

CPT-1 Product Manual



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1. System Recommendations

1.1 Precautions

DO NOT OPEN CONTROL BOX
Do not open up the control box. White Knight is not responsible for any damage caused by opening the control box.
Grounding
All electrical components must be ground to minimize risk of sparks. Follow proper procedures for grounding all products in the system.

1.2 System Environment Recommendations/Requirements

Environmental Temperature
This product is rated to withstand environmental temperatures up to 70°C.

1.3 Getting Started

Installing the CPT-1 for the first time it is recommended that you follow these steps:

- 1) Verify that you received all of the components that you ordered. Note: cables and breakout board for the controller are options that can be selected at the time of purchase.
- 2) Check that you have a compatible power supply to power the controller. See Section 4.1
- 3) Check that you have a compatible communication cable for setting up the controller. See Sections 4.2 and 4.3
- 4) Download the setup software from www.wkfluidhandling.com/cpt-1.
- 5) Verify that your computer is able to connect to the controller.
 - a) Power up the controller with correct power source
 - b) Connect the communication cable correctly. (Ethernet cables should go from the controller to a network switch, not your PC)
 - c) Install and launch the Smart Control Software.
 - d) The connections dialog should appear at launch. Verify that your controller appears on the list and click the connect button. See Section 7
 - e) Once connectivity is verified disconnect from the software, and disconnect power and communication cable.
- 6) Install CPT-1 in the desired location.
- 7) Connect 44-pin connector and use the wiring guide in Section 5 to connect system.
- 8) Connect to controller (same as before) and configure the CPT-1 settings to match your system needs.

2 Parts List

Part list by configuration options:

Part Numbers	Description	Quantity of parts for each configuration callout				
		CPT-1	-W	-S	-Q	-P
8600-XX-0011	Translator Controller	1				
8600-XX-0020	2 Pin Molex Connector	1			-1	
8600-XX-0021	Molex Crip Pin	2			-2	
8600-XX-0013	44 Pin Cable to Wire Leads		1			
8600-XX-0018	Screw Terminal Breakout Board			1		
14910-XX-0007	Controller Power Jumper Assembly				1	
8600-XX-0061	44 Pin Quick Connection Board				1	
8600-XX-0063	2 Pin Quick Connector				1	
8600-XX-0064	4 Pin Quick Connector				16	
10010-NY-0002	#4-40 ½" Thumb Screw				2	
8600-XX-0015	24 VDC Power Supply					1

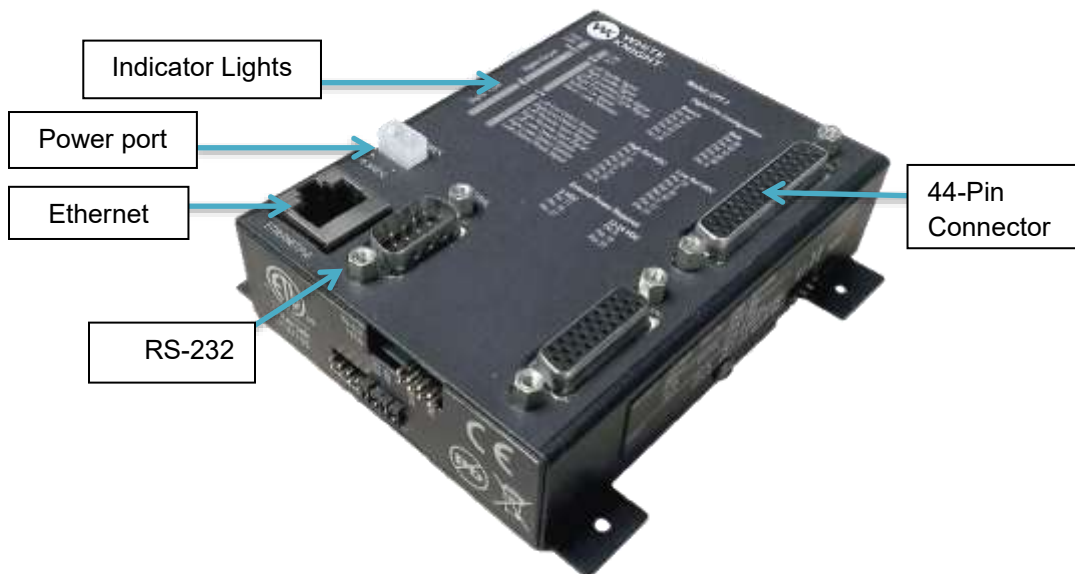
2.1 CPT-1 Cycle Rate Translator

The CPT-1 control box is a small I/O communication device that converts the pump's cycle rate to the cycle rate that works with the tool's algorithm. The control box has:

- 44-pin HD D-Sub Connector: Sends and receives digital signals.
- Indicator Lights: Show when each digital signal is active.
- Power Port: Takes 18-36 VDC input to power the controller.
- Ethernet Connector: This is used by the setup software to configure the controller.
- RS 232 serial communication: This is an alternate method of connecting to configure the controller.

Figure 1 shows an image of the WK CPT-1 controller with the above features labeled.

Figure 1: The CPT-1 Controller and communication ports.



