Technical Bulletin, Communicating with Daniel Ultrasonic Gas Flowmeter Model 3400, SeniorSonic

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NOTE: User Manual Reference - This Technical Bulletin complements the information contained in the User Manual, applicable to Revision 23.74/27.74+.

The Daniel SeniorSonic ultrasonic flowmeter measures gas flow by using the Time Travel method of acoustic pulses. This service communicates with OMNI Flow Computers via OMNI's 'SV' process I/O combo module using a proprietary protocol. To use the scaled pulse output of the Daniel Senior Sonic Metering, the flow computer must at least either have an 'A", 'B' or 'E' combo module installed.

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Scope

This Technical Bulletin applies to firmware revisions 23.74+ and 27.74+ of OMNI 6000/OMNI 3000 Flow Computers, for gas flow metering systems.

Abstract

The Daniel SeniorSonic ultrasonic flowmeter determines the linear gas velocity through the meter tube by using multiple acoustic pulse paths. The flowmeter analyzes these paths employing the delta time travel measurement method. The OMNI Flow Computer either totalizes the flowmeter pulse input signal or determines the flowrate from the data received serial from the flowmeter.

SeniorSonic Ultrasonic Flowmeter Theory of Operation

Daniel's ultrasonic gas flow-metering technology incorporates multiple pairs of transducers into a smart digital inferential instrumentation device. This device is installed into a gas pipeline system to measure gas flow. Each pair of transducers emits ultrasonic (acoustic) pulses that travel bi-directionally, to and from each transducer in the pair.

Four (4) pairs of transducers are positioned across the meter so that the path between each transducer has an axial component; i.e., one (1) transducer is upstream relative to the other. Pulses emitted by the downstream transducer are slowed down by the velocity of the fluid, with flow the pulse takes longer to travel to the upstream transducer than with no flow. Pulses emitted by the upstream transducer are aided by the velocity of the fluid, with flow the pulse takes less time to travel to the downstream transducer. Ultrasonic flowmeters such as the SeniorSonic 3400, that apply delta time methodology, measure these two travel times to determine both the linear fluid velocity and the speed of sound in the fluid. The flowmeter can measure fluid velocity for bi-directional (forward/reverse) fluid flow.

OMNI Flow Computer Logic

The OMNI Flow Computer can determine the actual flow rate from data received either serially from the SeniorSonic flowmeter, or from a live pulse frequency signal input if one has been connected, assigned, and configured. In this application, Modbus serial communication can be configured as the primary measurement source with the pulse frequency configured as the backup measurement source or vice versa to determine the actual flow rate. The OMNI Flow Computer can also be configured to use only the Modbus serial communication link with no pulse frequency input. When Modbus communications are available the flow computer transmits flowing temperature and pressure to the flowmeter to enable it to correct spool dimensions.

The flowmeter serially transmits the accumulated volume to the OMNI. The flow computer obtains a calculated volume increment by subtracting the new accumulated volume from the last accumulated volume it received. The flowmeter updates its totalizers on a regular interval depending upon flowing conditions and configuration settings. Updating the OMNI totalizers on this same period would result in somewhat erratic totalizers and sampler pulse outputs, which could upset other equipment connected to the flow computer. The OMNI provides a smooth totalizer update by monitoring the time interval between SeniorSonic totalizer updates, and distributing the volume increment over a matching time-period (Figure 1).

