

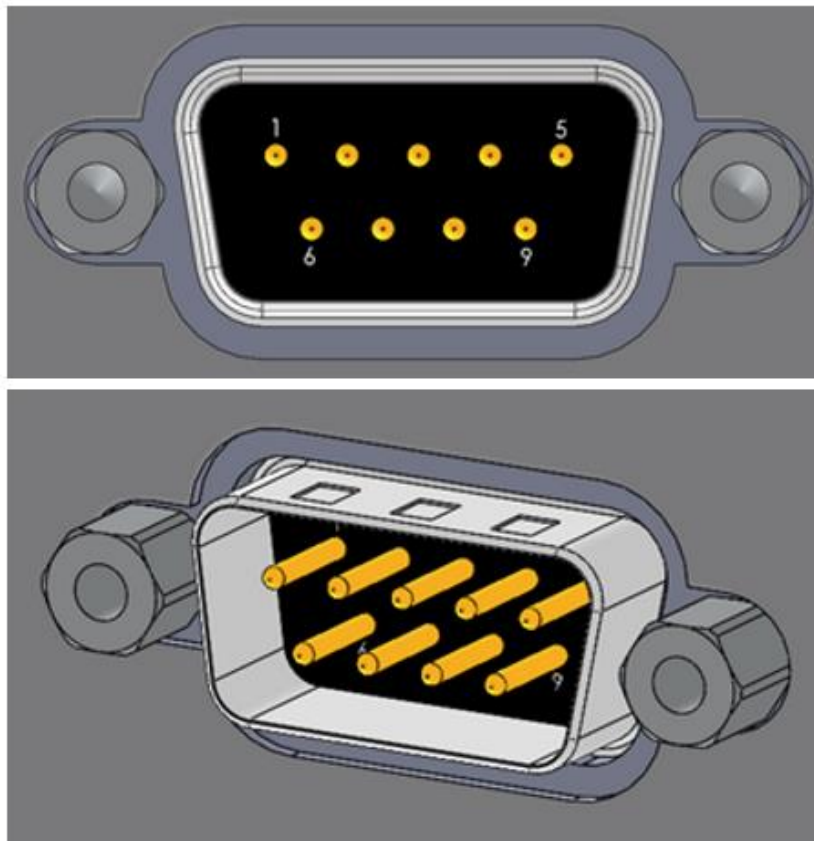
Chapter 13 – Communication

The instrument is able to communicate over RS232 and/or Ethernet via TELNET. This chapter explains how to setup communication with the instrument and how to decode the test results output.

The communication parameters are located in **Main Menu > Global Config** icon.

RS232 Connector Pinout

The pinout for the RS232 connector, located on the side of the I28, is denoted in the diagram below. Pins 1, 4, and 6 are internally connected, but are unused by the instrument.



1	DCD
2	RX
3	TX
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	Not Connected

Establishing RS232 Communication

The RS232 parameters are located in **Main Menu > Global Config > RS232 1** or **RS232 2**. The first step in establishing RS232 communication with the instrument is to set the RS232 1 or RS232 2 Interface parameter to “2-way” communication. Next, set the Baud parameter to match the baud rate of the device that will be communicating with the instrument. The options are: 115200, 57600, 38400, 19200, or 9600 bits per second.

*Note: The instrument always uses 8 data bits. The Parity is set to “None”.
The instrument uses 1 stop bit. The flow control is always set to “None”.*

Once you have established communication with the desired device you may select whether you want the instrument to “echo” back each character it receives on the TCP/IP 1 communication port. This setting is located in the **Main Menu > Global Config > RS232 1 icon > RS232 1 Echo**. If the parameter is set to “ON”, the instrument will output an echo for each character it receives. If this parameter is set to “OFF”, the instrument will not echo anything.

CTS DataHub

The CTS DataHub interface is a custom interface designed to work with a QualityWorX CTS Datahub setup. When **CTS DataHub** is enabled, the QualityWorX CTS Datahub setup will be able to communicate with the C28 instrument to capture streaming and result data. This data is stored on the QualityWorX CTS Datahub setup and allows for engineers and technicians to analyze and report on a collection of data from your production line.

