Universal TruFlow Controller/Monitor

Customer Product Manual
Part 1096928A
Issued 9/09

This document contains important safety information
Be sure to read and follow all safety information in this document and any other related documentation.

NORDSON CORPORATION • DULUTH, GEORGIA • USA
www.nordson.com

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address: http://www.nordson.com.

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Notice

Trademarks

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Universal TruFlow Controller/Monitor

WARNING! Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Safety

Read this section before using the equipment. This section contains recommendations and practices applicable to the safe installation, operation, and maintenance (hereafter referred to as “use”) of the product described in this document (hereafter referred to as “equipment”). Additional safety information, in the form of task-specific safety alert messages, appears as appropriate throughout this document.

WARNING! Failure to follow the safety messages, recommendations, and hazard avoidance procedures provided in this document can result in personal injury, including death, or damage to equipment or property.

Safety Alert Symbols

The following safety alert symbol and signal words are used throughout this document to alert the reader to personal safety hazards or to identify conditions that may result in damage to equipment or property. Comply with all safety information that follows the signal word.

WARNING! Indicates a potentially hazardous situation that, if not avoided, can result in serious personal injury, including death.

CAUTION! Indicates a potentially hazardous situation that, if not avoided, can result in minor or moderate personal injury.

CAUTION! (Used without the safety alert symbol) Indicates a potentially hazardous situation that, if not avoided, can result in damage to equipment or property.

Responsibilities of the Equipment Owner

Equipment owners are responsible for managing safety information, ensuring that all instructions and regulatory requirements for use of the equipment are met, and for qualifying all potential users.

Safety Information

- Research and evaluate safety information from all applicable sources, including the owner-specific safety policy, best industry practices, governing regulations, material manufacturer's product information, and this document.
- Make safety information available to equipment users in accordance with governing regulations. Contact the authority having jurisdiction for information.
- Maintain safety information, including the safety labels affixed to the equipment, in readable condition.

Instructions, Requirements, and Standards

- Ensure that the equipment is used in accordance with the information provided in this document, governing codes and regulations, and best industry practices.
- If applicable, receive approval from your facility's engineering or safety department, or other similar function within your organization, before installing or operating the equipment for the first time.
- Provide appropriate emergency and first aid equipment.
- Conduct safety inspections to ensure required practices are being followed.
- Re-evaluate safety practices and procedures whenever changes are made to the process or equipment.

User Qualifications

Equipment owners are responsible for ensuring that users:

- receive safety training appropriate to their job function as directed by governing regulations and best industry practices
- are familiar with the equipment owner's safety and accident prevention policies and procedures
- receive, equipment- and task-specific training from another qualified individual

  NOTE: Nordson can provide equipment-specific installation, operation, and maintenance training. Contact your Nordson representative for information

- possess industry- and trade-specific skills and a level of experience appropriate to their job function
- are physically capable of performing their job function and are not under the influence of any substance that degrades their mental capacity or physical capabilities

Applicable Industry Safety Practices

The following safety practices apply to the use of the equipment in the manner described in this document. The information provided here is not meant to include all possible safety practices, but represents the best safety practices for equipment of similar hazard potential used in similar industries.

Intended Use of the Equipment

- Use the equipment only for the purposes described and within the limits specified in this document.
- Do not modify the equipment.
- Do not use incompatible materials or unapproved auxiliary devices. Contact your Nordson representative if you have any questions on material compatibility or the use of non-standard auxiliary devices.

Instructions and Safety Messages

- Read and follow the instructions provided in this document and other referenced documents.
- Familiarize yourself with the location and meaning of the safety warning labels and tags affixed to the equipment. Refer to *Safety Labels and Tags* at the end of this section.
- If you are unsure of how to use the equipment, contact your Nordson representative for assistance.

Installation Practices

- Install the equipment in accordance with the instructions provided in this document and in the documentation provided with auxiliary devices.
- Ensure that the equipment is rated for the environment in which it will be used and that the processing characteristics of the material will not create a hazardous environment. Refer to the Material Safety Data Sheet (MSDS) for the material.
- If the required installation configuration does not match the installation instructions, contact your Nordson representative for assistance.
- Position the equipment for safe operation. Observe the requirements for clearance between the equipment and other objects.
- Install lockable power disconnects to isolate the equipment and all independently powered auxiliary devices from their power sources.
- Properly ground all equipment. Contact your local building code enforcement agency for specific requirements.
- Ensure that fuses of the correct type and rating are installed in fused equipment.
- Contact the authority having jurisdiction to determine the requirement for installation permits or inspections.

Operating Practices

- Familiarize yourself with the location and operation of all safety devices and indicators.
- Confirm that the equipment, including all safety devices (guards, interlocks, etc.), is in good working order and that the required environmental conditions exist.
- Use the personal protective equipment (PPE) specified for each task. Refer to *Equipment Safety Information* or the material manufacturer's instructions and MSDS for PPE requirements.
- Do not use equipment that is malfunctioning or shows signs of a potential malfunction.

Maintenance and Repair Practices

- Perform scheduled maintenance activities at the intervals described in this document.
- Relieve system hydraulic and pneumatic pressure before servicing the equipment.
- De-energize the equipment and all auxiliary devices before servicing the equipment.
- Use only new Nordson-authorized refurbished or replacement parts.
- Read and comply with the manufacturer's instructions and the MSDS supplied with equipment cleaning compounds.

  NOTE: MSDSs for cleaning compounds that are sold by Nordson are available at www.nordson.com or by calling your Nordson representative.

- Confirm the correct operation of all safety devices before placing the equipment back into operation.
- Dispose of waste cleaning compounds and residual process materials according to governing regulations. Refer to the applicable MSDS or contact the authority having jurisdiction for information.
- Keep equipment safety warning labels clean. Replace worn or damaged labels.

Equipment Safety Information

This equipment safety information is applicable to the following types of Nordson equipment:

- hot melt and cold adhesive application equipment and all related accessories
- pattern controllers, timers, detection and verification systems, and all other optional process control devices

Equipment Shutdown

To safely complete many of the procedures described in this document, the equipment must first be shut down. The level of shut down required varies by the type of equipment in use and the procedure being completed. If required, shut down instructions are specified at the start of the procedure. The levels of shut down are:

Relieving System Hydraulic Pressure

Completely relieve system hydraulic pressure before breaking any hydraulic connection or seal. Refer to the melter-specific product manual for instructions on relieving system hydraulic pressure.

De-energizing the System

Isolate the system (melter, hoses, guns, and optional devices) from all power sources before accessing any unprotected high-voltage wiring or connection point.

1. Turn off the equipment and all auxiliary devices connected to the equipment (system).
2. To prevent the equipment from being accidentally energized, lock and tag the disconnect switch(es) or circuit breaker(s) that provide input electrical power to the equipment and optional devices.

   NOTE: Government regulations and industry standards dictate specific requirements for the isolation of hazardous energy sources. Refer to the appropriate regulation or standard.

Disabling the Guns

All electrical or mechanical devices that provide an activation signal to the guns, gun solenoid valve(s), or the melter pump must be disabled before work can be performed on or around a gun that is connected to a pressurized system.

1. Turn off or disconnect the gun triggering device (pattern controller, timer, PLC, etc.).
2. Disconnect the input signal wiring to the gun solenoid valve(s).
3. Reduce the air pressure to the gun solenoid valve(s) to zero; then relieve the residual air pressure between the regulator and the gun.

General Safety Warnings and Cautions

Table 1 contains the general safety warnings and cautions that apply to Nordson hot melt and cold adhesive equipment. Review the table and carefully read all of the warnings or cautions that apply to the type of equipment described in this manual.

Equipment types are designated in Table 1 as follows:

HM = Hot melt (melters, hoses, guns, etc.)

PC = Process control

CA = Cold adhesive (dispensing pumps, pressurized container, and guns)

Table 1 General Safety Warnings and Cautions

Equipment Type	Warning or Caution
HM	**WARNING!** Hazardous vapors! Before processing any polyurethane reactive (PUR) hot melt or solvent-based material through a compatible Nordson melter, read and comply with the material's MSDS. Ensure that the material's processing temperature and flashpoints will not be exceeded and that all requirements for safe handling, ventilation, first aid, and personal protective equipment are met. Failure to comply with MSDS requirements can cause personal injury, including death.
HM	**WARNING!** Reactive material! Never clean any aluminum component or flush Nordson equipment with halogenated hydrocarbon fluids. Nordson melters and guns contain aluminum components that may react violently with halogenated hydrocarbons. The use of halogenated hydrocarbon compounds in Nordson equipment can cause personal injury, including death.
HM, CA	**WARNING!** System pressurized! Relieve system hydraulic pressure before breaking any hydraulic connection or seal. Failure to relieve the system hydraulic pressure can result in the uncontrolled release of hot melt or cold adhesive, causing personal injury.

Continued...

General Safety Warnings and Cautions (contd)

Table 1 General Safety Warnings and Cautions *(contd)*

Equipment Type	Warning or Caution
HM	**WARNING!** Molten material! Wear eye or face protection, clothing that protects exposed skin, and heat-protective gloves when servicing equipment that contains molten hot melt. Even when solidified, hot melt can still cause burns. Failure to wear appropriate personal protective equipment can result in personal injury.
HM, PC	**WARNING!** Equipment starts automatically! Remote triggering devices are used to control automatic hot melt guns. Before working on or near an operating gun, disable the gun's triggering device and remove the air supply to the gun's solenoid valve(s). Failure to disable the gun's triggering device and remove the supply of air to the solenoid valve(s) can result in personal injury.
HM, CA, PC	**WARNING!** Risk of electrocution! Even when switched off and electrically isolated at the disconnect switch or circuit breaker, the equipment may still be connected to energized auxiliary devices. De-energize and electrically isolate all auxiliary devices before servicing the equipment. Failure to properly isolate electrical power to auxiliary equipment before servicing the equipment can result in personal injury, including death.
HM, CA, PC	**WARNING!** Risk of fire or explosion! Nordson adhesive equipment is not rated for use in explosive environments and should not be used with solvent-based adhesives that can create an explosive atmosphere when processed. Refer to the MSDS for the adhesive to determine its processing characteristics and limitations. The use of incompatible solvent-based adhesives or the improper processing of solvent-based adhesives can result in personal injury, including death.

Continued...

Table 1 General Safety Warnings and Cautions *(contd)*

Equipment Type	Warning or Caution
HM, CA, PC	**WARNING!** Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others and can damage to the equipment.
HM	**CAUTION!** Hot surfaces! Avoid contact with the hot metal surfaces of guns, hoses, and certain components of the melter. If contact can not be avoided, wear heat-protective gloves and clothing when working around heated equipment. Failure to avoid contact with hot metal surfaces can result in personal injury.
HM	**CAUTION!** Some Nordson melters are specifically designed to process polyurethane reactive (PUR) hot melt. Attempting to process PUR in equipment not specifically designed for this purpose can damage the equipment and cause premature reaction of the hot melt. If you are unsure of the equipment's ability to process PUR, contact your Nordson representative for assistance.
HM, CA	**CAUTION!** Before using any cleaning or flushing compound on or in the equipment, read and comply with the manufacturer's instructions and the MSDS supplied with the compound. Some cleaning compounds can react unpredictably with hot melt or cold adhesive, resulting in damage to the equipment.
HM	**CAUTION!** Nordson hot melt equipment is factory tested with Nordson Type R fluid that contains polyester adipate plasticizer. Certain hot melt materials can react with Type R fluid and form a solid gum that can clog the equipment. Before using the equipment, confirm that the hot melt is compatible with Type R fluid.

