Excel 10

W7754K,P,Q,R,S,T,V FCU CONTROLLERS

HONEYWELL EXCEL 5000 OPEN SYSTEM

FEATURES

- **LONMARK® HVAC profile #8020**
- **Stand-alone operation or on high-speed 78 kilobit Echelon® LONWORKS© network**
- **Uses Echelon LonTalk® protocol**
- **FTT10A Transceiver**
- **Direct connection of thermal actuators**

   NOTE: VC6983 generates high-voltage pulses in the end position and therefore cannot be used in conjunction with the W7754.

- **Direct connection to fan switch**
- **Direct and indirect connection to electrical heat**
- **Supports (via relays) staged fan (up to 3 stages) or (via 0…10 V output) variable-speed fan**
- **Factory-configured default parameters**
- **Wide range of supported valves and actuators**
- **Supports (via 0…10 V output) one proportional valve or a 6-way valve for heat/cool chilled ceilings (alternatively to variable-speed fan)**
- **Interlocks and time delays to protect equipment**
- **Connected floating actuators exercised once a week**
- **Slim design fits into narrow fan coil units**
- **Terminals all on one side allow controllers to be positioned at back of fan coil unit**
- **Power supplied by power mains or 24 V**

GENERAL

The W7754 is a configurable fan coil unit application controller belonging to the Excel 10 product line for maintained zones. The W7754 covers a wide range of fan coil control applications and can operate as a stand-alone unit or networked using the standard Echelon LONWORKS® bus. Interfaces are provided for a wide range of actuator types. Heating systems can be water or electrical, and cooling systems can be chilled water supply or compressors. Extensive timing and interlock features make the W7754 especially suitable for systems using electrical heat and compressors.

DESCRIPTION

The W7754 Controllers provide room temperature control for two- and four-pipe fan coil units with optional electrical heating coils and can control single-, two-, or three-speed fans or variable-speed fans (depending upon model – see Table 1). The units are provided with default configuration settings from the factory and are fully operable upon installation. Using standard Echelon configuration tools, the units can be configured with job-specific settings. A variety of optional wall modules interface with the units and provide any or all of the following: setpoint adjustment, fan speed adjustment, and an occupancy bypass button. All wall modules include a space temperature sensor; however, a remote C7068A return air sensor can also be used.

LONMARK®3.0

OS no.	power supply (removable plug) 25, 26	triac voltage 19-22	binary input, for reading input from, e.g., window contact, occupancy sensor, etc. DI1	binary input, for reading input from window contact DI2	Fan I	Fan II	Fan III	n.-o. relay, for reheat coil control Reheat	OUT1 close	OUT1 open	OUT2 close	OUT2 open	output, for low-voltage PWM control of solid-state relay solid state	analog output, for variable-speed fan control AO1	binary input, for connection to wall module LED	FanSwitch	Sensor	Setpoint
W7754K1001	230 VAC	230 VAC	X	X	X	X	X	--	--	--	--	X	X	--	X	X	X	X
W7754P1000	230 VAC	230 VAC	X	X	X	X	X	X	X	X	X	X	--	--	X	X	X	X
W7754Q1008	24 VAC	24 VAC	X	X	X	X	X	X	X	X	X	X	--	--	X	X	X	X
W7754R4431	230 VAC	230 VAC	X	X	X	X	X	X	X	X	X	X	--	X	X	X	X	X
W7754S2230	230 VAC	230 VAC	X	X	X	X	X	--	--	X	--	X	--	--	X	X	X	X
W7754T4431	230 VAC	24 VAC	X	X	X	X	X	X	X	X	X	X	--	X	X	X	X	X
W7754V1230	230 VAC	230 VAC	X	X	--	--	--	X	--	X	--	X	--	X	X	X	X	X

Table 1. Overview of models

Sequences

Heat and cool sequences can be selected to be active or not active, giving a total of eight different sequence options (each can be with or without fan control):

