

PSC1 Variable Speed Controller

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PSC1 VARIABLE SPEED CONTROLLER

The iWorx® PSC1 is a compact, TRIAC-based pump and motor control designed for the HVAC and hydronic heating controls markets. The PSC1 can automatically control most single-phase AC pumps and motors used in applications such as heating control and zone mixing.

Overview

The PSC1 regulates motor speed from a 2-10VDC control signal or 4-20mA control signal. Automatic voltage and frequency detection, current rating of 2.0A per circulator (8.0A total) and a standard NEMA 4 Enclosure, combine to make this microprocessor-based design extremely flexible and economical. Benefits of using the PSC1 include temperature regulation, greater system reliability, increased pump life, improved safety, and energy savings.

Features

- Power Supply: 115-230VAC, automatically detected
- Line Frequency: 50/60Hz, automatically detected
- Control Signal: 2-10VDC or 4-20mA
- AC Motor Compatibility: TACO "00" series circulators
- Current Rating: 2.0A per circulator, 8.0A total
- Connections: Terminal Blocks for 14-24 AWG wiring
- Standard NEMA 4 electrical box included
- 3V (6mA) start point; attains full speed at 9V (17.5mA)
- FCC Compliance - FCC 47 CFR Part 15 Class B

REPRESENTATIONS AND WARRANTIES

This Document is subject to change from time to time at the sole discretion of Taco Electronic Solutions, Inc. All updates to the Document are available at www.taco-hvac.com. When installing this product, it is the reader's responsibility to ensure that the latest version of the Document is being used.

iWorx® products shall only be used for the applications identified in the product specifications and for no other purposes. For example, iWorx® products are not intended for use to support fire suppression systems, life support systems, critical care applications, commercial aviation, nuclear facilities or any other applications where product failure could lead to injury to person, loss of life, or catastrophic property damage and should not be used for such purposes.

Taco Electronic Solutions, Inc. will not be responsible for any product or part not installed or operated in conformity with the Document and instructions or which has been subject to accident, disaster, neglect, misuse, misapplication, inadequate operating environment, repair, attempted repair, modification or alteration, or other abuse. For further information, please refer to the last page of this Document for the company's Limited Warranty Statement, which is also issued with the product or available at www.taco-hvac.com.

APPLICABLE DOCUMENTATION

Part Number	Audience	Purpose
<i>iWorx® PSC1 Installation Guide</i> , Document No. 502-027 (this document)	<ul style="list-style-type: none"> – Application Engineers – Wholesalers – Contractors 	Provides specific application information about the iWorx® PSC1, including sequence of operation and configuration information.
http://iWorxWizard.taco-hvac.com	<ul style="list-style-type: none"> – Application Engineers – Wholesalers – Contractors 	An on-line configuration and submittal package generator based on user input. Automatically generates bill of materials, sequence of operations, flow diagrams, wiring diagrams, points and specifications.
Additional Documentation	<i>LonWorks FTT-10A Free Topology Transceiver User's Guide</i> , published by Echelon Corporation. It provides specifications and user instructions for the FTT-10A Free Topology Transceiver.	

INSTALLATION GUIDE

Precautions

General



This symbol is intended to alert the user to the presence of important installation and maintenance (servicing) instructions in the literature accompanying the equipment.



WARNING: Electrical shock hazard. Disconnect **ALL** power sources when installing or servicing this equipment to prevent electrical shock or equipment damage.

Make all wiring connections in accordance with these instructions and in accordance with pertinent national and local electrical codes. Use only copper conductors.

Static Electricity

Static charges produce voltages that can damage this equipment. Follow these static electricity precautions when handling this equipment.

- Work in a static free area.
- Touch a known, securely grounded object to discharge any charge you may have accumulated.
- Use a wrist strap when handling printed circuit boards. The strap must be secured to earth ground.

Location

Avoid locations where corrosive fumes, excessive moisture, vibration or explosive vapors are present.

