

# Project:

# Model: SHFC — Vertical Stack Fan Coil

Dev. B

Date:

Revision:

SIGMA Job #:

# SUBMITTAL SET

Document: SIGMA-SHFC-SUB-2406



Presented By:



## SUMMARY PAGE

#### **Standard Features**

- Vertical Stack Fan Coil
  - □ 120V/1Ph/60Hz
  - □ 208-240V/1Ph/60Hz
- Pipe System
  - □ 2-Pipe with Electric Heater
  - □ 2-Pipe without Electric Heater
  - □ 4-Pipe
  - □ 4-Pipe with 6-Way Valve
- □ Cabinet: 20 Gauge Galvanized Steel with 1/2" Sound Insulation
- □ Unit Mounted Disconnect Switch
- □ ECM Fan Motor with 3-speeds
- □ Coil Pack as per schedule
- □ Hose Kits
- □ Isolation Ball Valves:
  - □ Sweat x NPSM
  - □ FNPT x FNPT
  - □ FNPT x FNPT w/ PT Ports

#### **Optional Accessories**

- Electric Heater
- Optional Auto-Flow Balancing Valves
- Optional 2-Way Motorized Zone Valves
- Optional 3-Way Motorized Zone Valve
- Optional 6-Way Motorized Zone Valve
- □ Pressure Independent Balancing Control Valves (PICV)
- □ Y-Strainer
- Return Air Panel
  - Optional Panel Mounted Front Discharge Supply Grille
- □ Thermostat with backlit LCD display, with 3-Speed Fan:
  - □ 7-Day Programmable, Auto Change-Over (ACO)
  - □ Wi-Fi Smart, Programmable, Auto Change-Over (ACO), ERV on/off
  - □ Non-Programmable, Auto Change-Over (ACO)
- □ Freeze Protection Sensor
- □ Condensate Overflow Switch
- Flood Protection Package
- BTU Meter Installation
- Filters
  - □ 1-inch MERV 8 Pleated Filters
  - □ Optional 2-inch MERV 13 Pleated Filters
- □ Type M, or Type L Supply and Return Risers as per schedule
- □ Type M, or Type L Condensate Risers as per schedule
- □ 1-in Supply and Return Riser Fiber Glass Insulation
- Optional 3/4-in Supply and Return Riser Closed Cell Insulation
- □ Optional 3/8-in Condensate Riser Closed Cell Insulation



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# UNIT AND RISER COUNT SUMMARY



	Nominal CFM	Cabin	et Dimensio	ons (in)	Discharge Openings (in)		
Model		Width (W)	Depth (D)	Height (H)	Front/Left/Right/Back (WxH)	Top (WxH)	
SHFC 03	350	17	17	84	14 x 10	14 x 10	
SHFC 04	450	17	17	84	14 x 10	14 x 10	
SHFC 06	600	17	17	84	14 x 10	14 x 10	
SHFC 08	800	20	18.5	84	16 x 10	16 x 10	
SHFC 10	1000	20	18.5	84	16 x 10	16 x 10	
SHFC 12	1200	20	18.5	84	16 x 10	16 x 10	

## Note:

Discharge opening sizes shown (WxH) are customer configurable. Published sizes shown are maximum default factory sizes. Customer to verify discharge opening sizes match design requirements for proper airflow and confirm appropriate discharge openings at time of order.



## **SHFC - DISCHARGE OPENINGS**

Units comes with standard "*Knockout*" style discharge openings on top and all sides for field configuration. This allows for custom discharge configurations based on site requirements. Discharge opening sizes are configurable to meet site design conditions.



### Notes:

- Discharge opening sizes are customer configurable. Published sizes shown are maximum factory default sizes. Customer to verify discharge opening sizes match design requirements for proper airflow and select appropriate discharge openings at time of order.
- Unit comes standard with field "knockout" style discharge openings on all sides. Discharge flanges are 1.5 inches (38mm).
- Optional Line of Site Baffles (LOSB) are available where privacy is required with two or more horizontal discharges (Front, Left, Right and/or Back).
- All handing's determined by facing return air opening.