- Heat, only
- Cool, only
- Heat/cool changeover
- Heat and cool sequence
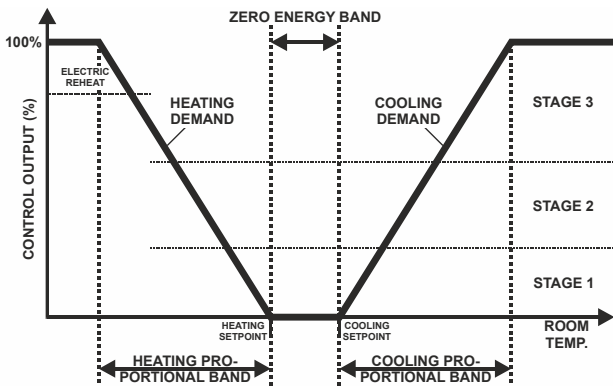- All of the above, plus electrical reheat.

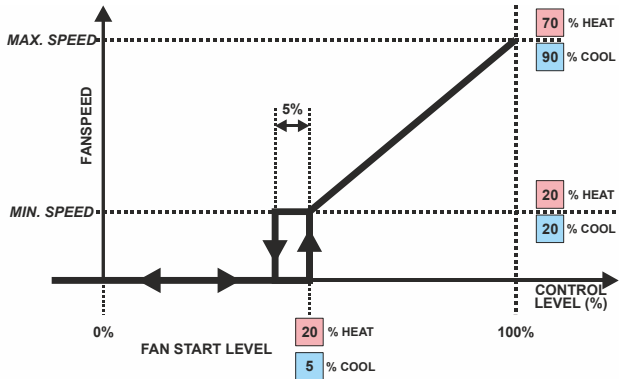**Fig. 1. Operational sequence with staged fan**

The minimum and maximum speed of the variable-speed fan can be configured as depicted in Fig. 2.

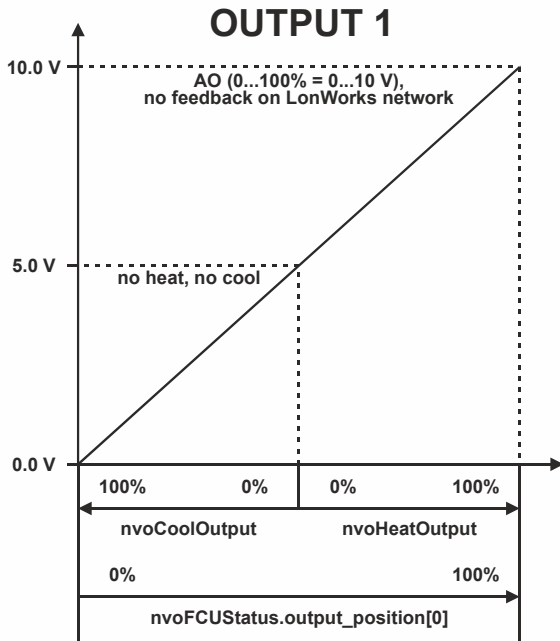**Fig. 2. Operational sequence with variable-speed fan**

OUTPUT 1

Fig. 3. Operational sequence with "floating mid characteristic" on the analog output (0….10 V)
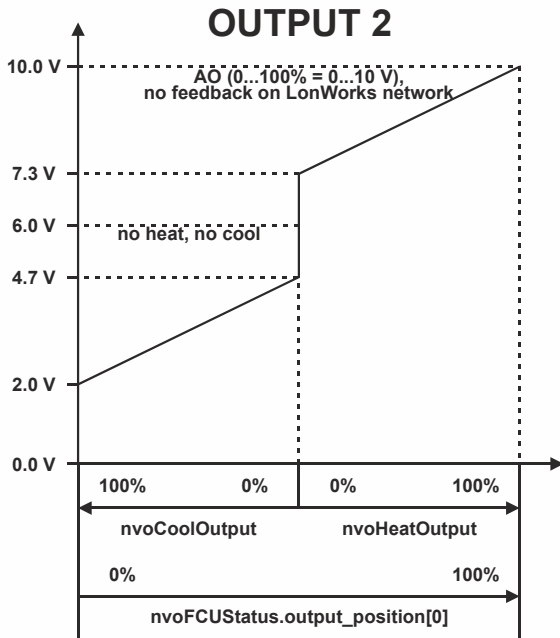
OUTPUT 2

