INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® RECYCLE TIMER

MODEL
5T

DRAWING NUMBERS
EL016.6
EL016.7
EL902

MANUAL NUMBER
IOM-130

REVISION
Rev. 0, 8/8/2016

TABLE OF CONTENTS

IMPORTANT SAFETY INFORMATION
READ ALL INSTRUCTIONS

Notes emphasize information and/or provide additional information to assist the user.

Caution messages appear before procedures that could result in damage to equipment if not observed.

Warning messages appear before procedures that could result in personal injury if not observed.

This manual is intended to be used as a basic installation and operation guide for the Welker® Recycle Timer, 5T. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in Appendix A of this manual.

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide for the installation, operation, and maintenance of the Welker® equipment described in this manual. Correct installation and operation, however, are the responsibility of the end user. Welker reserves the right to make changes to this manual and all products in order to improve performance and reliability.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

IMPORTANT - Save these instructions for local inspector's use.

IMPORTANT - Observe all governing codes and ordinances.

Note to Installer - Leave these instructions with the end user.

Note to End User - Keep these instructions for future reference.

Installation of this Recycle Timer is of a mechanical and electrical nature.

Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the warranty.

If you received a damaged Recycle Timer, please contact a Welker® representative immediately.

Phone: 281.491.2331
Address: 13839 West Bellfort Street
Sugar Land, TX 77498

SECTION 1: PRODUCT INFORMATION

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this equipment becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance* (IOM) *Manuals* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call Welker at 1-281-491-2331.

**The following procedures have been written for use with standard Welker® parts and equipment. Assemblies that have been modified may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® *5T* Recycle Timer is a simple recycle timer used to control sample pumps.

The 5T operates a solenoid for timing. The cycle time is set using two (2) banks of ten (10) switches. When supply voltage is applied, the 5T cycles off/on, energizing the solenoid, which in turn actuates the connected pump according to the switch settings until the supply voltage is removed.

Welker may custom design the 5T to suit the particular application and specifications of each customer.

1.3 Specifications

The specifications listed in this section are generalized for this equipment. Welker can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customizations of your equipment.**

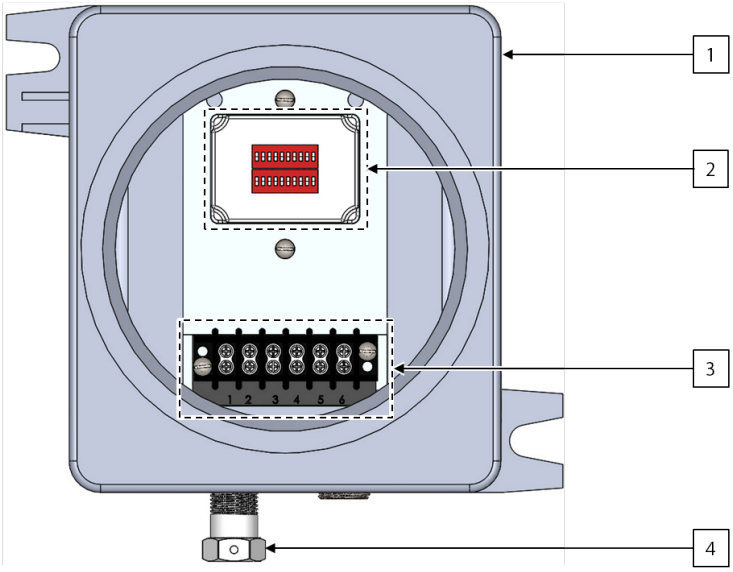
Table 1: 5T Specifications

Applications	Control of Sample Pumps; Timer
Temperature Range	-20 °F to 140 °F (*-28 °C to 60 °C*)
Power	3 W
Input	AC 110 V AC 240 V DC 24 V
Output	8-Pin DPDT, 4 A @ AC 120 V
Terminal Strip	6-Point
Features	Dwell Time Adjustable Between 1–1023 Seconds Explosion-Proof Enclosure LED Status Indicator Light
Option	Solenoid Valve

1.4 Equipment Diagrams

Figure 1: 5T Diagram

STANDARD 5T



No.	Description
1	Explosion-Proof Enclosure
2	Timer
3	Terminal Strip
4	Breather Drain
5	Optional Solenoid

