

# Communication Setup and Execution Sentinel M24 Instrument

APPLICATION BULLETIN #140

April, 2004

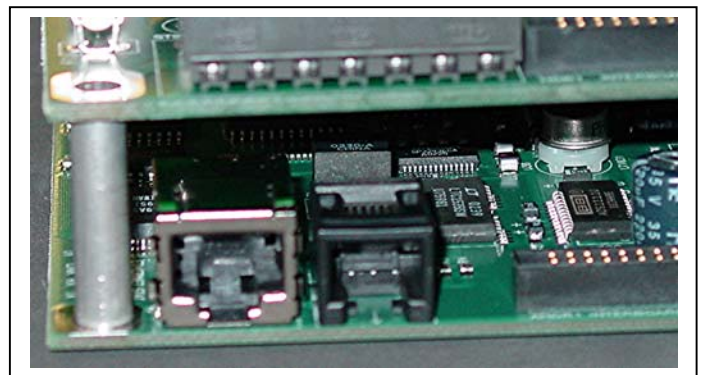
The Sentinel M24 instrument communicates via TCP/IP (Ethernet), RS485, RS232, and IrDA (Infrared). This communication is two-way with each method. There are common interface commands established to communicate with the instrument via the four methods. These commands can be used to remotely request selected data to be sent, to send new setup parameters for storage, and to change some instrument functions. Instrument setup parameters, station setup parameters, part program parameters, calibration data, counter data, test result data, and security setup are all available for communication.



The setup and operation commands for communications to and from the Sentinel M24 are accessed via the INSTR CONFIG key. For serial communication, the operator must select either RS232 or IrDA. The Sentinel M24 instrument can only communicate via one of these two methods at a time. There is a nine-pin RS232 connection and an IrDA port on the front of the instrument, shown above. There is also a five-terminal connector for RS232 on the internal I/O co-processor board, shown below.



RS485 and TCP/IP communication can operate simultaneously with the serial communication of RS232 or IrDA. The RS485 and TCP/IP connections are internal to the instrument on the left side of the bottom board, shown below.



For RS485 communication, the RS485 ID number must be set on the INSTR CONFIG, serial communication screen.

For TCP/IP communication, the instrument must be assigned an IP address. Information regarding the Mail server, Gateway/Router, and instrument IP address must be entered for the instrument within INSTR CONFIG, TCP/IP communications. The instrument power must be cycled if any IP addresses are changed.



## Cincinnati Test Systems, Inc.

Member of TASI - A Total Automated Solutions Inc. Company

5555 Dry Fork Road, Village of Clevs, OH 45002 • Tel. 513-367-6699 • Fax 513-367-5426

Website: [www.cincinnati-test.com](http://www.cincinnati-test.com) • E-mail: [sales@cincinnati-test.com](mailto:sales@cincinnati-test.com)

There are usually several communication and terminal parameters that must be setup within your computer or PDA to enable communication with the Sentinel M24 instrument. The PDA needs software to receive the ASCII information from the Sentinel M24 instrument. There may be a variety of software that works. (There is a software package from Markspace called "Online" that has worked. You can find more information at [www.markspace.com](http://www.markspace.com).) Computers with MicroSoft Windows 95, 98, XP, etc. have a standard communication software called Hyper-terminal found under START/ Accessories/ Communications.

## Communication settings set within PDA's software or Computer's Hyper-terminal

Method: Serial (If setting up for RS232 or IrDA communications)  
 Port: Serial (RS232) or IrComm (IrDA) or an appropriate port like 23 for TCP/IP  
 Baud: 9600 or 57600  
 Data Bits: 8  
 Parity: No  
 Stop Bits: 1  
 Handshake: Hardware (IrDa)  
 None (RS232)

Terminal settings (actual parameter descriptions may vary depending on computer, PDA, and software.)

