc (logical inputs)

Motor protection (TK): by connecting thermal (overheating) contacts of the motor

Analog input: not used

V+: not used

Outputs

Motor: 230 Vac / 50 Hz

L1: 0 or 230 Vac (unregulated output)
When the motor is stopped L1 output is 0 V. When the fan is running L1 output is 230 V.

Vdc: internal 12 Vdc

Analog output: 0-10 V or 0-20 mA (selected by jumper)

Fig.1 High voltage (HV) and low voltage (LV) part of TE15 power unit

Fig.2 Possible connection of INP

1.2. Temperature probe

The wire of the temperature probe may be lengthened up to 30 m. The probe has no polarity. Use screened cables.

1.3. Control unit

The TE15 control unit consists of two parts: a control for the LCD and a main control. The microcontroller and the keypad of the device are situated on the main control. A ribbon cable connects power and control unit.

2. FUNCTIONS

2.1. Operation working modes

The controller has four basic modes:

- Stand-by: the fan is not working (due to RTC/real-time clock setting or off level)
- Stop: the fan is not working (the controller is stopped by pressing the I/O button, TK, or sensor problem)
- Automatic: fan speed is depending on temperature and settings
- Hand Set: fan speed is controllable between minimum safety speed and maximum speed in auto mode (before entering in hand set) with the 'UP'/'DOWN' buttons. The initial speed in Hand set mode is the last speed of auto mode.

For each mode an LCD message is prepared:

Automatic mode	Hand set
Auto High/Low hh:mm Heat/Cool xx.x Cyy%	Hand set hh:mm xx.x C yy%
Stop mode:	Stand-by mode:
dd/mm/yyyy hh:mm xx.x C Stopped	dd/mm/yyyy hh:mm xx.x C Stand-by

For auto and hand set: mode and time are visualized on the first row of the LCD. On the second the submode (for auto mode) is shown, temperature with 0.5 °C resolution and fan speed in percents (0 V corresponds to 0 % and 230 V to 100 %).

If INP input is used to switch between Heat/Cool modes, at the left side of the mode a '*' will appear.

Mode screens when INP input is used to change the controller modes:

Auto High/Low hh:mm *Heat/Cool xx.x Cyy%
--

Change of the modes

In following tables the changing of the modes is shown, when the keypad is free and when the keypad is locked. In the first case it is sufficient to press a button to change the current mode. Otherwise, when the keypad is locked, it is necessary not only to press a button, but to enter the correct code. There is also a third case for change of modes. It concerns only the change from hand set to auto mode and is realized when the day by day programming option is selected via the installer menu.

From / to	AUTO	HAND SET	STOP	STAND-BY
AUTO		A/M	I/O	automatically (Off level, RTC)
HAND SET	A/M or High/Low change		I/O	RTC
STOP	I/O*			I/O*
STAND-BY	automatically (Off level, RTC)	A/M	I/O	

Modes changing (keypad is free)

* When you are in STOP mode by pressing I/O button you can change this mode to AUTO or STAND BY due to RTC, OFF level and day by day settings.

From / to	AUTO	HAND SET	STOP	STAND-BY
AUTO		(A/M & code)	(I/O & code)	automatically (Off level, RTC)
HAND SET	(A/M & code) or High/Low change		(I/O & code)	RTC
STOP	(I/O & code)*			(I/O & code)*
STAND-BY	automatically (Off level, RTC)	(A/M & code)	(I/O & code)	

Modes changing (keypad is locked)

* When you are in STOP mode by pressing I/O button you can change this mode to AUTO or STAND BY due to RTC, OFF level and day by day settings.

Fig.2 Modes changing (keypad is locked)

2.2. Functionality

The basic functionality of the TE15..DT controller in auto mode is presented in fig.4. The diagram shows how the fan speed changes in both heating and cooling mode. The maximum ambient,

temperature range is 0 - 40°C. The temperature is displayed on the LCD display with a 0.5°C resolution (accuracy is ± 1 °C).