( S CLG

R

C (**S** 

FRONT

RA

HTG  $(\mathbf{R})$ 

**CLG: Cooling Risers** 

**HTG: Heating Risers** 

# **SIGMA SHFC HI-RISE VERTICAL STACK FAN COIL**

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R

R

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CLG

HTG

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1

FRONT

RA

**RH-RS Mounting** 

T

FRONT

RA

**RH-SR Mounting** 

1

FRONT

RA



**f** FRONT

RA





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## SHFC - ELECTRICAL DATA (120V - 2 PIPE w/ ECM)

#### ELECTRICAL DATA - ECM MOTOR (NO HEATER)

		Fan Motor		Flectric Heater Tota		MIN CCT		MAX FUSE		MAX EWT
MODEL	VOLTAGE	HP	FLA	kW (120V)	Unit FLA	AMPACITY	(MOP)	/CCT. BKR. AMP	(PSI)	TEMPERATURE (F) (2Pipe/4Pipe)
SHFC03	120V/1/60	0.25	1.8	0.0	1.8	2.25	4.05	15	300	140 / 160
SHFC04	120V/1/60	0.25	2.4	0.0	2.4	2.94	5.29	15	300	140 / 160
SHFC06	120V/60/1	0.33	2.4	0.0	2.4	2.94	5.29	15	300	140 / 160
SHFC08	120V/60/1	0.33	4.4	0.0	4.4	5.50	9.90	15	300	140 / 160
SHFC10	120V/60/1	0.50	5.1	0.0	5.1	6.38	11.48	15	300	140 / 160
SHFC12	120V/60/1	0.50	6.0	0.0	6.0	7.44	13.39	15	300	140 / 160

#### ELECTRICAL DATA - ECM MOTOR- 2 PIPE SYSTEM ONLY (0.5 KW HEATER)

	SUPPLY VOLTAGE	Fan Motor		Electric Heater	Total	MIN. CCT.		MAX FUSE	MAX PRESSURE	MAX EWT
MODEL		HP	FLA	kW (120V)	Unit FLA	AMPACITY	(MOP)	/CCT. BKR. AMP	(PSI)	TEMPERATURE (F)
SHFC03	120V/1/60	0.25	1.8	0.5	6.0	7.46	8.22	15	300	140
SHFC04	120V/1/60	0.25	2.4	0.5	6.5	8.15	9.45	15	300	140
SHFC06	120V/60/1	0.33	2.4	0.5	6.5	8.15	9.45	15	300	140
SHFC08	120V/60/1	0.33	4.4	0.5	8.6	10.71	14.07	15	300	140
SHFC10	120V/60/1	0.50	5.1	0.5	9.3	11.58	15.64	15	300	140
SHFC12	120V/60/1	0.50	6.0	0.5	10.1	12.65	17.55	15	300	140

#### ELECTRICAL DATA - ECM MOTOR- 2 PIPE SYSTEM ONLY (1.0 KW HEATER)

	SUPPLY VOLTAGE	Fan Motor		Electric Heater	Total	MIN. CCT.		MAX FUSE	MAX PRESSURE	MAX FWT
MODEL		HP	FLA	kW (120V)	Unit FLA	AMPACITY	(MOP)	/CCT. BKR. AMP	(PSI)	TEMPERATURE (F)
SHFC03	120V/1/60	0.25	1.8	1.0	10.1	12.67	12.38	15	300	140
SHFC04	120V/1/60	0.25	2.4	1.0	10.7	13.35	13.62	15	300	140
SHFC06	120V/60/1	0.33	2.4	1.0	10.7	13.35	13.62	15	300	140
SHFC08	120V/60/1	0.33	4.4	1.0	12.7	15.92	18.23	20	300	140
SHFC10	120V/60/1	0.50	5.1	1.0	13.4	16.79	19.81	20	300	140
SHFC12	120V/60/1	0.50	6.0	1.0	14.3	17.85	21.72	20	300	140