2.2 Power Adapter with Crimp Pins



2.3 Cable: 44-Pin HD D-Sub to Wire Leads



2.4 Breakout Board: 44-Pin HD D-Sub to Screw Terminal



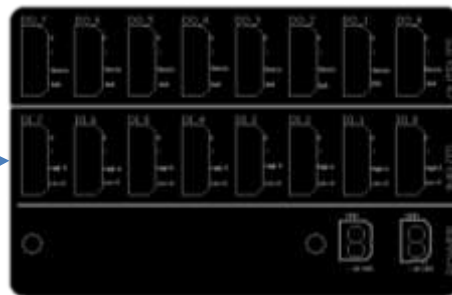
2.5 Din Rail Power Supply



2.6 Quick Connect: 44-Pin HD D-Sub to Connectors

(Pin reference start at one from top as shown in image below)

- Digital Output Connector:**
- Pin 1: 24 VDC Power
 - Pin 2: Ground
 - Pin 3: High Reference (NPN Type) Input
 - Pin 4: Low Reference (PNP Type) Input



- Digital Output Connector:**
- Pin 1: 24 VDC Power
 - Pin 2: Ground
 - Pin 3: Source (PNP Type) Output
 - Pin 4: Sink (NPN Type) Output

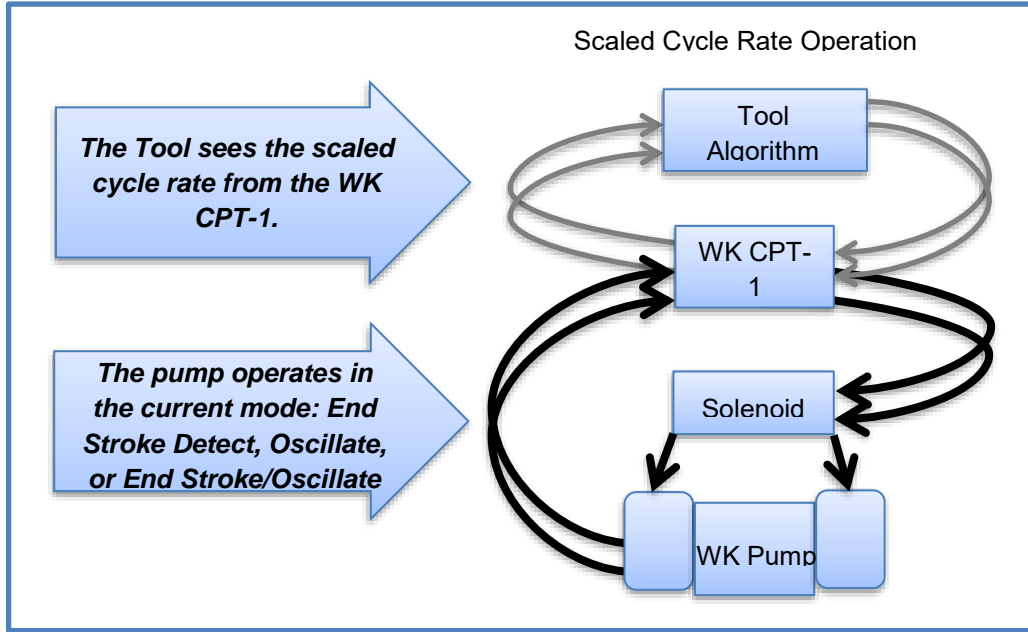
- Power Connector:**
- Pin 1: Ground
 - Pin 2: 24 VDC Power

3 System Overview

The CPT-1 has been designed to be an interface between the tool's algorithm and a pneumatic pump. This interface is needed when inserting an alternate pump into an existing tool; frequently the alternate pump will have a different cycle rate than the previous pump which may cause the tool to alarm out.

The CPT-1 is able to operate the pneumatic pump at the cycle rate that is optimal for the pump. Then, the CPT-1 will scale the pump's cycle rate by a factor set by the user and send the scaled cycle rate back to the tool. The CPT-1 can be configured to work with any system setup.

Figure 2: Illustration of how the CPT-1 maintains two separate communication loops. The CPT-1 will run the pump and calculate its cycle rate (shown with black arrows). The CPT-1 will scale the cycle rate and communicate the scaled cycle rate back to the tool (shown with gray arrows)



4 Power and Communication

4.1 Powering the CPT-1

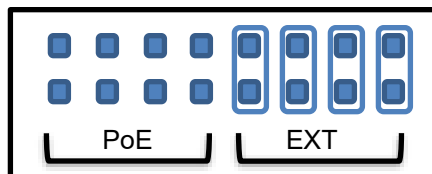
There are two methods of powering the CPT-1: 18-36 VDC power connector and Power over Ethernet (PoE). By default the CPT-1 is setup to use the external power adapter. Simply connect an appropriate DC power to the connector as shown in Figure 3.

Figure 3: External power connector.



To setup PoE, find the jumpers labeled EXT and PoE on the bottom face of the controller. See figure 4. Move the jumpers from EXT to PoE locations. POE can now be used.

Figure 4: External power/Power over Ethernet selection jumpers. Shown in figure is the default setup supporting external power



4.2 Ethernet Connection:

The Ethernet connection is available for PC to CPT-1 communications. These communications are available for setting up the software, and for on screen controls. After the controller has been setup the settings can be saved and disconnected to be run as a standalone unit. The CPT-1 uses two industry standard Ethernet connection protocols TCP/IP and UDP/IP, the controller will automatically respond in the format in which it is connected. When connecting to the WK Controller to a local network. The WK Controller will look to the server to assign it an IP address; this is supported on both DHCP and BOOT-P server protocols.

4.3 RS-232 Connection:

An RS-232 connection can be created through the 9 pin serial port on the box. When opening the software the RS-232 port will show as a COM port and will give two baud rate options, 19200 and 115000. The default baud rate is 115000, however the slower 19200 baud rate can be selected by placing a jumper on the connection labeled 19.2 on the upper right side of the control box.

5 Digital I/O Setup

5.1 Power Digital Ports

The digital ports are not powered by the controller. An external power supply is required for the digital ports to be active. Use Table 1 for digital port power connections.

