SAT-2.1 Controller Kit (230V)

for ISDL 56–110K, ISD 83–270K & OPA 100–170RKT

Installation Instructions

GENERAL

The **temperzone** SAT-2 is a microprocessor air conditioning temperature controller.

This SAT-2.1 Control Box Kit (Item no. 525-001-014) is designed for use with the following **temperzone** 230V control units:

a. ISDL 56–110K
b. ISD 83–270K
c. OPA 100–170RKT

The SAT-2 Wall Control sends instructions to the SAT-2 Controller board which is mounted, either:
(a) inside the electrical box of a ISD/L, or
(b) on the electrical board for an OPA.

In the event of a power failure a battery backup will maintain the real time clock and the integrity of the control data.

Note:

1. This thermostat may be applied as a replacement/retrofit to older models using R22 refrigerant. The wiring schematic in this document should be viewed as a generic example. Terminals and exact wiring will in most cases be identical or similar. If in doubt contact temperzone Engineering.
2. Parts for the SAT-2 are not interchangeable with the previous model SAT-1.
3. We recommend you fit the SAT-2 indoor coil sensor before connecting any refrigeration pipework.

SAT-2.1 CONTROLLER KIT

Components:

1. SAT-2.1 Controller board.
2. SAT-2.1 Wall Control plaque, including wall mounting plate.
3. 10 m interface lead (plaque-to-Controller).
4. Indoor Coil Sensor on lead; 1.7 m.
5. Mounting screws (x8).
6. Heat transfer paste.
8. Cable ties (x4).
9. Insulation tape 120 mm long
10. High temperature sleeving 150 mm long
11. Electrical filter.
12. Transformer.
13. Spire clips (x2)
14. Wiring loom.
15. Wiring diagram label.
16. *User's Operating Instructions* booklet.
17. SAT-2 Installation Instructions.

Optional

1. Remote return air sensor (in box).
2. Remote return air temperature sensor lead; 1.5, 6, 12 or 25 m.
3. 20 m extended interface lead (electrical box-to-plaque).
4. SAT-2 Zone Control PCB.
5. Zone Control 24V transformer.
6. Additional SAT-2 Wall Control plaque.
7. Infra red remote control.

Check that all items of the kitset are supplied and no damage has occurred to the items.

INSTALLATION

1. Isolate the air conditioner from the power supply, then remove electrical box cover.
2. **IMPORTANT:**
   For ISD/L units, discard any grey wires linking 'ACTIVE' to any fan speed terminals.
   For OPA units, discard any grey wires linking 'FAN' to any fan speed terminals.
3. Mount SAT-2 Controller board in position using plastic clips supplied (refer fig. 2).
4. Screw down the transformer (supplied) and connect to the SAT-2 Controller board – refer wiring schematic.
5. Secure the electrical filter using the supplied spire clips and connect to SAT-2 Controller board – refer wiring schematic.
6. Use the wiring loom supplied to connect the SAT-2 Controller board to the unit's connections as per Table 1 and the wiring diagram.
   Indoor Coil Sensor
7. Find the sensor pocket brazed on one of the coil's copper return bends nearest the electrical box.
8. Apply heat transfer paste (supplied) to the indoor coil sensor and the pocket entrance.
9. Insert the indoor coil sensor into the pocket and use the cable tie supplied to secure the sensor wire to the return bend so the sensor can not slip out.
10. Wrap the sensor pocket and tube using the supplied insulation tape, as shown in the wiring schematic on page 3 or 4.
11. Remove the Wall Control's interface lead from its box and connect the bare wired end of the interface lead to the colour coded terminal block on the SAT-2 Controller board. Trace the remaining length of the lead to the wall thermostat's intended location.
12. Ensure all interface and sensor wires are run separately and away from main power supply wires.
13. Ensure all SAT-2 Controller board DIP switches are set to the desired settings – refer wiring diagrams.
14. Attach the supplied wiring label to the unit's electrical box.
15. Replace the unit's electrical box cover.

SAT-2 WALL CONTROL

1. Isolate the unit from power supply, then remove electrical box cover.
2. Remove the Wall Control's backing plate by using a small screw driver to remove the single screw at the bottom edge of the plaque.
3. Install the Lithium battery, supplied loose,

Fig. 1   SAT-2 Control Wiring (Split System)

Note: Communication and sensor wires must be run separately and away from main power supply wires.