Avoid electrical noise interference. Do not install near large contactors, electrical machinery, or welding equipment.

This equipment is intended for indoor use only. Operate where ambient temperatures do not exceed 160° F (70° C) or fall below -13° F (-25° C) and relative humidity does not exceed 95%, non-condensing.

BEFORE INSTALLING

About this Document

The instructions in this document are for the PSC1 variable speed controller.

Inspecting the Equipment

Inspect the shipping carton for damage. If damaged, notify the carrier immediately. Inspect the equipment for damage. Return damaged equipment to the supplier.

What is Not Included with this Equipment

- A power source for the equipment electronics and peripheral devices.

- Tools necessary to install, troubleshoot and service the equipment.
- The screws or DIN rail needed to mount the device.
- Peripheral devices, such as sensors, actuators, etc.
- Cabling, cabling raceway, and fittings necessary to connect this equipment to the power source and peripheral devices.

INSTALLATION

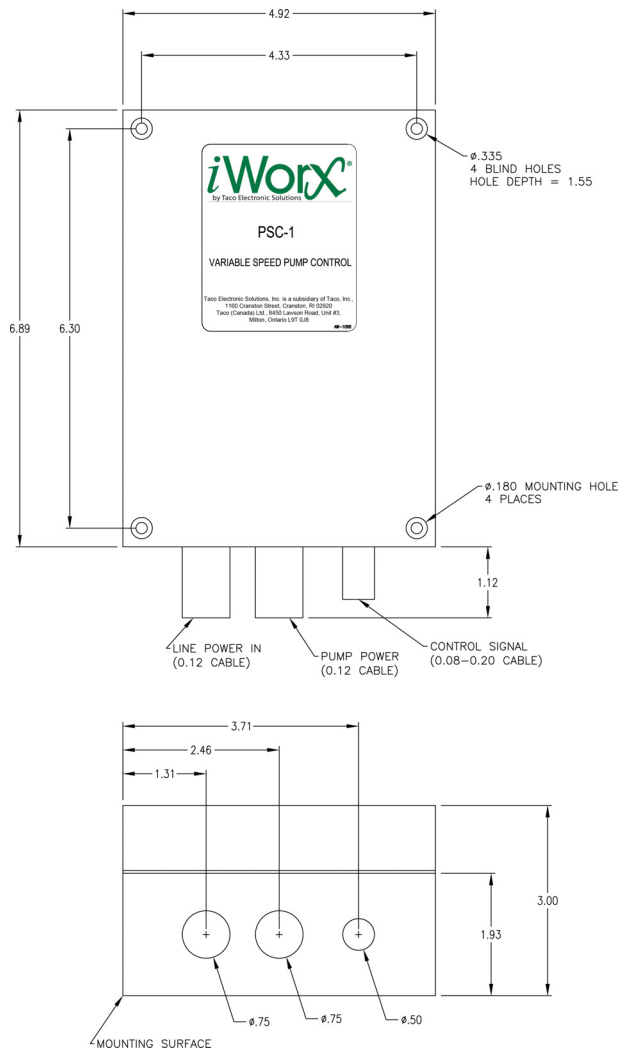


Warning: Electrical shock hazard. To prevent electrical shock or equipment damage, disconnect **ALL** power sources to controllers before installing or servicing this equipment or modifying any wiring.

Mounting

The PSC1 is supplied in a NEMA 4X enclosure with removable cover and strain reliefs. Included strain reliefs must be used for all wiring.

Figure 1: Mounting Dimensions - inches (mm)



WIRING INFORMATION



WARNING: Electrical shock hazard. To prevent electrical shock or equipment damage, disconnect ALL power sources to controllers before installing or servicing this equipment or modifying any wiring.

Power Connections

It is recommended that an adequately sized circuit breaker be connected between the power service and the PSC1 to permit fail-safe removal of power before making adjustments or connections. Connect power to W (white) and B (black) terminals. Maximum power wire size is 14 AWG.