Table 1: Wire connections for powering the digital ports. All ports should be connected

Pin Name	Pin #	Wire Color	Designation	Levels	Notes
Power: Source Outputs	15	Red/ Black Stripe	Power Source	12-24 VDC	The voltage input into these pins power all of the source type outputs. * The voltage input will equal the voltage output from these ports.
	27	Red/ White Stripe	Ground Reference	0 VDC	
Power: Sink Outputs	8	Green	Power Source	12-24 VDC	The voltage input into these pins will power the sink type outputs.
	11	Orange	Ground Reference	0 VDC	
Power: Input High	37	Violet/ Red Stripe	Reference Voltage High	12-24 VDC	The Voltage input into this pin will be the reference for all digital high inputs.
Power: Input Low	19	Orange/ Black Stripe	Reference Voltage Low	0 VDC	The Voltage input into this pin will be the reference for all digital low inputs.

* Note: When using the quick connection board simply connect power to one of the power ports, then power will be distributed to all of the correct locations. See markings on the board for power and ground pins. The second power port is to jumper power to the controller.

5.2 Digital Inputs:

Each digital input can be wired into either a high or low voltage reference see Table 2.

Table 2: List of all digital input connections with a description of behaviors

Pin Name	Pin #	Wire Color	Designation	Levels	Note
Digital Input: Remote Left [DI_2]	36	Yellow/ Red Stripe	High VDC Reference	24 V = Not Active 0 V = Active	<p>When one of these connections becomes active, the CPT-1 will turn on and start controlling the pneumatic pump. Disconnect the left and right inputs from the shuttle and connect these signals to the appropriate high or low voltage reference on the CPT-1.</p> <p>The left end detect is used to count each full cycle. If using a shuttle-operated pump, connect a pressure switch or end detect sensor to the left end detect signal.</p> <p>If using a solenoid valve-operated pump, connect both the left and right end detect sensors such that the signal is active when the sensor is triggered.</p> <p>For systems that do not support a leak detect function to turn off the pump when leaks are detected, leak detect signals can be brought into these digital inputs. When the leak detect signal is active, the CPT-1 will stop the pump and wait for the reset signal before the pump will restart.</p> <p>When alarms are enabled: leak detect, or speed alarms it is recommended that the alarm reset signal is connected. This can be wired into the tool or to a physical button located near the pump. f</p>
	18	Green/ Black Stripe	Low VDC Reference	0 V = Not Active 24 V = Active	
Digital Input: Remote Right [DI_3]	6	Blue	High VDC Reference	24 V = Not Active 0 V = Active	
	32	Gray/ Red Stripe	Low VDC Reference	0 V = Not Active 24 V = Active	
Digital Input: End Detect Left (Full Cycle Signal) [DI_0]	7	Brown	High VDC Reference	24 V = Not Active 0 V = Active	
	33	Light Green/ Red Stripe	Low VDC Reference	0 V = Not Active 24 V = Active	
Digital Input: End Detect Right [DI_1]	22	Gray/ Black Stripe	High VDC Reference	24 V = Not Active 0 V = Active	
	3	Red	Low VDC Reference	0 V = Not Active 24 V = Active	
Digital Input: Leak Detect Left [DI_4]	21	Brown/ Black Stripe	High VDC Reference	24 V = Not Active 0 V = Active	
	2	White	Low VDC Reference	0 V = Not Active 24 V = Active	
Digital Input: Leak Detect Right [DI_5]	35	Pink/ Red Stripe	High VDC Reference	24 V = Not Active 0 V = Active	
	17	Violet/ Black Stripe	Low VDC Reference	0 V = Not Active 24 V = Active	
Digital Input: Alarm Reset [DI_6]	5	Violet	High VDC Reference	24 V = Not Active 0 V = Active	
	31	Blue/ White Stripe	Low VDC Reference	0 V = Not Active 24 V = Active	

5.3 Digital Outputs:

The CPT-1 sends out signals to control or be read by other devices. There are two types of digital outputs, voltage source or a voltage sink. The CPT-1 will turn on both corresponding voltage source and sink when it turns on an output. Generally, components that may have a higher current draw should be connected to the voltage sink.

Table 3: List of digital output wiring with designations

Pin Name	Pin #	Wire Color/ Stripe	Designation	Levels	Note
Digital Output: Left Solenoid [DO_0]	26	Orange/ White Stripe	Sink	Relay Open = Not Active Relay Closed = Active	The CPT-1 will turn on the left and right solenoid signals to control a solenoid-operated pump. If using a shuttle-operated pump these connections are not required.
	44	Light Green/ Green Stripe	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Right Solenoid [DO_1]	40	Red/ Green Stripe	Sink	Relay Open = Not Active Relay Closed = Active	
	14	White/ Black Stripe	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Left Translated Cycle Rate [DO_2]	10	Light Blue	Sink	Relay Open = Not Active Relay Closed = Active	
	29	Brown/ White Stripe	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Right Translated Cycle Rate [DO_3]	25	Pink/ Black Stripe	Sink	Relay Open = Not Active Relay Closed = Active	
	43	Light Blue/ Green Stripe	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: System On [DO_4]	39	Orange/ Green Stripe	Sink	Relay Open = Not Active Relay Closed = Active	This is to indicate that the system is on. This input is required when operating a shuttle pump. However this can also be used as verification that the system is operational.
	13	Pink	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Leak Alarm [DO_5]	9	Gray	Sink	Relay Open = Not Active Relay Closed = Active	This output is to alert the user that a leak was detected.
	28	Violet/ White Stripe	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Over Speed Alarm [DO_6]	24	Light Green/ Black Stripe	Sink	Relay Open = Not Active Relay Closed = Active	This output is to alert the user that the pump was operating faster than the set threshold
	42	Brown/ Green Stripe	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Under Speed Alarm [DO_7]	38	Gray/ Green Stripe	Sink	Relay Open = Not Active Relay Closed = Active	This output is to alert the user that the pump was operating slower than the set threshold
	12	Light Green	Source	Relay Open = Not Active Relay Closed = Active	

5.4 Wiring Configurations

The CPT-1 works within a variety of configurations. Use Table 4 to learn which wiring connections should be connected when setting up the CPT-1. These connections have been divided into 3 sections that need to be selected.