ISD unit shown
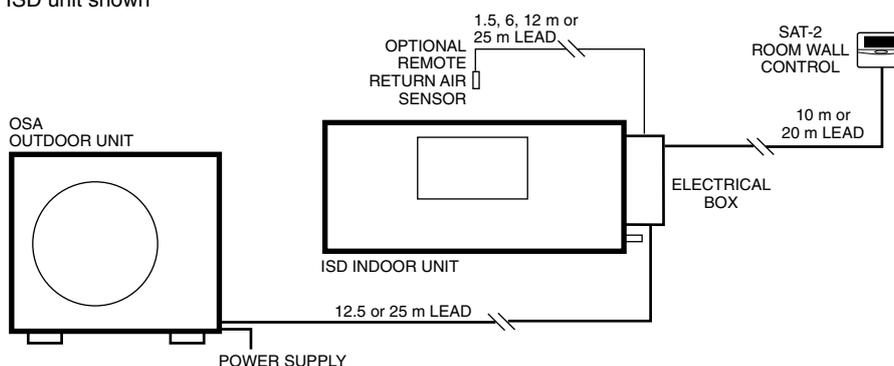
positive (+) side up in the Wall Control's battery holder.

4. Check the wall where the Wall Control plaque is to be located is flat before fastening the wall mounting plate. Alternatively, the mounting plate can be screwed to a standard wall socket mounted horizontally.
   Note: Use low profile (mush) headed screws to prevent contact with the PCB board. Fixing the plate to a distorted surface may damage the control.

5. Drill hole in wall to allow cable entry.

6. Connect the interface lead's lugs to the Wall Control board as per the wiring diagram overleaf.

7. Ensure the interface lead is run separately and away from main power supply wires, including the interconnecting cable. When installing cabling, trim any excess length to suit your location.

8. Fill around the interface lead with foam or cover hole with PVC tape to prevent draft from wall cavity affecting control operation. Do not use aluminium duct tape.

9. Secure the Wall Control body to the mounting plate by replacing the locking screw removed earlier.

10. Replace the ISD/OPA electrical box cover.

Remote Air Temperature Sensor/s (option)

The air temperature sensor is by default located in the Wall plaque. Optional remote air temperature sensors are available so that the measurement of the room temperature can be taken away from the wall plaque, eg. elsewhere in the room or in the return air duct.

Remote sensor's can be plugged directly into the Controller board (PCB). This board accepts up to four sensors which are designated as 'zones' one to four. The first return air sensor will automatically replace the Wall Control sensor and should be located in the same room as the Wall Control. The Controller will always use the average of the zones selected. Refer to the separate installation instructions supplied with the PCB for further details.

Ensure all remote sensor wires are run separately and away from main power supply wires, including the interconnecting cable.

accepts up to four sensors which are designated as 'zones' two to five. The first zone will always be the Wall Control itself. The Controller will always use the average of the zones selected. Refer to the separate installation instructions supplied with the PCB for further details.

COMMISSIONING

Refer to Outdoor Unit and Indoor Unit Installation Instructions in order to complete the start-up and commissioning procedure for the complete air conditioning system.

Check that the wall control is correctly wired and set at the desired temperature.

Demonstrate the SAT-2 Wall Control to the owner/user, after having first thoroughly familiarised yourself with the User's Operating Instructions. This booklet is to remain with the owner/user.

NOTE

The manufacturer reserves the right to change specifications at any time without notice or obligation.

This pamphlet replaces the previous issue no. 3398a dated 06/10.
Wiring revision E.