Fig. 4. Operational sequence with Belimo 6-way valve connected to the analog output (2….10 V)

Analog Output Specification

Table 2. Analog output specification

voltage / current	0…10 V, -1 / + 5mA
resolution	8 bit

Modes of Operation

The units have the following modes of operation.

"Occupied" Mode

This is the normal operating condition for a room or zone when occupied. The controllers can be switched to this mode by a network command, by the room occupancy sensor, or by a bypass button on the wall module. In the "occupied" mode, the fan is controlled by the setting of the fan speed switch on the wall module or, when the switch is set to "auto," by the control algorithm. The fan can be configured to remain ON or turn OFF during the zero energy band.

"Standby" Mode

The "standby" mode saves energy by reducing heating or cooling demand when the room is temporarily unoccupied. In this mode, the fan is switched OFF within the zero energy band.

"Unoccupied" Mode

This mode is used for longer unoccupied periods, such as at night or during weekends and holidays.

Window Open

If the controllers are configured for window open detection, they automatically disable heat and cool control until the window is closed again. Frost protection remains active.

Frost Protection

If the temperature drops below 46°F (8°C), the controllers enable the heating circuit as frost protection.

Smoke Control

The fan can be turned ON or OFF by network command for smoke control.

Fan Failure

When configured with an air flow detector, the controllers protect equipment by disabling the system when the fan fails.

Changeover

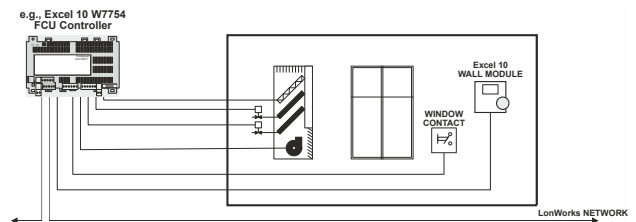The controllers operate two-pipe fan-coil units configured with a changeover input.

Fig. 5. Typical application

EN0B-0453GE51 R1015

SPECIFICATIONS
Power Supply

W7754K,P,R,S,V:	230 Vac +10%, -15%, 50/60 Hz; max. 6 VA power consumption (unloaded); max. 6 W heat dissipation
W7754T:	230 Vac +10%, -15%, 50/60 Hz; max. 12 VA power consumption (unloaded) max. 12 W heat dissipation
W7754Q:	24 Vac ±20%, 50/60 Hz max. 6 VA power consumption (unloaded) max. 6 W heat dissipation

Hardware Design

Processor:	Neuron 3150® running at 5 MHz, with 2 kB of RAM and 0.5 kB of EEPROM on chip.
Ext. memory:	EPROM, 64 kB by 8.

Approvals, Certifications, and Standards
Approvals and Certifications

- CE-approved
- Certified as per LonMark® Application Layer Guidelines V 3.0, thus interoperable with all other devices in open LONWORKS® networks (incl. 3rd-party devices)
- EUBAC-certified as follows:

W7754Q1008:	020706	W7754S2230:	211176
W7754R4431:	211182	W7754T4431:	215481
		W7754V1230:	211181

Classification according to EN 60730-1

EN 60730 sub part:	EN 60730-2-9
Environmental conditions:	For use in home (residential, commercial, and light-industrial) environments
Pollution degree:	Class 2
Protection against shock:	Class 0 (without terminal cover) Class II (with terminal cover)
Software class:	Class A