- **Tool Communications** – The tool will need to send a signal to tell the CPT-1 to turn on-off and will need to receive a signal from the CPT-1 for the cycle rate.
- **Pump Type** - The CPT-1 will send signals to open valves to operate the selected pump, and expects to receive end detect signals from the pump.
- **Leak Detection** – In the case where the tool already handles leak errors from a pump, there is no need to connect leak detection to the CPT-1; however, if the tool does not handle leak detection, this can be wired into the CPT-1.

Table 4: Wiring Selection table

Select one column from each section that matches the system configuration, and then use the rows in the table to determine how the system should be wired.

		Tool Communication			Pump Type		Leak Detection**	
		End Stroke Detection	On-Off with Cycle Counter	Cycle Counter Only	Solenoid Pump	Shuttle Pump	Tool	CPT-1
Digital Input	Remote Left	From Tool	From Tool	Hard Wire Active				
	Remote Right	From Tool						
	End Detect Left				From Pump	From Pump		
	End Detect Right				From Pump			
	Leak Detect Left							From Pump
	Leak Detect Right							From Pump
	Leak Reset							From Physical Button or Tool
Digital Output	Left Solenoid				To Solenoid			
	Right Solenoid				To Solenoid			
	Left Translated Cycle Rate	To Tool	To Tool	To Tool				
	Right Translated Cycle Rate	To Tool						
	System On					To Air Valve*		
	Leak Alarm							To Tool or Alarm
	Over Speed Alarm (Optional)						To Tool or Alarm	To Tool or Alarm
	Over Speed Alarm (Optional)						To Tool or Alarm	To Tool or Alarm

* In the case where the tool varies the air pressure to a shuttle-operated pump, there is no need to connect the system on signal to an additional air valve.

** See Pump manual for wire leak detection.

6 PC to CPT-1 Communication:

6.1 Ethernet Connection:

An Ethernet connection is only needed for using the CPT-1 setup software. After the controller has been setup, the settings can be saved and disconnected to be run as a standalone unit. The CPT-1 uses two industry standard Ethernet connections TCP/IP and UDP/IP the controller will automatically respond in the format to which it is connected. When connecting the CPT-1 to a local network, it will look to the server to assign it an IP address. This is supported on both DHCP and BOOT-P server protocols.

6.2 RS-232 Connection:

An RS-232 connection can be created through the 9-pin serial port on the box. When opening the software, the RS-232 port will show as a COM port and will give two baud rate options, 19200 and 115000. The default baud rate is 115000, but the slower 19200 baud rate can be selected by placing a jumper on the connection labeled 19.2 on the upper left side of the control box.

7 Software Setup:

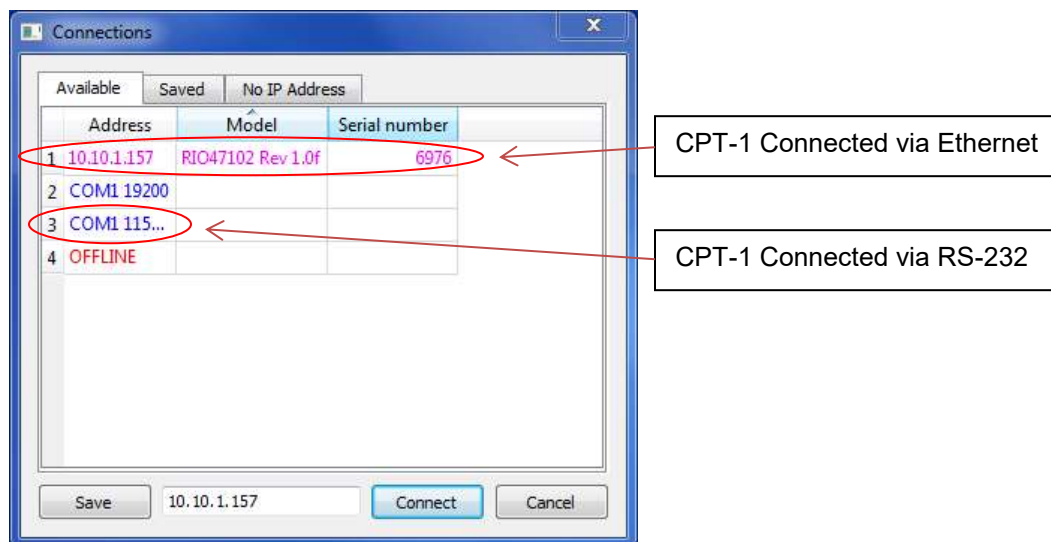
7.1 Installation:

Download the CPT-1 setup software at wkfluidhandling.com/cpt-1. Run the installers by double-clicking on the installer executable (.exe) file, and follow the on screen prompts. Software requires Windows XP or newer version of Windows.

7.2 Using the Software:

1. Open "WK Cycle Rate Translator.exe".
2. Wait for the connections window to show. If you have a CPT-1 connected to the computer via RS-232 or to the network via Ethernet, it will show in the connections window. See Figure 5 for an image of the connections window.