Fig.2 SAT-2 Controller Board Location

Ref. 525-004-024

ISD UNITS
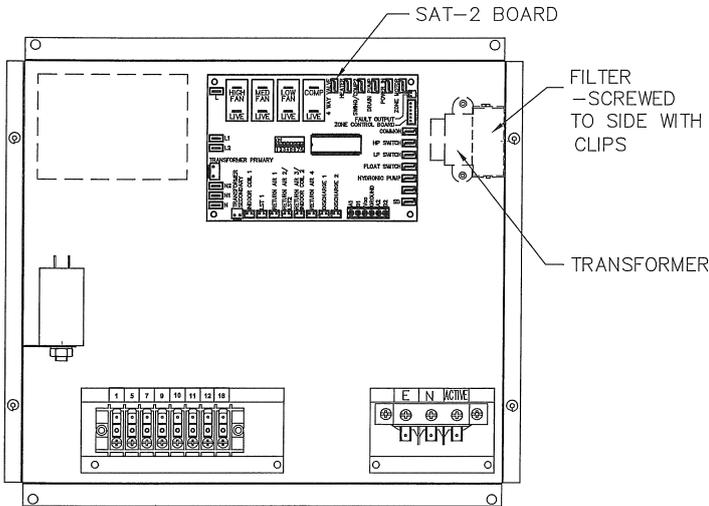
ISDL UNITS
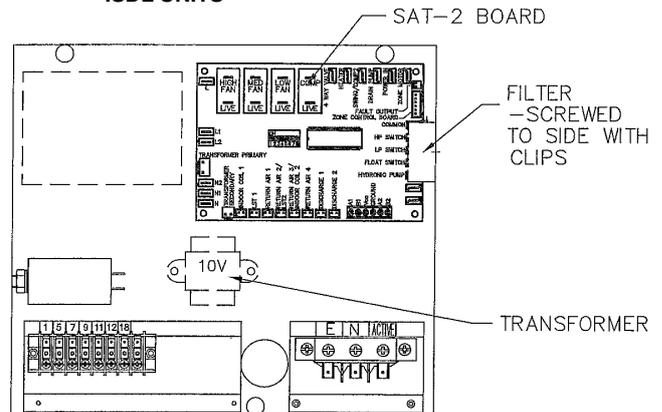
OPA UNITS
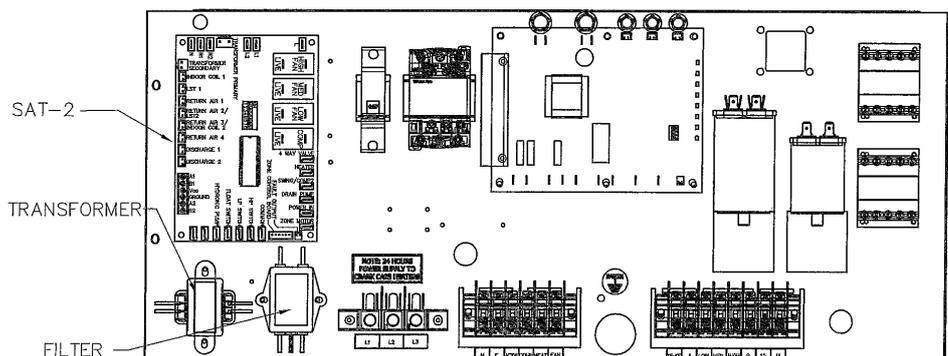
Table 1. Wiring Loom

Item	Length (mm)	Colour	From	To
1	720	BLUE	ISD/L terminal 5 OPA terminal 'COMP'	SAT-2 relay 'COMP'
2	720	ORANGE	7	SAT-2 terminal '4 WAY VALVE'
*3	720	WHITE	9	SAT-2 relay 'LOW'
4	720	RED	ISD/L terminal 11 OPA terminal 10	SAT-2 relay 'MED'
5	720	BROWN	ISD/L terminal 12 OPA terminal 11	SAT-2 relay 'HIGH'
*6	720	BROWN	ISD/L terminal 18 OPA terminal HST	SAT-2 terminal 'HEATER'
7	720	BLUE	N	SAT-2 terminal 'N'
*8	720	RED	OPA teminal 'FAN'	SAT-2 terminal 'ZONE MOTOR'
9	720	RED	ACTIVE	SAT-2 terminal 'L'
10	150	RED	SAT-2 terminal 'L'	SAT-2 terminal 'HIGH LIVE'
11	120	RED	SAT-2 terminal 'HIGH ACTIVE'	SAT-2 terminal 'MED LIVE'
12	120	RED	SAT-2 terminal 'MED LIVE'	SAT-2 terminal 'LOW LIVE'
13	120	RED	SAT-2 terminal 'LOW LIVE'	SAT-2 terminal 'COMP LIVE'
14	120	BLUE	SAT-2 terminal 'COMMON'	SAT-2 terminal 'HP SWITCH'
15	120	BLUE	SAT-2 terminal 'HP SWITCH'	SAT-2 terminal 'LP SWITCH'
16	120	BLUE	SAT-2 terminal 'LP SWITCH'	SAT-2 terminal 'FLOAT'
17	120	BLUE	SAT-2 terminal 'FLOAT'	SAT-2 terminal 'HYDRONIC PUMP'
18	120	BLUE	SAT-2 term'l 'HYDRON. PUMP'	SAT-2 terminal 'SD'

Important: For OPA units, remove the link wire from 'FAN' terminal to any fan speed.