Other Safety Precautions

- Do not use an open flame to heat hot melt system components.
- Check high pressure hoses daily for signs of excessive wear, damage, or leaks.
- Never point a dispensing handgun at yourself or others.
- Suspend dispensing handguns by their proper suspension point.

First Aid

If molten hot melt comes in contact with your skin:

1. Do NOT attempt to remove the molten hot melt from your skin.
2. Immediately soak the affected area in clean, cold water until the hot melt has cooled.
3. Do NOT attempt to remove the solidified hot melt from your skin.
4. In case of severe burns, treat for shock.
5. Seek expert medical attention immediately. Give the MSDS for the hot melt to the medical personnel providing treatment.

Safety Labels and Tags

Figure 1 illustrates the location of the product safety labels and tags affixed to the equipment. Table 2 provides an illustration of the hazard identification symbols that appear on each safety label and tag, the meaning of the symbol, or the exact wording of any safety message.

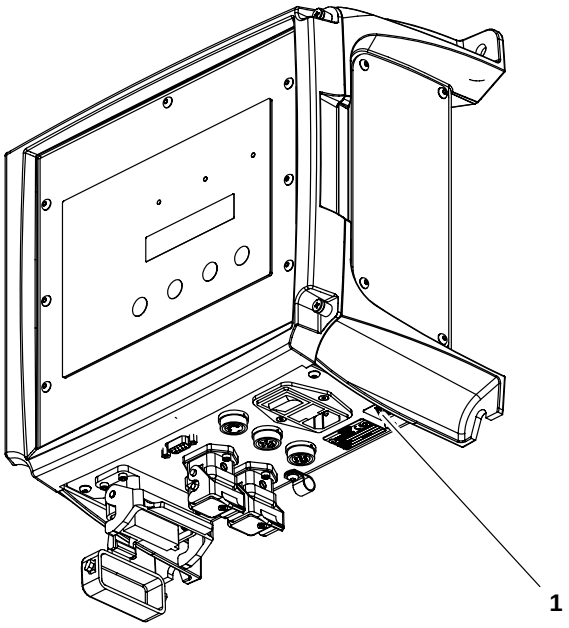
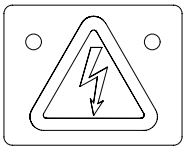


Figure 1 Safety labels and tags

Table 2 Safety Labels and Tags

Item	Part	Description
1.	242867	 Tag, warning

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Description

This manual describes the installation and use of the Nordson Universal TruFlow controller/monitor. When necessary, the reader is referred to the documentation supplied with other Nordson products or products supplied by third parties.

The Universal TruFlow controller/monitor is used in a hot melt adhesive delivery system to control and/or monitor adhesive consumption and add-on weights by providing inline measurement and reporting of adhesive-per-piece data for better process control. The TruFlow controller/monitor includes the following capabilities:

- Adhesive output can be monitored and recorded by individual part, time/day/shift, or current total output.
- Control parameters, warnings, and alarms can be preset to stop the line if dispensing deviates beyond upper or lower dispensing limits.
- The closed-loop encoder feedback can be used to improve the volumetric flow of adhesive during ramp-up and steady state operation.

Figure 2 shows how the TruFlow controller/monitor is typically used in an adhesive delivery system.

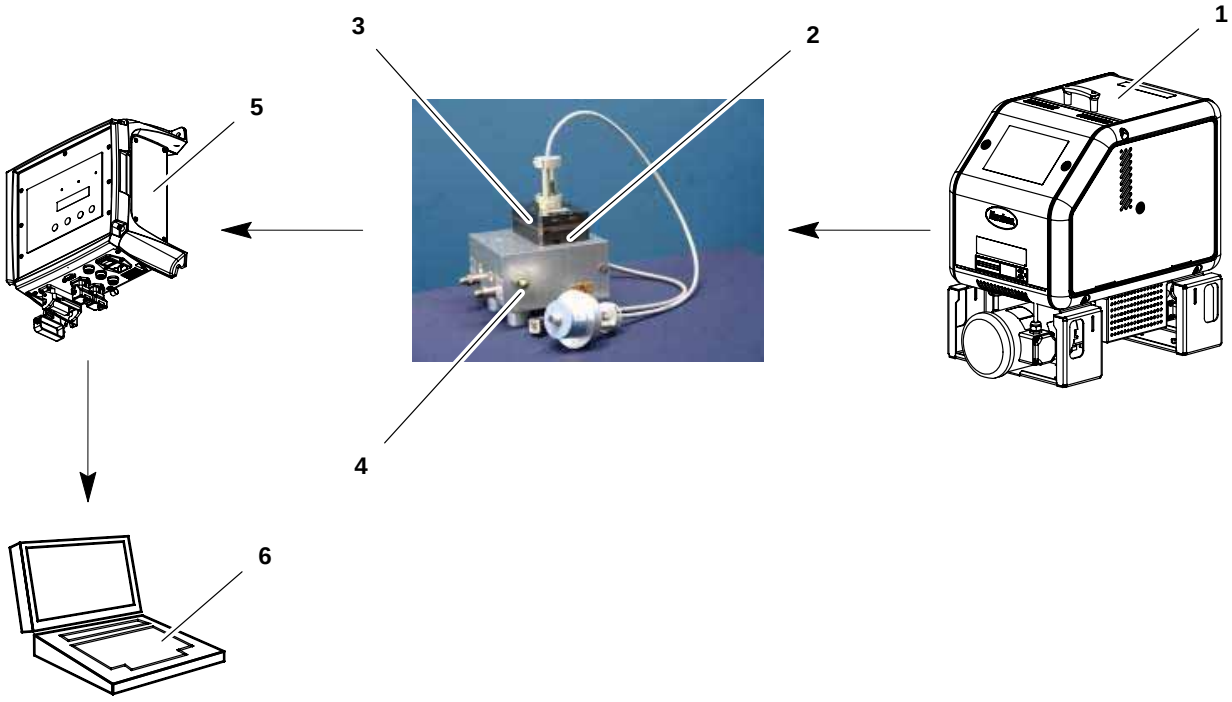


Figure 2 Universal TruFlow controller/monitor used in a typical adhesive delivery system

1. Melter
2. TruFlow metering pump
3. Encoder
4. Applicator
5. TruFlow controller/monitor
6. Laptop computer

Intended Use

The Universal TruFlow controller/monitor is specifically designed to:

- Be used with compatible equipment manufactured by Nordson Corporation
- Be used in non-explosive environments

The Universal TruFlow controller/monitor is virtually complete, but is intended to be incorporated into machinery or assemblies by an integrator. The equipment must not be placed into use in a member state of the European Union until the parent machinery or assemblies have been declared by the integrator to be in conformity with the applicable directives of the European Commission.

Limitations of Use

Use the Universal TruFlow controller/monitor only for the purpose for which it is designed. The Universal TruFlow controller/monitor should not be used:

- with any material that creates a health or safety hazard when heated
- in environments that will require the system to be cleaned using a water wash or spray

Unit Identification

See Figure 3. You will need the model and part number of the controller/monitor when requesting service or ordering spare parts and optional equipment. The model and part number are indicated on the equipment identification plate.

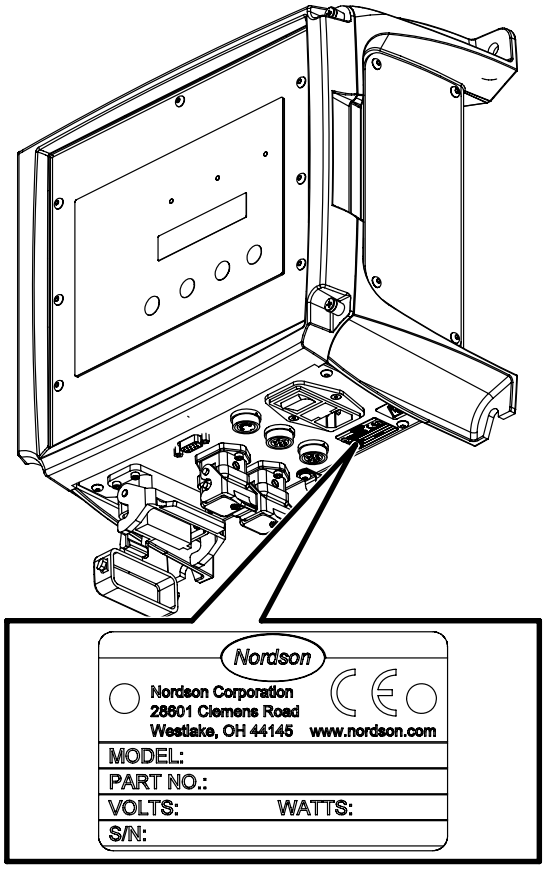


Figure 3 Location of the equipment identification plate

Key Components

Figures 4–5 provide the name and the location of key system components.

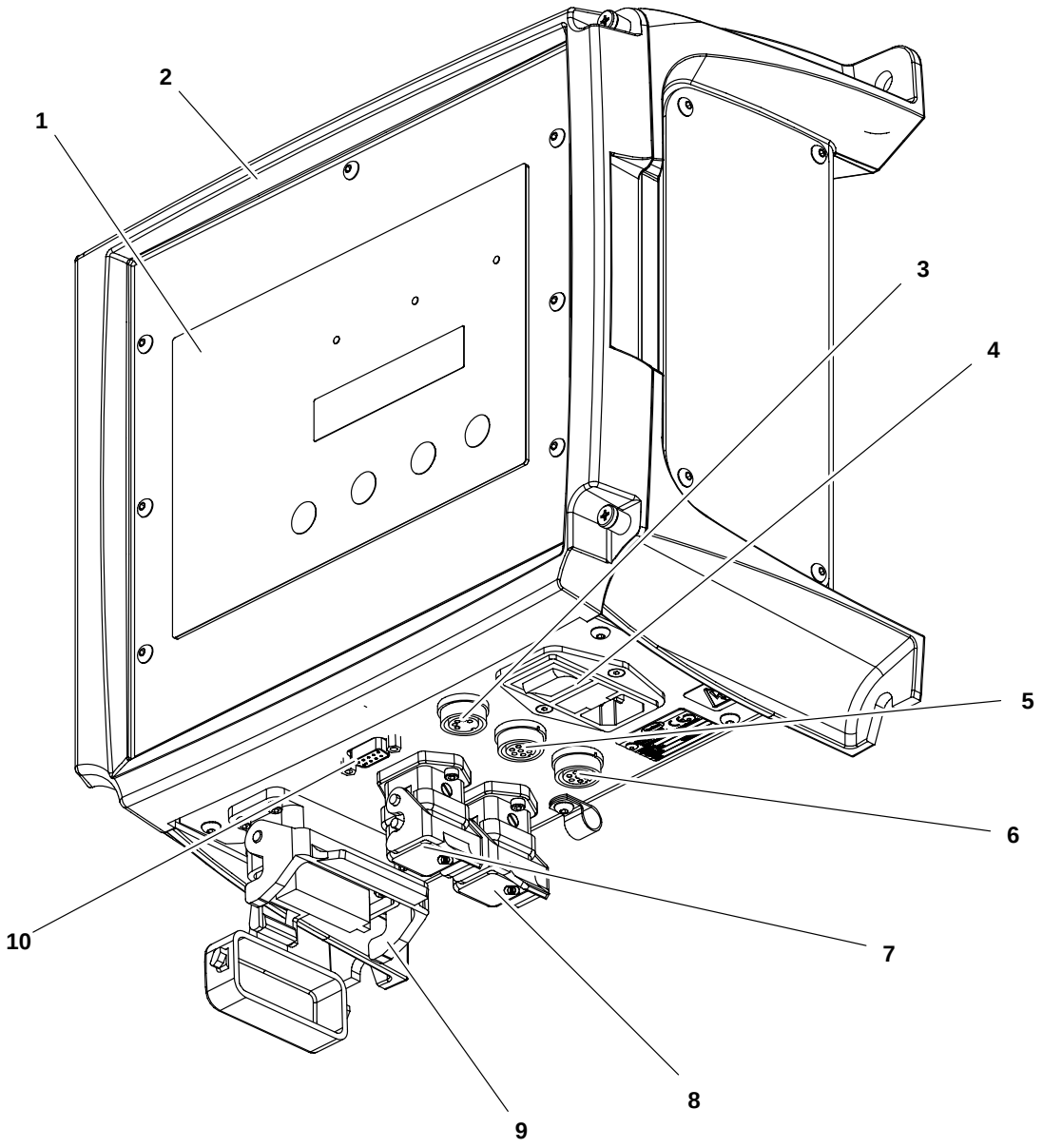


Figure 4 Key components of the Universal TruFlow controller/monitor

1. Operator panel (see Figure 5)
2. Enclosure door
3. Product sensor input
4. Power switch
5. Encoder input A
6. Encoder input B
7. Flow monitor output A (to melter)
8. Flow monitor output B (to melter)
9. Customer input/output (I/O) connector
10. Serial port (laptop computer connection)

Note: Refer to Table 3 later in this manual for connection details.