5T WITH OPTIONAL SOLENOID

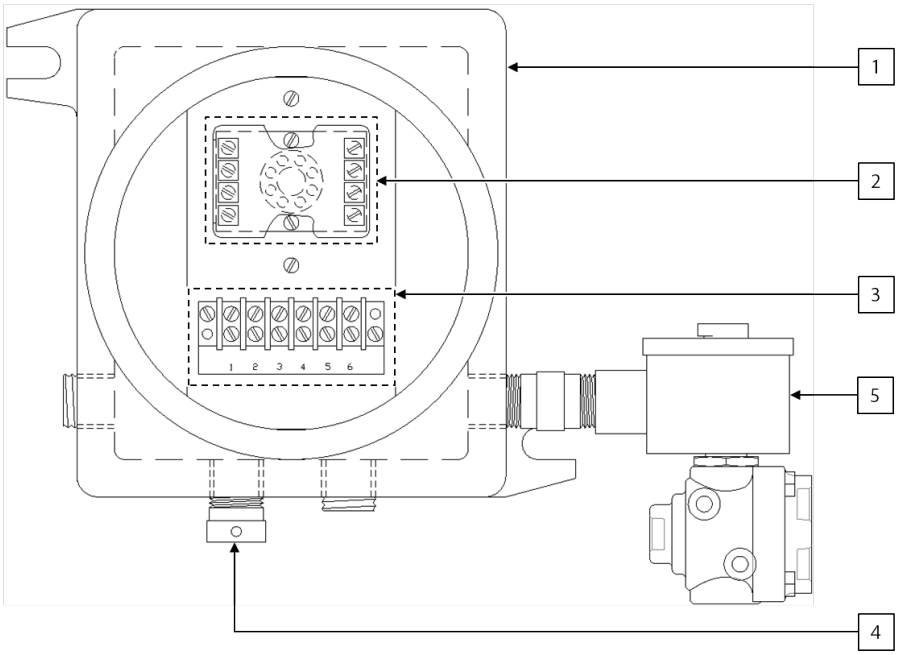
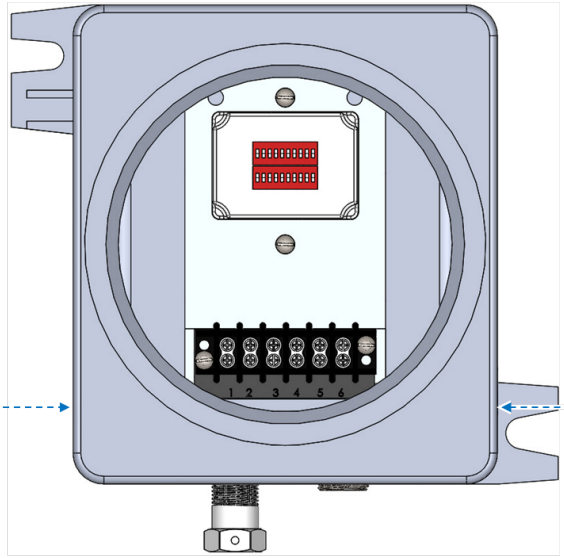


Figure 2: 5T Connections Diagram

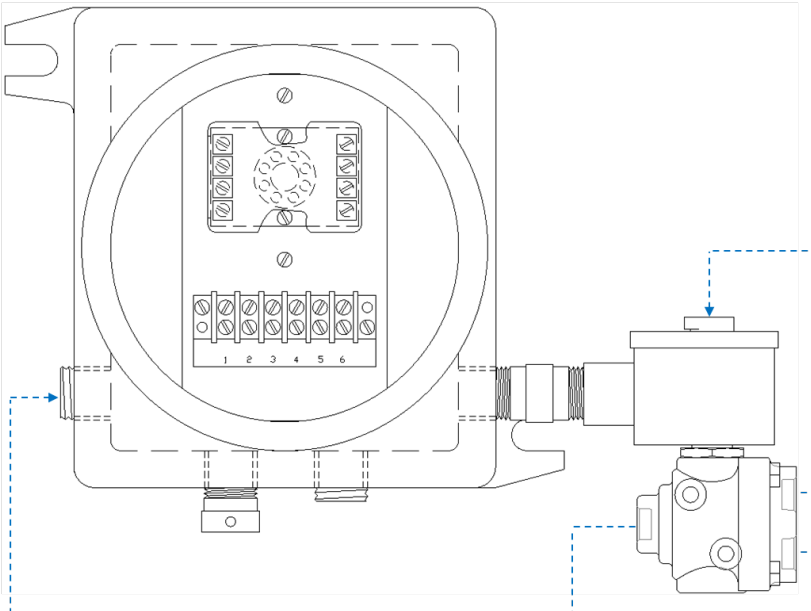
STANDARD 5T



Customer Power Supply
AC 110 V, AC 240 V, or DC 24 V

Customer Solenoid or Relay
Connection of Matching
Voltage

5T WITH OPTIONAL SOLENOID



Customer Solenoid
Connection of Matching
Voltage

Outlet to Actuation Ports
on Customer-Supplied
Sample Pump

Customer Power Supply
AC 110 V, AC 240 V, or DC 24 V

Exhaust

2.1 Before You Begin

After unpacking the unit, check the equipment for compliance and any damage that may have occurred during shipment. Immediately contact a Welker® representative if you received damaged equipment.