The CTS DataHub parameter is located in **Main Menu > Global Config > Network**. When CTS DataHub is enabled, a new parameter **Configuration Key** will appear. This parameter is currently unused.

To setup QualityWorx CTS Datahub, please refer to the QualityWorX CTS Datahub Getting Started guide.

Establishing Ethernet (TCP/IP) Communication via TELNET

It is highly recommended that you consult with your company's IT department regarding the configuration of placing the instrument on any network. You should get the proper settings for the following parameters from your company's IT department.

The TCP/IP parameters are located in **Main Menu > Global Config > TCP/IP**. The first step in establishing Ethernet communication with the instrument is to set the Obtain Network Settings parameter to DHCP or Manual (static IP address). If set to "DHCP", the Instrument IP Address becomes a read only parameter. If set to "Manual", then you will need to set the Instrument IP Address manually. You may choose to let the instrument initially get its settings with DHCP and then change the setting to Manual to edit the IP Address of the instrument or lock it so that it will not change.

The Mail Server IP Address parameter should be set to the address of the SMTP mail server.

The Subnet Mask parameter will need to be configured next. The most common configuration for this parameter is "255.255.255.0" unless there is more than one subnet in which case a common configuration is "255.255.0.0".

The Gateway IP Address is the default gateway of the network domain.

The MAC Address is the hardware address of the instrument. This number is read-only.

Once you have established communication with the desired device you may select whether you want the instrument to "echo" back each character it receives on the TCP/IP 1 communication port. This setting is located in the **Main Menu > Global Config > Telnet 1** icon. Select **Telnet 1 Echo**.

If the parameter is set to "ON", the instrument will output an echo for each character it receives.

If this parameter is set to "OFF", the instrument will not echo anything.

Understanding the Header Information

All of the information that the instrument sends over the communication ports is preempted by header information. This data is sent to help parse specific information. This header information is in the format XXYYZZZ H. The header is followed by a Tab as shown in the table below:

Header	Description
XX	8-Bit CRC in HEX. Used for error checking.
YY	Sequence Code in HEX. The value increments from 01 to FF. This value can be used as a verification that all data has been received and nothing was missed by the receiving device.
ZZZ	Data length in HEX.
	Tab
H	Data Type Code. See Data Type Code Table
	Tab

Note: For the most up to date Data Type Codes, type “TABLE HEADER” into the instrument using the communication port. The instrument will return a list of about 8 Data Type Codes and descriptions. The table below is an example of the instrument response.

Data Type Code	Description
V	Variable Edit
L	List
M	Message
Q	Result List
T	Streaming Started
S	Streaming Value
X	Streaming Stopped
R	Result

Test Results via RS232 or Ethernet (TCP/IP) communication

Depending on which type of communication is being used, these settings are located in:

- Main Menu > Global Config > RS232 1 icon > RS232 1 Results, or
- Main Menu > Global Config > RS232 2 icon > RS232 2 Results, or
- Main Menu > Global Config > Telnet 1 icon > TCP/IP 1 Results.

In order for the instrument to send the test Result Data automatically once the test is complete the parameter is set to “ON”. Once this parameter is turned on, the Result Field data parameters show on the screen. Each parameter may be turned on or off depending on the information that is required for to accompany each result. The Test Field parameter may be set to “All Result Information” or “First 2 Test Results”. The “First 2 Test Results” will send the two primary results. The table below shows the format of the Test Result Data.

Parameter	Number of Characters	Format	Example Text	Description of Example
Channel #	4	C##	C01	Channel 1
Port #	3	N#	N1	Port 1
Program #	4	P##	P01	Program 1
Link Information	4		R--	No Link
Time	13	HH:MM:SS.XXX	16:15:14.123	16 hrs, 15 mins, 14.123 secs
Date	9	MM/DD/YY	40179	02/01/16
Unique Id	11	#####	0000098353	Unique test number
Program Evaluation	3	#	A	Accept
SPC Flag	2	#	*	SPC Test Data Result
Test Field	First 2 Test Results			
Test Type	8	###	PLR	Pressure Decay-Leak Std
Test Evaluation	2	#	P	Pass
Test Data 1	22	TDI Data Unit	LR 0.123456 sccm	Test Data Identifier - Value - Unit
Test Data 2	22	TDI Data Unit	LR 0.123456 sccm	Test Data Identifier - Value - Unit
TAB				Tab
TAB				Tab
CR				Carriage Return
LF				Line Feed