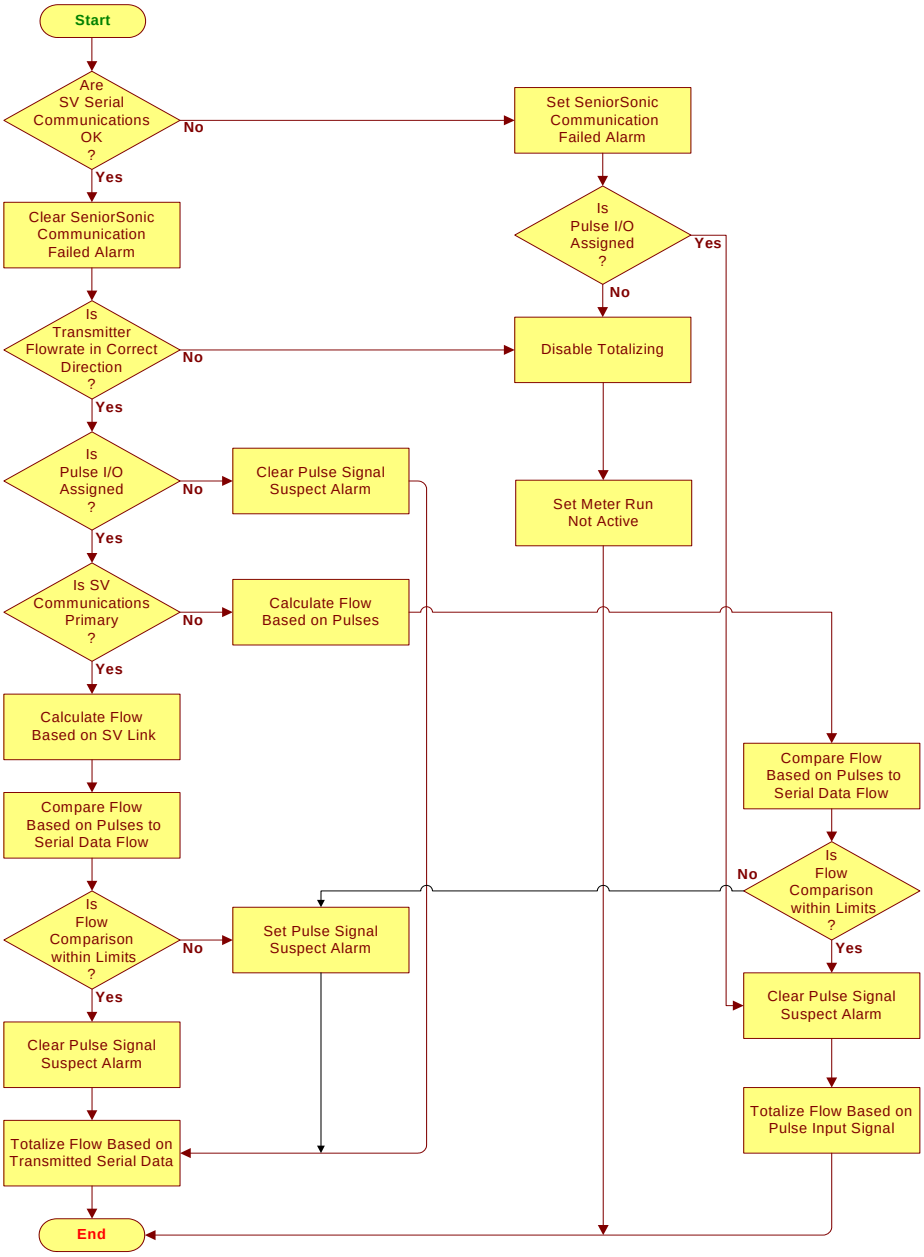

Figure 1. Daniel SeniorSonic 3400 Ultrasonic Gas Flowmeter

In the event of a communication failure between the two (2) devices, the OMNI will not receive serial data. However, the SeniorSonic may be fully operational and continue to accumulate volume. In this case, if a pulse signal is available from the flowmeter and the OMNI Flow Computer is configured to receive the flow pulse signal as a backup, the flow computer will automatically continue to accumulate flow based on this flow pulse train. When normal communications resume, the flow computer will validate and adjust its internal totalizers if necessary to match the SeniorSonic internal totalizer. The flow computer automatically adjusts its totalizers to account for the small amount of flow that takes place before it detects that a communication failure has occurred (i.e., the OMNI does not immediately start totalizing using the SeniorSonic pulse train).

If a pulse signal from the SeniorSonic is not available, and the communication link fails, the flow computer immediately stops totalizing. Once communication is reestablished, the OMNI will adjust its internal totalizers to match the SeniorSonic totalizer. In this case, the OMNI may have to add a significant amount of flow to its totalizers, depending upon how much time the communication link was inoperative.

In some instances, adjusting the flow computer's totalizers may not be desirable; e.g.: if a flowmeter has been disconnected for a long period of time, or the SeniorSonic electronics package has been replaced. For these cases, there are flow computer configuration settings that specify the maximum time that a SeniorSonic serial communication failure can exist, and still be compensated for by adjusting the flow computer totalizers. By default, this maximum time is fifteen (15) minutes.

Modbus Communication

NOTE: The serial interface between these devices is 2-wire RS-485 mode utilizing a modified Modbus protocol.

The SeniorSonic connects to an external system using the Modbus ASCII protocol via a serial line. This connection is typically a 2-wire RS-485 serial link. Communications parameters are fixed in the OMNI (Table 1):

Table 1. Fixed Communications Parameters

Setting	Value
Baud Rate	9600
Data Bits	7
Stop Bits	1
Parity	Even
Protocol	Modbus ASCII

NOTE: In order to communicate with Daniel Senior Sonic ultrasonic flowmeters, the OMNI Flow Computer must be equipped with at least one (1) SV combo module (Model 68-6203). For instructions on jumper settings and other process I/O combination module setup information, refer to Volume 1, Chapter 2 of the OMNI User Manual.

Wiring Installation

There are several options for wiring a SeniorSonic ultrasonic meter to an OMNI Flow Computer. The option to implement depends upon requirements of the flow metering system.

Always interconnect these devices via a 2-wire RS-485 serial interface from the SeniorSonic to an OMNI SV combo module serial port. This connection uses the Modbus protocol to transmit to the OMNI the volumetric flow data that the SeniorSonic accumulates. The OMNI also transmits the fluid temperature and pressure to the flowmeter to allow the flowmeter to correct for dimensional changes of the measurement Spool.