## ELECTRICAL DATA - ECM MOTOR- 2 PIPE SYSTEM ONLY (1.5KW HEATER)

	SUPPLY VOLTAGE	Fan Motor		Electric Heater	Total	MIN. CCT.		MAX FUSE	MAX PRESSURE	MAX EWT
MODEL		HP	FLA	kW (120V)	Unit FLA	AMPACITY	(MOP)	/CCT. BKR. AMP	(PSI)	TEMPERATURE (F)
SHFC03	120V/1/60	0.25	1.8	1.5	14.3	17.88	16.55	20	300	140
SHFC04	120V/1/60	0.25	2.4	1.5	14.9	18.56	17.79	20	300	140
SHFC06	120V/60/1	0.33	2.4	1.5	14.9	18.56	17.79	20	300	140
SHFC08	120V/60/1	0.33	4.4	1.5	16.9	21.13	22.40	25	300	140
SHFC10	120V/60/1	0.50	5.1	1.5	17.6	22.00	23.98	25	300	140
SHFC12	120V/60/1	0.50	6.0	1.5	18.5	23.06	25.89	25	300	140

## **SHFC - OPTIONAL ELECTRIC HEATER DATA**

Model	CFM	Electric Heater Air Temp Rise						
0120		0.5	1	1.5				
SHFC03	350	4.5	9.0	13.5				
SHFC04	450	3.5	7.0	10.5				
SHFC06	600	2.6	5.3	7.9				
SHFC08	800	2.0	4.0	5.9				
SHFC10	1000	1.6	3.2	4.7				
SHFC12	1200	1.3	2.6	4.0				

Air Temp Rise (Delta T) = (kW\*3160)/CFM = (MBH\*925)/CFM



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# SHFC - ECM FAN DATA

			External Static Pressure (in w.g.)							
Model	Rated SCFM	Speed	0	0.1	0.2	0.3	0.4	0.5	0.6	
			SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	
02		LOW	275	235	220	200	180	-	-	
03	350	MED	310	275	250	230	210	185	-	
		HIGH	405	370	350	315	280	235	200	
		LOW	340	300	275	240	220	-	-	
04	450	MED	410	370	350	338	315	290	260	
		HIGH	500	470	455	435	420	400	360	
		LOW	450	410	370	320	275	-	-	
06	600	MED	610	580	555	525	490	460	-	
		HIGH	700	675	655	640	610	580	550	
		LOW	560	520	480	440	410	-	-	
08	800	MED	740	695	640	595	550	500	-	
		HIGH	895	860	805	780	760	735	700	
		LOW	760	720	660	620	560	-	-	
10	1000	MED	890	840	800	750	700	650	600	
		HIGH	1080	1040	990	950	900	860	820	
		LOW	800	740	695	640	600	-	-	
12	1200	MED	1120	1090	1050	1010	970	920	-	
		HIGH	1350	1275	1240	1205	1175	1140	1100	

Note: All airflow ratings are taken at lowest voltage rating of dual rating (ie. 208 volt). Airflow ratings include resistance of dry coil, Return Air panel and clean MERV10 air filters.



## **SHFC - RISER INSTALL DETAIL**



### Notes:

- Risers are sized using a "Top" and "Base" Datum reference. A specified Top Datum Offset indicates where top of riser will be located relative to top of cabinet. A Base Datum indicates where bottom of riser will be located relative to floor.
- Upon request Sigma will provide 3-inch (75mm) deep swage on risers .
- Risers should insert 2-inches (50mm) into the 3-inch (75mm) deep swage connection.
- Riser Length = Floor Clearance Height + Slab Thickness + 2-inch overlap (Rounded up to 120" or 144").
- Sigma supplies two standard riser lengths, 120" (10') and 144" (12').
- Supply extension tailpieces or transition riser pieces for joining dissimilar piping sizes are field supplied.
- Risers available in Type L and Type M copper.
- Condensate riser are available with optional 3/8-inch (10mm) thick closed cell insulation to prevent condensation.
- Supply and Return risers are available with 1/2-inch (13mm), or optional 3/4-inch (19mm) closed cell insulation.



Optional Female NPT valves are for Field oupplied Histrs only. In
 Optional Female NPT valves with PT ports are available.



