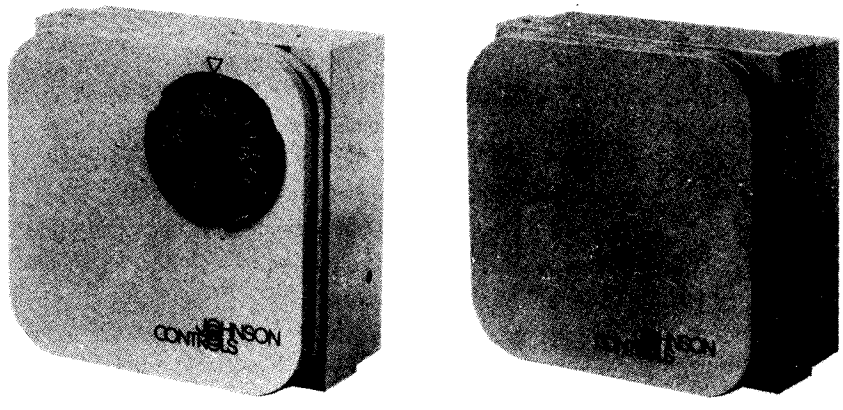
JOHNSON CONTROLS

PSC **1088**

TC-8801 Electronic Room Temperature Controller, Dual Output - Proportional

The TC-8801 Electronic Room Temperature Controllers provide individual space temperature control in heating and cooling applications.
These controllers produce a direct and reverse proportional output signal in response to load changes in the space.
They are primarily designed to modulate two controlled devices in sequence; examples: separate heating and cooling valves in four pipe systems; reheating valve and room discharge damper actuator in VAV applications.



TC-8801 Electronic temperature controllers with exposed (left) and concealed (right) set point dial

Features

- Built-in or remote variable resistance temperature sensing element (NTC thermistor).
- Set point adjustment: concealed, exposed or remote.
- Models with exposed set point adjustment are supplied with a snap-on transparent dial cap to prevent unauthorized persons from changing the set point.
- Adjustable deadband between heating and cooling cycles promotes energy conservation and prevents energy waste by eliminating heating and cooling overlap.
- Individually adjustable proportional band for each output.
- Stand -by set point.
- Day/Night setup and setback or outdoor temperature reset through central parameter adjuster (ES-8800).
- Mounting flexibility: wall or concealed in fan coils, induction units, etc.

Operation

The TC-8801 controllers provide a proportional direct and reverse acting modulating output signal between 0 and 10V D.C..
When the temperature being sensed is equal to the set point of the controller and is within the deadband range, the output is 0V D.C.
When the temperature increases above the set point and beyond the dead band limit, the direct acting output increases in proportion to the change. When the temperature decreases below the set point and deadband limit, the reverse acting output signal increases, again in proportion to the change; see graph 1.
The amount of output voltage change for any given temperature change is determined by individual proportional band setting for each output.
Typical applications of TC-8801 are:

- Direct control of devices such as valves, velocity controllers, etc. which have a control input signal compatible with the TC-8801 output.
- When interfaced by one of the TC-8801-89XX driving modules, the TC-8801 can drive two (or two pairs of) VE-7040 solenoid proportional valves in series (one heating, one cooling) or can sequence one proportional VE-7040 cooling valve and an on-off electric heating coil.
In both cases an optional proportional output, 0 to 10V D.C. is available from the TC-8801-89XX driving module to control additional devices such as motor fan speed controller, air velocity controller etc.
See the TC-8801 A.1 driving module Product Data Bulletin for complete and further details.

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Model Descriptions

Table 1 lists all the TC-8801 available models, highlighting features of each model. More detailed information on individual models is given in the following paragraphs.

Stand-Alone Controller Models:

The TC-8801-8001, -8002, -8011 and -8012 are devices used whenever independent and individual setting of temperature is required.

The TC-8801-8001 and -8002 feature a local exposed dial for set point adjustment whereas the set point for the TC-8801-8011 and -8012 is adjusted remotely through the ES-8800-8001.

Note: TC-8801-8011 and -8012 do not include a set point potentiometer and therefore do not have any provision for concealed local set point adjustment.

Centralized Controller Models:

The TC-8801-8021, -8022 are primarily designed to fulfil the need of a centralized adjustment of parameters such as set point, day/night set point setback, set point reset via outdoor temperature sensor/controller.

The remote centralized adjustments and settings can be obtained through the ES-8800-8100 Centralized Parameter Adjuster or via proper input signals from BAS/EMS.

Up to (64) TC-8801-8021, -8022 or -8031 can be driven simultaneously by one ES-8800-8100 Centralized Parameter Adjuster (see fig. 3).