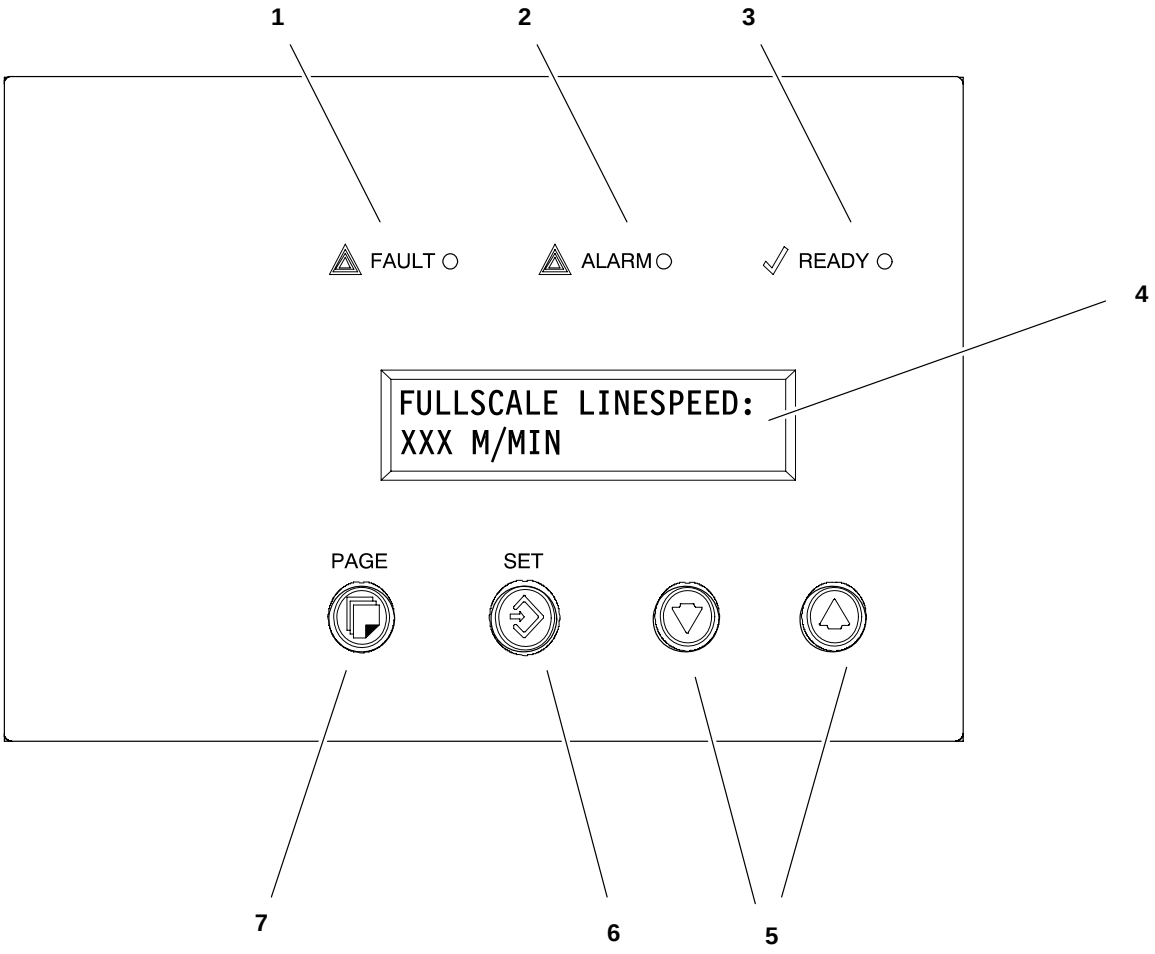


Figure 5 Universal TruFlow controller/monitor controls

1. FAULT LED
2. ALARM LED
3. READY LED
4. Display
5. Up/down arrow keys
6. SET key
7. PAGE key

Installation

Installation involves placing the controller/monitor in the desired location and making the electrical connections.

Electro-Magnetic Compliance Information

This system is classified as Class A, Group 2 under the European standard for limits and methods of measurement, EN 55011.

Experience of Installation Personnel

The instructions provided in this section are intended to be used by personnel who have experience in the following subjects:

- Hot melt application processes
- Industrial power and control wiring
- Industrial mechanical installation practices
- Basic process control and instrumentation

Customer-Supplied Installation Components

In addition to the components provided by Nordson Corporation, installation of the TruFlow controller/monitor requires the following customer-supplied components:

- laptop computer and serial cable
- melter with 0–10V key-to-line input (required only if the monitor/controller will be used for controlling purposes)
- appropriate guarding and signage as required to prevent personal injury during operation and service activities

Install the Controller/Monitor

See Figure 6. Carefully unpack and mount the controller/monitor at the desired location:

- Position the controller/monitor as close as possible to the parent machine or production line.
- Ensure that the mounting location provides sufficient clearance around the sides, the base, and rear of the controller/monitor for easy access to the control panel and connectors.

  NOTE: For unhindered air flow, the recommended minimum clearance at the top and base of the controller/monitor is 50 mm (1.96 in.).
- Mount the controller/monitor vertically on the wall or post to provide maximum cooling by convection across the heatsink fins.
- Mount the controller/monitor on a rigid support (e.g. wall or post) to prevent external vibration.

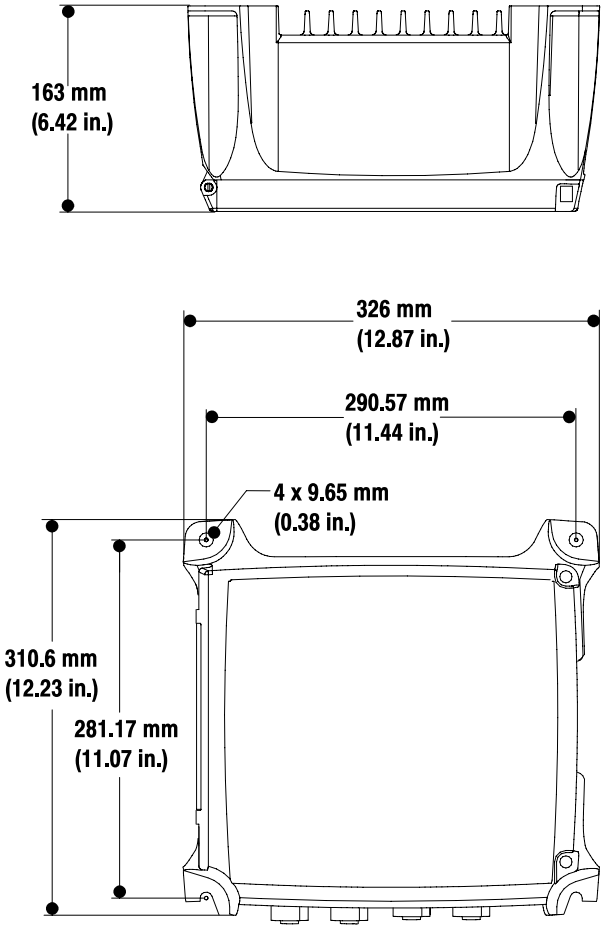


Figure 6 Controller/monitor mounting dimensions

Make the Electrical Connections

See Figure 7 and/or refer to Table 3 to make the correct electrical connections for your application.

Table 3 TruFlow Controller/Monitor Electrical Connections

Item No. in Fig. 7 (see Note)	Connection	Pins	Description
1	I/O (customer I/O connector)	1	Analog line speed input A (0–10 VDC or 4–20 mA)
		2	Common
		3	Encoder line speed input A (NPN or PNP)
		4	24V
		5	Warning out A (NPN)
		6	Fault out A (NPN)
		7	Common
		8	Analog line speed input B (0–10 VDC or 4–20 mA)
		9	Common
		10	Encoder line speed input B (NPN or PNP)
		11	24V
		12	Warning out B (NPN)
		13	Fault out B (NPN)
		14	Common (24V–)
2	SERIAL OUTPUT (serial port)	N/A	Laptop computer serial port cable connection
3	SENSOR (product sensor input)	2	Signal
		3	24V
		4	Common
4	POWER 110VAC (power input)	N/A	Power supply cable connection
5	ENCODER (encoder input A)	1	Signal
		3	Common
		5	24V
6	ENCODER (encoder input B)	1	Signal
		3	Common
		5	24V
7	FLOW COMMAND (flow command output A to melter)	1	Common
		2	Analog flow command (0–10VDC or 4–20 mA)
8	FLOW COMMAND (flow command output B to melter)	1	Common
		2	Analog flow command (0–10VDC or 4–20 mA)

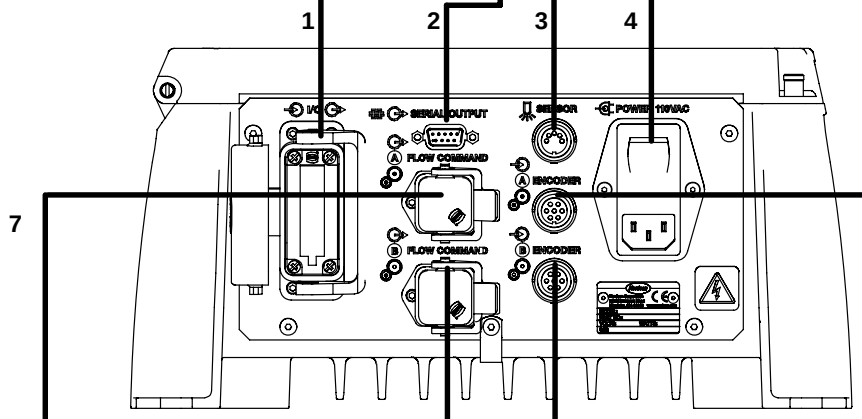
NOTE: The connections shown in bold (items 1, 7, and 8) are required only if the monitor/controller will be used for controlling purposes.

