



Key benefits

- Robust sensor enclosure for duct, immersion, wall or outside applications
- Digital connectivity using smart protocols
- Tool free installation
- No additional programming tool required
- Extensive user interface options
- Configurable Input and output options

Technical Overview

Save time and cost on installation through smart connectivity. The new SC series of Smart Sensors represents the next generation of total environmental sensing in one single device. The product range is designed to make installation, commissioning and operation simple and quick, while offering a comprehensive and universal range of user-configurable settings to allow the perfect fit of product and control requirements.

Features	Benefits
RS-485 data bus interface supports the communication protocols BACnet MS/TP and Modbus RTU	Low cost and robust RS-485 wiring Save on expensive physical inputs and outputs on the BMS controller. Flexibility to suit any BACnet or Modbus based control system in the industry. BACnet: Interoperability between different vendors equipment. BACnet: Approved and standard protocol by ANSI, ASHRAE and ISO.
DIP switch configuration of network parameters	BACnet MS/TP or Modbus RTU selectable via DIP switch. Wide range of different baud rates and MAC addresses selectable.
Auto-baud rate detection (BACnet only)	Detects the set baud rate of the network and adjusts the device baud rate automatically after start-up.
Auto device instance configuration (BACnet only)	Automatic device instance configuration provides out-of-the box functionality for smaller projects.
Full environmental sensing in on single device	Up to 7 sensing variables: Temperature, relative humidity, carbon dioxide, indoor air quality (TVOC), carbon monoxide, light level and PIR presence detection. Any sensors ordered with temperature and relative humidity offer psychrometric values: Enthalpy, dew point and absolute humidity.
Pluggable spring cage terminal blocks	Tool less cable termination in robust and pluggable terminal blocks. Installation time reduced to seconds, rather than minutes.
On board LED indication and advanced built-in self-test facilitates checking the sensors and the networks health status	Power LED, Error LED and BACnet/Modbus LEDs allow simple commissioning and fault finding. LEDs switch off after 15 minutes to avoid light intrusion in space applications.
All configurations can be made via the BACnet or Modbus network	No separate equipment or configuration tool is required.
Extensive user interface options, optional LCD screen and freely configurable 3-colour traffic light LED	Local control in the room allow room users to adjust control parameters and increase the comfort. The LCD screen keeps room occupants informed about the current sensing variables. 3-colour traffic light LED can be configured to indicate any sensing variables, such as CO2 levels, or any value via the network. The source and switching points are user configurable.
One configurable digital and analogue input by default in each sensor	The digital input can be configured as a volt free contact (NO or NC contact definition), for e.g. external occupancy detectors or fan proving switches, or pulse counting input for metering products. The pulse counting format uses contact de-bounce and is filtered. The analogue input can be configured as an additional thermistor (10K3A1) input or a 0-10Vdc
Two digital and three analogue outputs can be ordered as an option. The on-board test button overrides the analogue outputs.	Digital outputs intended to switch plants on/off and can be configured to be driven by the network or the momentary switch option. The analogue outputs can be configured to map sensor variables or any network value. For safety purpose, configurable fallback values can be set and override the outputs if there is a network problem. Test button allows simple identification of the output connection.

General Specification

Supply voltage	24Vac/dc $\pm 10\%$
Electrical connections	Pluggable spring loaded terminal block min. 0.2mm ² , max. 1.5mm ²
Communication	RS-485 (EIA-485) Protocol selectable via DIP switch
BACnet MS/TP	9k6, 19k2, 38k4, 76k8 or auto baud rate detection
Modbus RTU	9k6, 19k2, 38k4 or 57k6 baud rate 8 data bits, no parity 2 stop bits / odd parity 1 stop bit / even parity 1 stop bit selectable via DIP switch
Measurement ranges	
T	-20 min to +110 max units (°C or °F), 5 pre-set ranges plus user configurable range
RH	0 to 100% RH
CO ₂	0 to 2,000 or 5,000ppm
IAQ	0 to 1,000ppb TVOC
CO	0 to 500ppm
LL	0-10,000 lux
PIR	PIR occupancy status
User interface options	
LCD	To show T, RH, CO ₂ and IAQ values on a LCD screen 20 character state text editable and change of status via network
LED	"Traffic light" LED user configurable for any sensing variable or network value
Input options	
AI	Analogue Input 0-10Vdc linear or NTC thermistor (10K3A1) sensor
DI	VFC or pulse count
Output options	
AO	3x Analogue Output 0-10V, configurable
DO	2x Digital Output, 24Vac Triac, configurable
EMC Compliance	
Emissions	EN 61000-6-3:2007+A1:2011
Immunity	EN 61000-6-2:2005
Ambient	
Temperature	-30 to +60°C
RH	0 to 95% non-condensing
Media	Temperature -10 to +50°C
Housing	
Material	ABS (flame retardant)
Dimensions	116 x 106 x 52mm
Protection	IP54 IP65 (See installation notes)
Country of origin	UK
Conformity	EMC, CE & UKCA Marked