The following are the adjustments and settings which are obtainable through it:

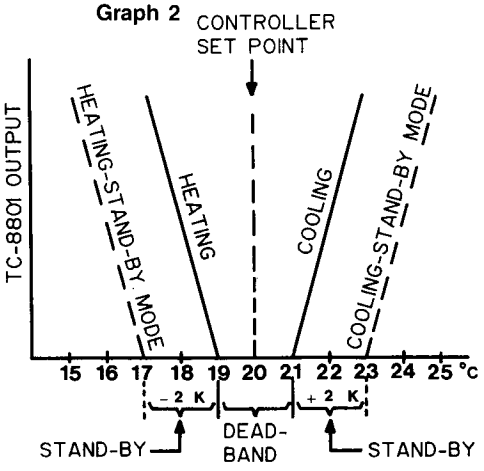
- Set point change
- Day/night setback: this is a shift of the set point signal value, adjustable from −8 to +8 K.
- Outdoor temperature reset; the set point value is shifted by an 0-10V D.C. signal from an outdoor temperature sensor/controller connected to the ES-8800-8100.

Note:
Further details are given in the ES-8800 Product Data Bulletin.

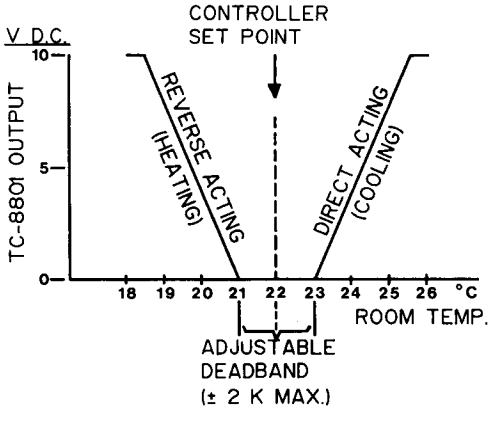
All the stand-alone and centralized models of the TC-8801 feature at local level an optional stand-by (occupied - non occupied) set point function which displaces the set point by 2 K on both heating and cooling sides: graphs 2 and 3 illustrate the stand-by function when on TC-8801 the dead-band is set to a given value (graph 2) or at zero (graph 3).

The above stand-by function is achieved via an external SPST contact: when the contact is closed the stand-by function is activated.

Graph 2



Graph 1: TC-8801 Typical Operational Graph.



Graph 3

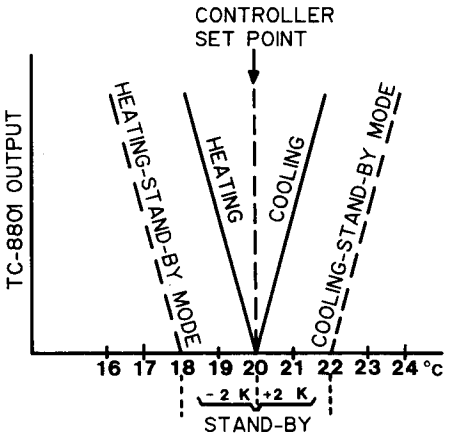
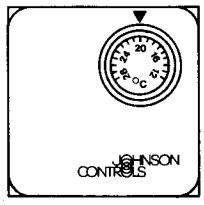
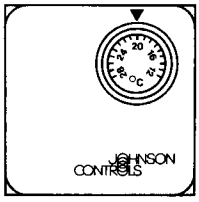
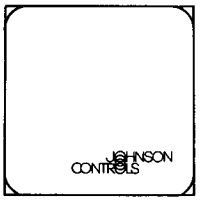
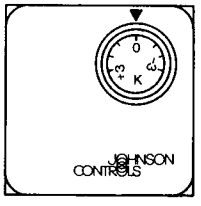