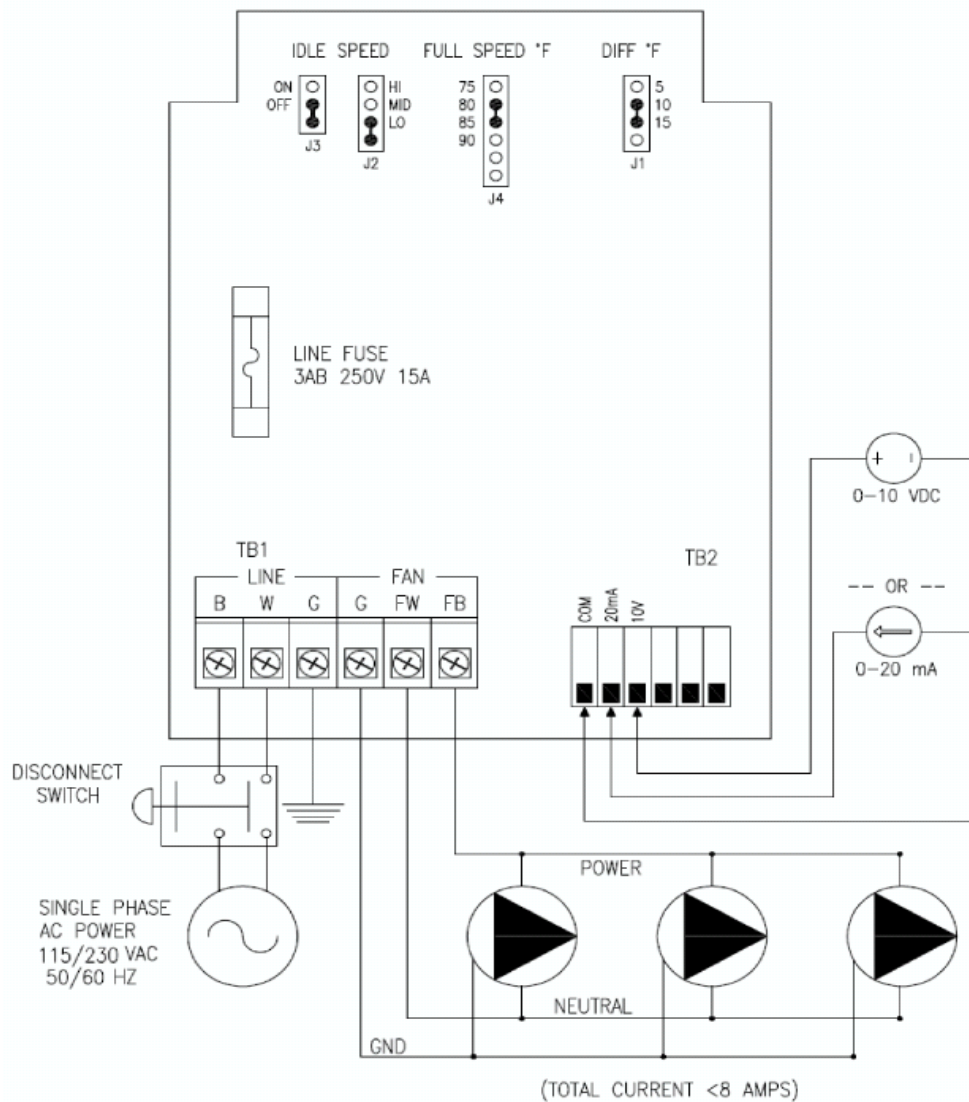
Pump Connections

Connect pump to positions marked FW and FB. Maximum pump wire size is 14 AWG.

Control Signal Connections

Connect a 2-10VDC or 4-20mA control signal to the appropriate terminal block connection. Use 16-22 AWG wire for control signal connections.