Heating and cooling mode graphics illustrate:

- set point (point A) for fan speed - at 50 % between min and max
- off level (point B): the fan will stop if the temperature is higher
- minimum fan speed (cannot be set under safe motor speed)
- max fan speed
- proportional range (region 1)
- hysteresis (region 2)

In the install menu it is possible to adjust:

- minimum safety speed for the fan (between 100 V and max speed minus 20 %),
- minimum speed (minimum safe speed - maximum speed minus 20 %),
- maximum speed (minimum speed + 20 % - 100 %)
- heating mode proportional range (2 °C - 30 °C),
- cooling mode proportional range (2 °C - 30 °C),
- hysteresis (0.5 °C - 5 °C) for on/off switching,
- set point (5 °C - 35 °C),
- off level (0 °C - 40 °C).

Fig.3 Fan speed in function of the temperature (auto mode)

2.3. Start, stop, alarm conditions

Fig.4 Softstart and kickstart

Softstart

When the fan is switched on, it starts to work from the least possible value to:

- the chosen maximum speed, if kickstart time is not zero (fig.4), or
- to the fan speed that corresponds to the measured temperature, if there is no kickstart.

Softstart duration is not a user-programmable parameter. For TE1S controllers, the fan voltage increases with 2 V on every 20 ms. For example, if minimum safety voltage is 100 V and maximum voltage is 230 V, softstart time duration will be approximately 1.32 seconds.

Kickstart

During a definite time interval, the motor speed is constant (fig.4), equal to the maximum speed. The user can set the kickstart time to any value between 0s and 30 seconds. The default value is 10 seconds.

After softstart and kickstart:

The motor speed decreases to voltage corresponding to the input signal.

It is important to note that even if the controller was in Hand set or Stand-by mode before power loss, it restarts in Auto mode.

When the fan is running, L1 output is 230 V, I_{max} = 2 A. This output can be used to power rotating field windings of a single phase motor with two coils, or it can be used to control electrically operated valves etc. that don't need to open/close when the fan is running.

Shut down conditions

The controller shuts down the fan in case of:

- alarm condition;
- depending on the off-levels and the sensed temperature in automatic mode.

When the motor is stopped L1 output is 0 V.

Alarm conditions

The TE1S..DT controller can generate two alarm messages:

z in case of TK-fault;

- in case of temperature sensor problems (the sensor is shorted/disconnected).

In both cases, a text is displayed on the LCD screen.

Note: the fan stops immediately and a fault condition is generated if TK-open or a sensor problem is detected within a second. After a fault condition is generated, the controller doesn't restart the motor until the fault condition is reset by the operator (via the I/O button).

At restart of the motor, if starting conditions are met, L1 output is powered and a kickstart is executed before the output voltage is adjusted to the normal working level.

2.4. Calibration

- Stop the controller
- Connect 538.96 Ohm resistor to TB 'Temp. sensor' instead of FLTSP/ROTSP sensor
- Start the controller
- Enter in Installer menu\Installation\Calibration
- Select 'Do calibration'
- After calibration is done, menu level will be changed automatically
- Exit of menu and stop the controller
- Replace 538.96 Ohm resistor with FLTSP/ROTSP sensor
- Start the controller

3. MENU GUIDE

3.1. Menu structure

Fig.6 TE1S controller LCD menus

3.2. ENTERING THE INSTALLER MENU

The changing of the mode parameters can be done via installer menu (unlocked or locked with 4-digit code). It can be easily entered from Auto/ Hand set/ Stand-by/ Stop mode by long pressing of A/M button (fig.7).

3.3. Navigation in the installer menu

When one has entered a menu, the navigation in it should be done as drawn in fig. 8.