Emulate: VT100  
 Font: Small or Large  
 Return: CR  
 Backspace: BS  
 Ok Add LF (incoming)  
 Ok Display follows cursor  
 Ok Auto wrap to next line  
 Ok Local echo Paging : 10

Logging settings (for PDAs)  
 Log to: memo pad

## Setup for "Hyper-terminal" within MicroSoft Windows 95 or higher

There is a procedure written up in Chapter 10 of the Sentinel M24 manual on how to establish an icon and define the basic parameters.

When using Hyper-terminal or a PDA as an ASCII terminal, the following settings need to be set in Hyper-terminal or the communication software as "properties" to receive and display data:

### Settings

Function, Arrow, and Control keys act as: "Terminal keys"  
 Backspace key sends: "Ctl + H"  
 Emulation:  
 Auto detect  
 Telnet terminal "ANSI"  
 Backscroll buffer lines "500"

Connect using Com port 2 (or whatever port the RS232 or IrDA comes through)

Bit/sec 9600 or 57600  
 Data bits 8  
 Parity none  
 Stop bits 1  
 Flow control Hardware (IrDA)  
 None (RS232)

## Setup for TCP/IP within Computer's Hyper-terminal or Communication software

Host address 192.168.000.225 (address assigned to the instrument on your plant Ethernet system)  
 Port # 23 (may vary by plant)  
 Connect Using TCP/IP

### Setup for ASCII communication

ASCII sending  
 Ok Send line ends with line feed  
 Ok Echo typed character locally  
 Line delay 0 milliseconds  
 Character 0 milliseconds  
 ASCII receiving  
 Ok Append line feeds to incoming line ends  
 Ok Wrap lines that exceed terminal width

## Sending information One-way via commands through the Sentinel M24 Communication screens within INSTR CONFIG functions.

When the instrument is setup to communicate with any of the four communication methods, the operator can command the instrument to send out any desired information via the INSTR CONFIG key. (There is a menu, "Custom Output Format", on the first screen after pushing INSTR CONFIG for customizing the content and order of the information for test results.) The operator chooses the desired information from the output options listed with "RS232/IrDA Function", "RS485 Function", and "TCP/IP Function". After entering the desired choice, the information is sent to the computer or PDA that is connected for the transfer. Full details about interfacing through the keypad for these communication options are described in Chapter 5 of the Sentinel M24 manual.

## Requesting information be sent using Two-way communication via remote commands using any of the four communication options.

A remote computer or PDA can request information from the Sentinel M24 via the two-way communication capabilities of the four communication methods. Sending the desired alphanumeric character string outlined below will either:

1. Request test results, part or instrument setup information, or counter information be sent or
2. Download changes to stored part or instrument setup information.
3. Change active part program within a station

(To communicate via IrDA, a character must be sent to the Sentinel M24 instrument from the IrDA device first in order to initiate a communication link. Otherwise the Sentinel M24 will not be able to find the handheld device. Because all other methods are directly linked to the instrument, there is no wakeup communication required.)

**Information request commands are:**

- Sn Select station number “n” to send and receive data
- Pn Select part program number “n” within the selected station
- DN Output the number “N” of saved test results within selected station
- DP Reset test data pointer to last test result within selected station
- DPn Reset test data pointer to a test result that is “n” test before within selected station
- DSn Send the last “n” “simple” test results within the selected station.
- DFn Send the last “n” “full” test results within the selected station
- DCn Send the last “n” “customized” test results within the selected station using the customized output format setup within INSTR CONFIG, “Customize Output Format”.
- DL Get all the test results since the last requested download for the selected station
- DR Clear the DL pointer, i.e. reset the counter to the current test result and ignore the data that was not downloaded since the last request for the selected station.
- Rxxx Reads the data or settings from the xxx registers defined in tables below
- Wxxx yyyy Write the information “yyyy” into the register “xxx” within the selected station and part (Write commands change the data in selected register.)
  