Figure 2: Typical Wiring Diagram



SPECIFICATIONS

Electrical

Inputs

- Power Source: 115-230VAC
- Frequency: 50/60Hz

Input Control Signal

- 2-10VDC or 4 to 20mA

Outputs

- Current Rating: 2.0 A per circulator, 8.0 A total

Connections

- 14-24 AWG wiring

Mechanical

Weight

- PSC1 Weight: 1.4 pounds (0.64 kilograms)
- Shipping Weight: 2.0 pounds (0.92 kilograms)

Environmental

- Storage Temperature: -40°F to 149°F (-40°C to 65°C)
- Humidity: 5 to 95% RH, non-condensing, drip-free environment

Agency Listings

- UL Listed for US and Canada: Motor Controllers, Mechanically-Operated and Solid-State - Component

OPERATIONS

The iWorx® PSC1 controller is capable of controlling the speed of a “00” series TACO circulator or pump, with no switches or settings required.

Attempting to control a pump that is not compatible or cannot be controlled by a triac could cause excessive heating and may permanently damage the pump motor. The outputs have a rating of 2.0A per circulator, 8.0A total.

The power to the motor is proportionate to the control signal, with the full supply voltage applied to the motor when the input signal is at its highest value. The iWorx® PSC1 is powered by 115-230VAC, 50/60Hz. No switches or settings are required for voltage or frequency selection.

The iWorx® PSC1 accepts either a 2-10VDC or 4-20mADC control signal. If the 2-10V signal is selected, the nominal input impedance is 150kW. The input impedance for the 4-20mA signal is 400W.

The iWorx® PSC1 starts pumps at full voltage for 2 seconds before throttling back to the selected control speed.