3.4. Installer menu parameters

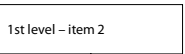
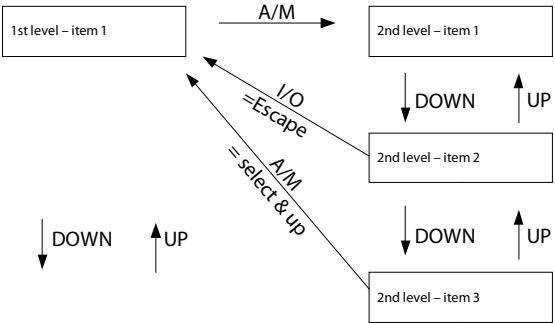
Fig. 9 illustrates all settings that can be done by the installer:

- Change of the language on which the LCD menus are displayed
- Setting the real-time clock in the controller (time and date)
- Change of user code (for speed change in Hand set mode)
- Change of installer code (for mode change and menu entrance)
- Setting the value of the minimum safety motor speed, kickstart time, proportional range, hysteresis
- Function of the configuration input INP
 - Don't care (the change of INP condition doesn't change the controller mode)
 - Heat/cool switching (the change of INP condition changes heat to cool mode and vice versa)
- Change of heat / cool mode
 - Heat mode (when 'Don't care' is chosen)
 - Cool mode (when 'Don't care' is chosen)
 - Auto change of modes due to INP
- Adjustment of the values of the set point, off level, minimum speed and maximum speed for the 4 possible sub-modes combinations in auto mode
 - heat high
 - heat low
 - cool high
 - cool low
- Presets for high/low mode switching times
 - TE1S..DT controller supports two factory preset switching intervals:
 - Monday - Friday
 - Saturday - Sunday

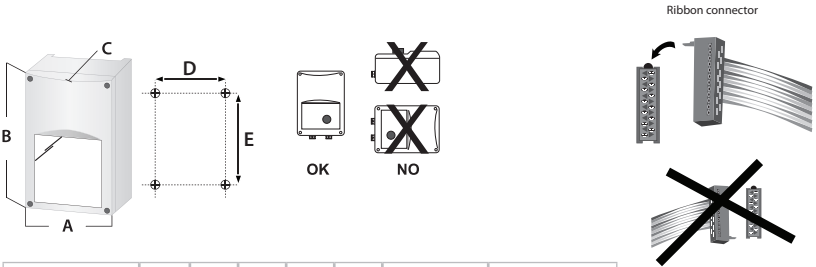
Fig. 7



Fig. 8



Scroll through menu: UP/DOWN
change a parameter: A/M, UP/DOWN, A/M (confirm), I/O (exit)



	A	B	C	D	E	net weight	gross weight
TE1S0-30-DT	170	255	140	155	194	1.63 kg	1.85 kg
TE1S0-60-DT	170	255	140	155	194	1.75 kg	1.97 kg
TE1S0100-DT	170	255	140	155	194	1.76 kg	1.98 kg

- Manual setting of times for high/low mode switching times
Maximum 3 time intervals will be supported for each high or low mode.
Stand-by mode time intervals are automatically calculated. The installer will not be able to change them.
- Manual setting of maximum 50 exceptions
- Calibration
- Hard reset (all parameters are loaded with their default values)

4. USB GUIDE

4.1. Overview

The USB interface gives the installer the possibility to read easily, change and write all device parameters via PC. Installer can save all parameters into file on disk and load them when it's necessary.

There is no need to install driver or application.

To enter in USB mode, just connect an USB cable to both end of PC or laptop and USB connector on TE1S Control board. Wait for PC to recognize the new hardware. Then run 3SM.exe.

4.2 Host system requirements

- Microsoft Windows XP SP2 / Vista / 7
- Microsoft .NET Framework 2.0
- One USB port available

Users with WindowsXP SP2 or SP3 must download and install this file from Microsoft site: Microsoft .NET Framework 2.0 Service Pack 1 (x86).

4.3. Operations

After starting the 3SM.exe installer can perform the following operations:

- Default Values – displays the default values of the parameters
- Read Parameters from USB-device (TE1S)
- View / Change all Parameters on PC screen
- Save Parameters into USB-device (TE1S)
- Export Hex File (Save Parameters to external file in 'IntelHEX format' on PC)
- Open Hex File (Load Parameters from external file on PC)

4.4. Parameters disposal (two main fields)

Main Settings

- Language (English by default)
- Time and data
- User Code (by default is disabled)
- Installer Code (by default is disabled)

Installation

- Motor Settings
- Configure Input
- Heat / Cool Parameters
- Presets – 'Monday-Friday' and 'Saturday-Sunday'

Format of times may be "h", "hh", "hh:mm", "h:mm", "hh/mm" or "h/mm". The start time must be less than end time.