Customer I/O Connector	
Pin	**Signal**
1	Analog line speed input A (0–10V or 4–20 mA)
2	Common
3	Encoder line speed input A
4	24V (+)
5	Warning out A
6	Fault out A
7	Common
8	Analog line speed input B (0–10V or 4–20 mA)
9	Common
10	Encoder line speed input B
11	24V (+)
12	Warning out B
13	Fault out B
14	Common

Serial Port

Product Sensor Input	
Pin	**Signal**
1	Not used
2	Signal
3	24V
4	Common
5	Not used

Power Inlet (110V)



Flow Command Output A	
Pin	**Signal**
1	Common
2	Analog flow command (0–10V or 4–20 mA)
3	Not used
4	Not used
5	Not used
6	Not used

Encoder Input A	
Pin	**Signal**
1	Signal
2	Not used
3	Common
4	Not used
5	24V

Flow Command Output B	
Pin	**Signal**
1	Common
2	Analog flow command (0–10V or 4–20 mA)
3	Not used
4	Not used
5	Not used
6	Not used

Encoder Input B	
Pin	**Signal**
1	Signal
2	Not used
3	Common
4	Not used
5	24V

Figure 7 Electrical connections (refer to Table 3)

Note: The tables outlined in bold are required only if the controller/monitor will be used for controlling purposes**.**

Check the Configuration Switch Settings

Perform the following steps to ensure that all configuration switches are properly set. The configuration switches are located on the circuit board assembly, as shown in Figure 8.

1. If you are using a 4–20 Ma signal, ensure that the configuration switch settings match the default settings shown under *Settings for 4–20MA I/O* in Table 4.
2. If you are using standard NPN or PNP sensors, set IN1 to NORM. If you are using signals that swing from 0–24V (such as solenoid signals), set IN1 to LD.

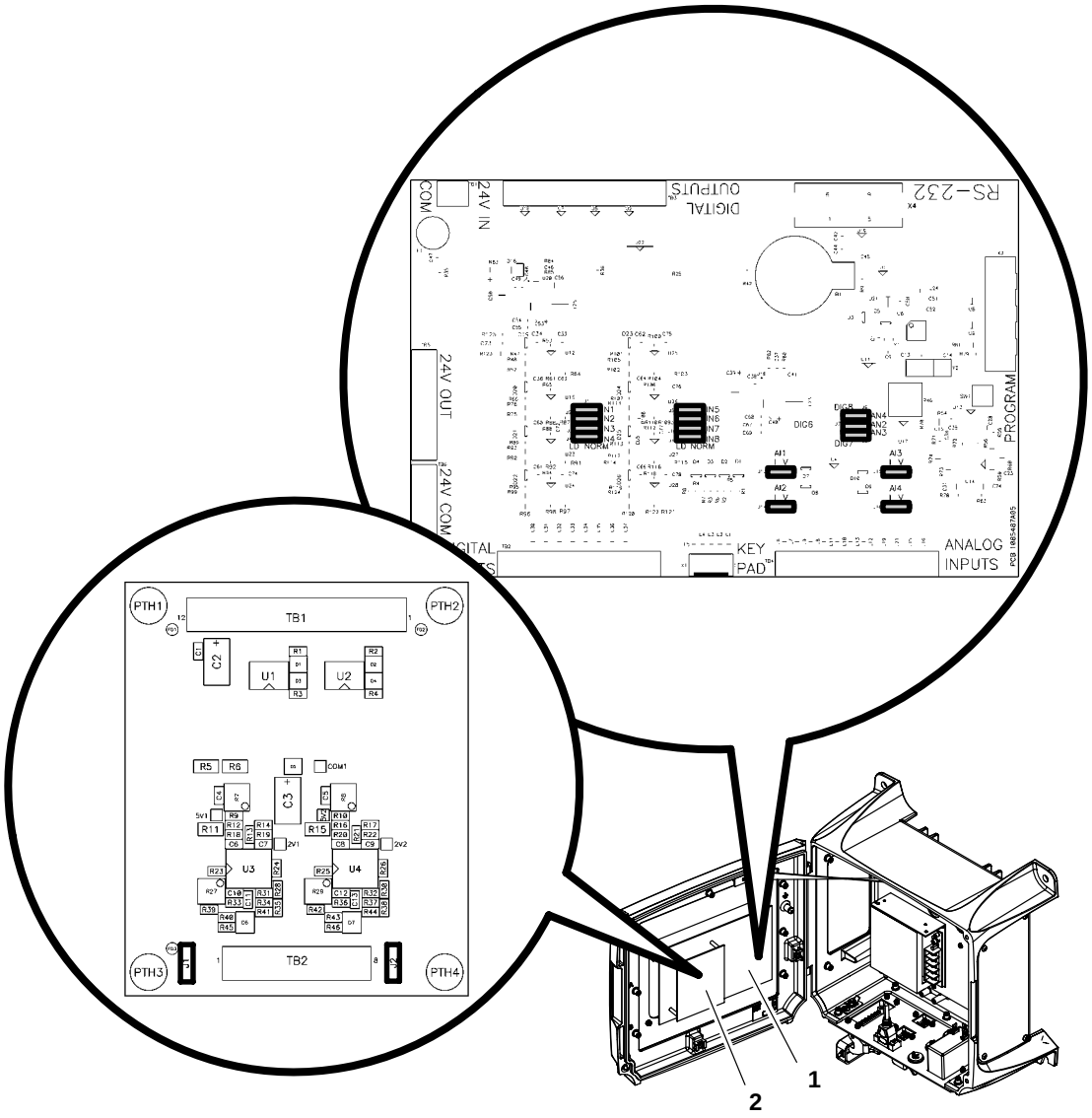


Figure 8 Location of the configuration switches on the control board assembly

1. Motherboard
2. Daughterboard

Table 4 Configuration Switch Default Settings

SETTINGS FOR 0–10V I/O

CONFIGURATION SWITCH SETTINGS
FOR ITEM 1:

IN1: NORM
IN2: LD
IN3: LD
IN4: NORM
IN5: NORM
IN6: NORM
IN7: NORM
IN8: NORM
J7: AN2
J8: DIG7
J9: DIG8
AI1: V
AI2: V
AI3: V
AI4: V

CONFIGURATION SWITCH SETTINGS
FOR ITEM 2:

J1: 0–10V
J2: 0–10V

SETTINGS FOR 4–20MA I/O

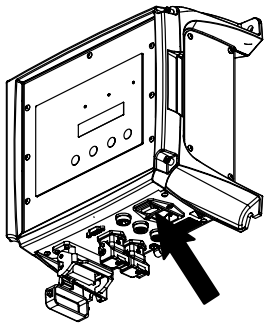
CONFIGURATION SWITCH SETTINGS
FOR ITEM 1:

IN1: NORM
IN2: LD
IN3: LD
IN4: NORM
IN5: NORM
IN6: NORM
IN7: NORM
IN8: NORM
J7: AN2
J8: DIG7
J9: DIG8
AI1: I
AI2: I
AI3: I
AI4: I

CONFIGURATION SWITCH SETTINGS
FOR ITEM 2:

J1: 4–20MA
J2: 4–20MA

View or Change Settings



Power switch

Place the power switch in the on position. The controller/monitor display will go through the startup screens.

The controller/monitor settings may be viewed or changed in two modes: user mode or administrator mode. Use the following procedures to view or change the settings as needed for your application.

To view or reset a parameter in the user mode:

1. Press **PAGE** until the desired parameter is displayed. Refer to Table 5 for the parameters that can be accessed in the user mode.
2. As applicable, press **SET** to reset the parameter value to zero (0).

To view or change a parameter in the administrator mode:

1. Simultaneously press and hold the **Up/Down** arrows for at least 5 seconds.

   The display will briefly flash “Administrator Mode Enabled.”
2. Press **PAGE** until the desired parameter is displayed. Refer to Tables 5 and 6 for the parameters that can be accessed in the administrator mode.
3. If there is only one value for the selected parameter, press the **Up/Down** arrows to scroll to the desired setting.

   If there are multiple values for the parameter, press **SET** until the desired value is displayed, then press the **Up/Down** arrows to scroll to the desired setting.

   NOTE: The word “Set” will appear in front of the value that can be set.
4. Simultaneously press and hold the **Up/Down** arrows for at least 5 seconds to exit the administrator mode.

   The display will briefly flash “Administrator Mode Disabled.”

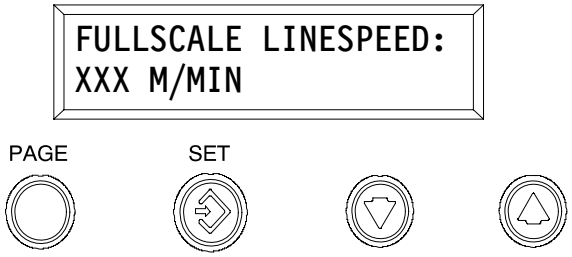


Figure 9 Controller/monitor display and keys

NOTE: Refer to *To view or reset a parameter in the user mode* or *To view or change a parameter in the administrator mode* earlier in this section for the procedures for viewing or changing a parameter.

NOTE: No parameters can be changed in the user mode.

Table 5 TruFlow Controller/Monitor User and Administrator Mode Parameters

Parameter	Function/Description
A– FLOW RATE MG/MIN –B XXX.XX XXX.XX	Displays the adhesive flow rates for channels A and B (as provided through encoder inputs A and B).
A– CONTROLLER MODE –B SPEED RAMP	Displays the line speed status of channels A and B (as provided through customer I/O analog line speed inputs A and B). Values: STOP, RAMP, or SPEED
A– LINE SPEED M/MIN –B XXX XXX	Displays the line speed for channels A and B (as provided through customer I/O analog line speed inputs A and B).
A– MG/PRODUCT –B X.XXX X.XXX	Displays the adhesive amount used per product for channels A and B (as provided through flow command inputs A and B).
A– TOTAL GRAMS –B XXXXX XXXXX	Displays the total adhesive amount used for channels A and B (as provided through the product sensor input and flow command inputs A and B) from the point at which the screen was last reset. Press **SET** to reset the values to zero (0).
PRODUCT COUNT: XXXX	Displays the number of products detected by the product sensor. Press **SET** to reset the value to zero (0).

View or Change Settings *(contd)*

NOTE: Refer to *To view or change a parameter in the administrator mode* earlier in this section for the procedure for viewing or changing a parameter.

Table 6 TruFlow Controller/Monitor Administrator Mode Only Parameters

Parameter (see Note)	Function/Description
CHANNEL B MODE: DISABLED	Used to enable or disable channel B. When channel B is disabled, the pages (screens) related to channel B do not appear. Values: Enabled or Disabled **NOTE:** Channel A is always enabled. **NOTE:** Before channel B can be enabled, the correct channel B connections must be made. Refer to *Make the Electrical Connections* earlier in this section.
LINE SPEED INPUT: ENCODER	Used to select the line speed input source (encoder inputs A and B or customer I/O connector). Values: Encoder, 0–10V, or 4–20 mA **NOTE:** This setting must be same for both channels A and B.
ADH SPECIFIC GRAVITY A= X.XX B= X.XX	Used to enter the specific gravity of the adhesive for channels A and B. Refer to the Technical Data Sheet (TDS) for the adhesive specific gravity. This value is used to calculate the actual flow rate. **NOTE:** These values must be same for both channels A and B.
GEAR CC/REV= XX.XX ENC PULSES/REV= XXXX	Used to enter the flow meter gear pump size in cc/rev and/or the encoder resolution in pulses per revolution (10,000 Hz maximum). **NOTE:** These values must be same for both channels A and B.
SPD ENCODER GEARING: X.XX PULSES/MM	Used to enter the encoder resolution when an encoder is used for line speed input. **NOTE:** This value must be same for both channels A and B.
NUMBER OF STREAMS: X	Used to enter the number of streams (so that the total adhesive volume displayed reflects the total amount of adhesive applied). **NOTE:** This value must be same for both channels A and B.
NOTE: The parameters outlined in bold are required only if the monitor/controller will be used for controlling purposes.	

Continued...

NOTE: Refer to *To view or change a parameter in the administrator mode* earlier in this section for the procedure for viewing or changing a parameter.