Sensing Characteristics

Temperature T	
Accuracy (20 to 40°C)	$\pm 0.5^{\circ}\text{C}$
Long term stability	$< 0.02^{\circ}\text{C p.a.}$
Response time	5 to 30 seconds (t 63%)
Humidity RH	
Type	ASIC
Accuracy (20 to 80% RH):	Typical Maximum
RH-622-AH	$\pm 2\%$ RH $\pm 3\%$ RH
RH-622	$\pm 3\%$ RH $\pm 4\%$ RH
Long term stability	$< 0.5\%$ RH p.a.
Response time	8 seconds (t 63%) @ 25°C 1 m/s airflow
Carbon Dioxide CO₂	
Type	NDIR with ABC logic, user configurable
Measurement interval	2 seconds
Accuracy	$\pm 70\text{ppm} \pm 3\%$ of reading
Pressure dependency	+1.6% reading per kPa deviation from normal pressure
Response rate	2 minutes by 90%
Indoor Air Quality IAQ	
Type	MEMS Siloxane, TVOC (Total Volatile Organic Compounds)
Accuracy	Typical $\pm 15\%$ of measured value
Conditioning period	7 days
Carbon Monoxide CO	
Type	Electrochemical sensor
Accuracy	Typical $\pm 7\%$ fsd.
Baseline offset	$< \pm 10\text{ppm}$ equivalent
Response time	max. 60 seconds (t90)
Light level LL	
Type	Photodiode
Occupancy PIR	
Type	Passive infrared
Detection distance	5 meters
Detection area vertical	100°
Detection area horizontal	82°

CO Sensor types:

IMPORTANT The sensor is not designed, manufactured or intended for use or re-sale as control or monitoring equipment in environments requiring life safety performance, in which the failure of the sensor could lead directly to death, personal injury, or severe physical or environmental damage. Sontay and its suppliers specifically disclaim any express or implied warranty of fitness for life safety.

Sontays range of CO sensors are not to be used in domestic applications.

WEEE Directive:



At the end of the products useful life please dispose as per the local regulations. Do not dispose of with normal household waste. Do not burn.



Part Codes

Part code									Description		
SC	-	I	-	0	0	x	0	x	x	Immersion/Duct Temperature	
											Configuration user indication:
						0					- none
						1					-LCD Display
											Configuration Digital Outputs:
								0			- none
								1			- 2x DO
											Configuration Analogue Outputs:
									0		- none
										1	- 3x AO

Part code								Description		
SC	-	D	-	x	x	x	0	x	x	Duct Temperature & RH
										Configuration sensing options CO2:
				0						- none
				1						-CO2
				2						-CO2 & Traffic Light LED
										Configuration sensing options CO/IAQ:
					0					-none
					1					-CO
					2					-IAQ
					3					-CO & IAQ
										Configuration user indication:
						0				- none
						1				-LCD Display
										Configuration Digital Outputs:
								0		- none
								1		- 2x DO
										Configuration Analogue Outputs:
									0	- none
									1	- 3x AO

Part code								Description			
SC	-	W	-	x	0	x	0	x	x	Plant Temperature	
											Configuration sensing options RH:
				0							- none
				1							-RH
											Configuration user indication:
						0					- none
						1					-LCD Display
						2					- Light Level sensor
						3					- PIR sensor
						4					- Light Level & PIR sensor
											Configuration Digital Outputs:
								0			- none
								1			- 2x DO
											Configuration Analogue Outputs:
									0		- none
									1		- 3x AO

Part Codes

Part code								Description
SC	-	O	-	x	0	x	0	Outside Temperature (Radiation Shield)
								Configuration sensing options RH:
				0				- none
				1				-RH
								Configuration user indication:
					0			- none
					1			-LCD Display
					2			- Light Level sensor *
					3			- PIR sensor *
					4			- Light Level & PIR sensor *
								Configuration Digital Outputs:
							0	- none
							1	- 2x DO
								Configuration Analogue Outputs:
							0	- none
							1	- 3x AO

* Note: Not available for RH configurations

Part code								Description
SC	-	P	-	x	x	x	0	Plant Gas Sensor IP65
								Configuration sensing option CO2
				0				- none
				3				-CO2
								Configuration sensing options CO:
					0			- none
					1			-CO
								Configuration user indication:
					0			- none
					1			-LCD Display
								Configuration Digital Outputs:
							0	- none
							1	- 2x DO
								Configuration Analogue Outputs:
							0	- none
							1	- 3x AO

Installation



Antistatic precautions must be observed when handling these sensors. The PCB contains circuitry that can be damaged by static discharge.