In addition to serial data, the OMNI can also receive live forward and/or reverse flow pulse signals from the SeniorSonic. The SeniorSonic transmits pulse frequencies through wires typically connected to an OMNI E combo module. Connecting two (2) SeniorSonic pulse output channels to the OMNI can provide pulse fidelity and integrity checking. To perform pulse fidelity checking, the OMNI must have one (1) E combo module for each flow direction requiring totalization.

OMNI Combo Module Terminal Assignments

Depending upon the implemented wiring option, the OMNI requires SV, E, and/or A combo modules. Tables 2 thru 4 specify the terminal assignments for each module type. This information is necessary when connecting wires to the OMNI. The terminal block number (TB*n*) on the OMNI back panel for each combo module corresponds to the slot on the motherboard into which the module is plugged. For more information, refer to "Volume 1: System Architecture and Installation" of the OMNI User Manual.

Table 2. OMNI SV Combo Module Back Panel Terminal Assignments (TB*n*)

Terminal	Signal Description
1	Port # 1 (3): RS-485 B Wire
2	Port # 1 (3): RS-485 A Wire
3	Port # 2 (4): RS-485 B Wire
4	Port # 2 (4): RS-485 A Wire
5	Signal Return for 4-20mA Analog Outputs
6	Signal Return for 4-20mA Analog Outputs
7	Analog Output # 5: 4-20mA
8	Analog Output # 6: 4-20mA
9	Analog Output # 3: 4-20mA
10	Analog Output # 4: 4-20mA
11	Analog Output # 1: 4-20mA
12	Analog Output # 2: 4-20mA
Note:	Numbers in parenthesis "( )" refer to SV module 2 if installed.

Table 3. OMNI E Combo Module Back Panel Terminal Assignments (TB*n*)

Terminal	Signal Description
1	Input Channel # 1: 1-5v, 4-20mA, RTD
2	Input Channel # 1: Isolated Signal Return
3	Input Channel # 2: 1-5v, 4-20mA, RTD
4	Input Channel # 2: Isolated Signal Return
5	Input Channel # 3: Flowmeter Pulses
6	Input Channel # 4: Flowmeter Pulses
7	Double Chronometry Detector Switch Input (Active Low)
8	RTD Excitation Current Source Output #2
9	RTD Excitation Current Source Output #1
10	Signal Return for Terminals 5, 6, 7, 8, 9, 11 & 12 (Internally connected to DC power return
11	Analog Output # 1: 4-20mA
12	Analog Output # 2: 4-20mA

Table 4. OMNI A Combo Module Back Panel Terminal Assignments (TB*n*)

Terminal	Signal Description
1	Input Channel # 1: 1-5v, 4-20mA, RTD
2	Input Channel # 1: Isolated Signal Return
3	Input Channel # 2: 1-5v, 4-20mA, RTD
4	Input Channel # 2: Isolated Signal Return
5	Input Channel # 3: Flowmeter Pulses
6	Input Channel # 3: Isolated Signal Return
7	Input Channel # 4: Flowmeter Pulses
8	Input Channel # 4: Isolated Signal Return
9	RTD Excitation Current Source Output #1
10	Signal Return for Terminals 9, 11 & 12 (Internally connected to DC power return
11	Analog Output # 1: 4-20mA
12	Analog Output # 2: 4-20mA or RTD Excitation Current Source Output #2 *(See JP12 Setting)*

SeniorSonic 3400 Terminal Assignments

Using the two (2) P2 terminal blocks # 3-3400-017 in the Senior Sonic to connect to the OMNI, Tables 5 and 6 specify the terminal assignments for each of these terminal blocks. This information is necessary when connecting wires to the Senior Sonic.

NOTE: Users of this Meter Model MUST verify the revision level of the installed meter and refer to that revision's Operations and Installation Manual supplied with the meter for the correct terminals required for meter frequency and serial wiring. The wiring terminals will vary for each revision level.

Table 5. SeniorSonic 3400 Electronics Board Terminal Block P2 Assignments Board # 3-3400-017

Terminal	Signal Description
1	DIG GND (Negative)
2	DIG GND (Negative)
3	FREQ1A Fwd Flow Pulses (Positive)
4	FREQ1B Fwd Flow Fidelity Pulses (Positive)
5	FREQ2A Rev Flow Pulses (Positive)
6	FREQ2B Rev Flow Fidelity Pulses (Positive)
7	N/A
8	N/A
9	N/A
10	N/A
11	N/A
12	N/A

Table 6. SeniorSonic Peripherals Terminal Block P2 Assignments

Terminal	Signal Description
12	Signal Ground
11	RS-485- (Negative)
10	RS-485+ (Positive)
*9	Signal Ground
*8	RS-485- (Negative)
*7	RS-485+ (Positive)

Note * 12, 11, and 10 are internally connected to 9, 8, and 7

Other SeniorSonic 3400 Terminal Assignments

Tables 7 and 8 specify the terminal assignments for the terminal block # 2-3-3400-421.