Temperature Control Accuracy (CA)

Minimum CA values requested by EUBAC for fan coil unit applications: ≤ 1.4 K

W7754P1000, W7754Q1008 with Motorized Actuator

FCU heating mode:	0.5 K
FCU cooling mode:	0.2 K

W7754R4431, W7754S2230 with Low-Cost Thermal Actuator

FCU heating mode:	0.8 K
FCU cooling mode:	0.9 K

W7754R4431, W7754T4431 with Floating-Point Actuator
(PID parameters: Xp = 1.5; Tn = 1100; Dn = 600)

FCU heating mode:	0.2 K
FCU cooling mode:	0.1 K

Classification according to EN 60529

Degree of Protection Provided by Enclosures: IP20

Ambient Environmental Limits

Operating temperature:	0 … +50 °C at 5…90% r.H.
Storage temperature:	-40 … +70 °C at 5…90% r.H.

Specified Sensing Temperature Range

32° to 104°F (0° to 40°C)

Dimensions (W x L x H)

Without terminal cover:	W x L x H = 110 x 180 x 60 mm
With terminal cover:	W x L x H = 130 x 180 x 60 mm

Weight

W7754T:	700 g
W7754K,P,R,S,V:	420 g
W7754Q:	260 g

Communications

The controllers use the LonTalk protocol. They support the LONMARK Functional Profile # 8020 "Fan Coil Unit Controller", version 2.0. Fig. 13 shows the implementation used.

The recommended wire size to be used for the LONWORKS Bus is level IV 22 AWG (Belden part no. 9D220150) or plenum rated level IV 22 AWG (Belden part no. 9H2201504) non-shielded, twisted pair, solid conductor wire.

FTT networks can be in bus, star, loop, or any combination of these topologies.

Mounting Options

The controllers are suitable for mounting on a standard rail (DIN EN 50022-35 x 7,5), on walls/ceilings, as well as for installation in wiring cabinets or fuse boxes.

Accessories

- Excel 10 T7460 and T7560 Wall Modules
- C7068A Return Air Sensor (Europe, only)
- M7410C Small Elec. Linear Valve Actuator (Europe, only)
- Z100 Thermoelectric Actuator (Europe, only)
- XAL-COV-L Terminal Protection Covers (8 pcs. bulk)
- Solid-state relay, Carlo Gavazzi (part no.: RS1A23D25-P64) with 40-cm cable and plug, for 230 Vac and max. 25 A (AC$_{rms}$)
- XAL-Term2, LONWORKS connection/termination module for DIN rail
- Belimo IMT 6-Way Ball Valve with LR24A-SR actuator

Inputs/Outputs

All models are equipped with a minimum of 3 relays, 1 LED digital output, 3 digital inputs, and 2 analog inputs. See Table 3.