Note: Sontays range of Smart Sensors are not suitable for use in swimming pool & spa applications. Sensors used in these types of applications are not covered under Sontays warranty terms. Chemicals used in swimming pool & spas can contaminate the humidity element, which results in a reduced service life.

Immersion temperature types:

1. Select a location in the system where the liquid is to be measured, install pocket as per datasheet TT-PO.
2. Insert the probe into the pocket and secure with the grub screw provided within the pocket.
NOTE This must be used with a pocket, it is not designed for direct mounting.

Duct temperature types:

1. Select a location in the duct where the sensor probe will give a representative sample of the prevailing air condition.
2. If the sensor is to be fitted direct to the duct and drill a 7mm diameter hole in the duct, then use the housing as a template mark the hole centres or use the dimensions below), drill and fix the housing to the duct with the screws supplied.
3. Sensors with optional flange, if depth adjustment is required, use the TT-DFP, insert the probe to the desired depth and tighten the

Duct

1. Select a location in the duct where dust & contaminants are at a minimum (i.e. after filters etc.) and which will give a representative sample of the prevailing air condition.
2. Fix the housing to the duct with appropriate screws, or by using the optional duct mounting flange.

grub screw.

Plant

1. Select a location where dust & contaminants are at a minimum and which will give a representative sample of the prevailing air condition.
2. Fix the housing with appropriate screws

Outside

1. Fix the radiation shield to a suitable mast using the U bolts supplied.
2. Insert the probe into the shield and tighten the gland (please see notes on the shield).

Duct, plant & outside humidity & temperature types:

Plant gas sensor types:

1. Select a location on a wall of the controlled space which will give a representative sample of the prevailing conditions. Avoid positioning the sensor in direct sunlight, direct water and weather exposure.
2. Fix the housing to the wall with appropriate screws.

Common installation:

1. Release the snap-fit lid by gently squeezing the locking tab.
2. Feed the cable through the waterproof gland and terminate the cores at the terminal block as required. Leaving some slack inside the unit, tighten the cable gland onto the cable to ensure water tightness.
3. If the sensor is to be mounted outside, it is recommended that the unit be mounted with the cable entry at the bottom. If the cable is fed from above then into the cable gland at the bottom, it is recommended that a rain loop be placed in the cable before entry into the sensor.
4. Unplug the terminal block from the PCB and terminate the cores at the loose terminal block, see electrical connections below.
5. Plug the terminal block on the pins header on the PCB. Check polarity and orientation.

IMPORTANT! Make sure the Terminal Block is fitted the correct position and direction. The cable entry faces the centre of the sensor.

8. Before powering the sensor, ensure that the supply voltage is within the specified tolerances

IMPORTANT! It is important to make all electrical output connections before applying the supply voltage. If the sensor is not connected in this sequence, damage may be caused to the circuitry of the controller or device the sensor output(s) are connected to.

9. Allow 3 minutes before checking functionality, and at least 30 minutes before carrying out pre-commissioning checks. This will allow the electronics time to stabilise.

To perform an accurate comparison between a transmitter output and a portable reference, it is essential that the two probes are held adjacent for a minimum of 30 minutes in a stable RH environment. Only in this way can speed of response and temperature factors be eliminated. It is not uncommon for test instruments and transmitters to disagree by 10% RH or more when site measurements are taken incorrectly. 'Slings' or other mechanical hygrometer should not be used as a reference.

Electrical Connections:

24V	Supply 24Vac/dc	DO1	Digital Output 1
0V	Supply 0V (Common 0V)	DO2	Digital Output 2
AI	Analogue Input	0V	Common 0V
DI*	Digital Input	OP1	Analogue Output 1
A+	RS-485 A+	OP2	Analogue Output 2
B-	RS-485 B-	OP3	Analogue Output 3

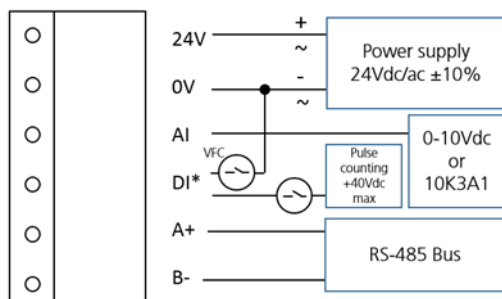
IMPORTANT! The DI (*) can be configured to VFC or Pulse

Terminal Block

For easier installation, the terminal block can be detached from the PCB.