Figure 5: Connections Window



3. Select your controller and click “Connect”. (If the controller does not show, you can click “Cancel” and proceed to the next screen where you can try connecting again.)
4. Wait for the Controls window to show. See Figure 6 for screen shot of controls window.

Figure 6: Controls Window



5. Set the desired controls parameters. See section 7.3 for more information about individual parameters.
6. When done, click “Save Defaults”. Note: if the settings are not saved, new settings will be lost when the controller restarts.

7.3 Software Inputs:

Operation Mode: This controller can control the pump in three ways. To change between operation modes, move the knob to the desired operation mode.

- **Simulation Mode** - Calibration mode runs the pump as a simple timer. Simulation mode has two functions:
 1. **Fiber-optic end stroke detection:** To calibrate the fiber-optic sensors, set a slow cycle rate (Recommended settings 16 CPM at 20-25 PSI). Then, turn on Simulation mode, and calibrate the

fiber-optic sensors. After the fiber-optic sensors have been calibrated, switch the operation mode out of Simulation mode.

2. **System experimentation:** When no pump is connected to the CPT-1 simulation mode can be used to simulate how the system would operate if the pump were running at a set speed. Simulation mode is ideal for testing that the connections are wired correctly, and for verifying how the tool will react to different cycle rates without actually swapping out different pumps.

Warning: Simulation mode should never be used for long term operation of a pump. This will result in premature damage to the pump.

- **End Stroke Mode** – End Stroke mode sends out a signal to open a valve that will cause one side of the pump to pressurize and will wait for an end of stroke signal before switching to the other side. End Stroke mode is recommended for applications where cycle rates may fluctuate due to variance in air supply pressure. When operating a shuttle pump, it is required to use End Stroke mode.
- **End Stroke/Timer** – End Stroke/Timer mode sends out a signal to open a valve that will cause one side of the pump to pressurize and when either the cycle timer or the end stroke is detected then the pressure will switch to the other side. This is a specialized operation mode that is ideal for systems that expect the set cycle rate to occur. This mode will also help protect the pump if an end detect sensor fails. This mode is not for shuttle-operated pumps.

Cycle Rate: The cycle rate sets the default cycle rate. When the system turns on, it will start up with the default cycle rate, and if the operation mode is set to End Stroke/Timer mode, this cycle rate will be forced as the slowest cycle rate allowed by the system.

Scale Value: The scale value changes the speed of the converted signal back to the tool. The number represents the ratio $[\text{Converted Cycle Rate}] / [\text{Actual Cycle Rate}]$, thus if the scale is greater than one, the converted cycle rate will be faster than the actual cycle rate. If the scale is less than one, the emulated cycle rate will be slower than the actual cycle rate.

Output Percent: The output percent changes the duration of the converted signal as a percent of its duration. For example if the signal should stay on until the signal from the opposite side turns on, set the output percent to 100%, or if the signal should turn off shortly after turning on, set the percentage to a smaller value. Some experimentation may be necessary to determine what output duration the tool's algorithm is expecting.

Off Delay: The CPT-1 expects either the right or left remote signal from the tool to be on. In some cases there may be a delay between the signal switching. The off delay will keep the system on for a set time without any signal being sent. The default setting is one second, but can be changed from the user interface.

Dual Detect Mode: For the majority of pumps this mode should be turned off. This mode should only be turned on in two cases:

1. **A single probe dual detect pump is to be operated.** In this case it is recommended that the CPT-1's operation mode also be set to End Stroke/Timer mode; this is recommended because it will prevent the pump from getting out of sync in its oscillations when the pump is at dead head. Thus it is also recommended that the cycle rate variable be set to a slower than the normal operation cycle rate so that timer doesn't affect normal operation.
2. **A pressure switch is being used for end of stroke sensing where a double signal is being detected.** A double signal may be seen if the pressure switch is connected to an exhaust port. In this case the dual detect mode will only count every other signal as an end of cycle signal.

Leak Alarm: When connecting leak detect through the CPT-1, the leak alarm will light up when leaks are detected and the pump will turn off. In order to turn the pump back on, the leak reset needs to be sent.

Over Speed/Under Speed Alarms: These alarms can be configured in the alarm settings. The following describe the alarm settings that can be configured.

- **Enabled** – If alarm is enabled then the alarm is allowed to occur, if disabled then the alarm will never occur.
- **Threshold** – The cycle rate that if passed the alarm will occur.

- On Delay – The duration in milliseconds that the over speed/under speed alarm condition is allowed to be true before the alarm actually occurs. (This might be needed for start-up conditions)
- Auto Stop – When the alarm occurs and auto stop is enabled, then the pump will be shut down until the reset signal has been received.
- Auto Recover – When an alarm occurs and the cycle rate returns to an acceptable operation the alarm will turn itself off. Note: this feature will not work if the auto stop is enabled.

Save Defaults: Saving the defaults will tell the controller that the current settings are to be used as the defaults when there are power outages. It is recommended to save the defaults after modifying any settings. If the defaults are not saved, the controller will lose all changes made to the settings.

Reset: This action clears the alarms and enabled the pump to startup from normally. This action can be performed in the software interface, or using the digital alarm reset button.

Connect/Disconnect: If connection was lost or when it is desired to connect to a different control box, use the Connect and Disconnect buttons. The software can only be connected to one device at a time, so when switching communications from one controller to another, the user should first disconnect from the current connection and then connect to the new connection.

Command Line Entry: This tool enables specific commands to be issued to the controller and check the response sent back from the controller.

Set IP Address: By default the control box is set to look for an IP address to be set from the DHCP network. However, this tool can be used to force an IP address to the box independent of the network.