NOTE: Users of this Meter Model MUST verify the Revision level of the installed Meter and refer to that revision's Operations and Installation Manual supplied with the meter, for the correct terminals required for meter frequency and serial wiring. The wiring terminals will vary for each revision level.

Table 7 SeniorSonic 3400 Electronics Board Terminal Block J4 and J5 Assignments Board # 2-3-3400-421

Terminal	Signal Description	
J4-1	DOUT1B	} To Flow Computer
J4-2	DOUT1A	
J4-3	DOUT1A	
J4-4	GND1	
J4-5	GND1	
J4-6	FOUT1B	
J5-1	DOUT2B	} To Flow Computer
J5-2	DOUT2A	
J5-3	GND2	
J5-4	GND2	
J5-5	FOUT2B	
J5-6	DOUT2A	

Table 8. SeniorSonic Peripherals Terminal Block J6 Port A or J7 Port B Assignments

Terminal	RS232 Signal Description	RS485
1	RX	RX +
2	TX	RX -
3	COMM GND	COMM GND
4	RTS	RTS
5	CTS	CTS

Forward & Reverse Flow Signals

Figure 2 is a typical wiring installation between the Daniel SeniorSonic with P2 of the connection board # 3-3400-017 and an OMNI 6000 for serial data and both forward and reverse flow signals. Figure 2, assume that the OMNI 6000 has an A module plugged into slot TB5, and an SV module in slot TB6.

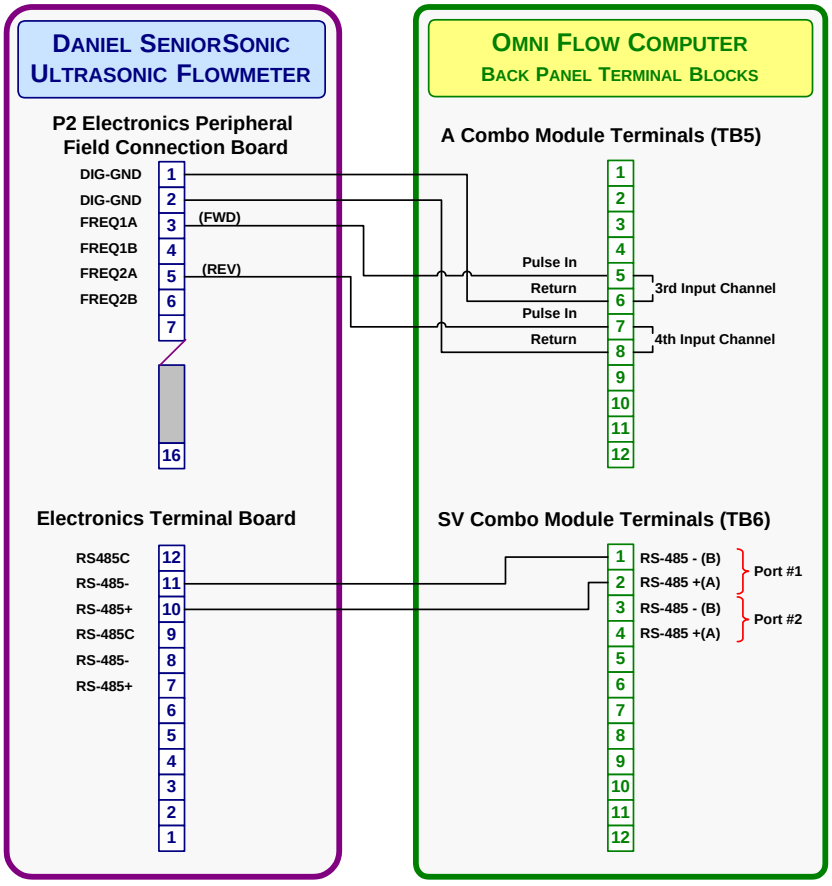

Figure 2. Daniel Senior Sonic 3400

Example of wiring a Daniel SeniorSonic 3400 ultrasonic flowmeter (Figure 2) to an OMNI 6000 Flow Computer with connections for serial data and live forward and reverse flow signals (without pulse fidelity and integrity checking).

Forward Flow Only with (Dual) Pulse Fidelity & Integrity Checking

Figure 3 is a typical wiring installation between the Daniel SeniorSonic with P2 of the connection board # 3-3400-017 and an OMNI 6000 for serial data and forward flow signals, with connections for pulse fidelity and integrity checking. In Figure 3, assume that the OMNI 6000 has an E module plugged into slot TB5, and an SV module in slot TB6.