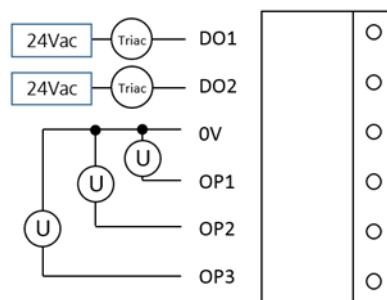
When used with ferrules it doesn't require any tools to release the spring loaded terminal block. When used with stranded cable, push in the orange latch to compress the spring load. Feed in the wire and release the spring to secure the wire connection.

IMPORTANT! Make sure the Terminal Block is fitted the correct position and direction. The cable entry faces the centre of the sensor.



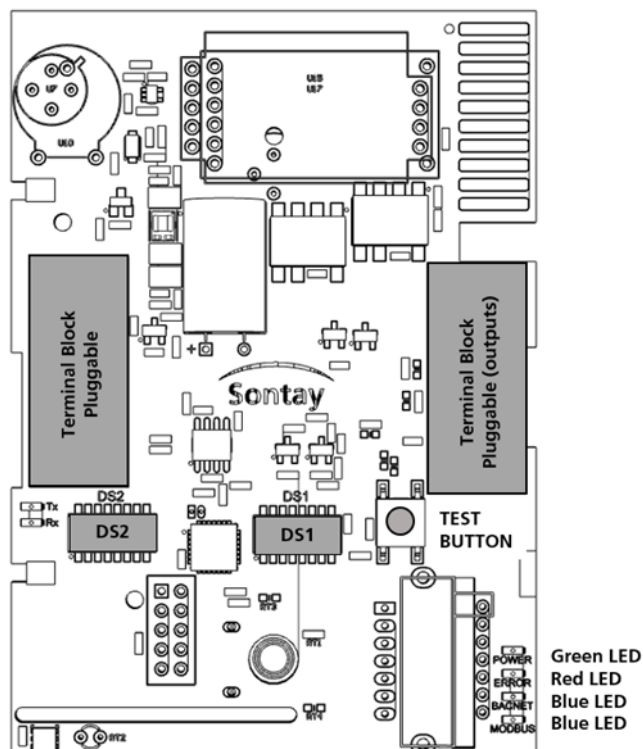
Network

Sontay recommend that Belden 9841 or 3106 cable be used for the RS-485 network bus. Similar specification cable may also be used. If other types of cable, such as CAT5, is employed, it may be necessary to switch DS2-8 (the 120Ω terminating resistor) ON for each device to obtain reliable communications.



Cable:

PCB Layout and wiring diagram



When using the digital input as a VFC, the VFC contacts should be connected across the DI terminal and the common 0v terminal, i.e. active low.

When using the digital input as a pulse counting input, the input should be connected across the DI terminal and is active high. Do NOT connect a pulse input across the DI terminal and common 0v.

The output override button can be used to manually override the mapped analogue outputs (if fitted) and the sensor input values.

- Press the override button for > 2 seconds. The mapped analogue values and the values in the BACnet AIs or Modbus registers go to 100% of range.
- Press the override button again for > 2 seconds. The mapped analogue values and the values in the BACnet AIs or Modbus registers go to 50% of range.
- Press the override button again for > 2 seconds. The mapped analogue values and the values in the BACnet AIs or Modbus registers go to 0% of range.
- Pressing the override button again returns the sensor to normal automatic outputs. If the override button is not pressed for more than 15 seconds, the sensor returns to normal automatic outputs.

DIP switches and LED's

Set network settings using the network DIP switch DS2.

Setting	DS2 - 1	DS2 - 2	DS2 - 3	DS2 - 4	DS2 - 5	DS2 - 6	DS2 - 7	DS2 - 8
Auto-baud (BACnet only)	-	-	On	-	-	-	-	-
9600 Baud Rate	Off	Off	Off	-	-	-	-	-
19200 Baud Rate	On	Off	Off	-	-	-	-	-
38400 Baud Rate	Off	On	Off	-	-	-	-	-
57600 (Modbus) / 76800 (BACnet) Baud Rate	On	On	Off	-	-	-	-	-
Modbus Network	-	-	-	On	-	-	-	-
BACnet Network	-	-	-	Off	-	-	-	-
No Parity - 2 Stop Bits	-	-	-	-	Off	Off	-	-
Odd Parity - 1 Stop Bit	-	-	-	-	On	Off	-	-
Even Parity - 1 Stop Bit	-	-	-	-	Off	On	-	-
No Parity - 1 Stop Bits	-	-	-	-	On	On	-	-
No RS485 termination	-	-	-	-	-	-	-	Off
RS485 termination	-	-	-	-	-	-	-	On

IMPORTANT!

