

## **Using HyperTerminal® to communicate with ATI-TDA-100P series Penetrometers.**

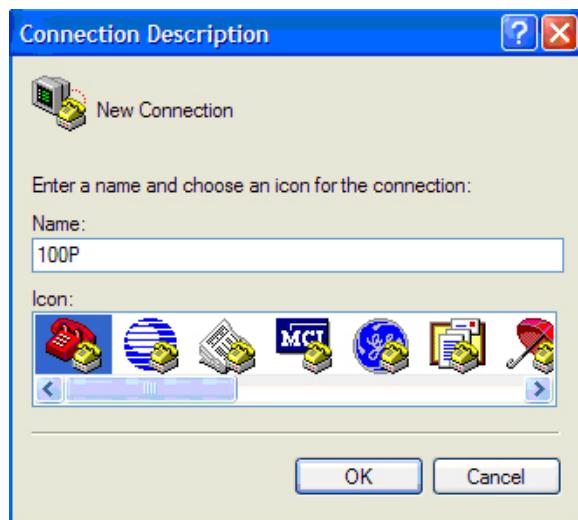
If you desire to capture data, or if you need to pass instructions to your TDA-100P series unit, HyperTerminal® or a similar serial communications program will need to be used.

HyperTerminal® is a utility RS232 communications program, developed by Hilgraeve, which is bundled with most versions of Microsoft Windows ®. This program can be used to communicate directly with your unit to capture data or send RS-232 commands. A 9-pin to 9-pin serial cable with a 'Null modem' configuration is required for this function. If a null modem cable is not readily available a separate null adapter may be used in conjunction with a standard serial cable.

## **Setting up HyperTerminal® to work with ATI-TDA-100P Series penetrometers.**

HyperTerminal® is supplied with the Windows® operating systems up to Windows XP. You can download a copy from Hilgraeve (the HyperTerminal developer located at [www.hilgraeve.com](http://www.hilgraeve.com)) free of cost if this program is missing. The free program is called "HyperTerminal Private Edition".

1. Start the HyperTerminal® program. The executable link is normally located in the Programs / Accessories / Communications section of the Windows® START menu.
2. You will be prompted for a name and icon for HyperTerminal's® setup configuration. Once saved, this configuration can be recalled in future sessions. Intuitive file names, such as 100P, etc. work best for most users. Click OK.

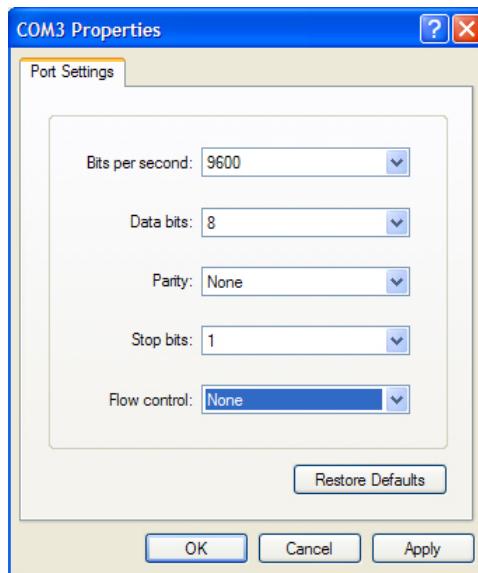


3. Select the appropriate COM port from the “Connect using” menu. Click OK.



4. Select the individual Port settings as shown below. Then click OK.

- ✓ Bits per second: 9,600
- ✓ Data bits: 8
- ✓ Stop bits: 1
- ✓ Flow control: None



5. Connect the serial null-modem cable to the female 9-pin serial port connection located at the rear of the TDA-100P unit. You should now have an active serial connection.

## Console Commands

The TDA-100series provides a mechanism to issue commands and set and recall operating parameters through the RS-232 serial communications port. This area documents the available functions.

The console mode is initiated in one of two ways:

- 1) Through the Maintenance Mode Security/Console Menu.
- 2) By request through the serial port. If an ASCII ESC (*Escape, hexidecimal 1B*) character is received while the TDA-100P is idle, the machine will issue a “READY?” prompt and initiate console mode. If the machine is busy when the ESC character is received, the character will be held until the machine is idle.

When the TDA-100P is ready to accept a new command, it will issue a prompt string to the serial port. The prompt string is “READY?” Characters sent to the serial port prior to the receipt of the prompt will be ignored. Each command sent to the serial port must be terminated by a carriage return character (0D in hexadecimal).