When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.

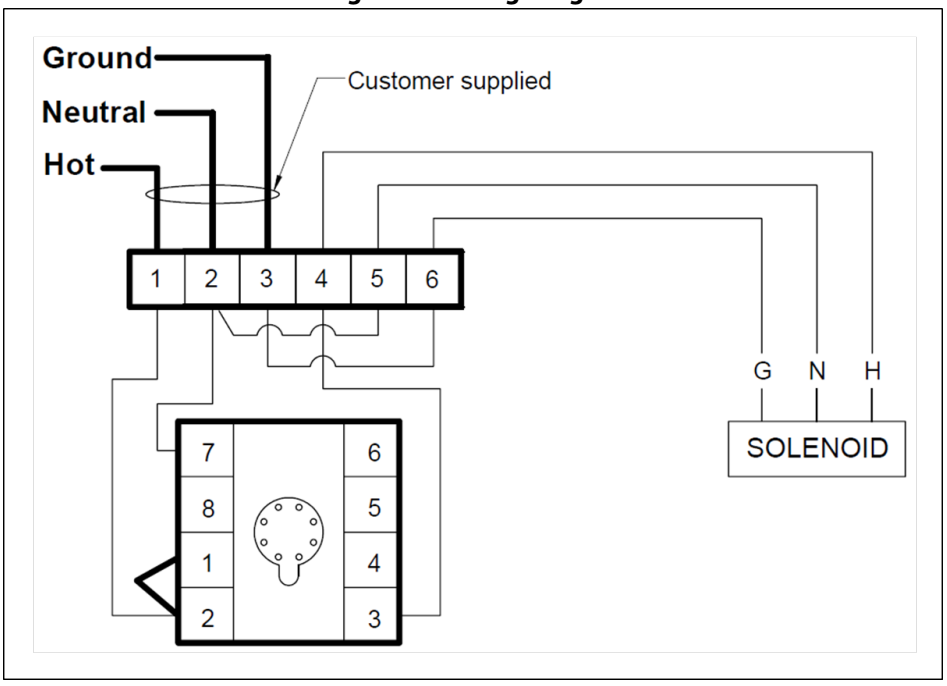
2.2 Installation

1. Mount the enclosure to the desired location. Ensure that there is enough room for cables and conduits to exit.

The enclosure can be mounted directly to the pump, on a nearby wall, or to a mounting bracket.

2. As necessary, install a customer-supplied solenoid to the explosion-proof enclosure (*Figure 2*).
3. Connect the incoming supply voltage to the 6-point terminal strip (*Figure 3*).

Figure 3: Wiring Diagram



For systems used in hazardous locations, sealing compound is required to seal all fittings to restrict the passage of gases, vapors, or flames.

4. Using appropriately sized customer-supplied tubing, connect the customer-supplied regulated instrument air supply to the instrument air inlet on the solenoid.
5. Using appropriately sized customer-supplied tubing, connect from the solenoid outlet ports to the corresponding motor actuation ports on the customer sample pump (*Figure 2*). Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the sample pump for tubing instructions.

2.3 Setting the Unit

1. Calculate the desired sampling frequency using the provided equations (*Figure 4*).

Figure 4: Sampling Actuation Equations for Timed Collection

Gas or Liquid Sampling, Timed Collection

Equation 1: Number of Samples Needed

$$\textbf{\textit{Gas}}: Number\ of\ Samples\ Needed = \frac{Cylinder\ Size\ (cc)}{Bite\ Size\ (cc)} \quad \textbf{or} \quad \textbf{\textit{Liquid}}: Number\ of\ Samples\ Needed\ to\ Fill\ to\ 80\% = \frac{(Cylinder\ Size\ (cc) * 0.8)}{Bite\ Size\ (cc)}$$

Equation 2: Time Conversion

$$Total\ Time\ in\ Sample\ Period\ (Seconds) = Total\ Time\ in\ Sample\ Period\ (Minutes) \times 60\ Seconds$$

Equation 3: Time Required to Collect & Inject One Sample

$$Length\ of\ OFF/ON\ Cycle\ (Seconds) = \frac{Total\ Time\ in\ Sample\ Period\ (Seconds)[Eq.\ 2]}{Number\ of\ Samples\ Needed\ [Eq.\ 1]}$$

Equation 4: "OFF" and "ON" Time*

$$Length\ of\ \text{"OFF" and "ON"}\ Time\ (Seconds)^{**} = \frac{Length\ of\ OFF/ON\ Cycle\ (Seconds)\ [Eq.\ 3]}{2}$$

Use Equation 1 to determine the number of actuations needed.
Use Equation 2 to convert the total time in the sample period to seconds, as necessary.
Use Equation 3 to determine the total time in one OFF/ON cycle of the timer.
Use Equation 4 to determine the settings for the "OFF" and "ON" time.