- DS2-5 and DS2-6 have no effect if DS2-4 is set to BACnet.
- Auto-baud only works in BACnet mode.
- Only set DS2-8 to ON if the sensor is the last device on the RS-485 bus.



The example above shows DS2 set for BACnet, 78k6 baud.

2. Set MAC address DIP switch DS1.

IMPORTANT: Changing any DIP switch setting while the sensor is powered will cause the sensor to reboot.

Address	DS1 - 1	DS1 - 2	DS1 - 3	DS1 - 4	DS1 - 5	DS1 - 6	DS1 - 7	DS1 - 8
0	Off	Off	Off	Off	Off	Off	Off	Off
1	On	Off	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off	Off
4	Off	Off	On	Off	Off	Off	Off	Off
8	Off	Off	Off	On	Off	Off	Off	Off
16	Off	Off	Off	Off	On	Off	Off	Off
32	Off	Off	Off	Off	Off	On	Off	Off
64	Off	Off	Off	Off	Off	Off	On	Off
128	Off	Off	Off	Off	Off	Off	Off	On

For a full list please see the Annex on the last two pages of this user manual.



The example above shows DS1 set for an address of 23.

Note the LED for fault finding and validating the installation:

IMPORTANT: All the LEDs apart from Power (green) will go off after being powered for 15 minutes.

Function	Colour	Description
Power	Green	Directly run from device power, lit when device is powered
Error	Red	Lit when self-test errors are detected
RS-485-TX	Green	Flash (~25ms per transfer) to indicate RS-485 data transactions in the given direction
RS-485-RX	Yellow	
BACnet	Blue	Indicates which network protocol is in use, errors have occurred if neither are lit. BACnet LED will flash whilst the auto-baud process is in progress

Trouble-Shooter's Guide

Symptom	Cause	Actions
No BACnet MS/TP Communications	PCB not powered	Check green power LED. Apply power to PCB observing correct polarity.
	BACnet not selected using DS2-4	Observe that the BACnet LED is ON. Check that DS2-4 is set to OFF.
	Incorrect address setting	Set a unique, valid address.
	Duplicate device instance	The device instance is "662" + the MAC address. Check that the device instance is correct and unique on the network.
	120Ω terminator (DS2-8) set ON	Only set the 120Ω terminator ON if the sensor is the last on the RS-485 bus.
	Incorrect baud rate	Check the baud rate switches (DS2-1 to DS2-3)
	Incorrect RS-485 wiring	Ensure A+ on the sensor is connected to A+ one each sensor and/or MS/TP master
No Modbus RTU Communications	PCB not powered	Check green power LED. Apply power to PCB observing correct polarity.
	Incorrect address setting	Set a unique, valid address.
	Modbus not selected using DS2-4	Observe that the Modbus LED is ON. Check that DS2-4 is set to ON.
	120Ω terminator (DS2-8) set ON	Only set the 120Ω terminator ON if the sensor is the last on the RS-485 bus.
	Incorrect baud rate	Check the baud rate switches (DS2-1 to DS2-3)
	Incorrect parity and stop bit settings	Check the parity and stop bit switches (DS2-5 to DS2-6)
	Incorrect RS-485 wiring	Ensure A+ on the sensor is connected to A+ one each sensor and/or RTU master

Whilst every effort has been made to ensure the accuracy of this specification, Sontay cannot accept responsibility for damage, injury, loss or expense resulting from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.