Update Firmware: If there is a discrepancy in the software version and the controller firmware version, then this tool can be used to update the controller to the compatible version.

8 Troubleshooting Q & A:

8.1 Issues connecting to CPT-1 via Ethernet:

- Check that all wires are connected correctly.
- Check that the network is assigning an IP Address. (Contact system administrator for help).
- Press the Reset button on the controller, wait a moment for system restart, and try connecting again.
- If still unable to connect, contact White Knight at Tech.Support@wkfluidhandling.com

8.2 Issues Connecting to CPT-1 via RS-232:

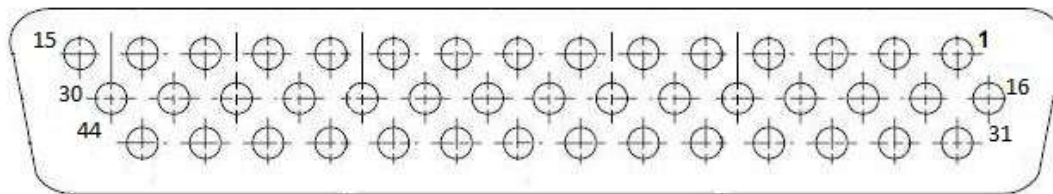
- Ensure wires are connected correctly.
- Ensure serial port uses RS-232 connection protocol.
- Go to the device manager on your computer.
 - Verify that your computer assigned a COM port for the device.
 - Verify that the COM port is set to a baud rate of 115000
- Try power cycling the control box by pressing the Reset button on the control box.
- If still unable to connect, contact White Knight at Tech.Support@wkfluidhandling.com

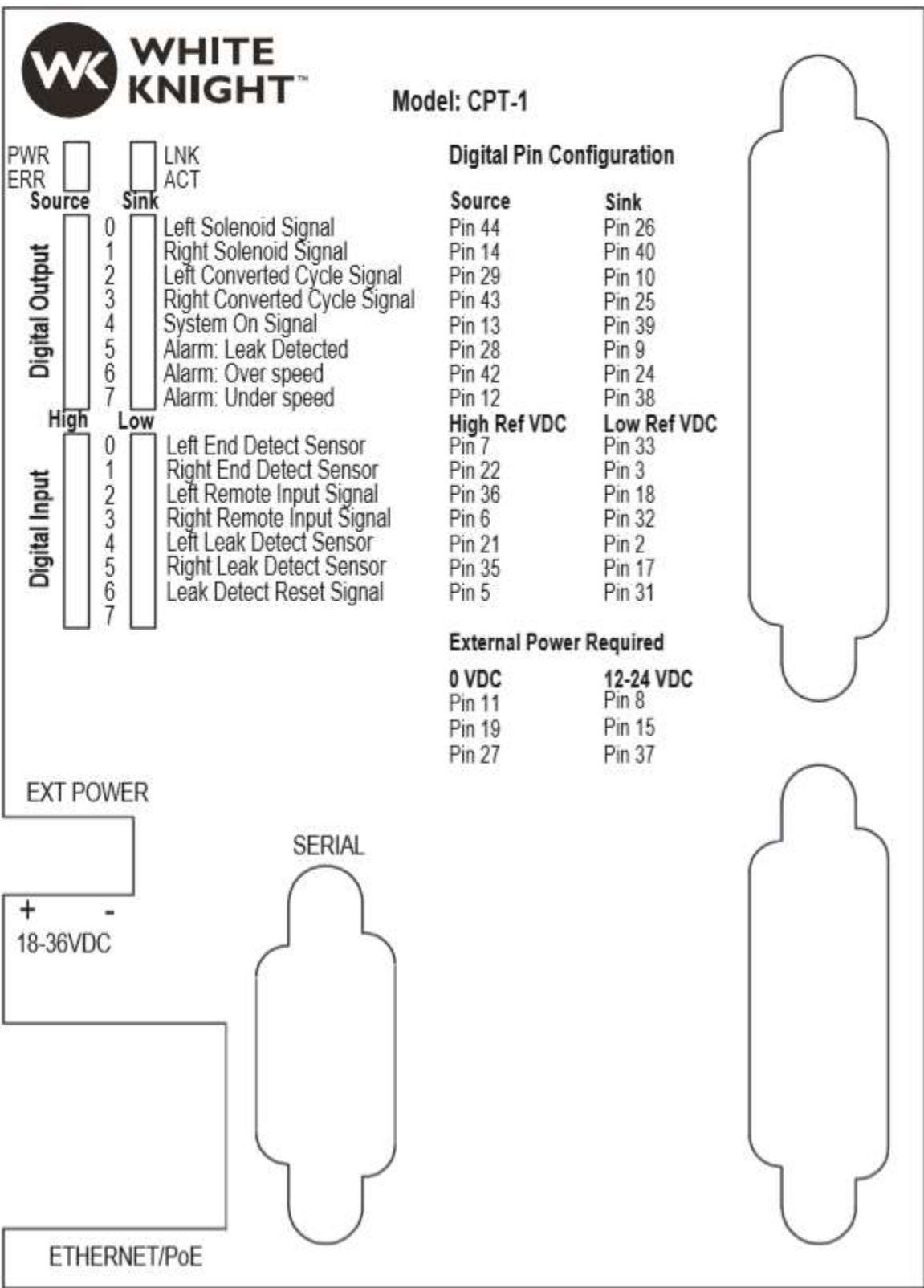
9 Appendix 1: Complete Wiring Guide Table