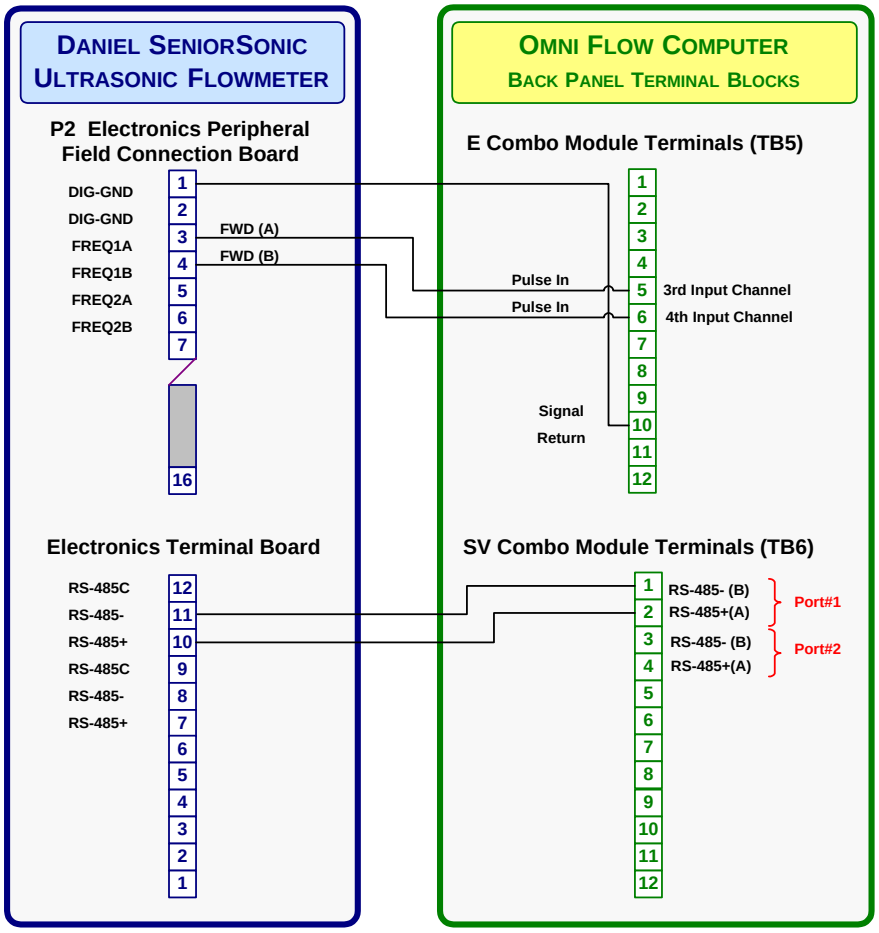

Figure 3. Daniel SeniorSonic 3400

Example of wiring a Daniel SeniorSonic 3400 ultrasonic flowmeter (Figure 3) to an OMNI 6000 Flow Computer with connections for serial data, live forward flow signal, and pulse fidelity and integrity checking.

Forward & Reverse Flow with (Dual) Pulse Fidelity & Integrity Checking

Figure 4 is a typical wiring installation between the SeniorSonic with P2 of the connection board # 3-3400-017 and an OMNI 6000 for serial data and both forward and reverse flow signals, with connections for pulse fidelity and integrity checking. Figure 4 assumes that the OMNI 6000 has two (2) E modules in slots TB5 and TB6, and an SV module in slot TB7.