Table 1: Model selection

	Features	Mounting	Ordering Code:
STAND-ALONE MODELS			
	- Exposed set point dial - Built-in temperature sensor - Adjustable deadband - Individually adjustable proportional band for each output - Stand-by set point	**WALL**	**TC-8801-8001**
	- Exposed set point dial - Remote temperature sensor (TE-8800-8001 to be ordered separately). - Adjustable deadband - Individually adjustable proportional band for each output - Stand-by set point	**UNIT**	**TC-8801-8002**
	- For individual remote set point adjustment (ES-8800-8001 to be ordered separately). - Built-in temperature sensor - Adjustable deadband - Individually adjustable proportional band for each output - Stand-by set point	**WALL**	**TC-8801-8011**
	- For individual remote set point adjustment (ES-8800-8001 to be ordered separately). - Remote temperature sensor (TE-8800-8001 to be ordered separately). - Adjustable deadband - Individually adjustable proportional band for each output - Stand-by set point	**UNIT**	**TC-8801-8012**
CENTRALIZED MODELS			**Ordering Code:**
	- Remote centralized: - set point - day/night set point setup and setback - set point reset via outdoor temperature sensor - Built-in temperature sensor - Individually adjustable proportional band for each output - Stand-by set point - Adjustable deadband	**WALL**	**TC-8801-8021**
	- Remote centralized: - set point - day/night set point setup and setback - set point reset via outdoor temperature sensor - Remote temperature sensor (TE-8800-8001 to be ordered separately). - Individually adjustable proportional band for each output - Stand-by set point - Adjustable deadband	**UNIT**	**TC-8801-8022**
	- Remote centralized: - set point - day/night set point setup and setback - set point reset via outdoor temperature sensor - Local set point override possibility (±3 K) - Built-in temperature sensor - Individually adjustable proportional band for each output - Stand-by set point - Adjustable deadband	**WALL**	**TC-8801-8031**

Specifications

Product	TC-8801 Electronic Room Temperature Controller, Dual Output	
Action	Proportional Direct & Reverse Acting Outputs	
Supply Voltage	24V A.C. $^{+15}_{-10}$ %, 50/60 Hz	
Output Signal	0 to 10V D.C.: 1000 Ω min. load; 0,1 Ω max. output impedence	
Power Consumption	1 VA approx. with no load on outputs	
Proportional Band	Individually adjustable from 1 to 4 K approx. on each output. Factory set at 2 K approx.	
Dead Band	Adjustable from 0 to ±2 K beyond the set point. Factory set at zero K	
Set Point Range	+12 to + 28 °C adjustable; factory set at 20°C	
Stand-by Set Point (occupied/non-occupied)	2 K (external free contact SPST, 5 m A)	
Set Point Readjustment (for centralized models only)	±8 K through a 0-10V D.C. signal. See ES-8800 Product Data Bulletin for details. Input impedence 750 KΩ :	
Sensing Element	NTC Thermistor	
Wiring	Removable terminal connector, screws for 1,5 mm² wire	
Housing (Cover Mounting Bracket)	Heat resistant & self-extinguishing ABS plastic; beige colour	
Ambient Operating Limits	0 to +50°C 10 to 90% RH non-condensing	
Storage Temperature Limits	-40 to +70°C	
Net Weight	Approx. 0.120 kg	
Auxiliary Devices (Order separately)	• Driving Modules (TC-8801-89XX) • Individual remote set point adjuster (ES-8800-8001). • Centralized parameter adjuster (ES-8800-8100).	See TC-8801 A.1 and ES 8800 Product Data Bulletins
Accessories (order separately)	• Remote Temperature Sensor (TE-8800-8001) • Sensor Holder (TE-8800-8901) • Sensor Holder Kit (TE-8800-8902) • Mounting Bracket for Horizontal Mounting inside terminal unit fan coil (TC-8800-8902) • Plastic surface mounting back (T-4000-8930) • Panel Mounting Kit (T-4000-8932) • Wall Box Mounting Kit (T-4000-8931) • Extension Cable for service (TC-8800-8901)	See TC-8800 A.1 Product Data Bulletin.

Installation

The TC-8801 can be mounted in virtually any position on walls or inside terminal units. It is recommended that they, or their sensing element, be located where they will be exposed to representative room temperatures or return air flow in case of remote sensing element models. Draughts, direct sunlight, etc. should be avoided.
Various accessories are available to facilitate their mounting: see TC-8800 A.1 Product Data Bulletin.

When controlling VE-7040 solenoid valves via the TC-8800-8900 driving module, a maximum of (5) TC-8801 can be connected on the same 24V A.C. power supply line (see figure 5): this limits is imposed by the wire size needed in this condition i.e. 1,5 mm², which is the maximum acceptable wire size for the TC-8801 terminal screw connector.

For detailed mounting, wiring and adjusting instructions, refer to TC-8800 Application Data Bulletin.
All wiring must be in accordance with local regulations and national codes.

Warning!

- Always disconnect electrical power supply before wiring or making any change to the wiring, to avoid electric shock or possible damage to equipment.
- Repair: Do not attempt field repairs. If the controller is not operating properly and if, after checking, all the wiring is correct, it should be replaced.

Typical Wiring diagrams and terminal block Wiring connections

(Note: The terminal wiring block connection is represented at the bottom rather than at center).