Table 6 TruFlow Controller/Monitor Administrator Mode Only Parameters *(contd)*

Parameter (see Note)	Function/Description
FULLSCALE LINESPEED-A: XXX M/MIN	Used to enter the maximum line speed that corresponds to a 10 VDC or 20 mA signal for channel A. This value is also used in conjunction with the maximum operating flow rate to determine the desired flow rate for a given line speed. **NOTE:** If you are using the controller/monitor in an intermittent application, refer to *To calculate minimum line speed* after this table to determine the minimum line speed at which the TruFlow controller/monitor can be used.
MAX FLOW PER STREAM: CHAN A: XX.X G/MIN	Used to set the desired flow rate at the maximum operating line speed for channel A. **NOTE:** Refer to *To calculate maximum operating flow* after this table to determine the maximum operating flow for a bead or slot application.
SPEED PID VALUES-A P:XX I:XX D:XX	Used to adjust the responsiveness level of the melter pump during a steady adhesive output state for channel A.
RAMP PID VALUES-A P:XX I:XX D:XX	Used to adjust the responsiveness level of the melter pump during ramp up and ramp down for channel A.
RAMP MODE THRESHOLD: XXXX MM/SEC2	Used to set an acceleration value that will allow the controller/monitor to distinguish between ramp mode and speed mode. Values: 1–20000 **NOTE:** Refer to *To calculate ramp mode threshold* after this table to determine this value. **NOTE:** This value must be same for both channels A and B.
STOP MODE THRESHOLD: XX M/MIN	Used to set the line speed below which the PID values are not active. Values: 0–500 **NOTE:** This value must be same for both channels A and B.
NOTE: The parameters outlined in bold are required only if the monitor/controller will be used for controlling purposes.	

Continued...

View or Change Settings *(contd)*

NOTE: Refer to *To view or change a parameter in the administrator mode* earlier in this section for the procedure for viewing or changing a parameter.

Table 6 TruFlow Controller/Monitor Administrator Mode Only Parameters *(contd)*

Parameter (see Note)	Function/Description
ENABLE ALARM SPEED: XXXX M/MIN	Used to set the line speed above which alarms will be recognized. Values: 0–1000 **NOTE:** This value must be same for both channels A and B.
ALARM DELAY TIME: XXX SECONDS	Used to set the number of seconds before an alarm will be generated after it is detected. Values: 0–60 (seconds) **NOTE:** This value must be same for both channels A and B.
WARN ON % DEVIATION: XX +/– (%)	Used to set the percentage of error allowed in the PID loop before an alarm will be generated. Value: 0–10 **NOTE:** This value must be same for both channels A and B.
FAULT ON % DEVIATION: XX +/– (%)	Used to set the percentage of error allowed in the PID loop before a fault will be generated. Value: 0–20 **NOTE:** This value must be same for both channels A and B.
TIME: XX:XX DATE: XX/XX/XXXX	Used to set the date and time. Time is entered in a 24-hour format.
SERIAL PORT PACKAGE: FULL DATA	Used to select the desired serial port package. Values: CHANNEL A GRAPHING = graphing package for channel A CHANNEL B GRAPHING = graphing package for channel B FULL DATA = full serial port data package
NOTE: The parameters outlined in bold are required only if the monitor/controller will be used for controlling purposes.	

Continued...

NOTE: Refer to *To view or change a parameter in the administrator mode* earlier in this section for the procedure for viewing or changing a parameter.

Table 6 TruFlow Controller/Monitor Administrator Mode Only Parameters *(contd)*

Parameter (see Note)	Function/Description
FULLSCALE LINESPEED-B: XXX M/MIN	Used to enter the maximum line speed that corresponds to a 10 VDC or 20 mA signal for channel B. This value is also used in conjunction with the maximum operating flow rate to determine the desired flow rate for a given line speed. **NOTE:** If you are using the controller/monitor in an intermittent application, refer to *To calculate minimum line speed* after this table to determine the minimum line speed at which the TruFlow controller/monitor can be used. **NOTE:** This page appears only when channel B is enabled
MAX FLOW PER STREAM CHAN B: XX.X G/MIN	Used to set the desired flow rate at the maximum operating line speed for channel B. **NOTE:** This page appears only when channel B is enabled
SPEED PID VALUES-B P:XX I:XX D:XX	Used to adjust the responsiveness level of the melter pump during a steady adhesive output state for channel B. **NOTE:** This page appears only when channel B is enabled
RAMP PID VALUES-B P:XX I:XX D:XX	Used to adjust the responsiveness level of the melter pump during ramp up and ramp down for channel B. **NOTE:** This page appears only when channel B is enabled
NOTE: The parameters outlined in bold are required only if the monitor/controller will be used for controlling purposes.	

To calculate minimum line speed

If the TruFlow controller/monitor is used in an intermittent application, there is a minimum speed at which the controller/monitor can be used to provide feedback to the melter. Use the following formula to calculate the minimum speed:

$$MLS = 0.6 \times GL$$

Where:
MLS = minimum line speed (m/min)
GL= gap length (mm)

To calculate maximum operating flow

Use the following formulas to calculate the maximum operating flow for a bead or slot application. For other applications, contact your Nordson representative for assistance.

Bead:

$$MOF = \frac{\{0.3 \times \pi \times D_2 \times L \times \rho \times PPM\}}{4000}$$

Where:
MOF = maximum operating flow (gm/min)
D = diameter of bead (mm)
L = length of bead (mm)
ρ = density of adhesive (gm/cm^3)
PPM = products per minute

Slot:

$$MOF = LS \times GSM \times w$$

Where:
MOF = maximum operating flow (gm/min)
LS = line speed (m/mm)
GSM = grams per square meter (gsm^2)
w = width of patter (m)

To calculate ramp speed threshold

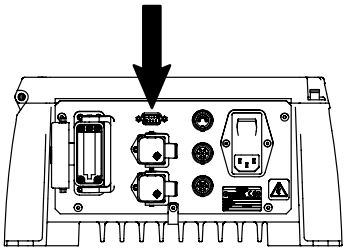
Use the following formula to calculate the ramp speed threshold value:

$$a = \frac{1000 \times LS}{60 \times t_R} - 100$$

Where:
a = acceleration (mm/sec^2)
LS = line speed (m/min)
t_R = ramp time in seconds (s)

Monitor Adhesive Flow

The TruFlow controller/monitor can be used to view active and/or desired material flow rates in real time. The desired flow rate is displayed only if the line speed input, maximum flow rate, and full-scale line speed are entered.



TruFlow controller/monitor serial port

Monitor Flow Rate Using a Computer

1. Connect the computer serial cable to the TruFlow controller/monitor.
2. Change the TruFlow controller/monitor setting for SERIAL PORT PACKAGE to one of the following:
   - CHANNEL A GRAPHING
   - CHANNEL B GRAPHING

   NOTE: Refer to *View or Change Settings* under *Installation* to change the TruFlow controller/monitor settings.
3. On the computer, open a serial graphing utility software application. Select the appropriate COM port and select 38400 as the Baud rate.

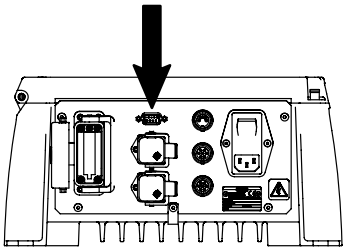
   NOTE: If you are using the monitor/controller to monitor actual flow only (e.g., there is no desired flow) and the line representing actual flow is a straight line at the top of the graph, raise the value on the corresponding MAX FLOW PER STREAM page on the monitor/controller until the graph can be properly seen. Refer to *View or Change Settings* under *Installation* as needed to change the TruFlow controller/monitor settings.

   NOTE: You can obtain a free serial graphing utility on the Internet. Serial Grapher by P & E Microcomputer Systems is an example of a serial graphing utility.

Collect Data Using a Computer

The raw data from the TruFlow controller/monitor can be saved to a computer to be processed and analyzed using the TruFlow AutoFormat Macro.

NOTE: Microsoft Excel is required to run the TruFlow AutoFormat Macro.



TruFlow controller/monitor serial port

1. If you have not already done so, obtain the TruFlow AutoFormat Macro.xls file. Contact your Nordson representative for assistance as needed.
2. Connect the computer serial cable to the TruFlow controller/monitor.
3. Before collecting data, press **SET** for the following parameters to reset the counter:
   - A- TOTAL GRAMS -B
   - PRODUCT COUNT

   NOTE: Do not press SET while data is being collected—doing so will cause the data output to reset.
4. Change the TruFlow controller/monitor setting for SERIAL PORT PACKAGE to FULL DATA.

   NOTE: Refer to *View or Change Settings* under *Installation* to change the TruFlow controller/monitor settings.
5. See Figure 10. On the computer, open the HyperTerminal software application.

   When opened, the HyperTerminal software will prompt you to create a new connection.

   NOTE: HyperTerminal is bundled with all Microsoft Windows operating systems from Windows 95 up to and including Windows XP. It is not included with Windows Vista or Windows 7 operating systems.

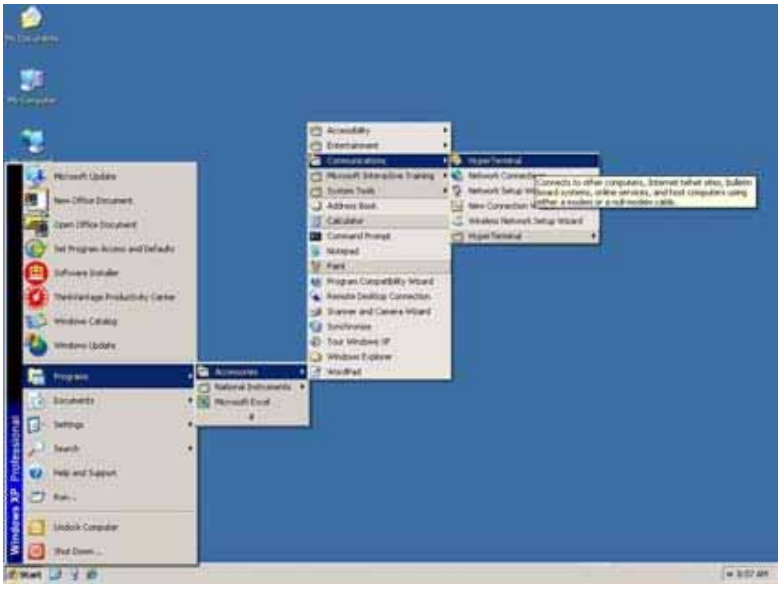


Figure 10 Opening HyperTerminal

6. See Figure 11. Enter **TruFlow** for the name of the new connection, choose an icon, and click on OK.

   A new dialog box will be displayed.

