

Accurate

TECHNOLOGY INC.

Linear Digital Measuring Systems

ProMUX-3



3 Input Multiplexer

Operation Manual

WARRANTY

Accurate Technology, Inc. warrants the ProMUX-3 against defective parts and workmanship for 1 year commencing from the date of original purchase. Upon notification of a defect, Accurate Technology, Inc., shall have the option to repair or replace any defective part. Such services shall be the customer's sole and exclusive remedy. Expenses incidental to repair, maintenance, or replacement under warranty, including those for labor and material, shall be borne by Accurate Technology, Inc. (Including freight or transportation charges during the first 30 days).

Except as expressly provided in this warranty, Accurate Technology, Inc. does not make any warranties with respect to the product, either expressed or implied, including implied warranties of merchantability or fitness for a particular purpose, except as expressly provided in this agreement.

Accurate Technology, Inc. shall not be liable for any special, incidental, or consequential damages or for loss, damage or expense directly or indirectly arising from the customer's use of or inability to use the equipment either separately or in combination with other equipment, or for personal injury or loss or destruction of other property, or from any other cause.

To request repair work, (either warranty qualified parts or not) follow the directions at www.proscale.com. A Returned Merchandise Authorization (RMA) number is required before returning any product for repair.

SAFETY WARNING

**Before installing this product:
Turn off and disconnect all power.**

SAFETY WARNING

Accurate Technology, Inc.

+1 828.654.7920

800.233.0580

828.654.8824 (F)

www.proscale.com

info@accurate-technology.com

Manual P/N 800-1098-001, Revision B

Copyright © 2011 Accurate Technology, Inc. All rights reserved

Table of Contents

SECTION 1	GENERAL INFORMATION	4
INTRODUCTION		4
SPECIFICATIONS		4
SECTION 2	OPERATION	5
CONNECTIONS		5
Input		5
Power and Serial Port		5
COMMAND STRUCTURE		6
Command Timing		6
Command List		7
Position Request		7
Encoder Enable		9
Multi Segment Mode		10
Segment Offset Adjustment		10
Streaming Position Output		11
Firmware Version		11
Hardware Settings		12
Factory Default Settings		12
Baud Rate Setting		12
Non-Volatile Memory		12
INPUT CONNECTOR		13
DB9 CONNECTOR		14

SECTION 1

GENERAL INFORMATION

Introduction

The ProMux 3 is an easy to use hardware interface device providing communication and control from a user provided PC or PLC via an RS232 serial interface.

ProMUX-3 will accept up to three ProScale Model 150/250 ABS encoders or SPC Digimatic® Inputs (Select ProScale Readouts have SPC output).

Uses for the ProMux 3 include axis position measurement on XY or XYZ quality control measurement tables, machinery position control (**NON-CNC**), tooling measurement devices and the like.

Specifications

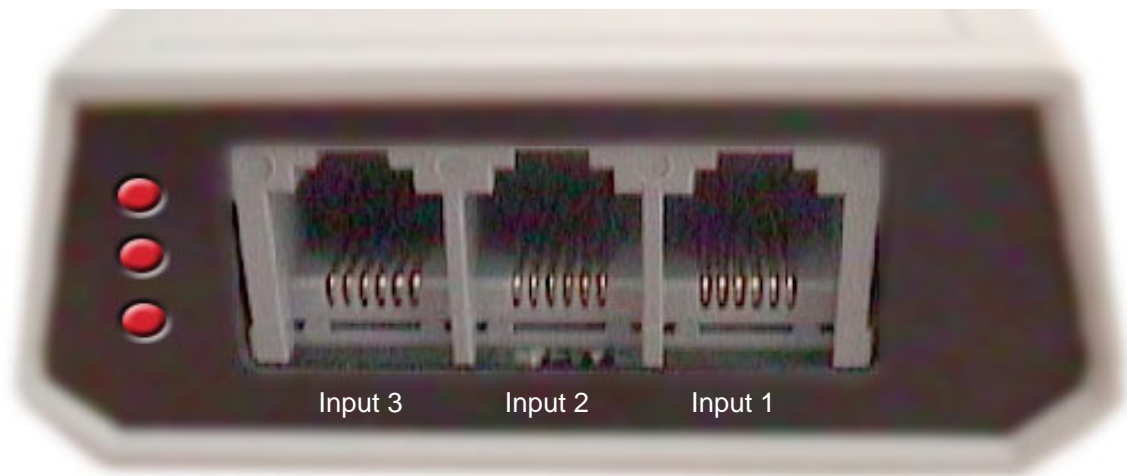
Dimensions:	2.6 x 4.25 x 1.125 In. (66 x 108 x 29 mm)
Power:	12-24 VDC (110VAC - 12VDC supply provided.)
Power connector:	P-5
Input:	up to 3 ProScale Model 150/250 ABS encoders or up to 3 Digimatic® SPC signals
Output:	RS-232 Serial Interface, DB-9 connector. (8 bits, no parity, 1 stop bit, No flow control)
Baud Rates:	9600, 19200 jumper programmed (19200 default)
Memory:	EEPROM non-volatile memory.
Input Status:	LED indicators and status word.
Protection:	Reverse polarity protection. Two stage over voltage protection. Transient voltage protection on all inputs.
Input Sampling:	Approximately 10 samples/second.
Streaming Data Rate:	Approximately one transmission/100 milliseconds.