Fig. 1: Stand-alone models

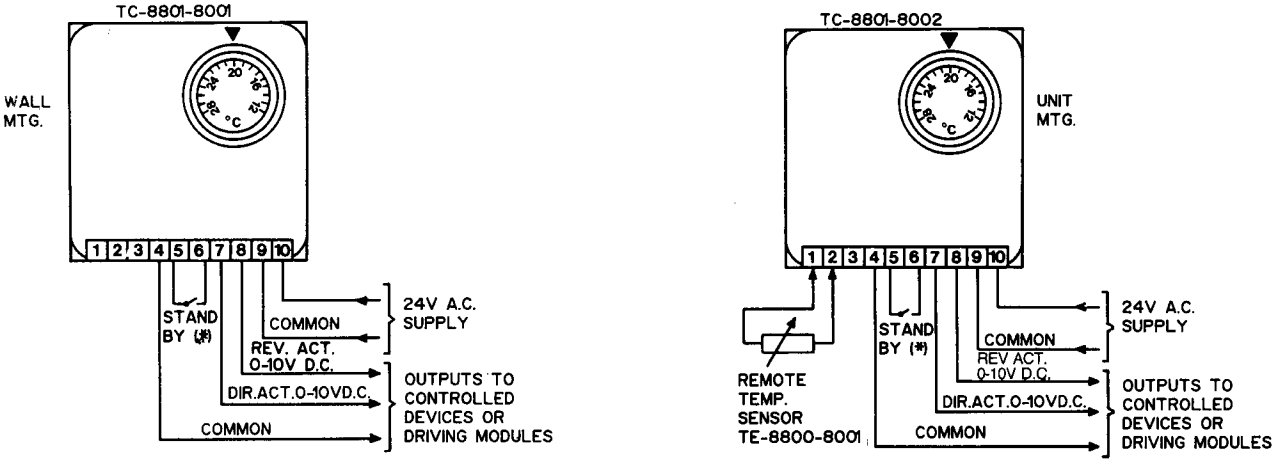
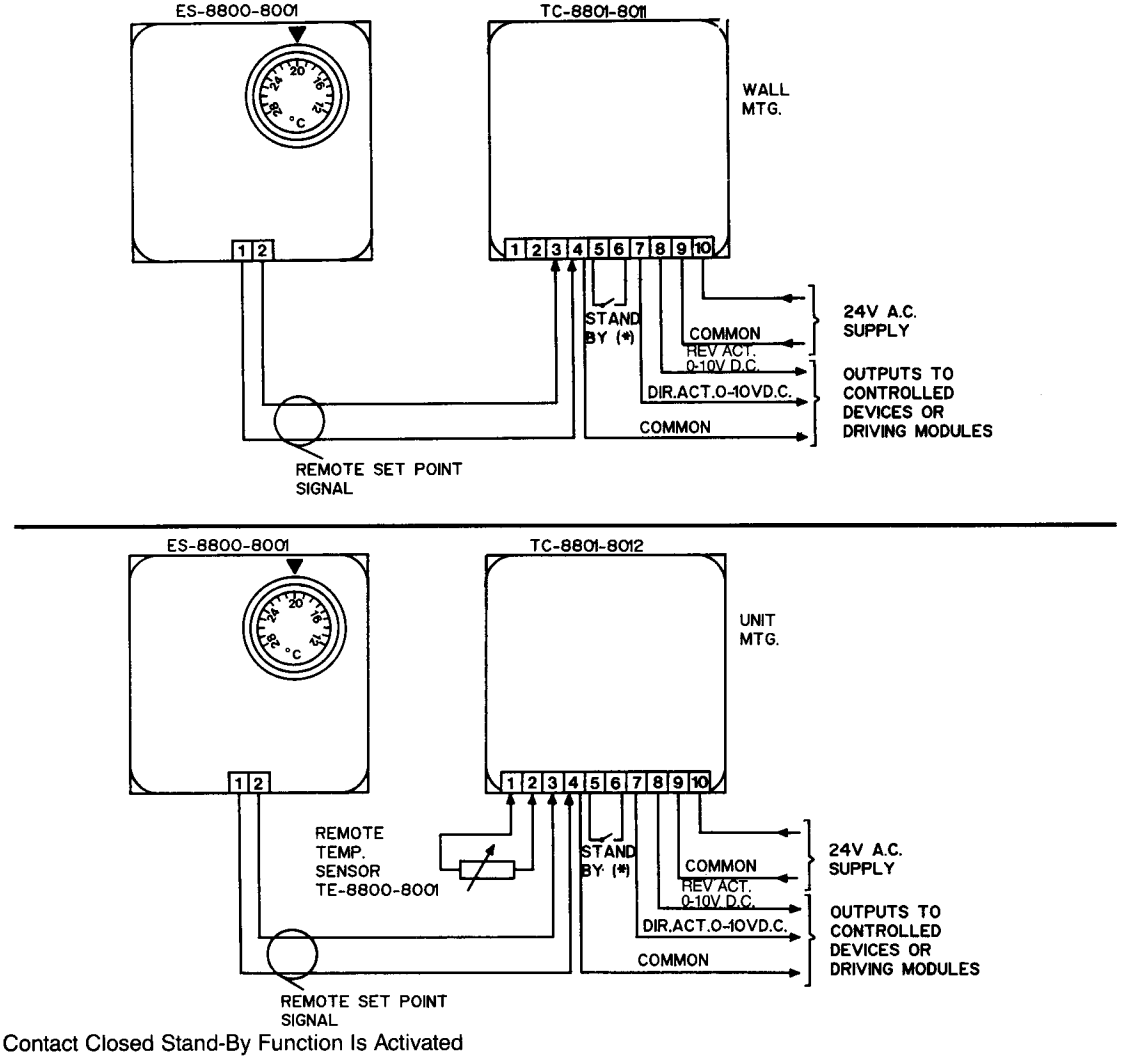
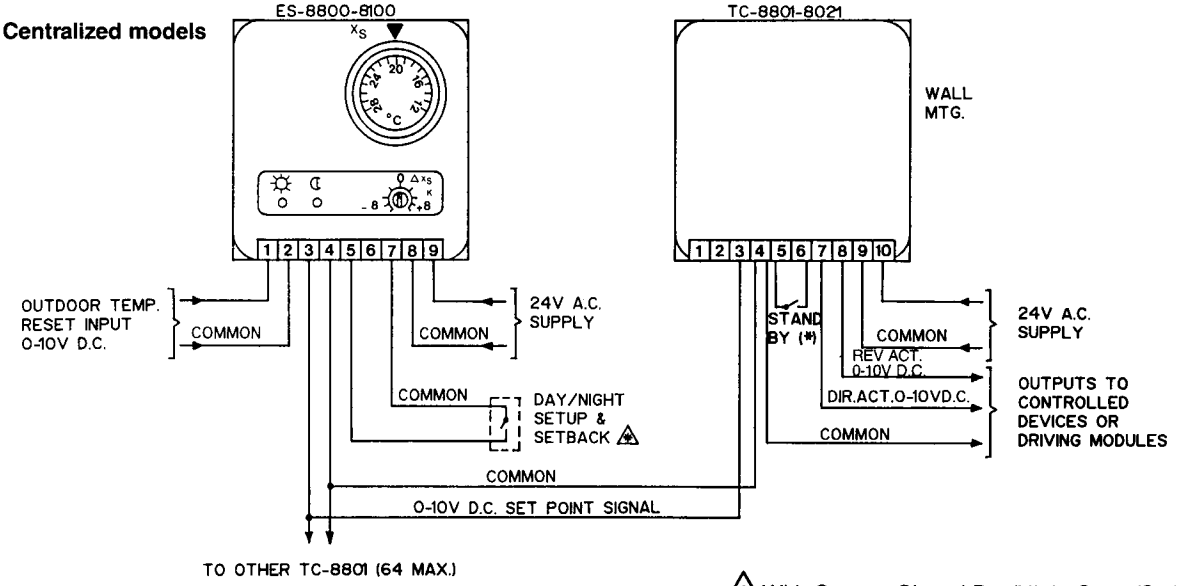