Pin Name [Quick Connect Port]	Pin #	Wire Color/Stripe	Designation	Levels	Note
Power: Source Outputs	15	Red/Black	Power Source	12-24 VDC	The voltage input into these pins will be the voltage output for all Source type output pins.
	27	Red/White	Ground Reference	0 VDC	
Power: Sink Outputs	8	Green	Power Source	12-24 VDC	The voltage input into these pins will power the sink type output pins.
	11	Orange	Ground Reference	0 VDC	
Power: Input High	37	Violet/Red	Reference Voltage High	12-24 VDC	The voltage input into this pin will be the reference for all digital high inputs.
Power: Input Low	19	Orange/Black	Reference Voltage Low	0 VDC	The voltage input into this pin will be the reference for all digital low inputs.
Digital Input: Remote Left [DI_2]	36	Yellow/Red	Reference High VDC	24 V = Not Active 0 V = Active	When one of these connections becomes active, the CPT-1 will turn on and start controlling the pneumatic pump. Disconnect the left and right inputs from the shuttle and connect these signals to the appropriate high or low voltage reference on the CPT-1.
	18	Green/Black	Reference Low VDC	0 V = Not Active 24 V = Active	
Digital Input: Remote Right [DI_3]	6	Blue	Reference High VDC	24 V = Not Active 0 V = Active	
	32	Gray/Red	Reference Low VDC	0 V = Not Active 24 V = Active	
Digital Input: End Detect Left, or Full Cycle Signal [DI_0]	7	Brown	Reference High VDC	24 V = Not Active 0 V = Active	
	33	Light Green/Red	Reference Low VDC	0 V = Not Active 24 V = Active	
Digital Input: End Detect Right [DI_1]	22	Gray/Black	Reference High VDC	24 V = Not Active 0 V = Active	
	3	Red	Reference Low VDC	0 V = Not Active 24 V = Active	
Digital Input: Leak Detect Left [DI_4]	21	Brown/Black	Reference High VDC	24 V = Not Active 0 V = Active	For systems that do not support a leak detect function to turn off the pump when leaks are detected, leak detect signals can be brought into these digital inputs. When the leak detect signal is active, the CPT-1 will stop the pump and wait for the reset signal before the pump will restart.
	2	White	Reference Low VDC	0 V = Not Active 24 V = Active	
Digital Input: Leak Detect Right [DI_5]	35	Pink/Red	Reference High VDC	24 V = Not Active 0 V = Active	
	17	Violet/Black	Reference Low VDC	0 V = Not Active 24 V = Active	
Digital Input: Leak Reset [DI_6]	5	Violet	Reference High VDC	24 V = Not Active 0 V = Active	
	31	Blue/White	Reference Low VDC	0 V = Not Active 24 V = Active	

Digital Output: Left Solenoid [DO_0]	26	Orange/White	Sink: Connect To ground when closed	Relay Open = Not Active Relay Closed = Active	The CPT-1 will turn on the left and right solenoid signals to control a solenoid operated pump. If using a shuttle operated pump, these connections are not required.
	44	Light Green/Green	Source: Connect to power when closed	Relay Open = Not Active Relay Closed = Active	
Digital Output: Right Solenoid [DO_1]	40	Red/Green	Sink: Connect To ground when closed	Relay Open = Not Active Relay Closed = Active	
	14	White/Black	Source: Connect to power when closed	Relay Open = Not Active Relay Closed = Active	
Digital Output: Left Translated Cycle Rate [DO_2]	10	Light Blue	Sink: Connect To ground when closed	Relay Open = Not Active Relay Closed = Active	
	29	Brown/White	Source: Connect to power when closed	Relay Open = Not Active Relay Closed = Active	
Digital Output: Right Translated Cycle Rate [DO_3]	25	Pink/Black	Sink: Connect To ground when closed	Relay Open = Not Active Relay Closed = Active	
	43	Light Blue/Green	Source: Connect to power when closed	Relay Open = Not Active Relay Closed = Active	
Digital Output: System On [DO_4]	39	Orange/Green	Sink: Connect To ground when closed	Relay Open = Not Active Relay Closed = Active	This is to indicate that the system is on. This input is required when operating a shuttle pump. However, this can also be used as verification that the system is operational.
	13	Pink	Source: Connect to power when closed	Relay Open = Not Active Relay Closed = Active	
Digital Output: Leak Alarm [DO_5]	9	Gray	Sink: Connect To ground when closed	Relay Open = Not Active Relay Closed = Active	This output is to alert the user that a leak was detected.
	28	Violet/White	Source: Connect to power when closed	Relay Open = Not Active Relay Closed = Active	
Digital Output: Under Speed Alarm [DO_7]	38	Gray/ Green Stripe	Sink	Relay Open = Not Active Relay Closed = Active	This output is to alert the user that the pump was operating slower than the set threshold
	12	Light Green	Source	Relay Open = Not Active Relay Closed = Active	
Digital Output: Over Speed Alarm [DO_6]	24	Light Green/ Black Stripe	Sink	Relay Open = Not Active Relay Closed = Active	This output is to alert the user that the pump was operating faster than the set threshold
	42	Brown/ Green Stripe	Source	Relay Open = Not Active Relay Closed = Active	