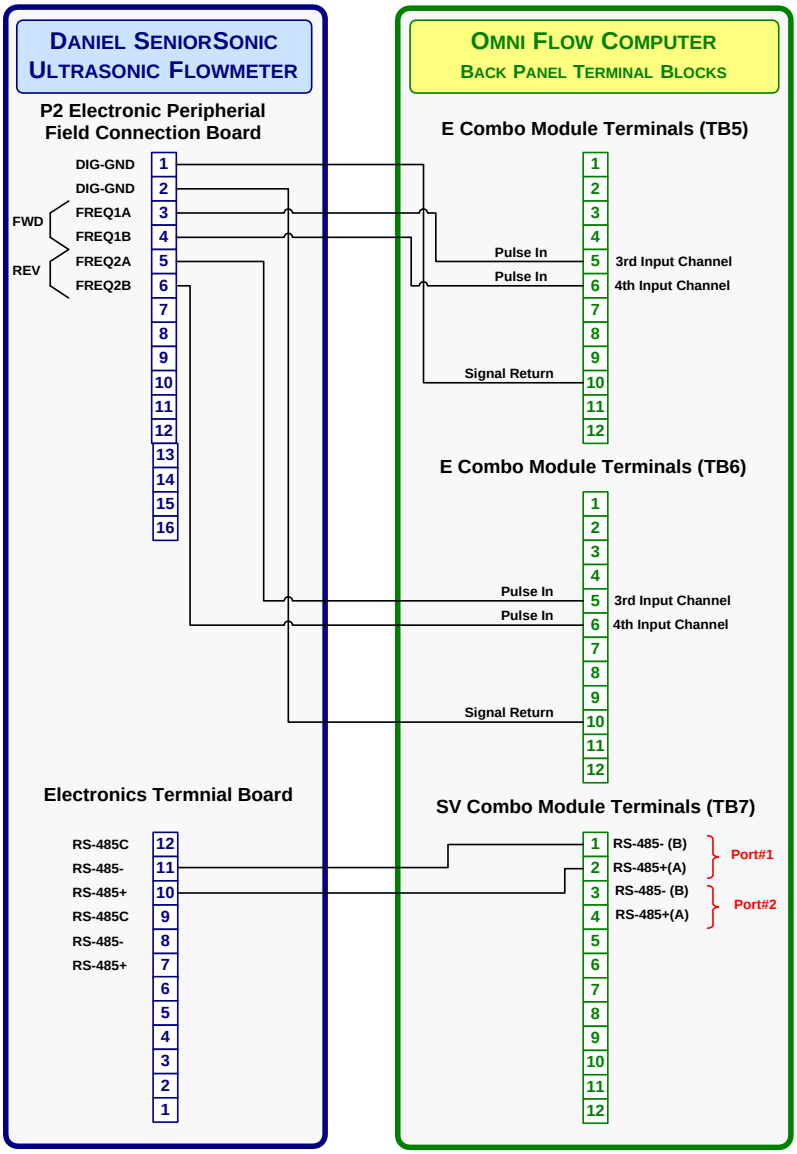

Figure 4. Daniel SeniorSonic 3400

Example of wiring a Daniel SeniorSonic 3400 ultrasonic flowmeter (Figure 4) to an OMNI 6000 Flow Computer with connections for serial data, live forward reverse flow signals, pulse fidelity, and integrity checking.

OMNI Flow Computer Configuration

Use the flow computer's front panel keypad to enter configuration settings unique to the SeniorSonic Flowmeter. The configuration settings that are specific to the SeniorSonic flowmeter are under Miscellaneous Setup, Configure Meter Run menu and the Meter Run Setup menu. Enter the miscellaneous configuration meter run settings first and then proceed to the meter run setup entries (Review Chapter 2 Flow Computer Configuration in Volume 3 of the OMNI User Manual, and the Technical Bulletin 960701 (52-0000-0001) Overview of OMNICOM Configuration PC Software).

Miscellaneous Configuration Meter Run Settings

The following miscellaneous configuration meter run settings correspond to the SeniorSonic ultrasonic gas flowmeter:

- **Select Flowmeter Device Type –** For each meter run, enter **[8]** to select the Daniel Ultrasonic flowmeter as the device type.
- **Select SV Module Port –** The OMNI Flow Computer can accept two (2) SV combo modules. With one (1) SV module, two (2) SV ports are available, and with two (2) SV modules, four (4) ports are available. For each ultrasonic meter run, enter the SV port number (1 to 4) to which the SV module's RS-485 serial interface input from the SeniorSonic flowmeter is wired to the OMNI.
- **DFI Address** – This is the address ID of the Daniel ultrasonic flowmeter communications port.
- **DFI Retry** – This is the number of SV serial port communications retries the OMNI will attempt with the flowmeter after a communications failure before actually raising a communications fail alarm.
- **Flow I/O Point –** Enter the input channel number that is used to input the ultrasonic flowmeter pulse signal. Assign flowmeter pulse signals only to Input Channels #3 and #4 of A or E combo modules, or input channel #3 of a B combo module.
- **Select Flow Direction (F/R) –** SeniorSonic flowmeters allow for bi-directional fluid flow measurement. For pulse frequency signals, setup the flow computer to totalize either forward or reverse flow on any meter run with an ultrasonic flowmeter.
- **Primary Flow** – This setting instructs the OMNI Flow Computer to use either the pulse input channel or the SV serial communications data as the primary means of calculating flow. Options are:

  0 = Select Serial Data as primary flow. This means that the SV serial communications data will be the primary and the pulse input channel, if assigned, will be used as a backup means of flow calculations by the flow computer.

  1 = Select Pulse Input as primary flow. This means that the flow pulses received from the flowmeter will be the primary and the SV serial communications data will be used as a backup means of flow calculations by the flow computer.

Meter Run Setup Entries

NOTE: Difference Between 'Gas Velocity' and 'Velocity of Sound' – The 'velocity of sound' (VOS) refers to the amount of time it takes an acoustic pulse to travel along the gas ultrasonic paths. The VOS will vary depending upon gas type and line conditions

The following meter run setup entries are available for the SeniorSonic ultrasonic flowmeter when using pulse frequency signals:

- **Velocity of Sound (VOS) in Gas, Deviation Percent from Average –** In some configurations, the flow computer can verify that the average VOS calculated for all paths conforms to the VOS of each individual path. This entry is the maximum percent that any one path VOS varies from the average VOS of all the paths.
- **Flow Minutes** – The time interval can be set for comparing the flow pulses input flow with the SV communications serial link flow. If the flow deviation exceeds the Flow Deviation Percent setting (see next setting) when this comparison is made, the OMNI will switch from the primary (flow pulses or SV serial link) to the backup source (SV serial link or flow pulses) for calculating flow.