The available “basic” commands are: VER, PROMPT, DUMP, LOAD, SET, and END. The function of each command is described below. In the descriptions references to “PPPPP” refers to one of the operating parameters listed in the 100P Parameter Table below. Also, “VVVVV” represents the value of the parameter or the value to be assigned to the parameter. The values can take several forms depending on the parameter. The forms are:

Integer	a sequence of decimal digits. For example, “150”.
Real	a sequence of decimal digits with an optional decimal point. For example, “2.3”.
True/False	A true value is entered as a “Y” (for “yes”) or an “N” (for “no”).

## BASIC COMMAND SET –

**Note: Remember that all commands are case-sensitive (CAPITAL letters required)**

<b>VER</b>	Displays the version of the software.
<b>END</b>	Terminates console entry mode and returns control to the TDA-100P front panel buttons.
<b>DUMP</b>	Displays the value of the 100P’s operating parameters in the form PPPPP=VVVVV. Each parameters is displayed on a line by itself followed by a carriage return and line feed ( <i>hexidecimal 0D and 0A, respectively</i> ).
<b>LOAD</b>	Accepts a series of operating parameters in the same form as that produced by the DUMP command.
<b>SET</b>	Used to set the value of an individual operating parameter. The form of the command is “SET PPPPP=VVVVV”. No additional spaces are <u>allowed</u> . See the Advanced Command Set below.
<b>PROMPT</b>	This command will cause the 100P to ask for changes to all of the parameters. For each parameter, the 100P will display “PPPPP=[VVVVV]”, where the PPPPP is the parameter name and VVVVV is the current value of the parameter. If the user wishes to leave the parameter unchanged, he can enter a carriage return. If he wishes to change the value, enter the new value of the parameter followed by a carriage return

## ADVANCED COMMAND SET

UNIT_ID	A numeric identifier that can be used to distinguish one TDA-100P from another. This number is included in the result output string reported at the serial port.
PENMAX	Maximum allowed penetration during a test. An alarm will be raised if this limit is exceeded.
PENMAX_ON	"Y" if maximum penetration limit is enabled; if "N" the upper limit will not be tested.
PENMIN	Minimum allowed penetration during a test. An alarm will be raised if the sample penetration falls below this limit.
PEN_LO_ON	"Y" if minimum penetration limit is enabled; if "N" the upper limit will not be tested.
RESMAX	Maximum allowed resistance during a test. An alarm will be raised if this limit is exceeded.
RESMAX_ON	"Y" if maximum resistance limit is enabled; if "N" the upper limit will not be tested.
RESMIN	Minimum allowed resistance during a test. An alarm will be raised if the sample resistance falls below this limit.
RESMIN_ON	"Y" if minimum resistance limit is enabled; if "N" the upper limit will not be tested.
FLOW_TOL	Allowable variation tolerance of the sample flow during testing in LPM.
FLOW_TOL_ON	"Y" if flow tolerance limit is enabled; if "N" the limits will not be tested.
CYC_TO_CAL	Number of test cycles performed between mandatory recalibrations.
CYC_TO_CAL_ON	"Y" if the mandatory calibration based on test count is enforced.
LOAD_TIME	Delay time (in seconds) allowed for aerosol loading and stabilization.
LOAD_TIME_ON	"Y" if load time will be used. If "N", load time will be ignored.
SAMP_TIME	Sample testing time (in seconds).
SAMP_TIME_ON	"Y" if sample testing is limited to the value of "SAMP_TIME". If "N", testing will run continuously until an alarm limit is exceeded or the chuck is opened by the operator.
EXT_LOAD_TIME	Extended load time (in seconds). Extended load time is used on the first test after calibration and after a limit error.

**Parameters below this line will only appear if the trace level (TLEVEL) parameter is > 1 (one). These parameters are normally set during the calibration process and should not be changed manually without a thorough understanding of the impact on test results.**

RES_OFF	Provides an end-user feature to shift the displayed pressure differential by a fixed amount due to sample path variations occurring in non-encapsulating test fixtures. Default setting is 0.
RES_OFF_ON	"N" disables the resistance offset. Default setting is N (Disabled).
ZERO_OFF	An offset in Analog to Digital converter counts that is be applied to the LSC reading, at each test cycle, during calculation of the % Penetration. Default setting of -120.
ZERO_OFF_ON	"N" disables the zero offset. Default setting is N (Disabled)
CAL_100	100% LSC Reading from gravimetric calibration
FLOWCON	Flow calibration slope constant
FLOWZERO	Zero flow output level for flow sensor (in counts)
GRAVCON	LSC slope constant created during gravimetric calibration
GRAVHI	Upper response limit of the 100% penetration reading (set during gravimetric routine).
GRAVLO	Lower response limit of the 100% penetration reading (set during gravimetric routine).
LSC_DAC	LSC DAC (Gain) Setting
RESCON	Pressure (resistance) calibration slope constant.
TLEVEL	Trace Level determines the amount of diagnostic information displayed through the serial port. Available levels are 0, 1, and 3, representing minimal, normal and maximum amounts of output. Default value of 0 to match legacy output content.
QZT	Quick Zero Tolerance is a factor applied to the LSC reading returned at the start of each test cycle to determine if the LSC state has recovered from the previous test. 0=Off. Default value of 6.

