TLC3-FCR-T-U-W52, Programmable Fan Coil Controller

Features

- The PWM control option reduces room temperature fluctuations and energy consumption
- Low power energy consumption:< 1W per unit
- Temperature control for 2-pipe fan coil systems.
- Large temperature range from –40°C to 70°C (-40°F to 158°F).
- Automatic fan control for three stage fans
- Cost saving option with Economy functionality and set point limitations
- External sensor or open contact for remote control, external heat – cool change or auto-changeover on supply temperature with selectable activation limits
- Control for single stage heating, cooling and fan only operation modes

Deluxe Version:
- Clock and time schedule functions with 48h backup battery
- Blue backlight for LCD
- Infrared remote controller option:
  With special features for Boost and delayed switching on or off

Ordering

Item Name	Item code	Variant	Power	Features
TLC3-FCR-T-U-24 TLC3-FCR-T-U-24-W01	40-10 0139 40-10 0139-01	Standard Cooling only	24VAC/DC	
TLC3-FCR-T-U-120 TLC3-FCR-T-U-120-W01	40-10 0149 40-10 0149-01	Standard Cooling only	120VAC	
TLC3-FCR-T-U-230 TLC3-FCR-T-U-230-W01	40-10 0116 40-10 0116-01	Standard Cooling only	230VAC	Fan coil controller with: 1 TI int or ext
TLC3-FCR-T-U-D-24 TLC3-FCR-T-U-D-24-W01	40-10 0144 40-10 0144-01	Deluxe Cooling only	24VAC/DC	3 DO (Relay) Fan control 1 DO (Relay) Binary valve control
TLC3-FCR-T-U-D-120 TLC3-FCR-T-U-D-120-W01	40-10 0154 40-10 0154-01	Deluxe Cooling only	120VAC	
TLC3-FCR-T-U-D-230 TLC3-FCR-T-U-D-230-W01	40-10 0117 40-10 0117-01	Deluxe Cooling only	230VAC	

Accessories

S-Tn10-2	40-20 0001	Flying lead sensor with 2 m cable
SD-Tn10-12-2	40-20 0002	Flying lead duct sensor 12cm immersion depth, 2m cable
SD-Tn10-20-2	40-20 0003	Flying lead duct sensor 20cm immersion depth, 2m cable
SDB-Tn10-12	40-20 0051	Duct sensor with housing, 12cm immersion depth
SDB-Tn10-20	40-20 0004	Duct sensor with housing, 20cm immersion depth
SRA-Tn10	40-20 0005	Room sensor
SOA-Tn10	40-20 0006	Outdoor sensor

Selection of valve actuators, fans and sensors

Temperature Sensors: Use only our approved NTC sensors to achieve maximum accuracy.
Binary auxiliary devices: E.g. fans and on/off valves. Do not directly connect devices that exceed maximum switching power.

Configuration of external input

The external input may be configured as external temperature control input or as binary input. The external temperature input can replace the internal sensor as control input or serve as input for the auto-changeover function. The binary input may be used to toggle Comfort and Economy modes or comfort and off modes. This may be used together with key card switches for hotels or motion detectors for offices.

Mounting location

- Install the controller on an easy accessible interior wall, approx. 1.5 m above the floor in an area of average temperature.
- Avoid direct sunlight or other heat sources, e.g. the area above radiators and heat emitting equipment.
- Avoid locations behind doors, outside walls and below or above air discharge grills and diffusers.
- Location of mounting is less critical if external temperature sensors are used.