Annex – DIP Switch settings MAC address

Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
7	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
9	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
10	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
12	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
13	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
14	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF	OFF	OFF
16	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
17	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
18	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
19	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
20	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
21	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
22	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
23	ON	ON	ON	OFF	ON	OFF	OFF	OFF
24	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
25	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
26	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
27	ON	ON	OFF	ON	ON	OFF	OFF	OFF
28	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
29	ON	OFF	ON	ON	ON	OFF	OFF	OFF
30	OFF	ON	ON	ON	ON	OFF	OFF	OFF
31	ON	ON	ON	ON	ON	OFF	OFF	OFF
32	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
33	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
34	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
35	ON	ON	OFF	OFF	OFF	ON	OFF	OFF
36	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF
37	ON	OFF	ON	OFF	OFF	ON	OFF	OFF
38	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
39	ON	ON	ON	OFF	OFF	ON	OFF	OFF
40	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF
41	ON	OFF	OFF	ON	OFF	ON	OFF	OFF
42	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
43	ON	ON	OFF	ON	OFF	ON	OFF	OFF
44	OFF	OFF	ON	ON	OFF	ON	OFF	OFF
45	ON	OFF	ON	ON	OFF	ON	OFF	OFF
46	OFF	ON	ON	ON	OFF	ON	OFF	OFF
47	ON	ON	ON	ON	OFF	ON	OFF	OFF
48	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
49	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
50	OFF	ON	OFF	OFF	ON	ON	OFF	OFF
51	ON	ON	OFF	OFF	ON	ON	OFF	OFF
52	OFF	OFF	ON	OFF	ON	ON	OFF	OFF
53	ON	OFF	ON	OFF	ON	ON	OFF	OFF
54	OFF	ON	ON	OFF	ON	ON	OFF	OFF
55	ON	ON	ON	OFF	ON	ON	OFF	OFF
56	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
57	ON	OFF	OFF	ON	ON	ON	OFF	OFF
58	OFF	ON	OFF	ON	ON	ON	OFF	OFF
59	ON	ON	OFF	ON	ON	ON	OFF	OFF
60	OFF	OFF	ON	ON	ON	ON	OFF	OFF
61	ON	OFF	ON	ON	ON	ON	OFF	OFF
62	OFF	ON	ON	ON	ON	ON	OFF	OFF

Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
128	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
129	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
130	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON
131	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
132	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON
133	ON	OFF	ON	OFF	OFF	OFF	OFF	ON
134	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
135	ON	ON	ON	OFF	OFF	OFF	OFF	ON
136	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
137	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
138	OFF	ON	OFF	ON	OFF	OFF	OFF	ON
139	ON	ON	OFF	ON	OFF	OFF	OFF	ON
140	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
141	ON	OFF	ON	ON	OFF	OFF	OFF	ON
142	OFF	ON	ON	ON	OFF	OFF	OFF	ON
143	ON	ON	ON	ON	OFF	OFF	OFF	ON
144	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
145	ON	OFF	OFF	OFF	ON	OFF	OFF	ON
146	OFF	ON	OFF	OFF	ON	OFF	OFF	ON
147	ON	ON	OFF	OFF	ON	OFF	OFF	ON
148	OFF	OFF	ON	OFF	ON	OFF	OFF	ON
149	ON	OFF	ON	OFF	ON	OFF	OFF	ON
150	OFF	ON	ON	OFF	ON	OFF	OFF	ON
151	ON	ON	ON	OFF	ON	OFF	OFF	ON
152	OFF	OFF	OFF	ON	ON	OFF	OFF	ON
153	ON	OFF	OFF	ON	ON	OFF	OFF	ON
154	OFF	ON	OFF	ON	ON	OFF	OFF	ON
155	ON	ON	OFF	ON	ON	OFF	OFF	ON
156	OFF	OFF	ON	ON	ON	OFF	OFF	ON
157	ON	OFF	ON	ON	ON	OFF	OFF	ON
158	OFF	ON	ON	ON	ON	OFF	OFF	ON
159	ON	ON	ON	ON	ON	OFF	OFF	ON
160	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
161	ON	OFF	OFF	OFF	OFF	ON	OFF	ON
162	OFF	ON	OFF	OFF	OFF	ON	OFF	ON
163	ON	ON	OFF	OFF	OFF	ON	OFF	ON
164	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
165	ON	OFF	ON	OFF	OFF	ON	OFF	ON
166	OFF	ON	ON	OFF	OFF	ON	OFF	ON
167	ON	ON	ON	OFF	OFF	ON	OFF	ON
168	OFF	OFF	OFF	ON	OFF	ON	OFF	ON
169	ON	OFF	OFF	ON	OFF	ON	OFF	ON
170	OFF	ON	OFF	ON	OFF	ON	OFF	ON
171	ON	ON	OFF	ON	OFF	ON	OFF	ON
172	OFF	OFF	ON	ON	OFF	ON	OFF	ON
173	ON	OFF	ON	ON	OFF	ON	OFF	ON
174	OFF	ON	ON	ON	OFF	ON	OFF	ON
175	ON	ON	ON	ON	OFF	ON	OFF	ON
176	OFF	OFF	OFF	OFF	ON	ON	OFF	ON
177	ON	OFF	OFF	OFF	ON	ON	OFF	ON
178	OFF	ON	OFF	OFF	ON	ON	OFF	ON
179	ON	ON	OFF	OFF	ON	ON	OFF	ON
180	OFF	OFF	ON	OFF	ON	ON	OFF	ON
181	ON	OFF	ON	OFF	ON	ON	OFF	ON
182	OFF	ON	ON	OFF	ON	ON	OFF	ON
183	ON	ON	ON	OFF	ON	ON	OFF	ON
184	OFF	OFF	OFF	ON	ON	ON	OFF	ON
185	ON	OFF	OFF	ON	ON	ON	OFF	ON
186	OFF	ON	OFF	ON	ON	ON	OFF	ON
187	ON	ON	OFF	ON	ON	ON	OFF	ON
188	OFF	OFF	ON	ON	ON	ON	OFF	ON
189	ON	OFF	ON	ON	ON	ON	OFF	ON
190	OFF	ON	ON	ON	ON	ON	OFF	ON