When a change is made in the start or end times, it is automatically transferred to the Switching Times field (for the corresponding day of the week).

- Switching times – here can be set switching times for the particular day of week.
- Exceptions – there are 50 user programmable exceptions that set switching times different from the previously mentioned. The date of the exception cannot past the current date.
- Standby intervals are all automatically calculated and are updated after each change.

WARRANTY

Two years from delivery date against defects in manufacturing. Any modifications or alterations to the product relieve the manufacturer of all responsibility.

The manufacturer bears no responsibility for any misprints or mistakes in this data, and modifications or improvements to the product can be made at any time after date of publication.

TRANSPORT AND STOCK KEEPING

Avoid shocks. Stock In original packaging. Avoid extreme conditions.

MAINTENANCE

In normal conditions the controllers are maintenance-free. If soiled clean with dry or dampish cloth. In case of heavy pollution clean with a non-aggressive product. In these circumstances the controller should be disconnected from the mains. Pay attention that no fluids enter the controller. Only reconnect the controller to the mains when it is completely dry.

MOTOR PROTECTION

It is always recommended to install a proper motor protection device.



All works may only be carried out by skilled personnel following the local regulations and AFTER the controller is completely separated from the mains.

Replace fuse only with same type and rating.

Fig. 1

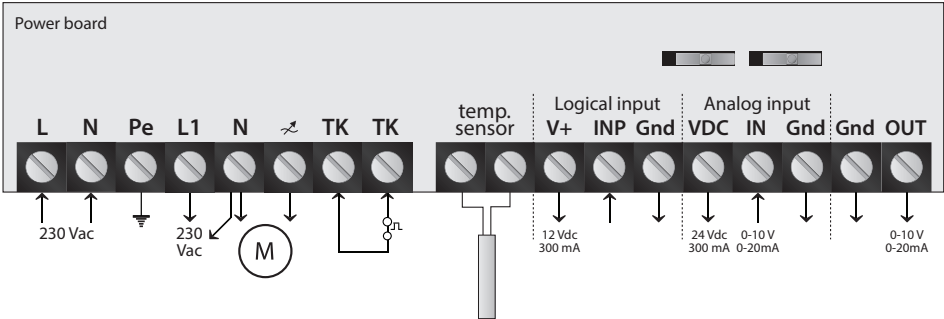


Fig. 2

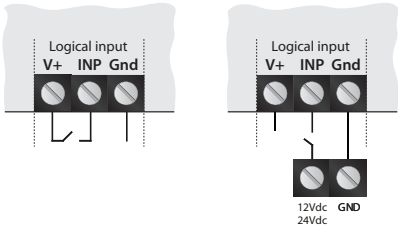


Fig. 4

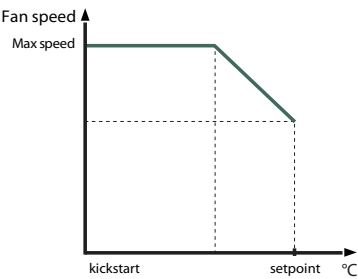
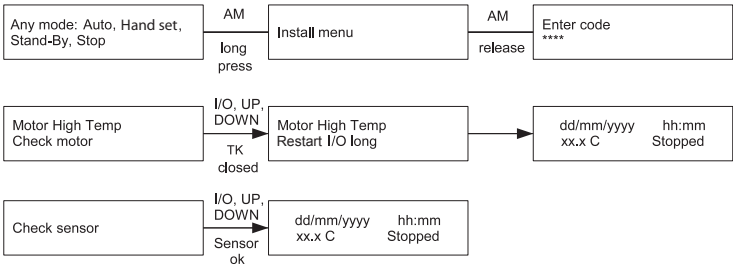
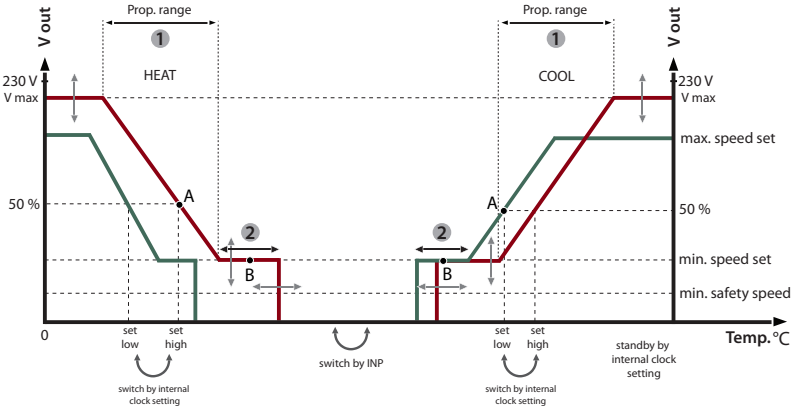
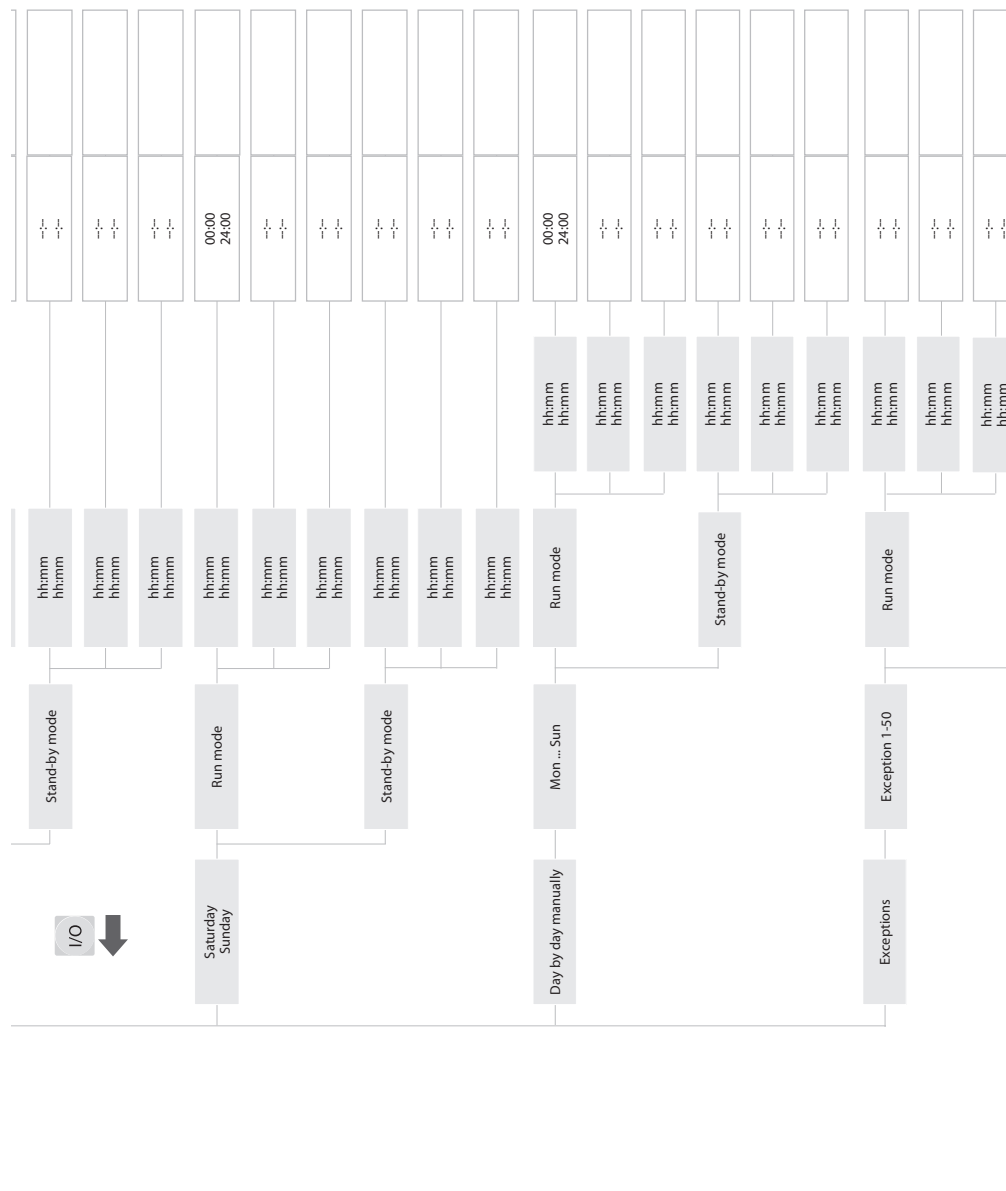


