

# TSI<sup>®</sup> MODEL 8635-C, 8635-M SUREFLOW<sup>™</sup> CIMETRICS<sup>™</sup> COMMUNICATIONS

---

APPLICATION NOTE LC-109

Cimetrics<sup>™</sup> communications are installed in all Model 8635 laboratory room pressure controllers and monitors. This document provides the technical information needed to communicate between the host DDC system and Model 8635 units. This document assumes the programmer is familiar with Cimetrics<sup>™</sup> protocol. Further technical assistance is available from TSI if your question is related to TSI interfacing to a DDC system. If you need further information regarding Cimetrics<sup>™</sup> programming in general, please contact:

Cimetrics Inc.  
55 Temple Place  
Boston, MA 02111-1300  
Phone: (617) 350-7550  
Fax: (617) 350-7552  
Website: <http://www.cimetrics.com>

The Cimetrics<sup>™</sup> protocol utilizes TINY-NSP Nine Bit Serial Protocol for data transfer and error checking. Check the Cimetrics Inc. TINY-NSP User's Manual for additional information.

Blocks of data can be read from each device. Using a block format will speed up the access time for each device. The size of the blocks is limited to 15 bytes. This means the maximum message length that can be transferred is 15 bytes. The typical response time of the device is around 0.05 seconds with a maximum of 0.1 seconds.

## Unique to TSI

The list of variable addresses shown below skips some numbers in the sequence due to internal Model 8635 functions. This information is not useful to the DDC system and is therefore deleted. Skipping numbers in the sequence will not cause any communication problems.

Occasionally an asterisk (\*) will accompany a flow variable name. This designates that the flow station could be mounted in either supply or exhaust duct, but the variable name states it is the supply flow. If the flow station is located in the exhaust, the DDC system will need a name change to properly display on the DDC screen.

All variables are outputted in English units: feet per minute, CFM, or inches H<sub>2</sub>O. If the DDC system is to display different units, the DDC system needs to make the conversion. All pressure setpoint and alarms are in ft/min values. These values must be converted to inches H<sub>2</sub>O or other pressure units as desired by the host DDC system.



## RAM Variables

RAM variables use the Cimetrics™ command **06 Read\_From\_Slave\_Int\_Ram**. RAM variables are read only variables, that correspond to what is shown on Digital Interface Module (DIM) display. TSI offers a number of different models, so if a feature is not available on a unit, the variable is set to 0.

### 8635-C Laboratory Room Pressure Controller

Variable Name	Variable Address	Information Provided to Master System	Integer DDC system receives
Velocity	47	Velocity of room pressure	Displayed in feet per minute.
Pressure	49	Room pressure	Displayed in inches H <sub>2</sub> O. Host DDC system must divide value by 100,000 to report pressure correctly.
General Exhaust Flow Rate	51	Flow (CFM) measured by the general exhaust duct flow station	Displayed in CFM.
ACPH	53	Calculated room air changes	Host DDC must divide by 10 to get number per hour.
Supply Flow Rate	55	Flow (CFM) measured by the supply duct flow station	Displayed in CFM.
Setpoint	61	Active control setpoint	Displayed in feet per minute.
Status Index	63	Status of SUREFLOW™ device	0 Normal            1 Low Alarm 2 High Alarm      3 Min Exh Alm 4 Min Sup Alm     7 Data Error 8 Emergency
Control Mode	65	Control mode device is in	0 Main 1 Remote
Control Output	73	Control output value	0 to 255 will be displayed.

### 8635-M Laboratory Room Pressure Monitor

Variable Name	Variable Address	Information Provided to Master System	Integer DDC system receives
Velocity	48	Velocity of room pressure	Displayed in feet per minute.
Pressure	50	Room pressure	Displayed in inches H <sub>2</sub> O. Host DDC system must divide value by 100,000 to report pressure correctly.
ACPH	54	Calculated room air changes	Host DDC must divide by 10 to get number per hour.
Flow Rate	56	Flow (CFM) measured by the flow station	Displayed in CFM.
Status Index	64	Status of SUREFLOW™ device	0 Normal            1 Low Alarm 2 High Alarm      4 Min Flow Alm 7 Data Error
Room Mode	66	Control Mode device is in	0 Main 1 Remote

**EXAMPLE of 06 Read\_From\_Slave\_Int\_Ram function format**

This example reads variable addresses 48 and 50 (Velocity and Pressure from 8635-M).