Table 3. Input/output specifications

term. #	function	model K[1]	P	Q	R	S	T	V
1+2	Removable plug; receiving/sending data on the LONWORKS network	X	X	X	X	X	X	X
3	BINARY INPUT (DI1), configurable (via the LNS plug-in) to read input from, e.g., a hardwired window contact, occupancy sensor, etc.; suitable for dry contacts, only; max. voltage at open contact = 5 Vdc	X	X	X	X	X	X	X
4	ANALOG INPUT (AI3), permanently configured to read input from a hardwired wall module's temperature setpoint adjustment knob; enabled / disabled using the **left** DIP switch (use only appropriate tool, e.g., ball-point pen)	X	X	X	X	X	X	X
5	ANALOG INPUT (AI2), permanently configured to read input from a hardwired wall module's room temperature sensor (use NTC20k sensor, only; accuracy [w/o sensor] = 0.5 °C at 25 °C); enabled / disabled using the **left** DIP switch (use only appropriate tool, e.g., ball-point pen)	X	X	X	X	X	X	X
6	GND serving terminals 4, 5, 9, 10, and 11 (I/Os for wall module)	X	X	X	X	X	X	X
7	GND serving terminal 12 (AO1)	--	--	--	X	--	X	X
8	GND serving terminal 3 (DI1)	X	X	X	X	X	X	X
9	BINARY OUTPUT (LED), permanently configured to write output to switch the LED of a hardwired wall module ON/OFF; enabled / disabled using the **left** DIP switch (use only appropriate tool, e.g., ball-point pen); max. voltage = 5 Vdc; max. current = 5 mA	X	X	X	X	X	X	X
10	ANALOG INPUT (AI1), permanently configured to read input on whether a hardwired wall module's 3-speed fan control knob has been set to AUTO, OFF, LOW, MEDIUM, or HIGH and whether its "occupancy override" button has been pressed; enabled / disabled using the **left** DIP switch (use only appropriate tool, e.g., ball-point pen)	X	X	X	X	X	X	X
11	BINARY INPUT (DI2), permanently configured to read input on condition (open/closed) of window contact; enabled / disabled using the **right** DIP switch (use only appropriate tool, e.g., ball-point pen); suitable for dry contacts, only; max. voltage at open contact = 5 Vdc	X	X	X	X	X	X	X
12	ANALOG OUTPUT (AO1), used (depending upon configuration via the LNS plug-in) to control a variable speed fan or to control a proportional valve[2] or to control a 6-way ball valve[6]	--	--	--	X	--	X	X
13+14	A normally-open relay (Rel4), permanently configured to write output to switch a hardwired electrical reheat coil ON/OFF; switching voltage = 24...230 Vac; switching current = 0.05...10 A	--	X	X	X	--	X	X
15	A common terminal for terminals 16, 17, and 18	X	X	X	X	X	X	--
16[3]	A normally-open relay (Rel3), permanently configured to write output to a hardwired three-speed fan, setting it to HIGH	X	X	X	X	X	X	--
17[3]	A normally-open relay (Rel2), permanently configured to write output to a hardwired three-speed fan, setting it to MEDIUM	X	X	X	X	X	X	--
18[3]	A normally-open relay (Rel1), permanently configured to write output to a hardwired three-speed fan, setting it to LOW	X	X	X	X	X	X	--
19[4]	Triac output (Triac1), permanently configured to write output to OUT1 & close hardwired valve	--[5]	X	X	X	--	X	--
20[4]	Triac output (Triac2), permanently configured to write output to OUT1 & open hardwired valve	--[5]	X	X	X	X	X	X
21[4]	Triac output (Triac3), permanently configured to write output to OUT2 & close hardwired valve	--	X	X	X	--	X	--
22[4]	Triac output (Triac4), permanently configured to write output to OUT2 & open hardwired valve	X	X	X	X	X	X	X
23[4]	A common terminal for terminals 19 and 20	X	X	X	X	X	X	X
24[4]	A common terminal for terminals 21 and 22	X	X	X	X	X	X	X
25+26	The "N" (25) and "L" (26) power supply terminals (removable plug); W7754Q: 24 Vac (±20%), 50/60 Hz; W7754K,P,R,S,T,V: 230 Vac (-15%/+10%), 50/60 Hz	230 Vac	230 Vac	24 Vac	230 Vac	230 Vac	230 Vac	230 Vac

[1] The W7754K features an extra socket (2-pin connector located to the left of the terminal blocks) containing an output suitable for attachment to a solid-state relay (use only Carlo Gavazzi RS1A23D25-P64; max. voltage = 12 Vdc; max. current = 12 mA at 10 Vdc) for low-voltage PWM control in high-current electrical reheat applications. To enable it, terminals 19 and 20 must be configured (via the LNS plug-in) for "Heat" -> "PWM".

[2] In order for AO1 (terminal 12) to be used to control a proportional valve, OUT1 (terminals 19 and 20) must be configured (via the LNS plug-in) for "PWM", and the fan must not be configured for "variable speed fan".