# **SHFC - ACOUSTIC RETURN AIR PANEL**



Acoustic Panel Dimensional Data										
Model Size	А	В	С	D						
SHFC03	51 3/4	16 7/8	54	19 1/4						
SHFC04	51 3/4	16 7/8	54	19 1/4						
SHFC06	51 3/4	16 7/8	54	19 1/4						
SHFC08	51 3/4	19 7/8	54	22 1/4						
SHFC10	51 3/4	19 7/8	54	22 1/4						
SHFC12	51 3/4	19 7/8	54	22 1/4						





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## **SHFC - PERIMETER RETURN AIR PANEL**



Perimeter Panel Dimensional Data										
Model Size	Α	В	С	D						
SHFC03	58.25	20.13	60.75	22.63						
SHFC04	58.25	20.13	60.75	22.63						
SHFC06	58.25	23.13	60.75	25.63						
SHFC08	58.25	23.13	60.75	25.63						
SHFC10	58.25	25.13	60.75	27.63						
SHFC12	58.25	25.13	60.75	27.63						



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6"

18"

FLOOR OPENING

FOR 4 PIPE RISERS

#### **SHFC - PERIMETER RETURN AIR PANEL ROUGH IN DETAILS Perimeter Panel Furring Details** Unit Size Opening **RA Panel** Model CFM "Wd" "Wp" SHFC03 350 20.25 22.25 SHFC04 450 20.25 22.25 1" SHFC06 600 23.25 25.25 • SHFC08 800 23.25 25.25 **CI** SHFC10 1000 25.25 27.25 27.25 SHFC12 1200 25.25 FRONT OF **TOP VIEW** CABINET TO (4 PIPE)







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#### SHFC - ELECTRICAL SCHEMATIC (2-PIPE or 4-PIPE) WOTORIZED ZONE VALVE: 2P & 4P MOTORIZED ZONE VALVE HEATING: 4P ONLY CONDENSATE OVERFLOW FLOAT SWITCH (OPTIONA CONDENSATE OVERFLOW FLOAT SWITCH JUMPER MZV MZH COS STANDARD WIRING SHFC HI-RISE JI (STD) J2 J3 ---- OPTIONAL WIRING FAN COIL MANUAL FREEZE SWITCH N.C. (FACTORY JUMPER) ONBOARD 4P/2P JUMPER (JUMPER ON FOR 4P) AUX ELECTRIC HEATER: 2P ONLY (OPTIONAL) ELECTRIC HEAT THLERY, 2P ONLY (OPTIONAL) ELECTRIC HEAT THERMAL OVERLOAD SWITCH; 2P (STERNAL) ---- FIELD WIRING 2-PIPE SYSTEM c/w AEH HRL HTS AUX ELECTRIC HEAT CORPORATION HTS ELECTRIC HEAT THERMAL OVERLOAD SWITCH; 2+ ONLY (OPTIONAL) SW LINE POWER SWITCH TRF POWER DISTRIBUTION BLOCK ECM EC MOTOR AOS WATER FI MPB FUSE; 24 VAC CIRCUIT PROTECTION ORD GROUND L1 POWER LINE; 1 L2 POWER LINE; 2 LAT POWER LINE; 2 LAT POWER LINE; 2 LAT FREEZE EVENT DRY SMITCH TO REMOTE ERV (FELD WIED) 4-PIPE SYSTEM WIRING DIAGRAM OWER SUPPLY BY OTHERS E 00 120V/1/60 G N 1.1 DE (FELD WIRED) DSW WHT 6 8 ₩НТ RM/Υ AEH HTS Ģ BLK BLK 47 F TB THERMOSTAT CONNECTION 3 100 WHIT MZ 41 L1 120VAC R G1G2G3 Y \*\*\* q 40VA Υ. 41 1 L 1 24 JI REMOVED WHEN 14 . . . 5 5 8888 ê ê VAC 11 1 1 11 . TRF N R G1G2G3 Y VLV V4H CO - DRY SWITCH TO REMOTE ERV: RZ 3 J2 13 Ę 0, E. FAN COIL -1 AQS CONTROLLER BOARD COM 24VAC EH JP1 HMLWC Y. .... Π AQS I 11 1 w æ ۰ 6ED BLU AFZ w. <u>o</u> GRN/YELL 1 GRN/YELL n R RI K BLU 005 ЖΠ ORC o σ 8 K RED ₩Н G N L 4 3 2 1 C COM LB00?? RO OCT 24, ,2023







## SHFC - CONTROLS

## Discrete Speed Control EC Motors (ECM)

High efficiency ECM fan motors are programmed with 3 preprogrammed speeds for Low, Medium, and High.