**QUERY**

Field Name (Hex)  
 Target Node Address 01  
 Message Length 07  
 Eight-Bit Checksum \*\*  
 Source Node Address 00  
 Command Opcode 06  
 Data Address 30  
 Data Number Bytes 04

**RESPONSE**

Field Name (Hex)  
 Target Node Address 00  
 Message Length 09  
 Eight-Bit Checksum \*\*  
 Source Node Address 01  
 Command Opcode 12  
 Data (High Byte) 00  
 Data (Low Byte) 64 (100 ft/min)  
 Data (High Byte) 00  
 Data (Low Byte) 59 (.00089 "H2O) \*

\* Pressure in Inches H<sub>2</sub>O = 6.2\*10<sup>-8</sup>\*(Velocity in ft/min / .836)<sup>2</sup>

**XRAM Variables**

These variables can be read using Cimetrics™ command **07 Read\_From\_Slave\_Ext\_Ram**. They can be written to using Cimetrics™ command **04 Write\_To\_Slave\_Ext\_Ram**. These variables are the same “menu items” that are configured from the SUREFLOW™ keypad. The calibration and control items are not accessible from the DDC system. This is for safety reasons, since each room is individually setup for maximum performance. TSI offers a number of different models, so if a feature is not available on a unit, the variable is set to 0.

**8635-C, 8635-M Variable List**

Variable Name	Variable Address	Input Provided to Master System	Integer DDC system receives
Software Version (read only)	0	Current software version	1.00 = 100
Control Device (read only)	2	SUREFLOW™ Model	5 8635-M    6 8635-C
Emergency Mode*	4	Emergency Mode Control	0 Leave emergency mode 1 Enter emergency mode Value will return a 2 when read
Setpoint*	6	Pressure control setpoint	Displayed in feet per minute.
Remote Setpoint*	8	Remote pressure control setpoint	Displayed in feet per minute.
Minimum Ventilation Supply Flow Setpoint*	10	Minimum supply flow control setpoint in normal mode.	Displayed in CFM.
Minimum Temperature Supply Flow Setpoint*	12	Minimum supply flow control setpoint in temperature mode.	Displayed in CFM.
Low Alarm	14	Low pressure alarm setpoint	Displayed in feet per minute.
High Alarm	16	High pressure alarm setpoint	Displayed in feet per minute.
Variable Name	Variable Address	Input Provided to Master System	Integer DDC system receives
Remote Low Alarm	18	Remote mode low pressure alarm setpoint	Displayed in feet per minute.
Remote High Alarm	20	Remote mode high pressure alarm setpoint	Displayed in feet per minute.
Min Supply Alarm	24	Minimum supply flow alarm	Displayed in CFM.
Top Velocity	26	Maximum Velocity out of linear based flow station	Displayed in feet per minute.
Averaging Index	30	Display averaging period	0 .75 sec.    4 5 Sec. 1 1 Sec.    5 10 Sec. 2 2 Sec.    6 20 Sec. 3 3 Sec.    7 40 Sec.