[3] If all three relays (terminals 16, 17, and 18) are switched OFF, the three-speed fan will likewise be switched OFF. Switching voltage = 24...230 Vac; switching current = 0.05...3 A (max. 3 A for all three relays together).

[4] Switching voltage = 230 Vac (W7754K,P,R,S,V) or 24 Vac (W7754Q,T), max. switching current = 0.5 A; max. peak (10 sec) current = 1 A

[5] In order for the output for low-voltage PWM control of a solid-state relay (W7754K, only) to be used, these terminals must be configured (via the LNS plug-in) for "Heat" -> "PWM".

[6] In order for AO1 (terminal 12) to be used to control a 6-way ball valve from Belimo, OUT1 must be configured for "Not USED," OUT2 (terminals 21 and 22) must be configured (via the LNS plug-in) for "Changeover Mode" type "Floating Mid," and the fan must not use the analog output (no fan or 1…3-speed fan).

Table 4. Use of the analog output

function	fan	output 1 mode	output 1 type	output 2 mode	output 2 type
var.-speed fan	var.-speed fan	don't care	don't care	don't care	don't care
0…10 V actuator with prop. characteristic	no fan or 1…3-speed fan	heat, cool or change-over	PWM	don't care	don't care
0…10 V actuator with "floating mid" characteristic	no fan or 1…3-speed fan	change-over mode	floating mid	not used	-
2…10 V actuator with 6-way valve characteristic	no fan or 1…3-speed fan	not used	-	change-over mode	floating mid

Sticker Details
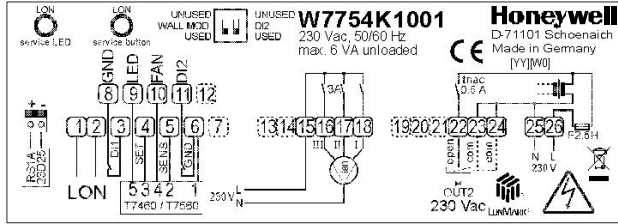
Fig. 6. W7754K sticker with input/output details
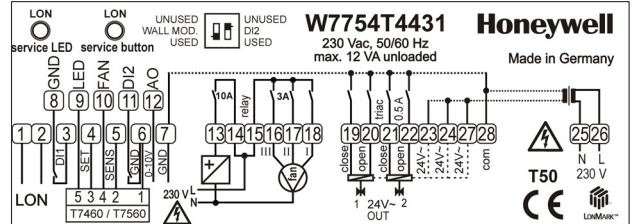
Fig. 11. W7754T sticker with input/output details
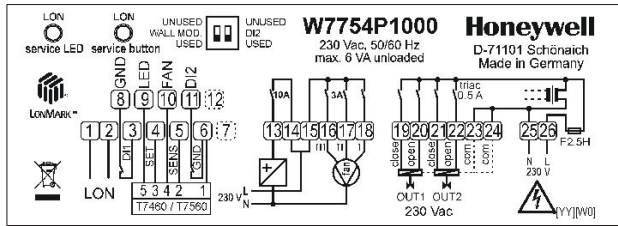
Fig. 7. W7754P sticker with input/output details
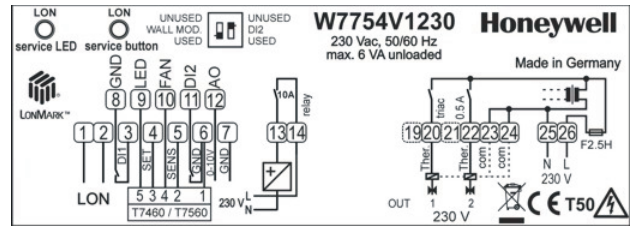
Fig. 12. W7754V sticker with input/output details
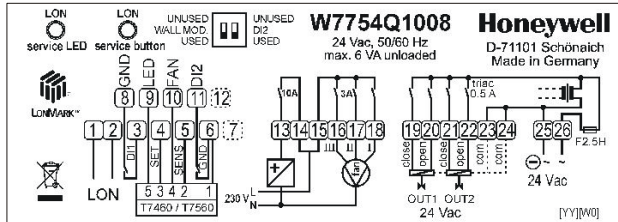
Fig. 8. W7754Q sticker with input/output details