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63	ON	ON	ON	ON	ON	ON	OFF	OFF
64	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
65	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
66	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
67	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
68	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
69	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
70	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
71	ON	ON	ON	OFF	OFF	OFF	ON	OFF
72	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF
73	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
74	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
75	ON	ON	OFF	ON	OFF	OFF	ON	OFF
76	OFF	OFF	ON	ON	OFF	OFF	ON	OFF
77	ON	OFF	ON	ON	OFF	OFF	ON	OFF
78	OFF	ON	ON	ON	OFF	OFF	ON	OFF
79	ON	ON	ON	ON	OFF	OFF	ON	OFF
80	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
81	ON	OFF	OFF	OFF	ON	OFF	ON	OFF
82	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
83	ON	ON	OFF	OFF	ON	OFF	ON	OFF
84	OFF	OFF	ON	OFF	ON	OFF	ON	OFF
85	ON	OFF	ON	OFF	ON	OFF	ON	OFF
86	OFF	ON	ON	OFF	ON	OFF	ON	OFF
87	ON	ON	ON	OFF	ON	OFF	ON	OFF
88	OFF	OFF	OFF	ON	ON	OFF	ON	OFF
89	ON	OFF	OFF	ON	ON	OFF	ON	OFF
90	OFF	ON	OFF	ON	ON	OFF	ON	OFF
91	ON	ON	OFF	ON	ON	OFF	ON	OFF
92	OFF	OFF	ON	ON	ON	OFF	ON	OFF
93	ON	OFF	ON	ON	ON	OFF	ON	OFF
94	OFF	ON	ON	ON	ON	OFF	ON	OFF
95	ON	ON	ON	ON	ON	OFF	ON	OFF
96	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
97	ON	OFF	OFF	OFF	OFF	ON	ON	OFF
98	OFF	ON	OFF	OFF	OFF	ON	ON	OFF
99	ON	ON	OFF	OFF	OFF	ON	ON	OFF
100	OFF	OFF	ON	OFF	OFF	ON	ON	OFF
101	ON	OFF	ON	OFF	OFF	ON	ON	OFF
102	OFF	ON	ON	OFF	OFF	ON	ON	OFF
103	ON	ON	ON	OFF	OFF	ON	ON	OFF
104	OFF	OFF	OFF	ON	OFF	ON	ON	OFF
105	ON	OFF	OFF	ON	OFF	ON	ON	OFF
106	OFF	ON	OFF	ON	OFF	ON	ON	OFF
107	ON	ON	OFF	ON	OFF	ON	ON	OFF
108	OFF	OFF	ON	ON	OFF	ON	ON	OFF
109	ON	OFF	ON	ON	OFF	ON	ON	OFF
110	OFF	ON	ON	ON	OFF	ON	ON	OFF
111	ON	ON	ON	ON	OFF	ON	ON	OFF
112	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
113	ON	OFF	OFF	OFF	ON	ON	ON	OFF
114	OFF	ON	OFF	OFF	ON	ON	ON	OFF
115	ON	ON	OFF	OFF	ON	ON	ON	OFF
116	OFF	OFF	ON	OFF	ON	ON	ON	OFF
117	ON	OFF	ON	OFF	ON	ON	ON	OFF
118	OFF	ON	ON	OFF	ON	ON	ON	OFF
119	ON	ON	ON	OFF	ON	ON	ON	OFF
120	OFF	OFF	OFF	ON	ON	ON	ON	OFF
121	ON	OFF	OFF	ON	ON	ON	ON	OFF
122	OFF	ON	OFF	ON	ON	ON	ON	OFF
123	ON	ON	OFF	ON	ON	ON	ON	OFF