  NOTE: Daniel Industries recommends a minimum of sixty (60) minutes for this setting due to the fluctuating flow pulse frequency output by the flowmeter.

- **Maximum Flow Deviation Percent —** Only valid if a flow pulse's I/O point is assigned. This is the allowable percent of deviation between the calculated flow from the pulse input channel compared to the SeniorSonic flow data received via the OMNI SV serial port. The OMNI raises the pulse suspect alarm if the flow deviation percentage exceeds this limit.

  NOTE: Refer to the Flow Minutes setting previous.

- **Maximum Meter Downtime —** Enter the maximum allowable flowmeter downtime in minutes. If communication downtime between the OMNI and the SeniorSonic is greater than this value, the OMNI **will not** adjust its internal totalizers to match the most recent SeniorSonic totalizer value. Depending upon how much time the communication link and pulses were inoperative and the amount of flow that occurred during this downtime, when communications is reestablished within the time specified in this setting, the OMNI may have to add a significant amount of flow to its totalizers. (Default = 15)

OMNI Flow Computer Database Addresses & Index Numbers

Tables 9 thru 17 list the Modbus database addresses assigned within OMNI firmware to the SeniorSonic ultrasonic metering feature. These tables categorize data type.

Table 9. Meter Run Alarm Status Points – Real Time Data

Description	Database Address For Meter Run Number			
	1	2	3	4
Loss of communication	2154	2254	2354	2454
Loss of pulse input	2155	2255	2355	2455
Flow rate deviation alarm	2156	2256	2356	2456
Path 0 – Gas VOS alarm	2181	2281	2381	2481
Path 1 – Gas VOS alarm	2182	2282	2382	2482
Path 2 – Gas VOS alarm	2183	2283	2383	2483
Path 3 – Gas VOS alarm	2184	2284	2384	2484

Table 10. 16-Bit Integer Register – Real Time Data

Description	Database Address for Meter Run Number			
	1	2	3	4
Flow direction (0=frwd,1=rvrs)	3155	3255	3355	3455

Table 11. 32-Bit Integer Register – Real Time Data

Description	Database Address for Meter Run Number			
	1	2	3	4
Volume From UFM (FWD)	15530	15630	15730	15830
Volume From UFM (REV)	15532	15632	15732	15832

NOTE: Table 11 Modbus registors are available in 23.74.20 and later, 23.75.00 and later, 27.74.19 and later, and 27.75.00 and later.

Table 12. 32-Bit IEEE Floating Points – Real Time Data

Description	Database Address for Meter Run Number				Description	Database Address for Meter Run Number			
	1	2	3	4		1	2	3	4
Serial Gross flow during Flow Minutes period	17141	17151	17161	17171	Temperature	7105	7205	7305	7405
Pulses Gross flow during Flow Minutes period	17142	17152	17162	17172	Pressure	7106	7206	7306	7406
Calculated Flow Dev %	17143	17153	17163	17173	Velocity of sound A	17527	17627	17727	17827
Maximum flow deviation (%)	17513	17613	17713	17813	Velocity of sound B	17528	17628	17728	17828
Total from pulse input	17215	17219	17223	17227	Velocity of sound C	17529	17629	17729	17829
Dev % between serial & pulse	17216	17220	17224	17228	Velocity of sound D	17530	17630	17730	17830
Maximum VOS deviation (%)	17516	17616	17716	17816					
Velocity of sound (VOS)	17521	17621	17721	17821	Gas velocity A	17533	17633	17733	17833
Gas velocity	17522	17622	17722	17822	Gas velocity B	17534	17634	17734	17834
					Gas velocity C	17535	17635	17735	17835
					Gas velocity D	17536	17636	17736	17836

Table 13. 32-Bit IEEE Floating Points Previous Hour's Average Data

Description	Database Address for Meter Run Number			
	1	2	3	4
Gas velocity A	17556	17656	17756	17856
Gas velocity B	17557	17657	17757	17857
Gas velocity C	17558	17658	17758	17858
Gas velocity D	17559	17659	17759	17859

Table 14. 32-Bit IEEE Floating Points Previous Hour's Average Data

Description	Database Address for Meter Run Number			
	1	2	3	4
Gas velocity A	**17556**	**17656**	**17756**	**17856**
Gas velocity B	**17557**	**17657**	**17757**	**17857**
Gas velocity C	**17558**	**17658**	**17758**	**17858**
Gas velocity D	**17559**	**17659**	**17759**	**17859**

Table 15. 32-bit IEEE Floating Points Previous Day' Average Data

Description	Database Address for Meter Run Number			
	1	2	3	4
Gas velocity A	17587	17687	17787	17887
Gas velocity B	17588	17688	17788	17888
Gas velocity C	17589	17689	17789	17889
Gas velocity D	17590	17690	17790	17890