Fig. 2: Stand-alone models with individual remote adjustment



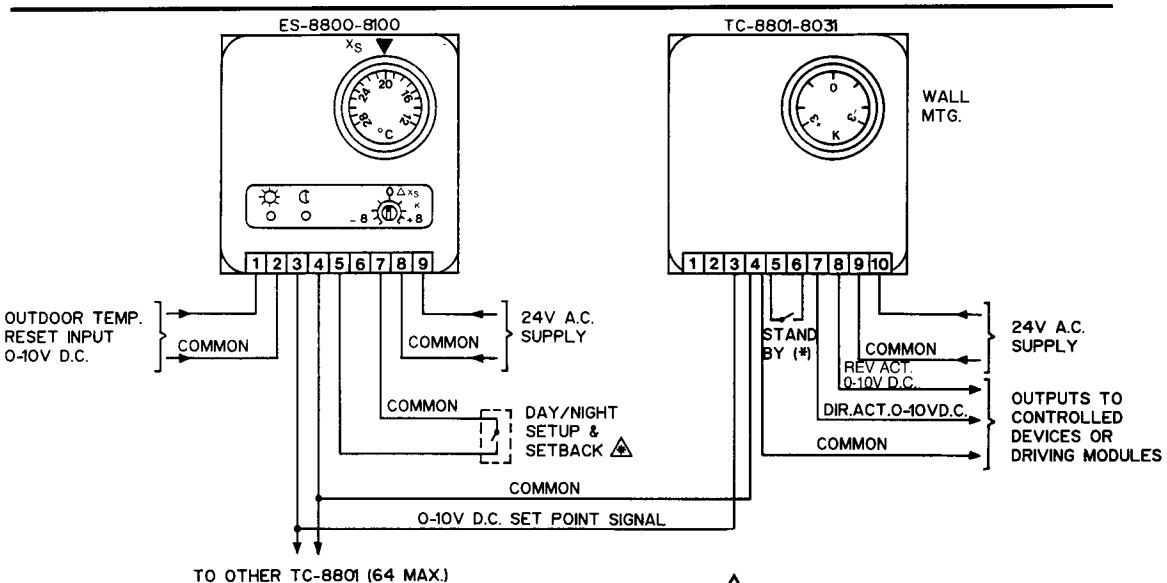
(*) With Contact Closed Stand-By Function Is Activated

