

TSI[®] MODEL 8630 PRESSURA[™] CIMETRICS[™] COMMUNICATIONS

APPLICATION NOTE LC-107

Cimetrics[™] communications are installed in all Model 8630 hospital room pressure controllers and premium monitors. This document provides the technical information needed to communicate between the host DDC system and Model 8630 units. This document assumes the programmer is familiar with Cimetrics[™] 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[™] programming in general, please contact:

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The Cimetrics[™] 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 8630 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 H₂O. If the DDC system is to display different units, the DDC system needs to make the conversion.



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.

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 ₂ O. Host DDC system must divide value by 100,000 to report pressure correctly.
Flow Rate	52	Flow (CFM) measured by the exhaust duct flow station	Displayed in CFM.
ACPH	54	Calculated room air changes	Host DDC must divide by 10 to get number per hour.
Supply flow rate*	56	Flow (CFM) measured by the supply duct flow station	Displayed in CFM.
Second Velocity	58	Second sensor velocity of room pressure	Displayed in feet per minute.
Second Pressure	60	Second sensor room pressure	Displayed in inches H ₂ O. Host DDC system must divide value by 100,000 to report pressure correctly.
Setpoint	62	Active control setpoint	Displayed in feet per minute.
Status Index	64	Status of PRESSURA™ device	0 Normal 1 Low Alarm 2 High Alarm 3 Min Exh Alm 4 Min Sup Alm 5 Sec Low ALM 6 Sec High ALM 7 Data Error 8 Emergency
Control Mode	66	Control mode device is in	0 Negative 1 Positive 2 No Isolation
Control Output	74	Control output value	0 - 255 will be displayed.

EXAMPLE of **06 Read_From_Slave_Int_Ram** function format
This example reads variable addresses 48 and 50 (Velocity and Pressure).

QUERY		RESPONSE	
Field Name	(Hex)	Field Name	(Hex)
Target Node Address	01	Target Node Address	00
Message Length	07	Message Length	09
Eight-Bit Checksum	**	Eight-Bit Checksum	**
Source Node Address	00	Source Node Address	01
Command Opcode	06	Command Opcode	12
Data Address	30	Data (High Byte)	00
Data Number Bytes	04	Data (Low Byte)	64 (100 ft/min)
		Data (High Byte)	00
		Data (Low Byte)	59 (.00089 "H ₂ O) *

* Pressure in Inches H₂O = $6.2 \times 10^{-8} \times (\text{Velocity in ft/min} / .836)^2$

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 PRESSURA™ 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.

Variable Name	Variable Address	Input Provided to Master System	Integer DDC system receives
Software Version (read only)	0	Current software version	1.00 = 100
Hospital Device (read only)	2	PRESSURA Model	1 8630-SM 3 8630-SC 2 8630-PM 4 8630-PC
Emergency Mode	4	Emergency Mode Control	0 Leave emergency mode 1 Enter emergency mode
Negative Setpoint	6	Negative pressure control setpoint	Displayed in feet per minute.
Positive Setpoint	8	Positive pressure control setpoint	Displayed in feet per minute.
Min Flow Setpoint	10	Minimum flow exhaust control setpoint	Displayed in CFM.
Damper Position	12	Damper position when DIM is in no isolation mode	0 to 255 will be displayed. 150 is approximately 1/2 open.
Negative Low Alarm	14	Negative low pressure alarm setpoint	Displayed in feet per minute.
Negative High Alarm	16	Negative high pressure alarm setpoint	Displayed in feet per minute.
Positive Low Alarm	18	Positive low pressure alarm setpoint	Displayed in feet per minute.
Positive High Alarm	20	Positive high pressure alarm setpoint	Displayed in feet per minute.
Min Flow Alarm	22	Minimum exhaust flow alarm	Displayed in CFM.
Min Supply Alarm	24	Minimum supply flow alarm	Displayed in CFM.
Sec Low Alarm	26	Second sensor low alarm	Displayed in feet per minute.
Sec High Alarm	28	Second sensor high alarm	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.
Units Value	32	Current pressure units displayed	0 Feet per minute 1 meters per second 2 inches of H ₂ O 3 Pascal 4 millimeters H ₂ 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 to 10,000 feet. Displayed in 1,000 feet increments.
Duct Area	48	Duct area in square feet	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

Variable Name	Variable Address	Input Provided to Master System	Integer DDC system receives
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.
Second Sensor Enable	54	Enables second room pressure sensor	0 Off 1 On
ACPH Flow Channel	56	Set ACPH flow calculation	0 Exhaust 1 Supply,
Program Control Mode	58	Changes room pressure control mode	0 Negative 2 No Isolation 1 Positive 3 Key switch
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

EXAMPLE of 04 Write_To_Slave_Ext_Ram function format

This example changes the positive 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 flow setpoint and the no isolation mode damper 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)	00
Data (Low Byte)	FF (255 Full Open or Closed)



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