Table 16. Flow Computer Configuration Data – Miscellaneous Meter Run Configuration

Description	Database Address for Meter Run Number				Description	Database Address for Meter Run Number			
	1	2	3	4		1	2	3	4
Flow pulse I/O point #	13001	13014	13027	13040	DFI Retry Times	3156	3256	3356	3456
Flowmeter device type	3108	3208	3308	3408	Primary Flow (0=Serial, 1=Pulses)	3157	3257	3357	3457
SV module port #	3153	3253	3353	3453					
DFI Address	3154	3254	3354	3454	DFI Delay Timer	13445	13446	13447	13448
Flow direction (0=frwd,1=rvrs)	3155	3255	3355	3455					

Table 17. Flow Computer Configuration Data – Meter Run Setup

Description	Database Address for Meter Run Number				Description	Database Address for Meter Run Number			
	1	2	3	4		1	2	3	4
Meter maximum downtime (minutes)	3116	3216	3316	3416	Maximum VOS deviation (%)	17516	17616	17716	17816
					Daniel Ultrasonic K-factor	17538	17638	17738	17838
Maximum flow deviation (%)	17513	17613	17713	17813	Minimum burst %	17515	17615	17715	17815

OMNI Flow Computer User Displays

SV Module Serial Communications Port

You can view live data received via RS-485 communications on the flow computer front panel LCD display only if a SV port is used to input the RS-485 interface from the SeniorSonic flowmeter. To view this data, press **[Setup] [*n*] [Display]** on the OMNI front panel keypad (where "n" equals the SV port number 1 to 4, you want to display), when in the Display Mode. The following data will display (Figure 5):

SV Port1 Daniel UFM	Ver 23
Trans Number	
Flow cfh	cfh
TimeLaps	s
TimeLapO	s
Fwd cf	cf
Pos Over	
Rev cf	cf
Neg Over	
P. Psi	Psi
T. Deg. F	Deg. F
KFC p/cf	p/cf
FlowVelA	m/s
FlowVelB	m/s
FlowVelC	m/s
FlowVelD	m/s
VOS Cord A	m/s
VOS Cord B	m/s
VOS Cord C	m/s
VOS Cord D	m/s
Avg-VOS	m/s
Gain A1	
Gain A2	
Gain B1	
Gain B2	
Gain C1	
Gain C2	
Gain D1	
Gain D2	
ChordAstatus	
ChordBstatus	
ChordCstatus	
ChordDstatus	
SW Version	x.xx

SV Port1 Daniel UFM	Ver 27
Trans Number	
Flow m3h	m3h
TimeLaps	s
TimeLapO	s
Fwd m3	m3
Pos Over	
Rev m3	m3
Neg Over	
P. mPa	mPa
T. Deg. C	°C
KFC p/m3	p/m3
FlowVelA	m/s
FlowVelB	m/s
FlowVelC	m/s
FlowVelD	m/s
VOS Cord A	m/s
VOS Cord B	m/s
VOS Cord C	m/s
VOS Cord D	m/s
Avg-VOS	m/s
Gain A1	
Gain A2	
Gain B1	
Gain B2	
Gain C1	
Gain C2	
Gain D1	
Gain D2	
ChordAstatus	
ChordBstatus	
ChordCstatus	
ChordDstatus	
SW Version	x.xx

Figure 5. Display Mode

Meter Run Data

To view the meter run data on the flow computer LCD display, press **[Meter] [*n*] [Display]** on the OMNI front panel keypad (where "n" equals the meter run number, 1 to 4, you want to display), when in the Display Mode. The following data will display: (Figure 6)

METER #X Daniel UFM	Ver 23
GAS Vel	m/s
Flow cf/h	cf/h
VOS ft/s	ft/s
Fwd cf	cf
Rev cf	cf
P. Psi	Psi
T. Deg.F	Deg. F
FlowV P0	m/s
FlowV P1	m/s
FlowV P2	m/s
FlowV P3	m/s
VOS P0	m/s
VOS P1	m/s
VOS P2	m/s
VOS P3	m/s

METER #X Daniel UFM	Ver 27
Gas Vel	m/s
Flow M3/h	m3/h
VOS m/s	m/s
Fwd m3	m3
Rev m3	m3
P. Bara	Bara
T. Deg.C	°C
FlowV P0	m/s
FlowV P1	m/s
FlowV P2	m/s
FlowV P3	m/s
VOS P0	m/s
VOS P1	m/s
VOS P2	m/s
VOS P3	m/s

Figure 6. Meter Run Data Display Mode

DOCUMENT REVISION HISTORY

DOCUMENT INITIAL RELEASE DATE.....04-September-2004

REVISION	DATE	PURPOSE / CHANGE REQUEST
A	04-September-2004	Maintained on the Web - Initial release
B	02-April-2009	DCR 090026
C	15-March-2010	DCR 100035