Fig. 3: Centralized models



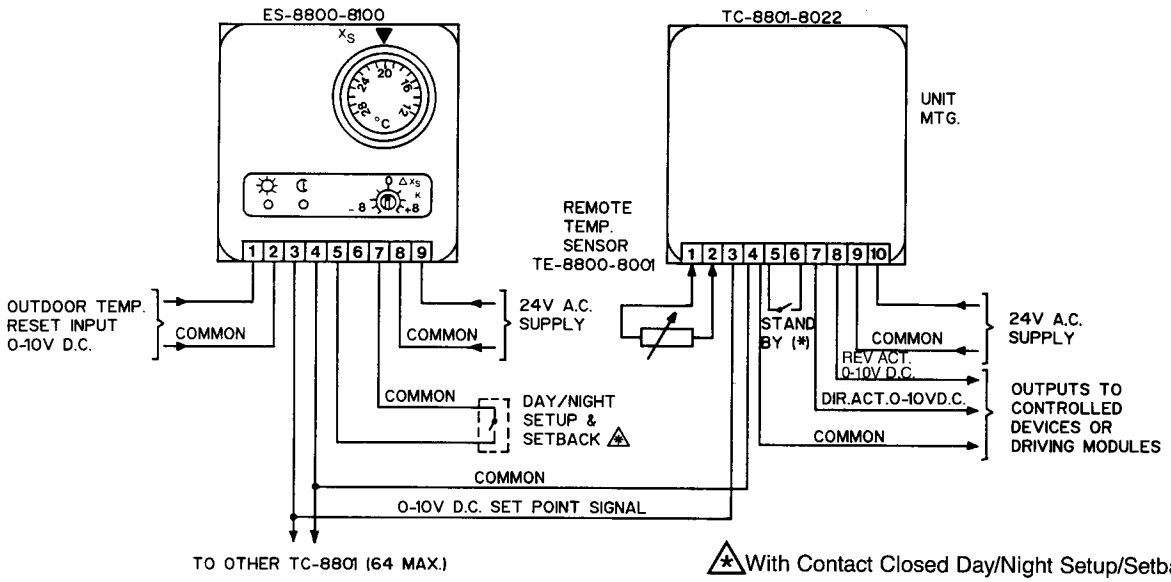
(*) With Contact Closed Stand-By Function Is activated

With Contact Closed Day/Night Setup/Setback Function is activated.



(*) With Contact Closed Stand-By Function Is activated

With Contact Closed Day/Night Setup/Setback Function is activated.



(*) With Contact Closed Stand-By Function Is activated

With Contact Closed Day/Night Setup/Setback Function is activated.

Fig. 4: Typical wiring Hook up of TC-8801 To VE-7040 Valves With TC-8801-8900 Driving Module.