Variable Name	Variable Address	Input Provided to Master System	Integer DDC system receives
Units Value	32	Current pressure units displayed	0 Feet per minute 1 meters per second 2 inches of H <sub>2</sub> O 3 Pascal 4 millimeters H <sub>2</sub> O
Alarm Mode	34	Latched or unlatched alarms	0 Unlatched 1 Latched
Audible Alarm	36	Audible alarm indication	0 OFF 1 On
Alarm Delay	38	Time delay before audible alarm sounds	Host DDC system must divide value by 10 to report alarm delay correctly.
Mute Delay	40	Length of time alarm is muted when mute key is pressed	Host DDC system must divide value by 600 to report alarm delay correctly.
Output Range	42	Room pressure analog output range	0 Low 1 High
Output Mode	44	Analog output signal	0 4 to 20 mA 1 0 to 10 Volt
Elevation	46	Elevation above sea level	0-10,000 feet. Displayed in 1,000 feet increments.
Exhaust Duct Area*	48	Duct area in square feet of general exhaust flow station	Host DDC system must divide value by 1,000 to report duct area correctly.
Room Volume	50	Room volume in cubic feet (needed for ACPH calculation)	Displayed in Cubic Feet
Supply Duct Area	52	Supply duct area in square feet	Host DDC system must divide value by 1,000 to report supply duct area correctly.
Flow Station Type	54	Type of flow station being utilized by controller	0 Pressure Based 1 Linear
ACPH Flow channel	56	Set ACPH flow calculation	0 Exhaust 1 Supply,
Program Control Mode	58	Changes room pressure control mode	0 Main 1 Remote
Control Action*	64	Control output signal direction	0 Reverse 1 Direct
Network Protocol	72	Network Protocol for RS-485 Communications	0 Modbus 1 Cimetrics
Network Address	74	Communication address of device	Range is 1 to 247
Set Code Enable*	96	Setpoint menu access code enable	0 Off 1 On
Alarm Code Enable	98	Alarm menu access code enable	0 Off 1 On
Conf Code Enable	100	Configure menu access code enable	0 Off 1 On
Cal Code Enable	102	Calibration menu access code enable	0 Off 1 On
Control Code Enable*	104	Control menu access code enable	1 On 0 Off
Interface Code Enable	106	Interface menu access code enable	0 Off 1 On
Diagnostic Code Enable	108	Diagnostic menu access code enable	0 Off 1 On
Door Delay	124	Time delay before audible alarm sounds when unit is in remote mode	Host DDC system must divide value by 10 to report alarm delay correctly.

Variable Name	Variable Address	Input Provided to Master System	Integer DDC system receives
Temp Low*	126	Low limit to switch into temperature mode	Voltage signal from thermostat. Host DDC system must divide by 10 to report correctly
Temp High*	128	High limit to switch into temperature mode	Voltage signal from thermostat. Host DDC system must divide by 10 to report correctly

\* Not used on 8635-M Laboratory Room Monitor

**EXAMPLE of 04 Write\_To\_Slave\_Ext\_Ram function Format**

This example changes the remote set point to 100 ft/min.

**QUERY**

Field Name (Hex)  
 Target Node Address 01  
 Message Length 09  
 Eight-Bit Checksum \*\*  
 Source Node Address 00  
 Command Opcode 04  
 Data Address (Low) 08  
 Data Address (High) 00  
 Data Value (High) 00  
 Data Value (Low) 64

**RESPONSE**

Field Name (Hex)  
 Target Node Address 00  
 Message Length 05  
 Eight-Bit Checksum \*\*  
 Source Node Address 01  
 Command Opcode 11

**Example of 07 Read\_From\_Slave\_Ext\_Ram function format:**

This example reads the minimum ventilation setpoint and the minimum temperature setpoint.

**QUERY**

Field Name (Hex)  
 Target Node Address 01  
 Message Length 08  
 Eight-Bit Checksum \*\*  
 Source Node Address 00  
 Command Opcode 07  
 Data Address (Low) 0A  
 Data Address (High) 00  
 Data Number Bytes 04

**RESPONSE**

Field Name (Hex)  
 Target Node Address 00  
 Message Length 09  
 Eight-Bit Checksum \*\*  
 Source Node Address 01  
 Command Opcode 12  
 Data (High Byte) 03  
 Data (Low Byte) 8E (1,000 CFM)  
 Data (High Byte) 04  
 Data (Low Byte) B0 (1,200 CFM)



UNDERSTANDING, ACCELERATED

TSI Incorporated – Visit our website [www.tsi.com](http://www.tsi.com) for more information.

USA Tel: +1 800 874 2811 India Tel: +91 80 67877200  
 UK Tel: +44 149 4 459200 China Tel: +86 10 8251 6588  
 France Tel: +33 4 91 11 87 64 Singapore Tel: +65 6595 6388  
 Germany Tel: +49 241 523030