#### Thermostat

It is recommended to use a fan coil compatible, 3-speed thermostat to control heating and cooling operation to maximizing staging. Single fan speed thermostats will need to be wired to the desired fan speed on unit terminal strip.

### **SEQUENCE OF OPERATION**

#### **Call for Cooling**

When a call for cooling is made, and the temperature reading from the riser is sufficient for cooling the motorized auto shut-off control valve will be energized to the open position. The contactor will then be energized so long as none of the following fault conditions are present:

Condensate Over Flow Alarm (Optional)

When a call for cooling request is terminated, the motorized auto shut-off control valve will be de-energized (close) and fan operation will end.

If the water temperature is not sufficient for cooling, the motorized zone valve will not be energized.

## Call for Heating

When a call for heating is made, and the temperature reading from the riser is sufficient for heating the motorized auto shut-off control valve will be energized to the open position.

When a call for heating request is terminated, the motorized auto shut-off control valve will be de-energized (close) and fan operation will end.

If the water temperature is not sufficient for heating, the motorized zone valve will not be energized and ignore command from thermostat. If there is an optional electric heater, and the water loop is not high enough for heating demand the electrical heater will be energized.



## **SHFC - MECHANICAL SPECIFICATION**

### 1 GENERAL

Vertical stacked fan coil units shall be Sigma SHFC Series. Units shall provide scheduled capacities at the ampacity and voltage shown on the drawings. Specified airflow shall be at the scheduled external static pressure and shall include the effects of a wet coil and clean filter.

Each unit shall be factory tested. Each unit shall have factory affixed label showing ETL logo. Cabinets shall be factory wired and pre-piped when applicable.

#### 2 CABINET

**2.1** The vertical stacked fan coil units shall be Sigma. Units shall provide scheduled capacities at the ampacity and voltage specified.

**2.2** The cabinet shall be 20-gauge galvanized steel. Cabinet shall have internal surfaces insulated with 1/2 inch thick, 3.5 lbs. high-density, mold resistant, thermal and acoustic insulation. Insulation shall meet NFPA 90, UL-181, and ASTM-C1071 standards and insulation shall have a flame spread of less than 25, and a smoke developed classification of less than 50 per ASTM E-84 and UL 723.

**2.3** Physical dimensions of each unit shall be accommodated within furring / ceiling-slab spaces provided as shown on the architectural drawings

**2.4** A removable inner service panel allowing service access to the fan, valves and coil pack compartment shall be provided with each unit.

**2.5** The drain pan shall be stainless steel. The drain pan outlet shall be readily accessible for cleaning with a 7/8 inch OD (22mm) copper drain connection. Unit shall be provided with a flexible p-trap condensate hose for connection to the condensate riser.

**2.6** (Factory) (Field) supplied supply and return risers shall be (Type L) (Type M) copper, with (factory) (field) mounted shut-off ball valves on each supply and return riser. Valves shall be brass and rated for 300 psig (2060kPa). A (Type M) condensate riser shall be (factory) (field) supplied and field installed. Risers sizes shall be installed according to building plans.

**2.7** Risers shall have optional factory provided 3-inch (75mm) deep swage. Reducers and caps shall be field provided and field installed. Anchors, and compensators shall be field supplied and field installed.

**2.8** Unit cabinet shall come with supply discharge opening "knockouts". All cabinet discharge openings shall include 1-1/2 inch drywall flange around the full opening perimeter. Supply discharge "knockouts" are cut and field selected.

**2.9** Supply ducts shall not be rigidly attached to the cabinet and shall be acoustically isolated from cabinet using flexible connections. Contractor shall install flex connection on all discharge openings. There shall be no rigid connection to supply-air discharge grilles or supply ducts.

**2.10** Each unit shall have a removable Acoustic Return Air panel. The panel shall be easily removable without tools.

**2.11 (Optional)** Perimeter Return Air Panel shall be provided. Return air panel shall be a swing door design to allow access to unit controls, servicing and filter.