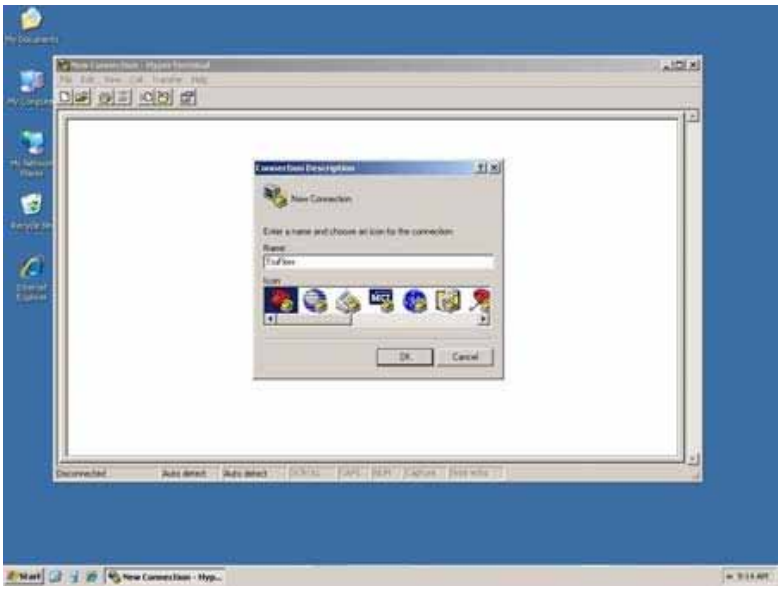


Figure 11 Entering the connection name

7. See Figure 12. Under the Connect Using drop-down menu, select the appropriate COM port.

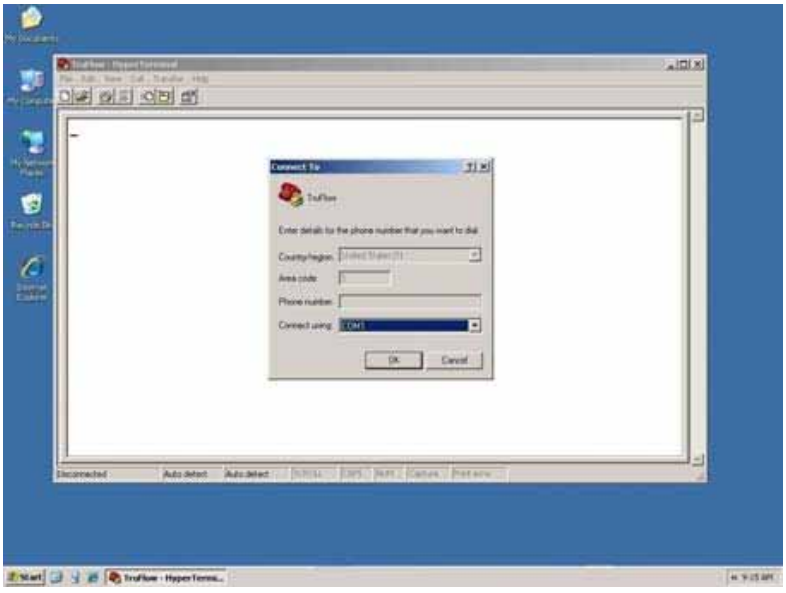


Figure 12 Selecting the COM port

Collect Data Using a Computer *(contd)*

8. See Figure 13. Set the Bits Per Second to 38400 and click on OK.

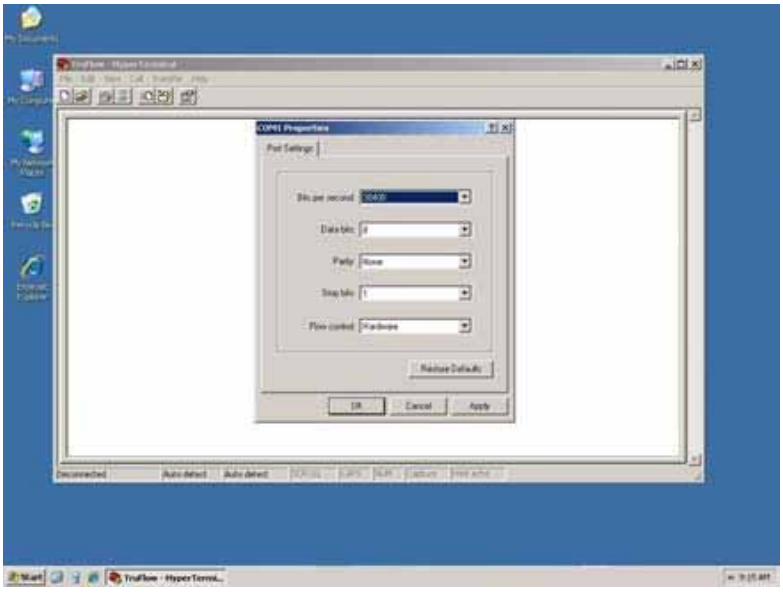


Figure 13 Setting the BPS

9. Follow these steps to begin data collection in HyperTerminal:

   a. Select the Transfer tab.

   b. Click on Capture Text.

   c. Name the text file, then click on Start.

   Data collection will begin. Data can be collected for a maximum time of 1 hour and 40 minutes. All data must be collected within this time frame.

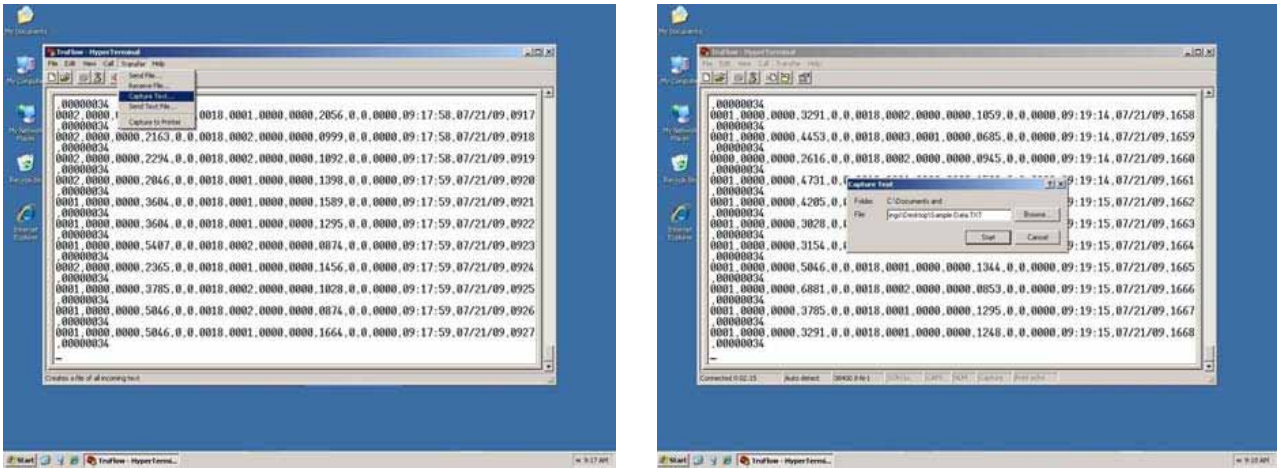


Figure 14 Data collection

10. See Figure 15. To stop data collection and complete the text file, select the Transfer tab and then click on Capture Text > Stop.

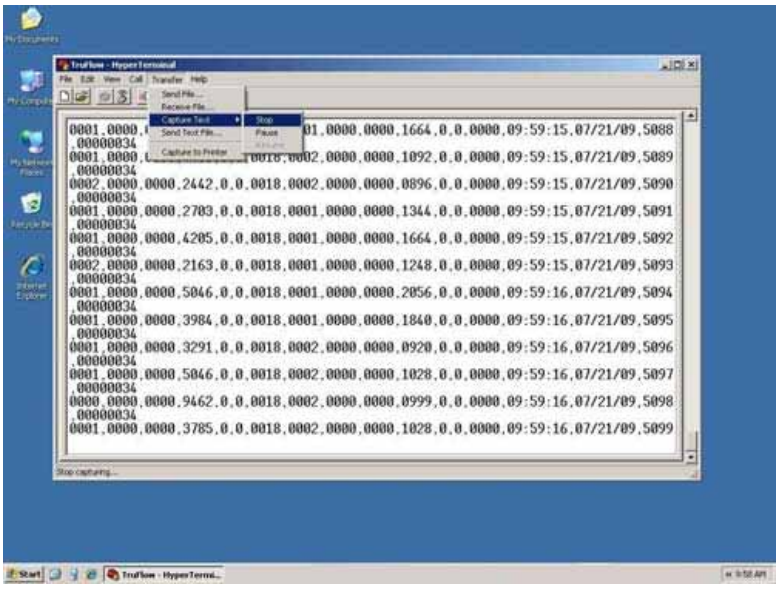


Figure 15 Stopping data collection

11. See Figure 16. To process the text file, open the Excel file titled TruFlow AutoFormat Macro.xls and enable all macros by clicking on the appropriate button when prompted.

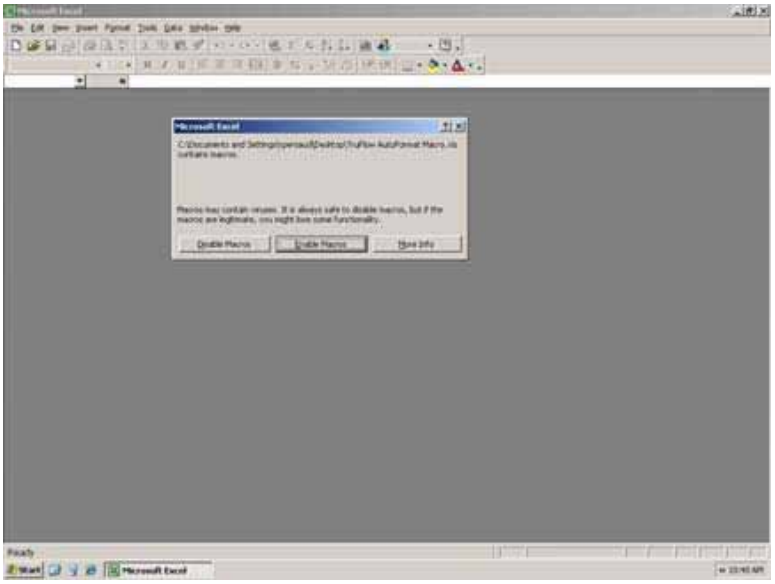


Figure 16 Opening the TruFlow AutoFormat Macro.xls file

Collect Data Using a Computer *(contd)*

12. See Figure 17. Navigate to the directory that contains the saved text file and open the file.

    The macro will process the data and then open a window.

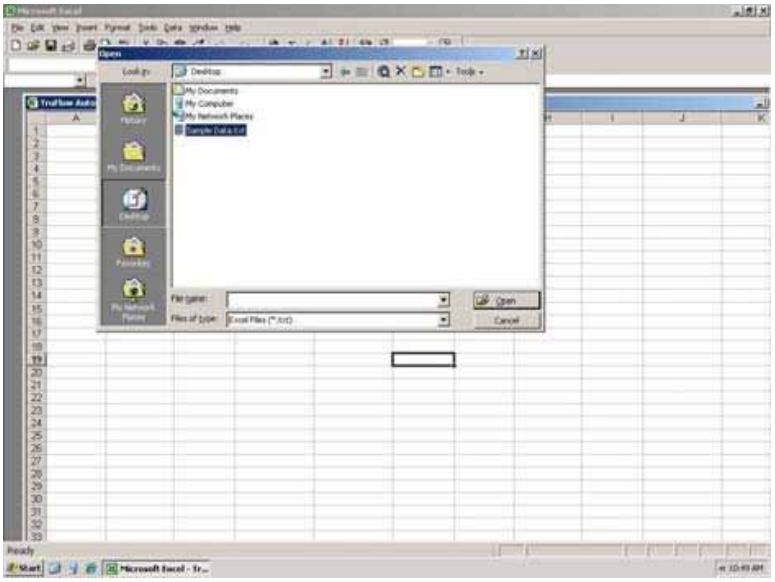


Figure 17 Opening the data file

13. When the window showing the processed data opens, save the newly created Excel file.

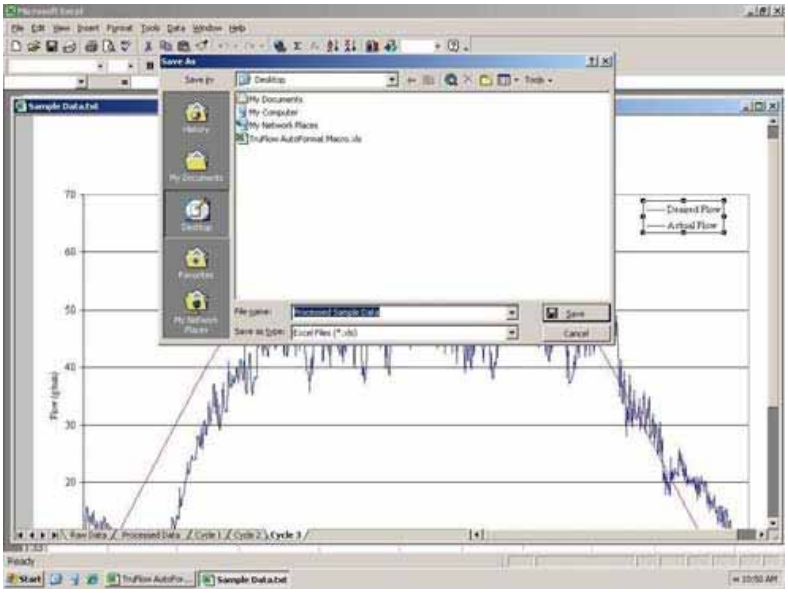


Figure 18 Saving a processed data file in Excel

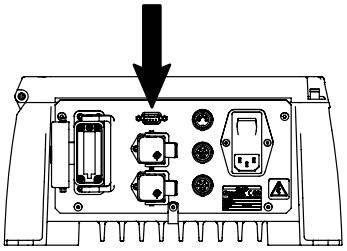
14. To process another file, press **Ctrl** + **T** to restart the macro to open another file.