Connections

The ProMUX-3 is supplied with a low voltage plug-in power supply. The user must provide the host PC or PLC and a standard DB-9 serial cable (male to female).

Input

Plug in the modular connector from the ProScale encoder (or Readout SPC output) to the ProMUX-3. The corresponding LED will be illuminated when an input signal is detected. ProMUX-3 is factory configured to identify encoders connected to input 1. Other inputs must be enabled through programming. (See page 9 for more information). The picture below illustrates the encoder connection ports and the port assignments.



Power and Serial Port

Connect your serial cable to the communications port of the ProMUX-3. Then connect the cable to the host computer. NOTE: MAXIMUM CABLE LENGTH IS 25 FEET (8 meters).

The ProMUX-3 is provided with a plug-in power supply that will power both the multiplexer and any ProScale encoders that are connected. Plug the power connector into the mating jack on the ProMUX-3 multiplexer. Then connect to a standard wall receptacle.

Command Structure

All commands sent to and received from the multiplexer are in standard ASCII format. This allows the user to initially test the communications channel with the ProMUX-3 utilizing a terminal emulation program such as HyperTerminal®. All commands sent to the multiplexer are based on the following format:

1. Command character (i.e. **P** for position)
2. Optional parameter 1
3. Optional parameter 2
Command Terminator character ; (semicolon) OR
<ENTER> (Decimal 13 or 0Dh)

The ProMUX-3 response can be any of the following:

1. Position Data
2. Command Acknowledgment (OK)
3. Command Failure (?)

The first character of all responses will always be the asterisk *. This provides a sentinel character to synchronize the response with the host if needed. Following the asterisk, one of the above responses will be sent. A carriage return character (0Dh) ends the message stream.

Command Timing

The ProMUX-3 expects a maximum delay of 10 seconds between characters when sending a command. If the 10 second limit is exceeded between characters, the pending command is aborted and must be re-sent from the beginning.

Upon receiving a valid command from the host, the ProMUX-3 will send a response within approximately 1 millisecond.

Command List

The following is a list of commands that may be sent to the ProMUX-3. If an invalid command is sent, the ProMUX-3 will respond with a Command Failure (?).

Action	Command	For More Information
Position Request	P or p	See page 7
Encoder Enable	M <control character>	See page 9
Multi-Segment Mode	L <control character>	See page 10
Adjust Segment Offset	S <channel><+ or ->	See page 11
Streaming Output	A <control character>	See page 11
Firmware Version	V	See page 11

Position Request

This command is used to acquire the current position data from the ProMUX-3. The response includes the position information for all encoders (including a status character which indicates the operating condition of each encoder).

Command: **P** or **p**
Response: *s-xxxx.xx-yyyy.yy-zzzz.zzL<CR>

* = Sentinel Character (see page 6)
s = Status Character (see table on page 8)
-xxxx.xx = Input Data 1
-yyyy.yy = Input Data 2
-zzzz.zz = Input Data 3
L = Data input latch
<CR> = Carriage Return

Status Character: The following table defines values of the status character. (The multiplexer uses a bitwise operation to map the state of each encoder. If the bit is set, the encoder is connected and operating properly. If the bit is clear, the encoder has failed or is not connected.)

Status Character	Enc1	Enc2	Enc3
1	OK	FAIL	FAIL
2	FAIL	OK	FAIL
3	OK	OK	FAIL
4	FAIL	FAIL	OK
5	OK	FAIL	OK
6	FAIL	OK	OK
7	OK	OK	OK

Position of Encoder: The Input Data can be millimeters or inches. Encoders which are connected directly to ProMUX-3 ALWAYS transmit in millimeter format. Inputs from ProScale Readouts transmit in the currently displayed units on the Readout (inches or mm).