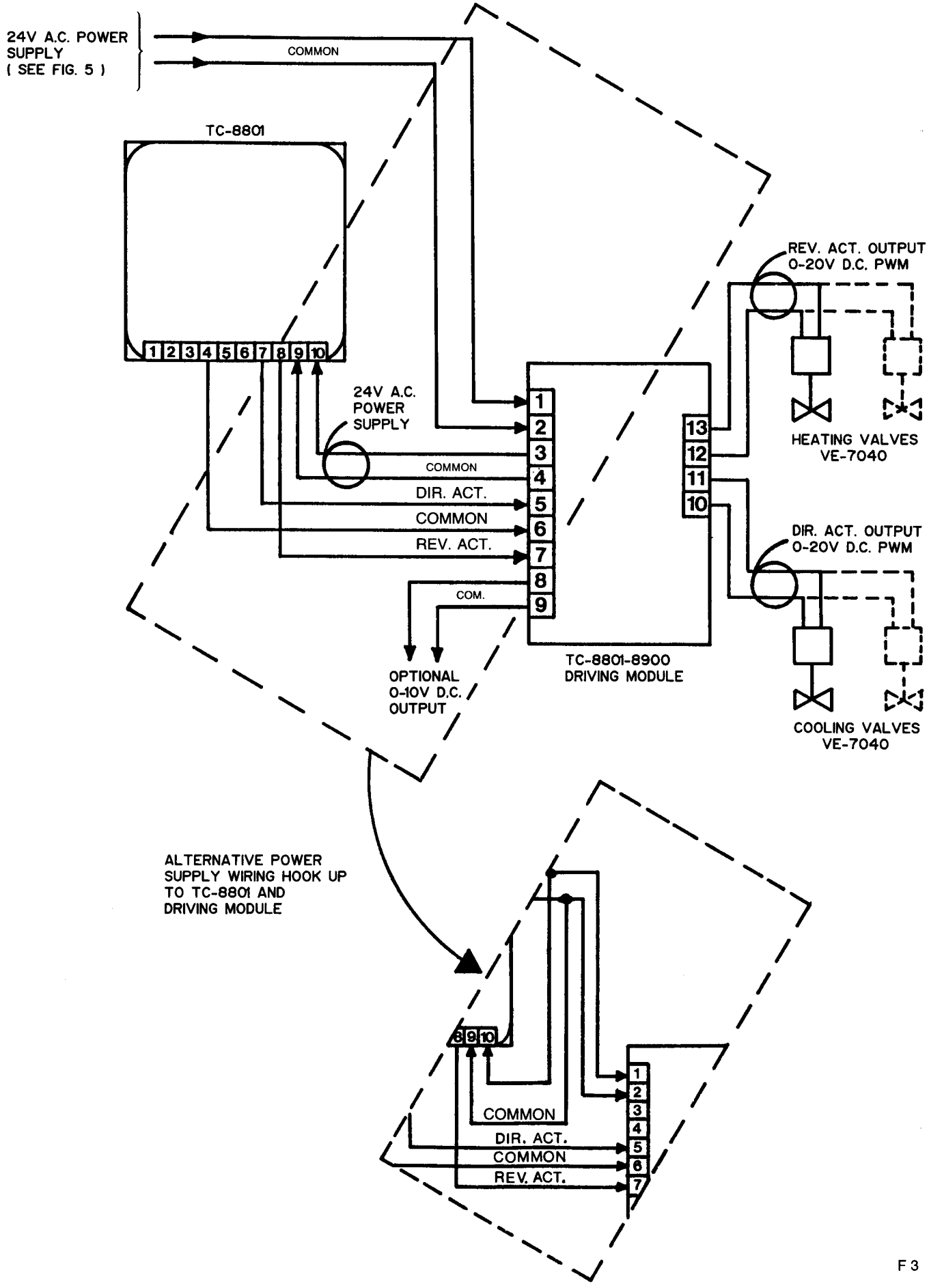
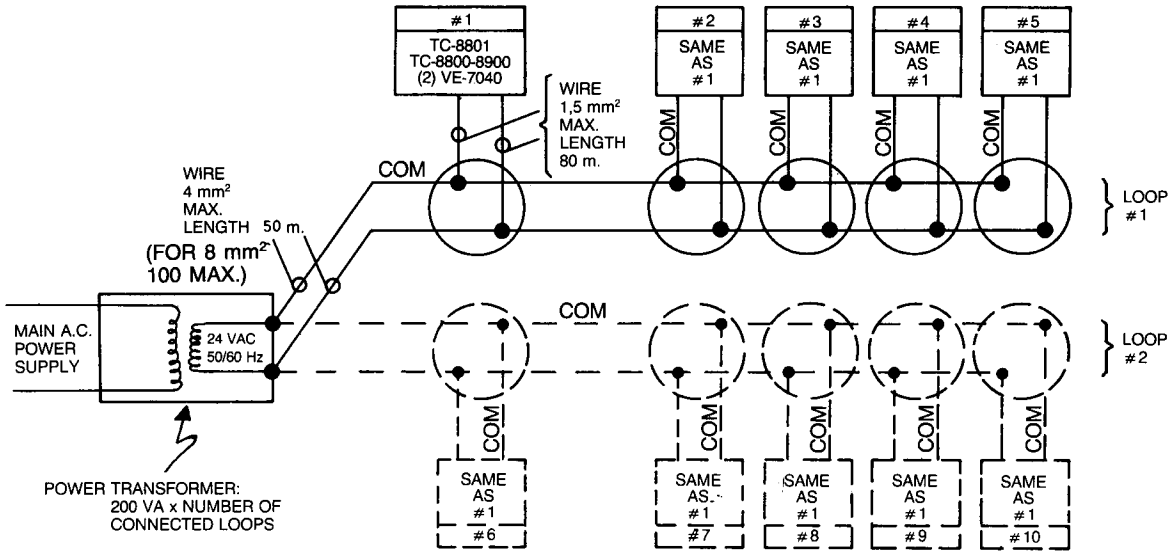
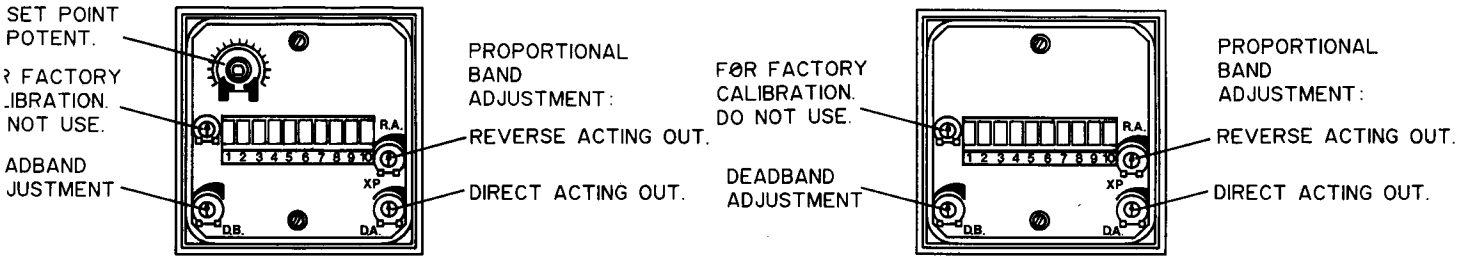