CONTROL METHOD

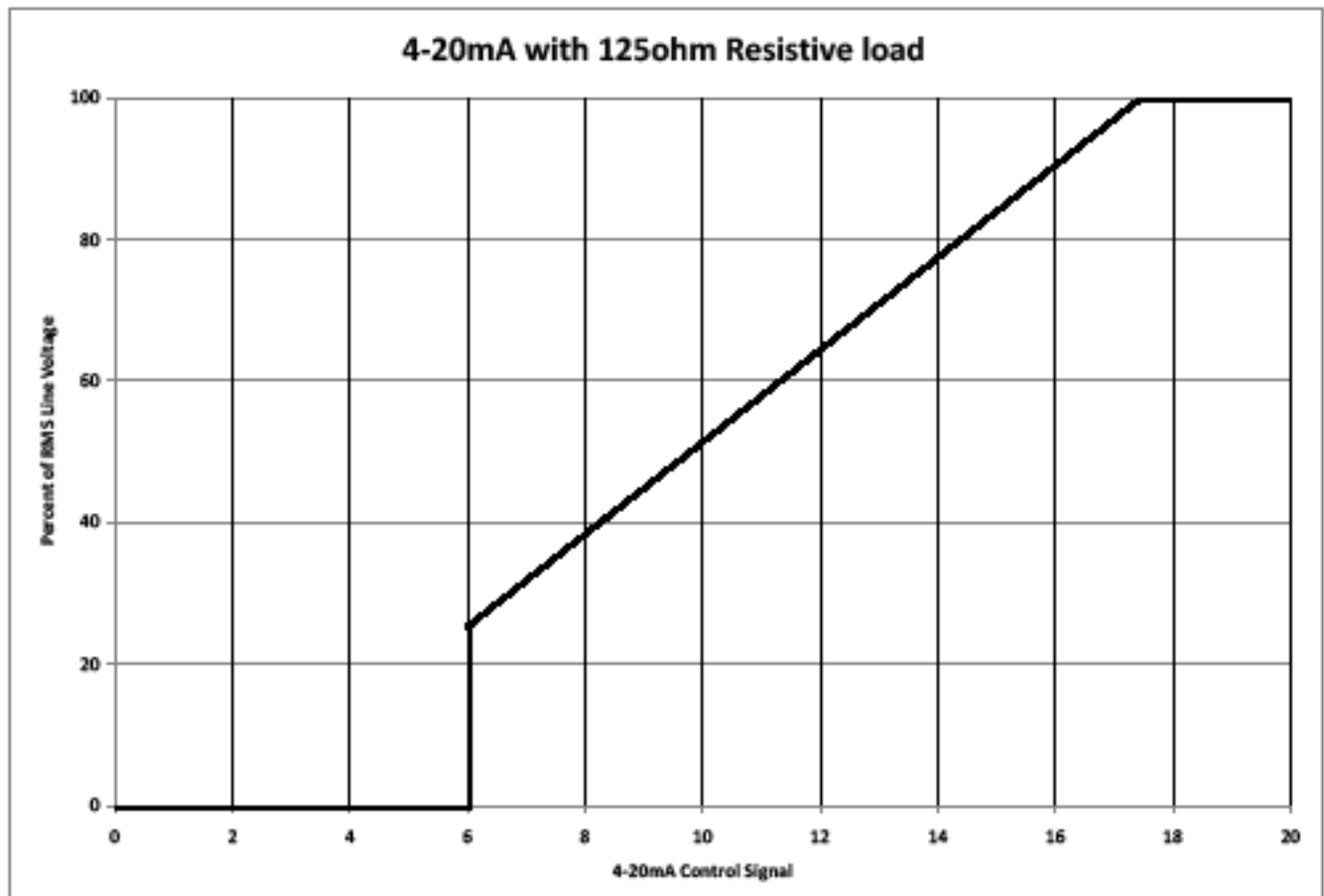
Sequence

The iWorx® PSC1 continuously monitors the control signal input. The output voltage to the motor is set according to the figure below. With the control signal at zero, the motor output is off. It remains off until the signal rises to 3.0V or higher. When the output is first turned on, it is set to 100% of the line voltage for 2 seconds to start the pump. The output level is then set to provide the appropriate RMS voltage.

Accuracy

The actual start point of 3.0V (6mA) is accurate to within $\pm 0.4\text{VDC}$ ($\pm 0.8\text{mA}$).

Figure 3: RMS Pump Voltage vs. Control Signal



TROUBLESHOOTING

Getting Help

Components within an iWorx® controller, sensor, or power supply cannot be field repaired. If there is a problem with a unit, follow the steps below before contacting your local TES representative or TES technical service.

1. Make sure controllers, sensors, and power supplies are connected and communicating to desired devices.
2. Record precise hardware setup indicating the following:
 - Version numbers of application software.
 - Device and/or firmware version number.
 - A complete description of difficulties encountered.

Notes:

LIMITED WARRANTY STATEMENT

Taco Electronic Solutions, Inc. (TES) will repair or replace without charge (at the company's option) any product or part which is proven defective under normal use within one (1) year from the date of start-up or one (1) year and six (6) months from date of shipment (whichever occurs first).

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local TES stocking distributor or TES in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local TES stocking distributor or TES. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any TES product or part not installed or operated in conformity with TES instructions or which has been subject to accident, disaster, neglect, misuse, misapplication, inadequate operating environment, repair, attempted repair, modification or alteration, or other abuse, will not be covered by this warranty.

TES products are not intended for use to support fire suppression systems, life support systems, critical care applications, commercial aviation, nuclear facilities or any other applications where product failure could lead to injury to person, loss of life, or catastrophic property damage and should not be sold for such purposes.

If in doubt as to whether a particular product is suitable for use with a TES product or part, or for any application restrictions, consult the applicable TES instruction sheets or in the U.S. contact TES at 401-942-8000 and in Canada contact Taco (Canada) Limited at 905-564-9422.

TES reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. TES reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TES OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING

WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TES.

TES WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

CONTROLS MADE EASY®

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