Notes:
*3 – For ISD/L units:
    3 speed motor - relay low connected to terminal 9
    4 speed motor - relay low connected to terminal 10
*6 – For OPA units, if heaters are fitted with LAT, remove LAT. Discard Item 6 if no heaters are fitted.
*8 – For OPA units only.

Table 2. Error Codes

Should a fault develop, the relevant error code will be displayed on the Wall Plaque display.
If there are multiple faults happpening at the same time, the error codes will display one afther another.

Code	Fault	Remarks
1	Room sensor #1 failure	Main board AD3
2	Room sensor #2/LST sensor #2 failure	Main board AD4
3	Room sensor #3/Indoor coil sensor #2 failure	Main board AD5
4	Room sensor #4/Discharge sensor #1	Main board AD6
5	#1 indoor coil sensor failure	Main board AD1
6	#1 LST sensor failure	Main board AD2
7	#1 insufficient refrigerant	
8	#1 compressor overload	
9	Low pressure failure	
10	High pressure failure	
11	Room sensor #5 failure	At wall plaque B
12	Room sensor #6 failure	At wall plaque A
13	All room sensor failure	
14	Float switch failure	
15	#1 Low safety thermostat failure	
16	Communication failure	
17	Hydronic pump switch failure	
18	#2 insufficient refrigerant	
19	#2 compressor overload	
20	#2 low safety thermostat failure	
21	Discharge sensor 1 failure	
22	Discharge sensor 2 failure	
23	Discharge temp 1 failure	
24	Discharge temp 2 failure	

USE THIS CONNECTION DIAGRAM FOR OPA UNITS

CONNECT ONLY IF ELECTRIC HEAT OPTION FITTED

BEFORE FITTING SAT-2, REMOVE LAT & INTERCONNECTING WIRING (IF FITTED)

FAN
ACTIVE
HST
HEAT
COMP

ALARM OUT
ZONE CONTROL BOARD

OUT6 OUT5 OUT4 OUT3 OUT2
COM DI6 DI5 DI4 DI3 DI2 DI1

DIP SWITCH SETTING – REFER TABLE –
ON 1 2 3 4 5 6 7 8

ADB AD7 AD6 AD5 AD4 AD3 AD2 AD1
SEC

N 11 10 9 COMP
HIGH FAN   MED FAN   LOW FAN
LIVE

L1 L2   PRI   N2 N1 N
WHITE
ELECTRONIC FILTER
GREEN/YELLOW
BLACK
RED
WHITE
TRANSFORMER

RED
BLACK
WHITE
YELLOW
GROUND Vcc
BLACK
RED
WHITE
YELLOW

B2 A2 Vcc B1 A1 SEC

WALL PAD 2 (OPTIONAL)
B | A | GND | Vcc
WHITE | YELLOW | BLACK | RED

WALL PAD 1
B | A | GND | Vcc
WHITE | YELLOW | BLACK | RED

RETURN AIR SENSOR (OPTIONAL)
INDOOR COIL SENSOR

DIPSWITCH SETTINGS
STANDARD SETTING

	OFF	ON
1	COOL ONLY	HEAT PUMP
2	NO ELECTRIC HEATERS	ELECTRIC HEATERS FITTED
3	1.5T DIFFERENTIAL CONTROL	1.0T DIFFERENTIAL CONTROL
4	FAN ON IN COOL CYCLE HEAT BAND (FOR IN-DUCT SENSORS)	FAN OFF IN COOL CYCLE DEAD BAND
5	AIR COOLED	HYDRONIC
6	TWO STAGE	SINGLE STAGE
7	ALARM RELAY TURNS ON UPON COMPLETE LOCKOUT OF SYSTEM FAULT.	ALARM RELAY TURNS ON WHENEVER THERE IS SYSTEM FAULT.
8	FAN ON IN HEAT CYCLE DEAD BAND (RECOMMENDED FOR IN-DUCT SENSORS)	FAN OFF IN HEAT CYCLE HEAT BAND