Installation

1. Connect the wires to be connected to the terminals of the power case according to wiring diagram
2. Install the mounting plate to the flush mounting box. Make sure that the nipple with the front holding screw is facing to the ground. Make sure the mounting screw heads do not stand out more than 5 mm (0.2") off the surface of the mounting plate.
3. Ensure that the jumpers are set correctly.
4. Slide the two latches located on the top of the front part into the hooks at the upper side of the mounting plate.
5. Carefully lower the front part until the interconnector reaches the mounting-plate. Continue pressing in a gentle way until the front part is fully connected. While inserting the connectors, a slight resistance can be felt. This is normal. Do not use excessive force!
6. With a Philips-type screw driver of size #2, carefully tighten the front holding screw to secure the front part to the mounting plate. This screw is located on the front lower side of the unit. There is no need to tighten the screw too much.
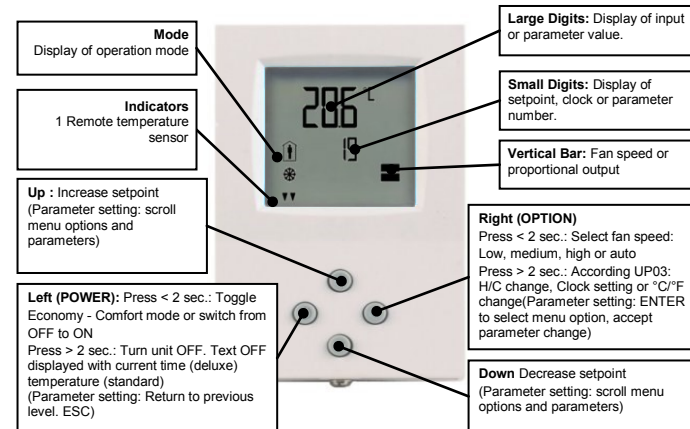
Power Failure

Upon power-interruption, all parameters and set points are memorized in non-volatile memory and therefore do not have to be re-entered again.

Error messages

Err1: Error temperature sensor. The temperature sensor may be damaged or not present. Verify wiring or setup.
Err2: External input for heat / cool auto-change-over missing or damaged.
FP: Steady: Frost protection is active.
Blinking: Frost protection activated in the past and is now inactive. Confirm with OPTION key.

Display and Operation

Mode Display of operation mode

Indicators 1 Remote temperature sensor

Up : Increase setpoint (Parameter setting: scroll menu options and parameters)

Left (POWER): Press < 2 sec.: Toggle Economy - Comfort mode or switch from OFF to ON
Press > 2 sec.: Turn unit OFF. Text OFF displayed with current time (deluxe) temperature (standard)
(Parameter setting: Return to previous level. ESC)

Large Digits: Display of input or parameter value.

Small Digits: Display of setpoint, clock or parameter number.

Vertical Bar: Fan speed or proportional output

Right (OPTION)
Press < 2 sec.: Select fan speed: Low, medium, high or auto
Press > 2 sec.: According UP03: H/C change, Clock setting or °C/°F change(Parameter setting: ENTER to select menu option, accept parameter change)

Down Decrease setpoint (Parameter setting: scroll menu options and parameters)

Technical Specification

|		
Power Supply	Operating Voltage	120V AC 50/60 Hz (-5,+10%)
	Power Consumption	Max 1W, 1.5VA
	Electrical Connection	Terminal Connectors
	Deluxe type only: Power backup for real time clock	Min 48h if charged for 24h
Signal Inputs	Temperature Inputs Range Accuracy	RT Internal, External (Sxx-Tn10 sensor) 0…50 °C (32…122 °F) 0.5°C (1°F)
Signal Outputs	Digital Switching Outputs Switching Type Max. Switching power Insulation strength between relays contacts and system electronics: between neighboring relays contacts	DO1 to DO4 Relays 1385VA / 150W each output For -230 types only 4000V AC to EN 60 730-1 1000V AC to EN 60 730-1
Environment	Operation Climatic Conditions Temperature Humidity	To IEC 721-3-3 class 3 K5 0°C …50°C (32°F…122°F) <95% R.H. non-condensing
	Transport & Storage Climatic Conditions Temperature Humidity Mechanical Conditions	To IEC 721-3-2 and IEC 721-3-1 class 3 K3 and class 1 K3 -25°C…70°C (-13°F…158°F) <95% R.H. non-condensing class 2M2
Standards	conformity EMC Directive Low Voltage Directive	(CE) 2004/108/EC 2006/95/EC
	Product standards Automatic electrical controls for household and similar use Special requirement on temperature dependent controls	EN 60 730 –1 EN 60 730 – 2 - 9
	Electromagnetic compatibility for domestic sector	Emissions: EN 60 730-1 Immunity: EN 60 730-1
	Degree of Protection	IP30 to EN 60 529
	Pollution Class	II (EN 60 730-1)
	Safety Class	II (IEC 60536)
	Overvoltage Category	III (EN 60 730-1)
	RoHS	Compliant
General	Materials Cover, back part Mounting Plate	ABS plastic (UL94 class V-0) Galvanized Steel
	Dimensions (H x W x D)	Front: 16 x 73 x 113mm (0,7 x 2.9 x 4.5 in.) Back: 60 x 50 x 32mm (2.4 x 2.0 x 1.3 in.)
	Weight (including package)	Standard: 300g (10.5oz) Deluxe (-D): 310g (10.9oz)