Figure 7: Pin out diagram for 44-pin connector

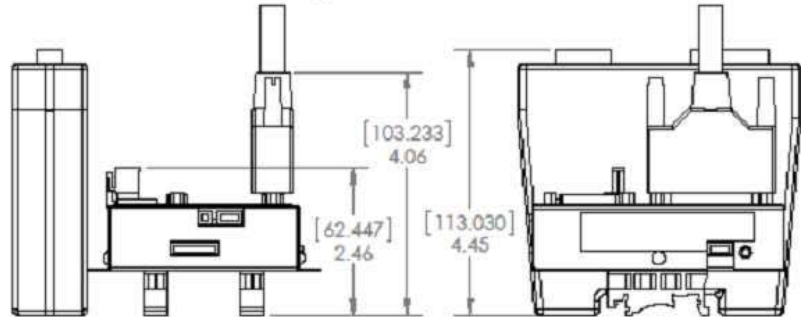
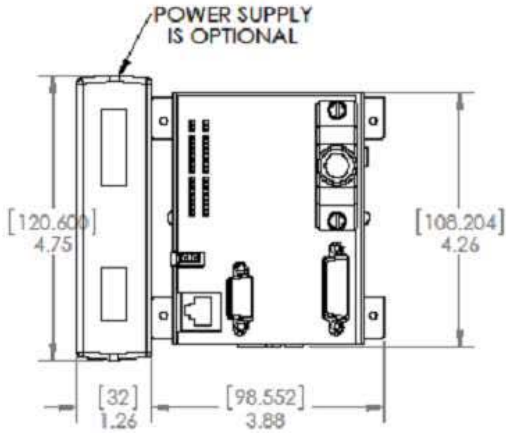
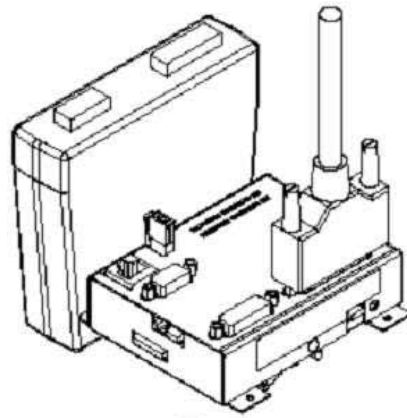




10 Appendix 2: Dimensional Diagrams

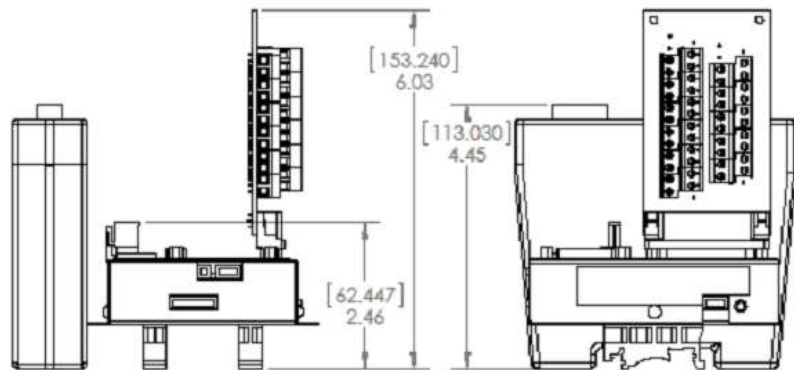
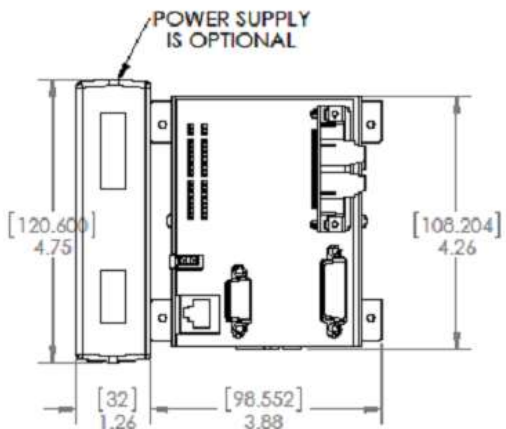
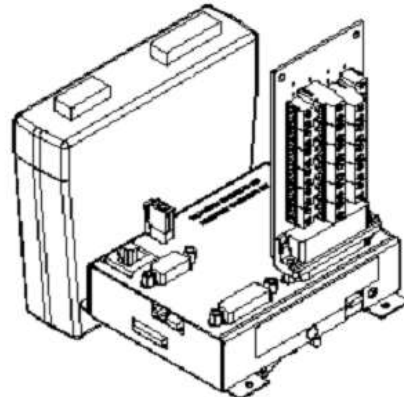
CPT - 1 WITH WIRE CABLE

MAIN DIMENSIONS ARE INCHES,
[BRACKETED]DIMENSIONS ARE mm.



CPT - 1 WITH SCREW TERMINAL

MAIN DIMENSIONS ARE INCHES,
[BRACKETED]DIMENSIONS ARE mm.



11 Ordering Instructions

CPT-1 (Cycle Rate Translator) Ordering Instructions



Required Configurations	Additional Options	Rev				
CPT-1	<table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">$\frac{W}{\textcircled{1}}$</td> <td style="text-align: center;">-</td> <td style="text-align: center;">$\frac{P}{\textcircled{2}}$</td> </tr> </table>	$\frac{W}{\textcircled{1}}$	-	$\frac{P}{\textcircled{2}}$	<table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">$\frac{\quad}{\textcircled{3}}$</td> </tr> </table>	$\frac{\quad}{\textcircled{3}}$
$\frac{W}{\textcircled{1}}$	-	$\frac{P}{\textcircled{2}}$				
$\frac{\quad}{\textcircled{3}}$						




To configure your Cycle Rate Translator with different connection methods, a power supply or request a specific revision level, please select options from the appropriate additional options (1-3).

Optional Configurations

① Connection Method

W	= 44 male pin to 1-Meter Wire Lead Cable	
Q	= Quick Connect Plugs	
S	= 44 male pin to Screw Terminals	

② Power Supply

P	= 24V/60W Power Supply	
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③ Revision Level : Contact factory for copy exact code activation information.

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435-783-6040



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