Test Field	All Result Information			
Test Type	8	###	PLR	Pressure Decay-Leak Std
Test Evaluation	2	#	P	Pass
Test Data 1	22	TDI Value Unit	LR 0.123456 sccm	Test Data Identifier - Value - Unit
Test Data 2	22	TDI Value Unit	LR 0.123456 sccm	Test Data Identifier - Value - Unit
Test Data X	22	TDI Value Unit	LR 0.123456 sccm	Test Data Identifier - Value - Unit
TAB				Tab
TAB				Tab
CR				Carriage Return
LF				Line Feed

Note: For the most up to date Test Data Identifier Codes, type “TABLE VARIABLE” into the instrument using the communication port. The instrument will return a list of about 550 Test Data Identifier Codes and descriptions. See the full list in [Appendix D](#).

Note: For the most up to date Test Evaluation Codes, type “TABLE EVALUATION” into the instrument using the communication port. The instrument will return a list of about 120 Test Evaluation Codes and descriptions. See the full list in [Appendix D](#).

Note: For the most up to date Program Evaluation Codes, type “TABLE RESULT” into the instrument using the communication port. The instrument will return a list of about 12 Data Program Evaluation Codes and descriptions. See the full list in [Appendix D](#).

Streaming Measured Data

The instrument has the ability to stream measured data using either the RS232 or TCP/IP communication port (one or the other, not both simultaneously) in real time while the test is being conducted. This data may be collected and used for analysis. The data is comma delimited. The table below shows the format of the streaming data.

Parameter		Format	Example Text	Description of Example
Channel #	Comma Delimited	C##	C01	Channel 1
Program #	Comma Delimited	P##	P01	Program 1
Segment	Comma Delimited	XXX	PRF	Prefill Segment
Test Data	Comma Delimited	TDI Value Unit	LR 0.123456 sccm	Test Data Identifier - Value - Unit
TAB				Tab
TAB				Tab
CR				Carriage Return
LF				Line Feed

Note: For the most up to date Segment Codes, type “TABLE SEGMENT” into the instrument using the communication port. The instrument will return a list of about 120 Segment Codes and descriptions. See the full list in [Appendix D](#).

Note: For the most up to date Test Data Identifier Codes, type “TABLE VARIABLE” into the instrument using the communication port. The instrument will return a list of about 550 Test Data Identifier Codes and descriptions. See the full list in [Appendix D](#).

Parsing Data Packets

For users who are trying to parse data packets from the instrument, any line beginning with an asterisk “*” should be parsed to be ignored, as these lines will not have header information to be parsed. An example of these types of lines would be the Root menu displayed at instrument boot.

Reports

The instrument is capable of generating a variety of reports through RS232, Ethernet, Email, or USB memory port located on the front of the unit. The reports available are in the table below.

Report	Description
Cur Program Res	Reports all of the test results for the current active program. The current program can be seen in the bottom right hand corner of the display.
All Results	Reports all of the test results in the instrument memory.
Chan Last 1000	Reports the last 1000 test results.
Chan Last 100	Reports the last 100 test results.
Chan Last 20	Reports the last 20 test results.
Chan Last Res	Reports the last test result.
Global Config	Reports all of the parameters and their settings within the Global Config menu.
Channel Config	Reports all of the parameters and their settings within the Channel Config menu.
Cur Program Config	Reports all of the parameters and their settings within the current active program. The current program can be seen in the bottom right hand corner of the display.
Program Config	Reports all of the parameters and their settings within the Program Config menu.
Regulator Cal	Reports the Electronic Regulator Calibration data if the instrument is configured with an electronic regulator.
Transducer Ver	Reports the Transducer Verification data of the last Transducer Verification conducted on the instrument.
Transducer Cal	Reports the Transducer Calibration data of the last Transducer Calibration conducted on the instrument.
Channel Cntrs	Reports all of the counters in the instrument.