*The minimum actuation time will vary by sample pump. This information must be known by the user in order to set the 5T, as the length of the "OFF" and "ON" time must be greater than the minimum actuation time.
As necessary, **round down to the nearest whole number.

Never fill the container above 80% of its capacity. Allow at least 20% room for product expansion should the container be exposed to increased temperatures.

Note the 0.8 in Equation 1 represents the 80% volume limit for liquid sampling.

2. Set the "ON" time to the calculated "ON" time (*Figure 4*). Beginning with the largest value, add the values of the "ON" dip switches until their added value equals the required "ON" time.

As necessary, round the calculated length of the "OFF" and "ON" time down to the nearest whole number.

Ensure that the "ON" time is greater than the minimum amount of time required by the customer-supplied sample pump to inject or collect a sample.

3. Turn on the dip switches whose added values equal to the "ON" time (*Figure 5*).

Figure 5: Example–Setting the "ON" and "OFF" Time

Example: Liquid Sampling, Timed Collection

Equation 1: Number of Samples Needed

$$8\ Samples\ Needed\ to\ Fill\ to\ 80\% = \frac{300\ cc\ *\ 0.8}{30\ cc}$$

Equation 2: Time Conversion

$$600\ Seconds\ in\ Sample\ Period = 10\ Minutes \times 60\ Seconds$$

Equation 3: Time Required to Collect & Inject One Sample

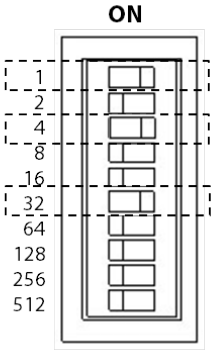
$$75\text{–}Second\ OFF/ON\ Cycle = \frac{600\ Seconds}{8\ Samples\ Needed\ to\ Fill\ to\ 80\%}$$

Equation 4: "OFF" and "ON" Time

$$37.5\text{–}Second\ \text{"OFF" and "ON"}\ Time = \frac{75\text{–}Second\ OFF/ON\ Cycle}{2}$$

The calculated "ON" time in this example is rounded down to 37 seconds.

Switches 1, 4, and 32 are set to the ON position because their binary values equal 37 when added together.



The calculated "OFF" time in this example is rounded down to 37 seconds.

Switches 1, 4, and 32 are set to the ON position because their binary values equal 37 when added together.

4. Set the "OFF" time to the calculated "OFF" time (*Figure 4*). Beginning with the largest value, add the values of the "OFF" dip switches until their added value equals the calculated "OFF" time.

As necessary, round the calculated length of the "OFF" and "ON" time down to the nearest whole number.

Ensure that the "OFF" time is greater than the minimum amount of time required by the customer-supplied sample pump to inject or collect a sample.

5. Turn on the dip switches whose added values equal to the "OFF" time (*Figure 5*).

2.4 Operation

1. Turn ON electrical power to the 5T.
2. The 5T will cycle off/on according to the programmed settings until electrical power is turned OFF.

The LED indicator will:

- glow green when energized;
- glow red when de-energized; and
- flash green or red when timing.

2.5 Troubleshooting

If an issue is encountered that is not described below, please contact Welker for service options.

Table 2: 5T Troubleshooting

Issues	Possible Causes	Solutions
Nothing is happening.	Electrical power has not been supplied to the 5T or is turned off.	Verify that electrical power has been supplied to the 5T and is turned on.
	The 5T was not wired correctly.	Verify that the wiring to the terminal strip is correct (*Figure 3*). If the wiring is correct but the 5T is still not working, the 5T needs to be replaced.
The cylinder is not filling properly.	The set cycle time is shorter than the actual cycle time of the sample pump.	Verify the minimum actuation time of the sample pump and ensure that it is less than the length of the "OFF" and "ON" time.
	The sample pump may be set at a slower sampling frequency than desired.	Check the calculations to ensure that the settings were calculated correctly (*Figure 4*).
	The dip switches are in the off position.	Ensure that the correct dip switches have been turned on.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

Welker® *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- None

Other *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- ASCO Valve, Inc. General Service Solenoid Valves Series 8342 (Welker® IOM-V139)
- Signaline Model 338 & Model 368 Recycle Timers "Off Time First" (Welker® IOM-V130)

Welker® drawings and schematics suggested for use with this unit:

- Electrical Drawing: EL016.6 (Standard 5T)
- Electrical Drawing: EL016.7 (5T With Optional 4-Way Solenoid)
- Electrical Drawing: EL902 (Standard Wiring Diagram)

NOTES

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