2.12 (Optional) Provide each unit with 2-inch thick MERV 13

### pleated filters.

#### 3 FAN & BLOWER

**3.1** Each unit shall include a factory mounted forward curved, double inlet double width centrifugal direct drive fan and motor assembly with internal overload protection. The blower fan assembly shall be positioned horizontally from a sheet metal blower deck.

**3.2** Units shall be supplied with an ECM fan motor as standard. Fan motors speeds shall be factory programmed and field selectable by wiring thermostat to required fan speed terminals.

#### 4 COIL PACK

**4.1.** Provide high temperature and pressure rated water hoses for connection of the risers to the coil pack. The hoses supplied shall be constructed with an inner core of rubber, a stainless-steel metal braid, and rubber outer covering. Fittings shall be brass construction. Hoses shall carry a working pressure rating of 600 psig.

**4.2.** The coil pack shall be mounted inside the fan cabinet. Air side coils shall have copper tubes mechanically bonded to aluminum fins. Coil shall be sized to meet scheduled performance for cooling and heating. Provide 1" T/A filter on coil face.

**4.3** The coil pack shall have factory installed 2-way control valves, as specified on the mechanical drawings.

**4.4** (**Optional**) The coil pack shall employ an optional 3-way motorized auto shut-off valve to shut off water to the unit. Valve shall be factory installed as part of the coil pack assembly.

**4.5** (**Optional**) The coil pack shall employ an optional 6-way motorized auto shut-off valve to shut off water to the unit. Valve shall divert cooling or heating water to the single coil pack. Coil pack shall be factory installed as part of the coil pack assembly.

**4.6** (**Optional**) The coil pack shall employ an optional pressure independent control valve (PICV) to shut off water to the unit and balance water flow.

**4.7** (**Optional**) The coil pack shall employ optional autoflow balancing valve factory installed in the coil pack to maintain specified unit water flow rate over 2-80 psig differential water pressure. Auto flow balancing valve shall be field serviceable.

**4.8 (Optional)** The coil pack shall come with optional y-strainer with #20 mesh screen to filter any debris and shall be field serviceable.

### **5 CONTROLS**

**5.1** Each unit shall be factory wired with all necessary controls. Each unit shall come standard with a fan motor contactor, 24-volt control power transformer, terminal block for low voltage field wiring connection, and terminal block for main power electrical connection, (optional) unit mounted service disconnect switch.

**5.2 (Optional**) Condensate Overflow Switch shall be installed in the drain pan and wired to the electrical box compartment.

**5.3** Thermostats shall be 24VAC, field wired to the unit terminal strip. Thermostats shall be (non-programmable) (programmable). Thermostats shall be suitable for fan coil operation and have 3 fan speed control capability with Auto Change-Over and LCD backlit display.



# **SHFC - MECHANICAL SPECIFICATION CONT'D**

## 6 TESTING & WARRANTY

**6.1** Each unit shall be factory tested using a multi-step controlled testing equipment to prevent operator error during factory testing.

**6.2** Warranty shall be for parts, 1 year not to exceed 18 months from date of shipment.

## 7 EXECUTION

7.1 Units shall be installed neat and level.

**7.2** Flush the system per manufacturer instructions before connecting fan coil. Contractor shall join supply and return riser flexible hoses together, at the top/bottom on every riser and at the farthest point from the pump for flushing purposes. Contractor shall not flush or clean riser system through the unit coil pack.

**7.3** Installing contractor shall install risers and install riser transition piece connections where riser sizes change.

**7.4** The hoses shall be installed in the field by the contractor to the riser isolation valves. The flare fittings on the hoses shall be connected according to industry standard (Finger tighten then tighten with wrench while <u>always using back-up wrench</u>).

**7.5** Flush the system per manufacturer instructions before connecting coil pack. The riser system shall be flushed, cleaned and commissioned before connecting fan coil units to the riser system.

**7.6** Contractor shall provide flexible duct connections on all single piece units.







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SHFC - ACCESSORIES — WI-FI SMART THERMOSTAT—ESC Pro 2