Millimeter format is: -xxxx.xx (default), or -xxxxx.x

Inch format is: -xxxx.xx, -xxx.xxx (default), or -xx.xxxx

The minus sign position in each parameter will appear as: minus '-' sign if the position value is negative OR a space if the position is positive.

Data input latch: A data field with a valid range from ASCII 0 to ASCII 7 (0x30 – 0x37). It represents a bit field used to indicate if a hardware input has been triggered which signifies to the host to latch the current position data for that input channel. This can be used to support a "Data Read" function indicating to the host when significant position data is available. See page 13 Input Connector.

Encoder Enable

This command tells the ProMUX-3 which inputs to read. The ProMUX-3 is factory set to enable **only** encoder 1. A control character is sent to indicate which encoders are to be made active. Use the table below to choose the appropriate control character.

Command: M<control character 1-7>;

Response: *OK<CR> Command accepted. OR
*?<CR> Command rejected.

Example: Command **M5**; issued.
Response is *OK<CR>
ProMux 3 now enabled for Inputs 1 & 3.

Control Character	Input 1	Input 2	Input 3
1	ENABLED	DISABLED	DISABLED
2	DISABLED	ENABLED	DISABLED
3	ENABLED	ENABLED	DISABLED
4	DISABLED	DISABLED	ENABLED
5	ENABLED	DISABLED	ENABLED
6	DISABLED	ENABLED	ENABLED
7	ENABLED	ENABLED	ENABLED

Multi Segment Mode

ProScale Models 150 & 250 ABS measurement systems are designed utilizing a printed circuit board (scale panel) laminated to an aluminum extrusion. The length of this scale panel is approximately 430 millimeters (16.9 inches). Measurement scales longer than 430 millimeters require the installation of multiple scale panels end to end to provide the additional measurement range. ProMUX-3 automatically accounts for transitions from one scale panel to another and provides a continuous position update to the host. When using a Readout SPC output with the multiplexer, this feature must be disabled for that input channel because the Readout already accommodates the multiple scale panel operation. Use the table on page 9 to choose the appropriate control character values to enable or disable Multi Segment Mode on selected inputs.

Command: L<control character>;
Response : *OK<CR> Command accepted. OR
*?<CR> Command rejected.

Example: Command **L4**; is issued.
Response is *OK<CR>
ProMUX-3 is now enabled for multi segment mode on encoder channel 3 ONLY.

Segment Offset Adjustment

As described above, the ProMUX-3 can automatically compensate for ABS scale panel transitions. However, in cases where power is removed from the multiplexer, and the encoder is moved from one scale panel to another, the multiplexer will report an improper position for that encoder once power is restored. To compensate for this condition, the host computer can send a command to the multiplexer to add or subtract one scale panel length (430 mm), resulting in an adjusted encoder position being reported. This command can be issued multiple times to compensate for multiple panel transitions.

Command: S<encoder channel 1, 2 or 3><+ or ->;
Response: *OK<CR> Command accepted. OR
*?<CR> Command rejected. Invalid parameter.

Examples: Command **S2+**; issued.
Response is *OK<CR>
ProMUX-3 adds 430 mm to the current position of encoder 2.

Command **S1-**; issued.
Response is *OK<CR>
ProMUX-3 subtracts 430 mm from the current position of encoder 1.

Streaming Position Output

This command enables or disables streaming position output to the host. If enabled, position output is sent from the multiplexer to the host without the Position Command being issued/received. If disabled, the host must use the Position Command to receive the encoder position data.

Command: A<0 for disable, 1 for enable>;
Response: *OK<CR> Command accepted. OR
*?<CR> Command rejected.

Example: Command **A1**; issued.
Response is *OK<CR>
ProMUX-3 is now enabled for streaming output.

Firmware Version

This command is used to query the ProMUX-3 for its firmware revision level.

Command: V;
Response: *n.nn<CR>

Example: Command **V**; issued.
Response is *1.06<CR>
Firmware Version is 1.06.

Hardware Settings

Factory Default Settings

The ProMUX-3 is factory set to the following parameters:

- Baud Rate 19200.
- Encoder channel 1 enabled.
- Multi-segment Mode enabled on all channels.
- Streaming Position Output is disabled.

Baud Rate Setting

To modify the baud rate setting:

1. Remove power from the unit.
2. Remove the four screws from the bottom of the unit.
3. Remove the top cover from the multiplexer.
4. A single two-position jumper exists located behind the DB-9 serial port connector. For 9600 baud, move the jumper to the two pins closest to the “9600” marking on the PC board. For 19200 baud, move the jumper to the two pins closest to the “19200” marking.
5. Re-assemble the housing and install the four screws.