- ? Lists the categories of registers where the instrument, station, and part parameters are stored
- ?0 Lists all the Instrument MISC ID register numbers and descriptions
- ?1 Lists all the Security register numbers and descriptions
- ?2 Lists all the Digital I/O ID register numbers and descriptions
- ?3 Lists all the Instrument Counter register numbers and descriptions
- ?4 Lists all the Station MISC register numbers and descriptions
- ?5 Lists all the Timer register numbers and descriptions
- ?6 Lists all the Fault Detect register numbers and descriptions
- ?7 Lists all the Calibration register numbers and descriptions
- ?8 Lists all the Part MISC register numbers and descriptions
- ?9 Lists all the Part Counter register numbers and descriptions
- ?E Lists all the Err and Test Evaluation Codes and descriptions

The Sentinel M24 instrument stores the setup information in registers. There are general instrument registers, station specific registers, and station and part holder specific registers.

Registers ?0, ?1, and ?2 are general instrument registers that apply to the identification, communication, security, and digital input/output setup of the instrument. These registers are reviewed or changed directly by identify the register number in the read or write command. For example:

- R003 (Reads the assigned instrument name)
  
- W003 Quad 4 (changes the instrument name to “Quad 4”)

Registers ?3 and ?4 are station specific registers that apply to station specific counters and how the station specific functions are set up. To review or change these values, the commands must identify the station and then the register number. For example:

- S3 (selects station 3)
- R409 (reads the number of holders that are active for station 3)
  
- S3 (selects station 3)
- W409 6 (changes the number of active part holders for station 3 to six)

Registers ?5, ?6, ?7, ?8, ?9, and ?E are part specific registers within a specified station that apply to the timers, pressures, leak rates, miscellaneous functions, counters, and error codes. To review or change these values, the commands must identify the station, the part holder number, and then the register number. For example:

- S2 (selects station 2)
- P3 (selects part holder 3 within station 2)
- R501 (reads the pre-fill time for part holder 3 within station 2)

S3 (selects station 3)  
P1 (selects part holder 1 within station 3)  
W503 3 (changes the stabilization timer to 3 seconds in part holder 1 within station 3)

Register numbers for instrument, station, and part information

<b>?0 Instrument - MISC</b>	<b>?1 Instrument - Security</b>	<b>?2 Instrument - I/O</b>
001* Software Version	101* Calibration	201 Digital Input 1 Test 1
002* Hardware Rev	102* Change Part	202 Digital Input 2
003 Instrument Name	103* Part Config	203 Digital Input 3
004* Serial Number	104* Instrument Config	204 Digital Input 4
005* Current Station	105* Reset Counters	205 Digital Input 5 Test 2
006* Current Part	106* Clear Test Data	206 Digital Input 6
007 Calib Frequency	107* Password	207 Digital Input 7
008 Screen Saver		208 Digital Input 8
009 RS232/IrDA Port		209 Digital Input 9 Test 3
010 RS485 Address		210 Digital Input 10
011 RS232 Function		211 Digital Input 11
012 RS485 Function		212 Digital Input 12
013 TCP/IP Function		213 Digital Input 13 Test 4
014* M24 IP		214 Digital Input 14
015* Mail Server IP		215 Digital Input 15
016 Email Alert		216 Digital Input 16
017 Email Alert Addr		217 Digital Output 1 Test 1
018 Send Email Addr		218 Digital Output 2
019* Date		219 Digital Output 3
020* Time		220 Digital Output 4
021 Change Part Holder		221 Digital Output 5 Test 2
		222 Digital Output 6
		223 Digital Output 7
		224 Digital Output 8
		225 Digital Output 9 Test 3
		226 Digital Output 10
		227 Digital Output 11
		228 Digital Output 12
		229 Digital Output 13 Test 4
		230 Digital Output 14
		231 Digital Output 15
		232 Digital Output 16