Manually Tune PID Settings (For Controlling Only)

CAUTION! This procedure is provided as a guideline only. The PID settings for each application will differ. Exact values cannot be provided.

Follow this procedure to use the TruFlow controller/monitor to regulate flow from the melter. This is accomplished by fine-tuning the ramp and speed PID (proportional, integral, derivative) settings that control the level of responsiveness of the actual flow rate to the desired flow rate during ramp mode and speed mode.

NOTE: An intermittent pattern will have different PID values than a continuous pattern with the same monitor/controller inputs.



TruFlow controller/monitor serial port

1. Connect the computer serial cable to the TruFlow controller/monitor.
2. Change the TruFlow controller/monitor setting for SERIAL PORT PACKAGE to one of the following, as applicable:
   - CHANNEL A GRAPHING
   - CHANNEL B GRAPHING
3. Open the serial graphing utility on your computer and enter the correct parameters to detect the data (refer to *Collect Data Using a Computer* earlier in this section) so that the visual feedback is immediate, which will assist in manual tuning.
4. On the TruFlow monitor/controller, set the **I** and **D** values to zero (0).

   NOTE: These steps are for one set of PIDs at a time (for example, the SPEED PID VALUES parameter for channel A contains one set of PIDs, and the SPEED PID VALUES parameter for Channel B contains another set of PIDs). Refer to *View or Change Settings* under *Installation* as needed to change the TruFlow controller/monitor settings.

Manually Tune PID Settings (For Controlling Only) *(contd)*

5. Increase the **P** values until the actual flow oscillates around the setpoint (as viewed on the serial graphing utility). Then set **P** to approximately half of that value.

   NOTE: This is referred to as a quarter amplitude decay-type response.

6. Increase **I** until any offset is correct for the process. Too much **I** will cause instability.

7. As required, increase **D** until the actual flow responds quickly enough to reach its reference after a load disturbance.

   NOTE: Too much **D** will cause excessive response and overshoot. A fast PID response usually overshoots slightly to reach the setpoint more quickly, but some systems cannot accept overshoot, in which case the system will require a **P** setting that is significantly less than half that of the **P** setting that is causing oscillation. Table 7 shows the effects of fine-tuning PID settings.

Table 7 Effects of Changing the PID Settings

Parameter	Rise Time		Overshoot		Settling Time		Error at Equilibrium	
	↑	↓	↑	↓	↑	↓	↑	↓
P	Decrease	Increase	Increase	Decrease	Small change	—	Decrease	Increase
I	Decrease	Increase	Increase	Decrease	Increase	Decrease	Eliminate	Increase
D	Indefinite (small decrease or increase)	—	Decrease	Increase	Decrease	Increase	—	—

Maintenance

Table 8 provides recommended maintenance activities and a schedule for performing those activities. Base how often you perform maintenance on your operating conditions.

Table 8 Recommended Maintenance

Activity	Interval	Procedure
Inspect for external damage	Daily	When damaged parts pose a risk to the operational safety of the unit and/or safety of personnel, switch off the system and have the damaged parts replaced by qualified personnel. Use only original Nordson spare parts.
Clean the exterior	Daily	Remove dust, flakes, etc. with a vacuum cleaner or a soft cloth. Do not damage or remove warning labels. Replace any damaged or removed warning labels.

Troubleshooting

Troubleshooting begins when the flow of adhesive from the applicator stops or diminishes unexpectedly or when a control system alerts you of a problem through an alarm or visual display. This section covers only the most common problems you may encounter. If you cannot solve a problem with the information given here, contact your local Nordson representative for help.

For additional troubleshooting information, refer to the manuals provided with the other equipment used in the hot melt system.

TruFlow Controller/Monitor Alarm Troubleshooting

Alarm	Cause	Corrective Action
WRITE TO FLASH MEMORY FAILED!	Bad memory	Cycle the power. If this alarm persists, replace the controller/monitor.
LINE SPD A UNPLUGGED	No line speed input detected for channel A (4–20 mA input signal only)	Check the electrical connections. Refer to *Make the Electrical Connections* under *Installation*.
LINE SPD B UNPLUGGED	No line speed input detected for channel B (4–20 mA input signal only)	Check the electrical connections. Refer to *Make the Electrical Connections* under *Installation*.
CHAN A FLOW WARNING	Flow error for channel A is greater than the value entered for WARNING ON % DEVIATION.	Check your settings. Refer to *View or Change Settings* under *Installation*.
CHAN B FLOW WARNING	Flow error for channel B is greater than the value entered for WARNING ON % DEVIATION.	Check your settings. Refer to *View or Change Settings* under *Installation*.
CHAN A FLOW FAULT PRESS ´SET´ TO CLEAR	Flow error for channel A is greater than the value entered for FAULT ON % DEVIATION.	Press SET to clear the fault. Correct the cause of the fault or check your settings. Refer to *View or Change Settings* under *Installation*.
CHAN B FLOW FAULT PRESS ´SET´ TO CLEAR	Flow error for channel B is greater than the value entered for FAULT ON % DEVIATION.	Press SET to clear the fault. Correct the cause of the fault or check your settings. Refer to *View or Change Settings* under *Installation*.

Adhesive Flow Troubleshooting

Problem	Possible Cause	Corrective Action
1. Adhesive flow rate too high (about twice the normal rate)	Configuration switch IN2 or IN3 set to NORM	Set configuration switch IN2 or IN3 to LD. Refer to *Check the Configuration Switch Settings* under *Installation* to ensure that the configuration switch settings are correctly set for a 0–10 VDC or 4–20 mA input signal, as applicable.
2. Adhesive flow rate is 0 (input never changes state)	Configuration switch IN2 or IN3 set to LD	Set configuration switch IN2 or IN3 to NORM. Refer to *Check the Configuration Switch Settings* under *Installation* to ensure that the configuration switch settings are correctly set for a 0–10 VDC or 4–20 mA input signal, as applicable.
3. Analog readings stuck at or near full scale setting	Configuration switch AI set to V	Set the configuration switch AI to I. Refer to *Check the Configuration Switch Settings* under *Installation* to ensure that the configuration switch settings are correctly set for a 0–10 VDC or 4–20 mA input signal, as applicable.
4. Burning resistor odor or readings higher than expected	Configuration switch AI set to I	Set the configuration switch AI to V. Refer to *Check the Configuration Switch Settings* under *Installation* to ensure that the configuration switch settings are correctly set for a 0–10 VDC or 4–20 mA input signal, as applicable.
5. Analog readings stuck at 0 or some other value	Configuration switch DIGx/ANx set to DIGx	Set the configuration switch DIGx/ANx to ANx. Refer to *Check the Configuration Switch Settings* under *Installation* to ensure that the configuration switch settings are correctly set for a 0–10 VDC or 4–20 mA input signal, as applicable.
6. Channel A or B encoder line speed input stuck at 0	Configuration switch DIGx/ANx set to ANx	Set the configuration switch DIGx/ANx to DIGx. Refer to *Check the Configuration Switch Settings* under *Installation* to ensure that the configuration switch settings are correctly set for a 0–10 VDC or 4–20 mA input signal, as applicable.

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Control Panel Board Assembly Replacement

WARNING! Risk of electrocution! Disconnect and lock out electrical power to the equipment. Failure to properly disconnect power can result in personal injury, including death.

1. Place the controller/monitor power switch in the off position and disconnect and lock out power to the controller/monitor.

See Figure 19.

2. Remove the four screws that secure the control panel board assembly and then remove the assembly.
3. Disconnect all power and control cables from the board assembly.

CAUTION! Before removing the new board assembly from its anti-static bag, ground yourself by touching any bare metal part of the equipment chassis or any grounded structure. Failure to properly ground yourself can cause electrostatic discharge, resulting in damage to the board assembly.

4. Connect the power and control cables to the new board assembly and secure the assembly to the controller/monitor with the screws removed previously.
5. Restore power to the controller/monitor and switch the controller/monitor on. Verify that the controller/monitor starts normally. Refer to *View or Change Settings* under *Installation* to change settings as needed.

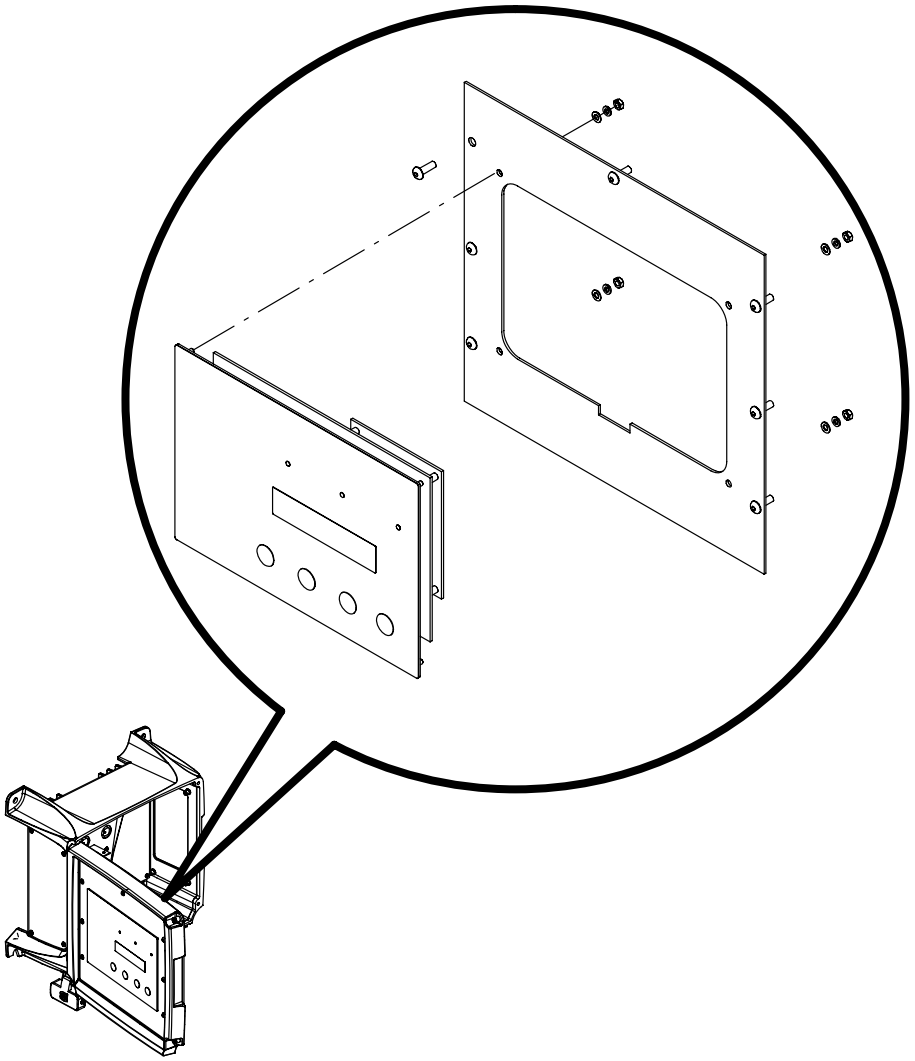

Figure 19 Replacing the control panel board assembly

Parts

See Figure 20.