⚠ **CAUTION**

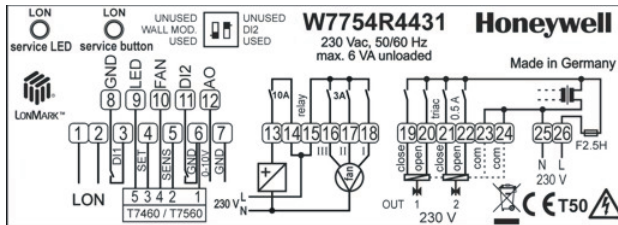When installed on walls or ceilings, the unit must be equipped with the optional terminal protection cover.
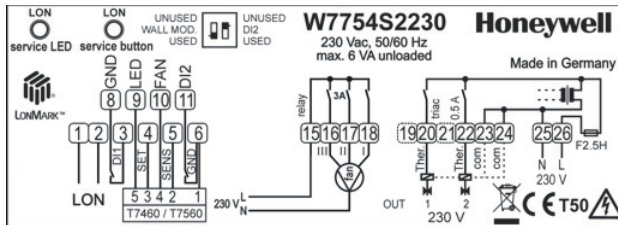

Fig. 9. W7754R sticker with input/output details
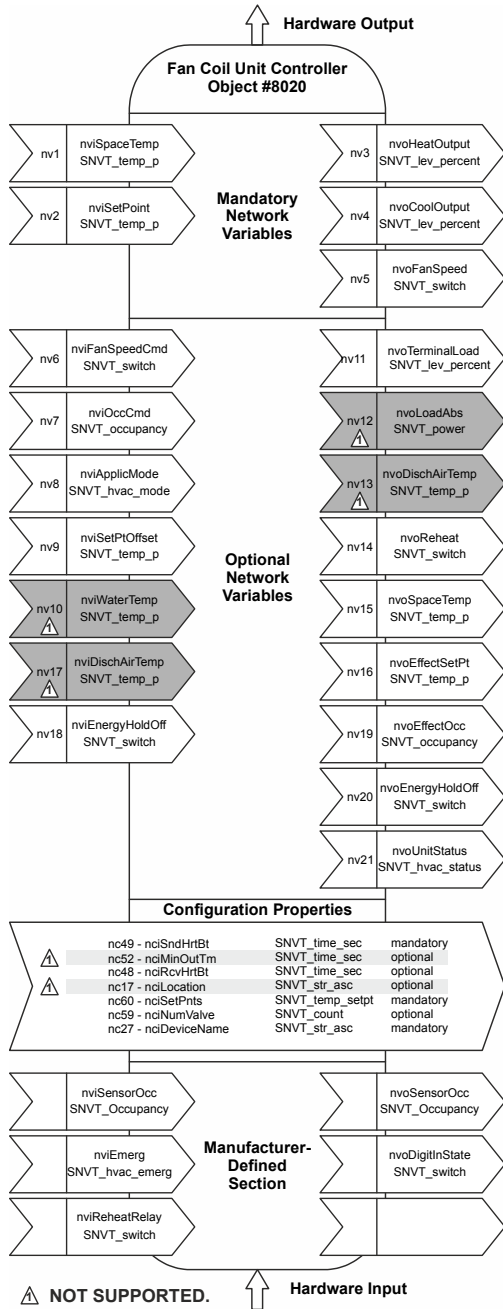

Fig. 10. W7754S sticker with input/output details

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Fig. 13. LONMARK object details