### For operating revisions ≥2.0

BPSENSTYPE	Specifies the type of barometric pressure sensor installed. 0=None (Default), 1 = MPX4105A, 2= MPX5100A
FLOWSENSTYPE	Specifies the mass flow meter installed. A=Alicat (Default), T=Teledyne Hastings
ALT100PCT	"N" disables the non-encapsulating feature (Default). Default setting is N (Disabled). "Y" enables non-encapsulating feature utilizing an optional dedicated valve for obtaining 100% during daily 'PenCal' routine.

## **Remote Mode Operation:**

In remote mode, the TDA100P can be controlled from an external computer through a combination of the user interface port and commands sent and received through the serial port. The remote mode is selected by DIP switch 2 (two) and 4 (four) (See **Error! Reference source not found.**). The program trace level (TLEVEL parameter) should also be set to level 1 for remote operation (See [Section 15](#) & [Appendix B](#) of Operating Manual 1800186)

When the machine is restarted in this mode:

- 1) The machine will wait for air.
- 2) The check level prompt is bypassed.
- 3) The system warm-up will proceed.
- 4) Personnel will be required to either enter or bypass barometric pressure and ambient temperature selection.
- 5) The message “**Insert Filter; and Close**” will print on the VF display. Personnel will be required to close the test fixture locally or through an HMI, and an external start signal sent through the user interface port.
- 6) The sample flow rate is then adjusted using the “Flow Adjustment “ valve located on the front panel and accepted using the ‘D’ function key on the control panel.
- 7) The machine will enter an LSC calibration cycle. In the calibration cycle:
  - a. The machine will remain busy.
  - b. The message “**!Close Chuck**” will be sent to the serial port, while the message “**Clear Chuck & Close**” will print on the VF display. In response to this, the chuck should be closed, and an external start signal sent to the machine through the user interface port.
  - c. Upon receipt of the external start, a 100% calibration will be performed.
  - d. At the end of the 100% calibration, two messages will be sent to the serial port. The first:  
“**PENCAL: LSC\_100% = nnnnnn**” will display the penetration calibration constants. The second: “**PENCAL: Res Tare = nnnnnn**” will display the resistance tare value.  
The numbers in the above strings will not occupy a fixed number of digits; they will be as large as needed to represent the values.
  - e. A 0 (zero) baseline routine will be performed with no external intervention required.
  - f. At the end of the calibration process, the “**Ready**” contact at the User Interface port will become active.

**Note:** The calibration beginning from step 7 will also be entered if a “PENCAL” command is sent to the RS-232 port using the console command protocol (See [Section 15](#) of Operating Manual 1800186) or the number of cycles specified by the “Cycles to Cal” variable is exceeded.

Other operational features of the machine can be controlled through parameter setting commands available as described in the Console Commands section of this manual (See [Section 15](#) of Operating Manual 1800186).

The RS-232 printed statements listed above are the minimum that will be printed during these stages of unit operation. As greater levels of program trace output are enabled there may be significantly more data available at the RS-232 port.

## User Interface Port

The outputs are an open collector type capable of sinking 50 mA maximum for a non-inductive load.

- Ready (Output) – Indicates that the unit is ready to start a new test
- Pass (Output) – Indicates a passed test
- Fail (Output) – Indicates a failed test
- Fault (Output) – Indicates a system fault (See Table 3 – System Fault & Error Messages)
- In Cal (Output) – Indicates when the unit is in penetration calibration
- External Start (Input) – The signal used to start a test cycle from an external source. A pulse of 5-24V DC for a minimum of 100 milliseconds will start a test cycle.

**NOTE: *This port is isolated from the unit to protect against external damage.***

**Table 1 – Connector Pins & Functions**

Connector Pin	Function
1	External Start
2	NC
3	Fault
4	Pass
5	NC
6	Ground
7	Ready
8	Fail
9	In Cal / Busy

**USER INTERFACE CIRCUIT SCHEMATIC (sub-circuit of 0800183 PCBA):**