Fig. 5: Typical power supply distribution to (5) TC-8801 controlling (10) VE-7040 Valves with TC-8801-8900 Driving Module (Ref. Fig. 4)

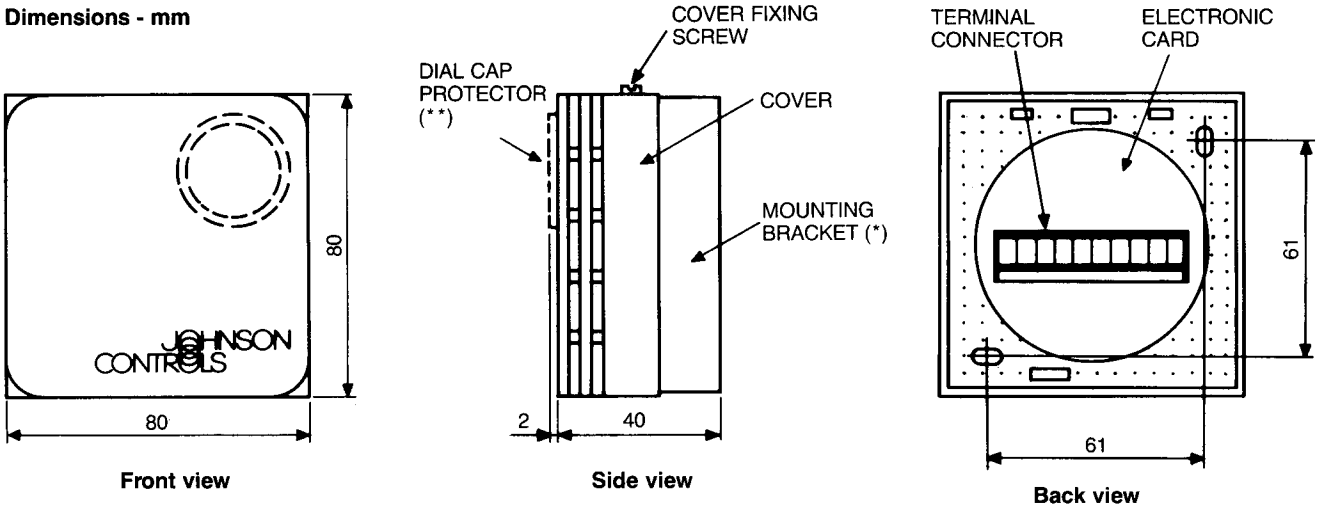


NOTE: MAKE SURE TO RESPECT COMMON CONNECTION WIRES

TC-8801 Internal adjustemnt



Dimensions - mm



Front view **Side view** **Back view**

(*) Supplied with controller (**) Only On Models With Exposd set Point Dial

Performance specifications are nominal and are subject to accepted manufacturing tolerances and application variables.

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European Operations
European Factories at Lomagna (Italy), Leeuwarden (The Netherlands) and Essen (West Germany),
Branch Offices in Principal Cities

Printed in Italy