NOTE: PLEASE SELECT CORRECT POSITION WITH OR WITHOUT HEATERS ON ASSY

SAT 2 BOARD DEFINITIONS
OUT1	4-WAY VALVE
OUT2	ELECTRIC HEATER
OUT3	SWING/COMP2 TWO STAGE
OUT4	DRAIN/PUMP
OUT5	POWER IN
OUT6	ZONE/MOTOR/FAN
ALARM OUT	FAULT RELAY
RELAY1	ZONE CONTROL BOARD
COM.	COMMON
DI6	HP SWITCH
DI5	LP SWITCH
DI4	FLOAT SWITCH
DI3	HYDRONIC PUMP
DI2	NO FUNCTION
DI1	SD–REMOTE SHUT DOWN
AD8	DISCHARGE 2–HYDRONIC
AD7	DISCHARGE 1–HYDRONIC
AD6	RETURN AIR 4
AD5	RETURN AIR 3/INDOOR COIL 2 TWO STAGE
AD4	RETURN AIR 2/LST HYDRONIC
AD3	RETURN AIR 1
AD2	LST 1–HYDRONIC
AD1	INDOOR COIL 1
SEC	TRANSFORMER SECONDARY
PRI	TRANSFORMER PRIMARY

IMPORTANT:
FOR ISD/ISDL UNITS REMOVE ANY LINK WIRES BETWEEN "ACTIVE" & FAN SPEEDS.

FOR OPA UNITS REMOVE ANY LINK WIRES BETWEEN "FAN" & FAN SPEEDS

USE THIS CONNECTION DIAGRAM FOR ISDL & ISD UNITS

CONNECTION 9 FOR 3 SPEED MOTOR UNITS
.OR.
CONNECTION 10 FOR 4 SPEED MOTOR UNITS

ACTIVE OUT
ACTIVE IN | ACTIVE OUT
18
7
5

ALARM OUT
ZONE CONTROL BOARD
OUT6 OUT5 OUT4 OUT3 OUT2 OUT1
COM DI6 DI5 DI4 DI3 DI2 DI1

DIP SWITCH SETTING – REFER TABLE –
ON 1 2 3 4 5 6 7 8

ADB AD7 AD6 AD5 AD4 AD3 AD2 AD1
SEC

9 10
N 12 11 10 9 COMP
HIGH FAN   MED FAN   LOW FAN
LIVE

L1 L2   PRI   N2 N1 N
WHITE
ELECTRONIC FILTER
GREEN/YELLOW
BLACK
RED
WHITE
TRANSFORMER

RED
BLACK
WHITE
YELLOW
GROUND Vcc
BLACK
RED
WHITE
YELLOW

B2 A2 Vcc B1 A1 SEC

WALL PAD 2 (OPTIONAL)
B | A | GND | Vcc
WHITE | YELLOW | BLACK | RED

WALL PAD 1
B | A | GND | Vcc
WHITE | YELLOW | BLACK | RED

RETURN AIR SENSOR (OPTIONAL)
INDOOR COIL SENSOR

INDOOR COIL SENSOR INSTALLATION:
RETURN BEND
HEAT TRANSFER PASTE
SENSOR POCKET
SENSOR WIRE
HI-TEMP SLEEVING 2mm BORE 150 mm Lg.
CABLE TIE (X2)
INSTALL 24K3 (120mm Long)

ISSUE	MODIFICATION	EC/N	DATE	APRVD
E	UPDATE SAT-2.1 WIRE DIAGRAMS	N2589	13-08-10	ROD
D	NOW 230V KIT. NOTE REMOVED	N2323	20-03-10	D.A.B
C	TITLE: OPA 170 WAS OPA 178	N2346	03-12-09	KTT
B	ADD ISD 270 TERMINATIONS	N2241	02-07-09	ROD
A	TERM. 'SD' & NOTE 'A' ADDED.	N1873	22-07-08	B.P.

DRG SIZE | No. | DESCRIPTION | Mat.I | FINISH | ASSY No.