Wiring Diagram
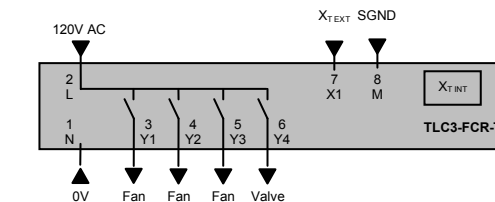
Description:

|		
N	Power supply:	0V Neutral
L	Power supply:	120VAC
Y1	Binary output 120V AC:	Fan speed low
Y2	Binary output 120V AC:	Fan speed medium
Y3	Binary output 120V AC:	Fan speed high
Y4	Binary output 120V AC:	Valve (Heating or cooling)
X1	External input:	NTC 10kΩ @ 25°C (77°F) or open contact to SGND
M	Signal common:	0 potential for inputs

Terminal Connections
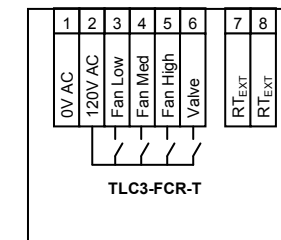
Legend:
1: 0V AC Neutral Power Supply
2: 120V AC Power Supply
3: Fan Speed Low
4: Fan Speed Medium
5: Fan Speed High
6: Spring Return Coil Valve
7: External Temperature Sensor
8: External Temperature Sensor

Dimensions
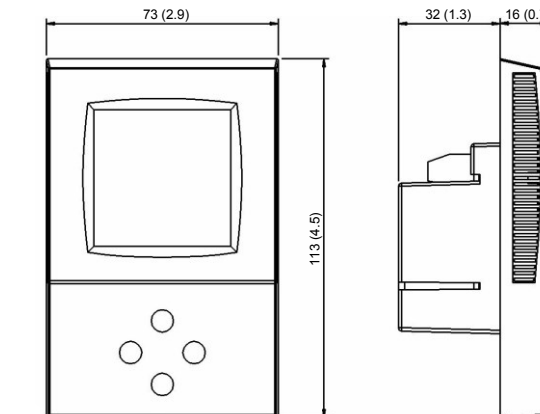
Space required in flush mounting box:(H x W x D) 60 x 50 x 32mm (2.4 x 2.0 x 1.3 in.)
Distance for mounting screws: Horizontal and vertical: 45 to 63mm (1.8 to 2.5 in.)

Configuration parameters for firmware version 3.1 -W52

The TLC3-FCR-T-U can be adapted to wide variety of fan coil applications. The adaptation is done with parameters. The parameters can be changed on the unit without the need of additional equipment.

Identifying the firmware version

The parameters and functionality of controller depend on its firmware revision. It is therefore important to use a matching product version and parameter set. The firmware version is shown on the large LCD digits when pressing UP and DOWN buttons for more than 3 seconds simultaneously.

Changing parameters

The parameters may only be accessed by entering a code. There are two levels of parameters: User operation parameters for access control settings and Expert parameters for control functions and unit setup. The codes for user levels and expert levels are different. Only control experts should be given the control parameter code.
The parameters can be changed as follows:
1. Press UP and DOWN button simultaneously for three seconds. The display shows the software version in the large digits and the software revision in the small digits.
2. Pressing the OPTION button will indicate CODE on the small digits and 000 on the large digits.
3. The code for accessing the user parameters is 009
4. Select this using UP or DOWN buttons.
5. Press OPTION button after selecting the correct code.
6. Once logged in, the parameter is displayed immediately.
7. Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. The MIN and MAX symbols show up and indicate that the parameter may be modified now. Use UP or DOWN buttons to adjust the value.
8. After you are done, press OPTION or POWER in order to return to the parameter selection level.
9. Press the POWER button again so as to leave the menu. The unit will return to normal operation if no button is pressed for more than 5 minutes.