124	OFF	OFF	ON	ON	ON	ON	ON	OFF
125	ON	OFF	ON	ON	ON	ON	ON	OFF
126	OFF	ON	ON	ON	ON	ON	ON	OFF
127	ON	ON	ON	ON	ON	ON	ON	OFF
191	ON	ON	ON	ON	ON	ON	OFF	ON
192	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
193	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
194	OFF	ON	OFF	OFF	OFF	OFF	ON	ON
195	ON	ON	OFF	OFF	OFF	OFF	ON	ON
196	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
197	ON	OFF	ON	OFF	OFF	OFF	ON	ON
198	OFF	ON	ON	OFF	OFF	OFF	ON	ON
199	ON	ON	ON	OFF	OFF	OFF	ON	ON
200	OFF	OFF	OFF	ON	OFF	OFF	ON	ON
201	ON	OFF	OFF	ON	OFF	OFF	ON	ON
202	OFF	ON	OFF	ON	OFF	OFF	ON	ON
203	ON	ON	OFF	ON	OFF	OFF	ON	ON
204	OFF	OFF	ON	ON	OFF	OFF	ON	ON
205	ON	OFF	ON	ON	OFF	OFF	ON	ON
206	OFF	ON	ON	ON	OFF	OFF	ON	ON
207	ON	ON	ON	ON	OFF	OFF	ON	ON
208	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
209	ON	OFF	OFF	OFF	ON	OFF	ON	ON
210	OFF	ON	OFF	OFF	ON	OFF	ON	ON
211	ON	ON	OFF	OFF	ON	OFF	ON	ON
212	OFF	OFF	ON	OFF	ON	OFF	ON	ON
213	ON	OFF	ON	OFF	ON	OFF	ON	ON
214	OFF	ON	ON	OFF	ON	OFF	ON	ON
215	ON	ON	ON	OFF	ON	OFF	ON	ON
216	OFF	OFF	OFF	ON	ON	OFF	ON	ON
217	ON	OFF	OFF	ON	ON	OFF	ON	ON
218	OFF	ON	OFF	ON	ON	OFF	ON	ON
219	ON	ON	OFF	ON	ON	OFF	ON	ON
220	OFF	OFF	ON	ON	ON	OFF	ON	ON
221	ON	OFF	ON	ON	ON	OFF	ON	ON
222	OFF	ON	ON	ON	ON	OFF	ON	ON
223	ON	ON	ON	ON	ON	OFF	ON	ON
224	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
225	ON	OFF	OFF	OFF	OFF	ON	ON	ON
226	OFF	ON	OFF	OFF	OFF	ON	ON	ON
227	ON	ON	OFF	OFF	OFF	ON	ON	ON
228	OFF	OFF	ON	OFF	OFF	ON	ON	ON
229	ON	OFF	ON	OFF	OFF	ON	ON	ON
230	OFF	ON	ON	OFF	OFF	ON	ON	ON
231	ON	ON	ON	OFF	OFF	ON	ON	ON
232	OFF	OFF	OFF	ON	OFF	ON	ON	ON
233	ON	OFF	OFF	ON	OFF	ON	ON	ON
234	OFF	ON	OFF	ON	OFF	ON	ON	ON
235	ON	ON	OFF	ON	OFF	ON	ON	ON
236	OFF	OFF	ON	ON	OFF	ON	ON	ON
237	ON	OFF	ON	ON	OFF	ON	ON	ON
238	OFF	ON	ON	ON	OFF	ON	ON	ON
239	ON	ON	ON	ON	OFF	ON	ON	ON
240	OFF	OFF	OFF	OFF	ON	ON	ON	ON
241	ON	OFF	OFF	OFF	ON	ON	ON	ON
242	OFF	ON	OFF	OFF	ON	ON	ON	ON
243	ON	ON	OFF	OFF	ON	ON	ON	ON
244	OFF	OFF	ON	OFF	ON	ON	ON	ON
245	ON	OFF	ON	OFF	ON	ON	ON	ON
246	OFF	ON	ON	OFF	ON	ON	ON	ON
247	ON	ON	ON	OFF	ON	ON	ON	ON
248	OFF	OFF	OFF	ON	ON	ON	ON	ON
249	ON	OFF	OFF	ON	ON	ON	ON	ON
250	OFF	ON	OFF	ON	ON	ON	ON	ON
251	ON	ON	OFF	ON	ON	ON	ON	ON
252	OFF	OFF	ON	ON	ON	ON	ON	ON
253	ON	OFF	ON	ON	ON	ON	ON	ON
254	OFF	ON	ON	ON	ON	ON	ON	ON
255	ON	ON	ON	ON	ON	ON	ON	ON

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