Item	Part	Description	Quantity	Note
—	1097469	ASSY,TRUFLOW UNIT	—	
1	1097906	• PCA, UNIVERSAL CONTROLLER, TRUFLOW	1	
2	1089693	• POWER SUPPLY,24V,2.5A,60W,PNL-MNT	1	
NS	1096725	• CABLEASSY,DSUB,9POS,M/F,2.5FT,SHLD, REV	1	
NS	1023676	• CABLE,PWR,3-COND,IEC,9FT10-IN, BR/BLU/G-Y	1	
NS: Not Shown				

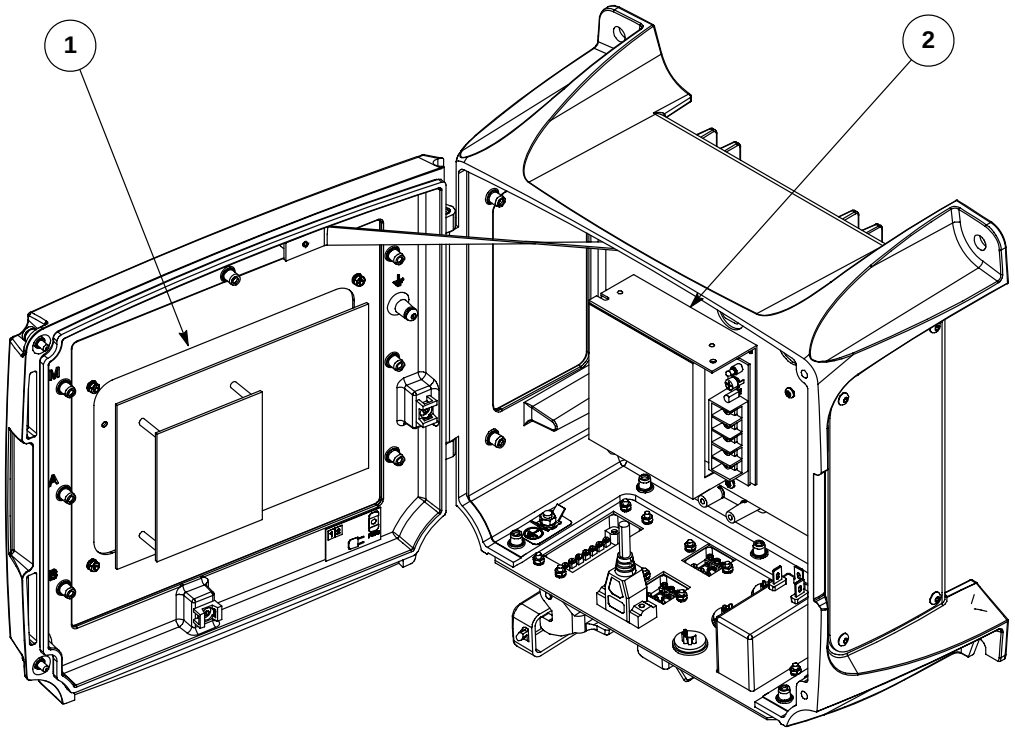

Figure 20 Universal TruFlow controller/monitor parts

Technical Data

Specifications

Operating Conditions

Item	Specification
Ambient temperature range	0–40 °C (32–104 °F)
Enclosure rating	IP32
Humidity	5–95% non-condensing

Electrical

Item	Specification
Line voltage	100–240 VAC, 50/60 Hz, 1.3 A maximum
Analog line speed inputs	0–10 VDC analog line speed inputs: Input impedance: 7.2K ohms Maximum allowable input voltage: 20 V 4–20 mA analog line speed inputs: Input impedance: 162 ohms Maximum allowable input current: 25 mA
Analog output signal	0–10 VDC analog outputs: Output load (minimum): 500 ohms 4–20 mA analog outputs: Output load (maximum): 250 ohms
Encoder input, line speed, or flow meter	10,000 Hz maximum Type: NPN or PNP Input impedance: 10K ohms
Product sensor input	Type: NPN or PNP Input impedance: 10K ohms **NOTE:** Line driver inputs are supported by changing the setting for configuration switch IN1 from NORM to LD. Refer to *Check the Configuration Switch Settings* under *Installation*.)
Fault and warning outputs	Type: NPN (sinking output) Maximum current per output: 0.5 A Maximum current for all outputs combined: 0.6 A

Dimensions

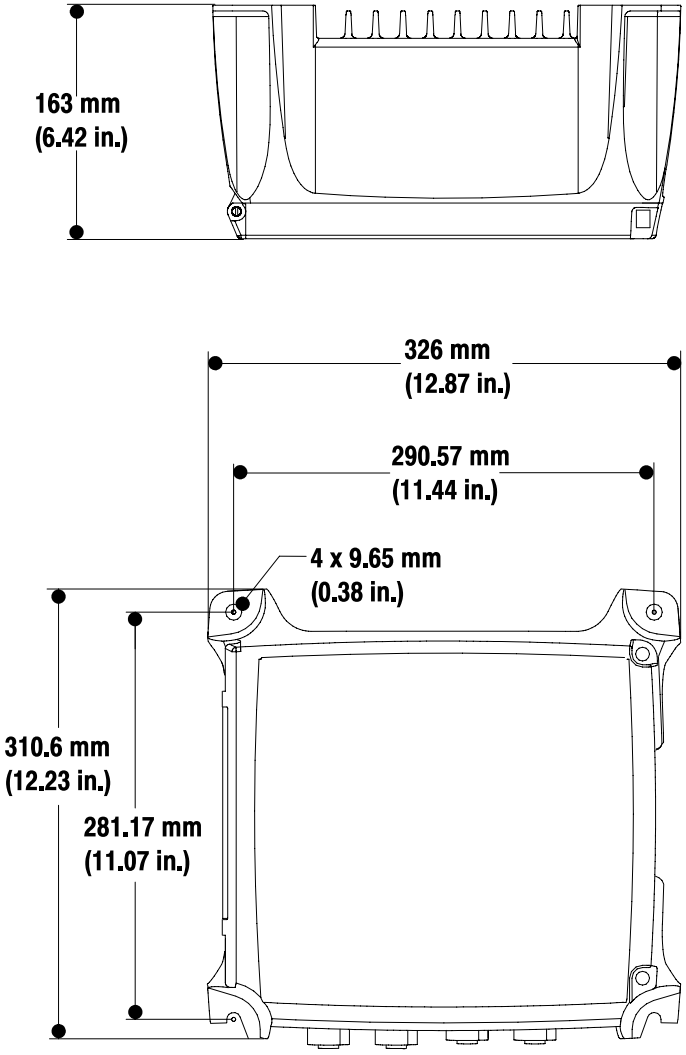

Figure 21 TruFlow controller/monitor dimensions

Schematic

The following schematic is provided for your reference as needed.

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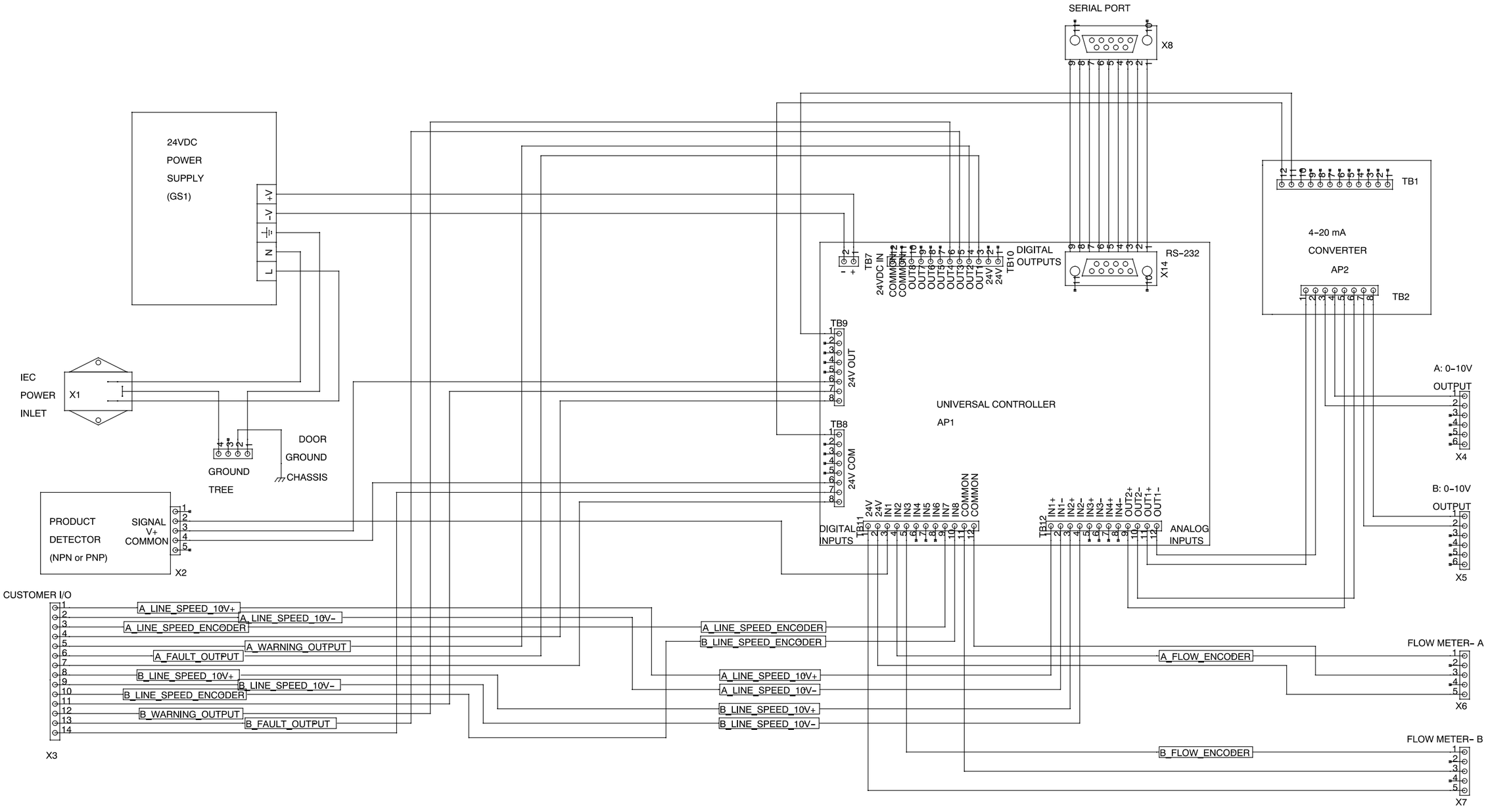

Figure 22 Schematic

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