User Parameters (Access Code: 009)

Parameter	Description	Range	Standard
UP 00	Enable change of operation modes,	ON, OFF	ON (Enabled)
UP 01	Enable change of set points	ON, OFF	ON (Enabled)
UP 02	Enable manual control fan speeds	ON, OFF	ON (Enabled)
UP 03	Function of advanced mode (long press, right key) 0 = disabled 1 = access to heat / cool / fan only change 2 = access to clock settings and time programs 3 = access to heat / cool / fan only and clock settings 4 = change of Celsius / Fahrenheit mode	0…4	2
UP 04	Not used	ON, OFF	OFF
UP 05	State after power failure: 0 = OFF, 1 = ON, 2 = Last State	0, 1, 2	2
UP 06	Enable Economy (unoccupied) Mode. Shift the set point to a lower temperature in winter or higher temperature in summer in order to save energy. May be activated through the POWER button, or with the external input (typically for key card switches in hotel rooms or motion detectors for meeting rooms.)	ON, OFF	OFF (No Economy)
UP 07	Celsius or Fahrenheit, OFF for Celsius, ON for Fahrenheit	ON, OFF	OFF (Celsius)
UP 08	Calibrate internal temperature sensor –10° to +10° in 0.1° steps. (Sensor is factory calibrated, use this feature for field adjustment only as required.)	-10…10	0
UP 09	Enable Frost Protection. Activates the output independent of operation mode when the control temperature drops below 5°C or 41°F. The controller returns to normal operation when the temperature increases above 10°C or 50°F.	ON, OFF	OFF (Disabled)
UP 10	Select contents of Large LCD display in standard mode: 00 = OFF 03 = Output Fan Speed 01 = Set point 04 = Clock 02 = Temperature Sensor 05 = Alternative Sensor	0…5	02 Temperature
UP 11	Select contents of small LCD display in standard mode (use table of UP 10)	0…5	Standard: 01 Set point Deluxe: 04 Clock
UP 12	Contents of vertical bar in standard mode OFF = Fan Speed ON = Control output	ON, OFF	OFF (FAN)
UP 13	Clock display type: Only available for deluxe version OFF = Show 24hour clock ON = Show 12hour clock (AM, PM)	ON, OFF	OFF (24h)
UP 14	Reset timer for override mode: Only available for deluxe version 0 = Reset of override mode is not active. 1…255 = delay in minutes to switch off device if ON/Economy mode is activated while the unit is scheduled to be in OFF mode	0…255	60 (Min)

Control Parameters (Access Code: 241)

Warning! Only experts should change these settings!

Set point Limitation

Parameter	Description	Range	Standard
FC 00	Minimum set point limit in heating mode	-40…60°C (160°F)	16°C (61°F)
FC 01	Maximum set point limit in heating mode	-40…60°C (160°F)	24°C (75°F)
FC 02	Minimum set point limit in cooling mode	-40…60°C (160°F)	18°C (64°F)
FC 03	Maximum set point limit in cooling mode	-40…60°C (160°F)	30°C (86°F)

Controls Configuration

FC 04	Economy (unoccupied) Mode temperature shift: The comfort (occupied) set point is shifted by the value set with parameter. If heating is active the comfort set point will be decreased, if cooling is active, the set point will be increased. (Enable with UP06.)	0…100°	4°C (8°F)
FC 05	Switching Span Heating	0.5…100°	1.5°C (3°F)
FC 06	Switching Span Cooling	0.5…100°	1.0°C (2°F)
FC 07	Switching Hysteresis is the difference between switching on and switching off. A small hysteresis will increase the number of switching cycles and thus the wear on fan and relays contacts.	0…100°	0.5°C (1°F)
FC 08	Mold Protection: OFF = Disabled, ON = Enabled	ON, OFF	ON
FC 09	Switching delay min running time of fan speed	0…255s	10s
FC 10	Switching delay min stopping time of fan speed	0…255s	10s
FC 11	Control option: 0 = Cooling only 1 = Heating only 2 = 2-pipe system	0…2	2 (2-pipe system)

Control Configuration for PWM mode

FC 12	P – band heating X_{PH}	0-10.0°C (20.0°F)	1.0°C (2.0°F)
FC 13	P – band cooling X_{PC}	0-10.0°C (20.0°F)	1.0°C (2.0°F)

➔ **Proportional control(P-band)**
The proportional control function calculates the output based on the difference between set point and measured value. The proportional band (P-band) defines the difference between set point and measured value which will result in a 100% output. Setting the proportional band to 0 disables proportional control.