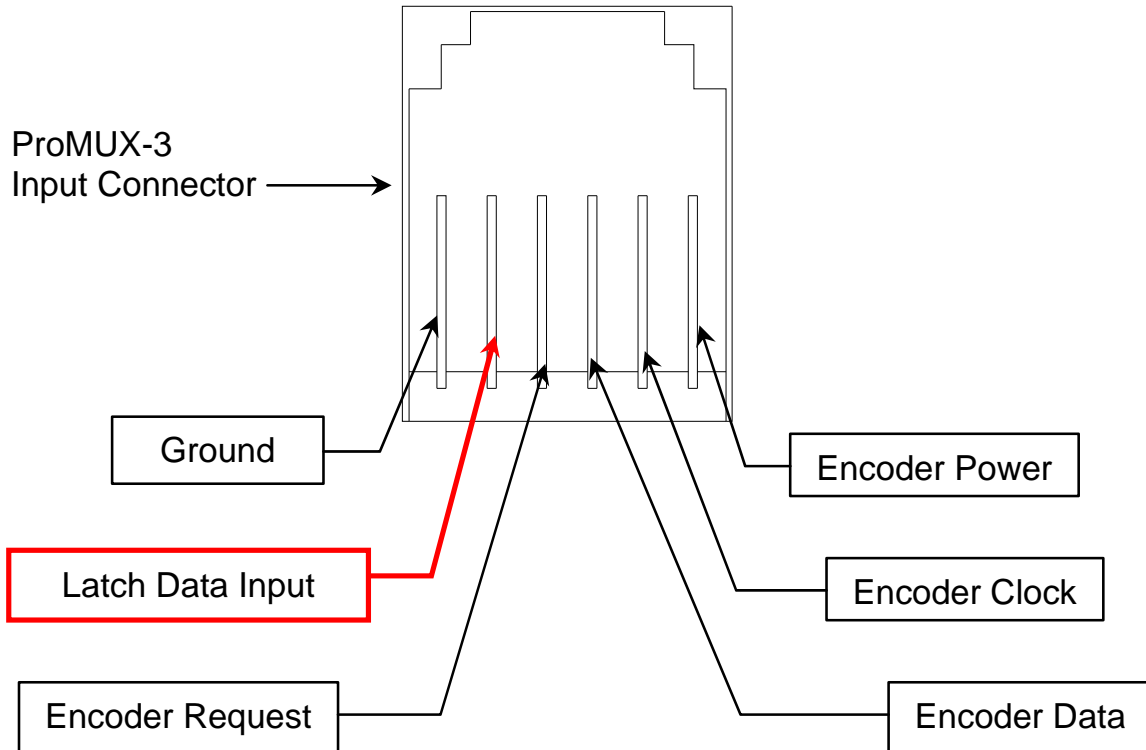
Non-Volatile Memory

The ProMUX-3 utilizes an EEPROM memory system that retains vital system parameters after power has been disconnected. These parameters include:

- Scale Panel Offsets
- Encoder enable/disable settings
- Multi-segment operation mode settings
- Host transmit mode settings

Because of the non-volatile memory, configuration commands that are sent to the multiplexer are retained between applications of power and do not need to be reset after each power-up sequence.

Input Connector



ProMUX-3 Input Connector and corresponding Encoder connections

The **Latch Data Input** pin can be used to indicate to the host when significant position data is available for each encoder. To activate this input, momentarily connect this pin to Ground via a normally open switch. When activated, the corresponding bit in the Latch Data field of the position command will be set. Typically, this input must be held at ground for at least 50ms to be detected by the host.

WARNING: Do not connect positive voltage to this pin. Only connect GROUND. Positive voltages in excess of 5 VDC will cause damage to the ProMUX-3.

DB9 Connector

Pin 2 – RS-232 Transmit to Host

Pin 3 – RS-232 Receive from Host

Pin 5 – Signal Ground

Note: Hardware handshaking is not supported.

This page intentionally left blank

Thank you for choosing an
Accurate Technology Product

This product was proudly MADE IN USA



Accurate Technology, Inc.
270 Rutledge Rd. Unit E
Fletcher, NC 28732 USA
800 233-0580 • 828-654-7920
Fax 828-654-8824
www.proscale.com
customerservice@accurate-technology.com

Please register your system at:
<http://www.proscale.com/registration.htm>

This manual is available at www.proscale.com

Manual P/N 800-1098-001, Revision B
Copyright © 2011 Accurate Technology, Inc. All rights reserved