Fig. 3





Parameter	Unit	Minimum value	Maximum value	Default value	Step
User code *		0000	9999	0000	1
Installer code *		0000	9999	0000	1
Minimum safety speed **	%	25	Maximum speed – 20	45	1
Kickstart time	Second	0	30	10	1
Heat proportional range ***	°C	2	30	20	0,5
Cool proportional range ***	°C	2	30	7,5	0,5
Hysteresis	°C	0,5	5	2	0,5

* The step concerns the value of each digit

When the user code is different from 0000, then user have to enter the correct code which will allow encrease/decrease of motor speed

When the installer code is different from 0000, then the installer have to enter the correct code which will allow to change a mode, or to enter in the menu

After a password (user/installer) has been entered correctly, no password will be asked for 60min.

** If the new minimum safety speed setting is higher than minimum speed, then minimum speed value becomes equal to minimum safe speed

0V corresponds to 0%, 230V corresponds to 100%

*** Minimum temperature difference for off-level and set-point is: minimum proportional range + 1/2*hysteresis
(the set-point entry has priority over the off-level)

Mode	Default condition	Mode	Default condition
Language(EN, FR, DE, ND)	English	Heat/Cool mode	Heat mode
Configure input ****	Don't care	High/Low mode	Due to RTC
Calibration	Default calibration	Switching times	Due to Presets
Access to modes	Keypad is free	Exceptions	Date: 01.01.2008/ Times: Due to the corresponding day

**** The condition of INP doesn't influence on TEDS..DT current mode

	Low	High	Stand-by	Day
Preset1	00:00 – 07:59; 19:00 – 23:59	08:00 – 18:00	18:01 – 18:59	Monday – Friday
Preset2			00:00 – 23:59	Saturday-Sunday

Mode	Parameter	Unit	Minimum value	Maximum value	Default value	Step
Heat / High	Set-point	°C	5	35	18	1
Heat / High	Off level	°C	0	40	24	1
Heat / High	Minimum speed	%	Minimum safe speed	Maximum speed – 20	45	1
Heat / High	Maximum speed	%	Minimum speed + 20	100	100	1
Heat / Low	Set-point	°C	5	35	14	1
Heat / Low	Off level	°C	0	40	20	1
Heat / Low	Minimum speed	%	Minimum safe speed	Maximum speed – 20	45	1
Heat / Low	Maximum speed	%	Minimum speed + 20	100	100	1
Cool / High	Set-point	°C	5	35	25	1
Cool / High	Off level	°C	0	40	19	1
Cool / High	Minimum speed	%	Minimum safe speed	Maximum speed – 20	45	1
Cool / High	Maximum speed	%	Minimum speed + 20	100	100	1
Cool / Low	Set-point	°C	5	35	29	1
Cool / Low	Off level	°C	0	40	23	1
Cool / Low	Minimum speed	%	Minimum safe speed	Maximum speed – 20	45	1
Cool / Low	Maximum speed	%	Minimum speed + 20	100	100	1

Fig. 6