Output Parameters

FC 14	PWM cycle time heating, 0 disables PWM mode	0…100 min	0
FC 15	PWM cycle time cooling, 0 disables PWM mode	0…100 min	0

➔ **Pulse With Modulation (PWM)**
In PWM mode the digital output will be switched on/off once per cycle. The on and off times are calculated according to the control sequence. It is not recommended to use cycle times below 10 minutes as the lifetime of the relays will be shortened with frequent switching. For PWM applications requiring cycle times below 100 seconds we recommend using TLC3-FCR-2Twith TRIAC outputs

Input Configuration

FC 16	External input: 0 = No external input 1 = External temperature sensor 2 = Occupation sensor – Comfort / Economy 3 = Occupation sensor – Comfort / Off 4 = Heat / Cool changeover 5 = Key card with alternative set point	0…5	4
FC 17	Activation delay (Minutes) = the time the binary input needs to be open before economy/off mode is activated.	0…255 min	5
FC 18	Auto-changeover limit heating FC16 = 4 or economy set point in heating mode if FC16 = 5	-40…60°C (160°F)	28°C (82°F)
FC 19	Auto-changeover limit cooling FC16 = 4 or economy set point in cooling mode if FC16 = 5	-40…60°C (160°F)	18°C (64°F)

Run extension for fan at power off

FC 20	Fan run extension after active heating output	0…255s	60s
FC 21	Fan run extension after active cooling output	0…255s	60s

➔ **Configuring the function of the external input**

FC16 = 0	Input not used	
FC16 = 1	External control input	The external sensor is the control input. The internal sensor will be disabled.
FC16 = 2	Switching Economy and Comfort modes	Economy (unoccupied) and Comfort (occupied) modes are controlled through an external contact by connecting the input through a dry contact to signal common. This function may be used together with key card switches for hotels or motion detectors for offices.
FC16 = 3	Switching Energy Hold OFF and Comfort modes	Opening the input will force the unit into the OFF operation mode. The operation mode cannot be overridden by using the terminal. Connecting the input to signal common returns control of the operation mode to the terminal. This function may be used as window contact to prevent loss of energy.
FC16 = 4	Heat – Cool changeover	Switch heating and cooling mode based on supply media or outside temperature or binary contact. See below for further details.
FC16 = 5	Key card with alternative set point	As with FC16 = 2, the key card function switches economy (unoccupied) and comfort (occupied) modes. Instead of using the set point shift, the set points in unoccupied mode are defined by parameter FC18 and FC19.

➔ **Configuring auto changeover input if FC16 = 4:**
The auto changeover function automatically changes heating and cooling mode based on supply media temperature or outdoor temperature. The difference between the two is in the values of the changeover limits FC18 and FC19. See table below for recommended settings.

Heating and cooling may be as well changed by an open contact switched to signal ground. Note: all signal ground levels of involved controllers must be the same in case more than one controller is switched.

➔ **Recommended settings for FC18 and FC19:**

Change over mode FC16=4	Relation FC18 to FC19	Example FC18	Example: FC19
Supply media	FC18 > FC19	25°C (77F)	18°C (64F)
Outside temperature	FC18 < FC19	15°C (59F)	25°C (77F)
Dry contact: Heating if contact closed	FC18>FC19	25°C (77F)	15°C (59F)
Dry contact: Cooling if contact closed	FC18< FC19	15°C (59F)	25°C (77F)

➔ **Run extension for fan:**
This keeps the fan running until the defined time runs out when switching the unit off or deactivating the valve. The idea is to prevent condensation on the cooling coil or triggering the overheat fuse on electrical reheat devices.