<b>?3 Station - Counters</b>	<b>?4 Station - MISC</b>	<b>?5 Part - Timers</b>
301* All Counters	401 Module	501 Pref
302* All Cycles	402 Manifold	502 Fill
303* ACC	403* Reserve	503 Stab
304* REJ	404* Reserve	504 Test
305* Malfunction	405* Reserve	505 Quik
306* Runs Since New	406 Cal Method	506 Exht
	407 Pres Unit	507 Relx
	408 Leak Unit	
	409 Number of Parts	508 Pref 2
	410 *Curr Part Holder #	509 Fill 2
	411 Transducer 1	510 Stab 2
	412 Transducer 2	511 Test 2
	413 Run Autorun #####	512 Quik 2
		513 Exht 2

<b>?6 Part - Pressures</b>	<b>?7 Part - Leak Info</b>	<b>?8 Part - MISC</b>
601 Min Test Pres	701 Test Evaluation	801 Part Name
602 Max Test Pres	702 Hi Lim Leak Rate	802 Skip 1st Test
603 No Leak Loss	703 Lo Lim Leak Rate	803 Skip 2nd Test
604* Low Limit Loss	704 Min Cal Ratio	804 Enable Quik Test
605 High Limit Loss	705* Cal Ratio	805 Proc Drift Perc
606 Max Calib Loss	706 Orifice Value	806 Enable Quik Test 2
	707 Orifice Cal Date	807 Proc Drift % 2
	708 Orifice Cal Due	
607 Min Test Pres 2		
608 Max Test Pres 2		
609 No Leak Loss 2	709 Test Evaluation 2	
610* Low Limit Loss 2	710 Hi Lim Leak Rate 2	
611 High Limit Loss 2	711 Lo Lim Leak Rate 2	
612 Max Cal Loss 2	712 Min Cal Ratio 2	
	713* Cal Ratio 2	
613 *Cal loss	714 Orifice Value 2	
614 *Cal loss 2	715 Orifice Cal Date 2	
	716 Orifice Cal Due 2	

<b>?9 Part - Counters</b>	<b>?E Error Codes</b>	<b>Part Holder Numbers</b>
901* All Cycles	0: Bad Command	<b>Station 1</b>
902* ACC	1: DataID Missed	1 Part holder 1
903* REJ	2: DataID Invalid	2 Part holder 2
904* Malfunctions	3: Security is ON	.
905* Runs Since New	4: Value Missed	.
906* Runs Since Calib	5: Value Invalid	16 Part holder 16
907* Runs Until Calib	6: Value too Small	<b>Station 2</b>
	7: Value too Big	17 Part holder 1
	8: Value not Writeable	18 Part holder 2
	9: Index out of Range	.
	<b>Test Eval Codes</b>	.
	A: Accept	32 Part holder 16
	R: Reject	<b>Station 3</b>
	P: Stopped	33 Part holder 1
	S: Severe Leak	34 Part holder 2
	H: Test Pres High	.
	L: Test Pres Low	.
	Z: Trans Zero Bad	48 Part holder 16
	M: Malfunction	<b>Station 4</b>
		49 Part holder 1
		50 Part holder 2
		.
		.
		64 Part holder 16

### Examples:

If you want to download the last 500 test results using the customized output format from station 1 via Ethernet, you would type or send the following character string from your hyper-terminal.

S1 (select to communicate about Station 1)  
DC500 (download the last 500 test results using the customized output format)

Send all the test results for Station 4 since the last time the data was requested.

S4 (select to communicate about station 4)  
DL (download all Test Results for station 4 since last downloaded)

Select Part Holder 3 within Station 2 for the next test.

W021 19 (Change the active Part Holder to 3 for Station 2) - see table above for breakdown of part holders to stations.

Verify that the Sentinel M24 received the Part Holder change requested above.

S2 (select to communicate about Station 2)

R410 (read the current part holder for the selected station)

Change the Hi Limit reject value for Station 4, Part Holder 3 to 5.0 sccm.

S4 (select to communicate about Station 4)

P3 (select to communicate about Part Holder 3)

W702 5 (write or change the Hi Limit Leak Rate to 5 sccm)

Download the Accept and Reject Counter information for station 2.

S2 (select to communicate about Station 2)

R303 (read station Accept counter)

R304 (read station Reject counter)