WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® ELECTROHYDRAULIC UNIT

MODEL
EHUC

DRAWING NUMBER
EHUCBSBYB10000003

MANUAL NUMBER
IOM-112

REVISION
Rev. 0, 08/08/2024

TABLE OF CONTENTS

SAFETY

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® Electrohydraulic Unit, Model EHUC. For comprehensive instructions, please refer to the Installation, Operation, and Maintenance *(IOM)* Manuals *for each individual component. A list of relevant component* IOM Manuals *is provided in the* Appendix *to 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 inspectors' 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 Electrohydraulic Unit 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 Electrohydraulic Unit, 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 might have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® *Electrohydraulic Unit*—also known as a hydraulic power unit or HPU—is designed to generate hydraulic pressure to use for actuating sampling equipment. When pneumatic supply is impractical or unavailable, the Welker® Electrohydraulic Unit can be used instead. It has the ability to operate multiple instruments simultaneously.

For this manual, the term "Programmable Logic Controller" (PLC) will refer to the PLC, DCS, or other signal control used by the customer.

Welker® might custom design the Electrohydraulic Unit to suit the particular application and specifications of each customer.

1.3 Specifications

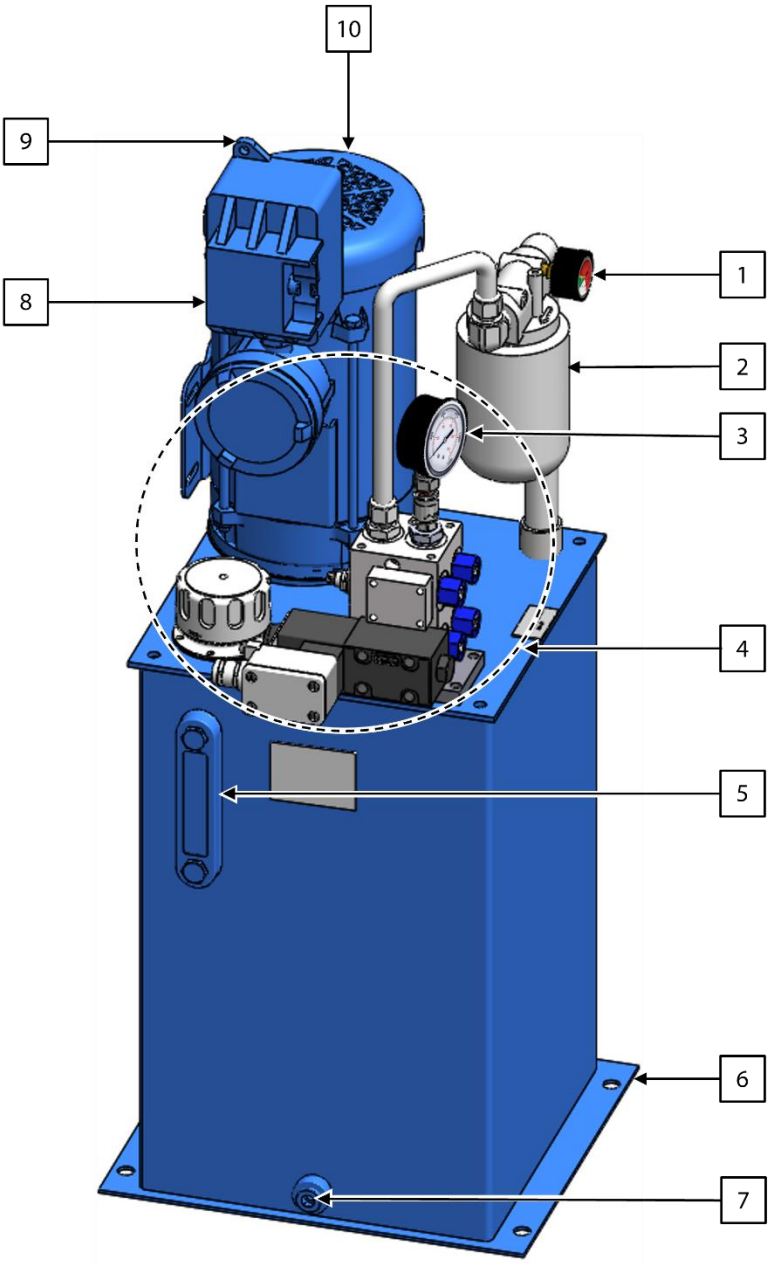
The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

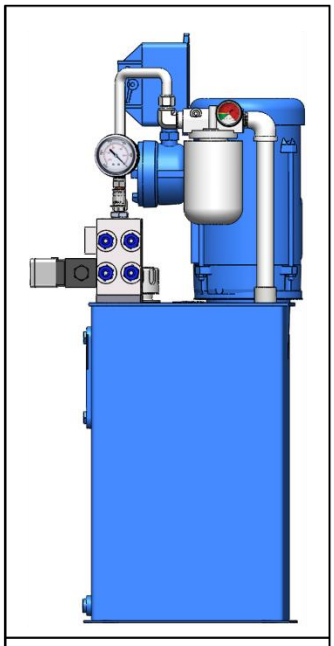
Table 1: Welker® Electrohydraulic Unit Specifications	
Products	Crude Oil and Other Liquids Compatible With the Materials of Construction
Materials of Construction	Carbon Steel, Painted
Maximum Allowable Relief Pressure (Optional Secondary Internal Relief)	150 psig (*10.3 barg*)
Connections	⅜" FNPT (With Correct SAE Thread Fittings) ¼" FNPT (Solenoid Hydraulic Connections) (With Correct SAE Thread Fittings) M20 Thread Standard (½" FNPT Adapter Provided) (Solenoid Electrical Connection) ½"FNPT (Hydraulic Fluid Drain) ¾" FNPT (Motor Electrical Connection)
Fluid Reservoir	**Standard:** 5 US Gallons (*18.9 Liters*) at 100% 10 US Gallons (*37.8 Liters*) at 100%
Pump Capacity	**Standard:** 2.8 GPM (5-Gallon Tank) 5 GPM (10-Gallon Tank)
Motor—Power	1-Phase, AC 110/240 V, 60 Hz Others Available
Motor Starter	1-Phase
Motor—Full Load Amps	7 Amps / 110 Volts 3 Amps / 240 Volts
Solenoid (4-Way)	DC 24 V or AC 110 V
Approximate Weight	125 lb (10-Gallon Model)
Approximate Dimensions	14½" x 15½" x 36" (Length x Width x Height) (10-Gallon Model)
Features	Drain Plug Explosion-Proof On/Off Motor Starter Switch Floor Mounting Holes Fluid Filter Fluid Level Indicator Fluid Temperature Indicator Solenoid (4-Way) With Manual Override Stackable Manifold (for Additional Solenoid Installations)
Industry Standards / Product Certifications	UL/CSA Approved
Electrical Area Classification (Motor)	NEC Class I, Div. 1, Groups C & D
Options	Additional In and Out Ports on Manifold Additional Solenoids Secondary Internal Relief (10-Gallon Model) Three (3)-Phase Motor

1.4 Equipment Diagrams & Schematics

Figure 1: Welker® Electrohydraulic Unit Diagram – General Arrangement

ELECTROHYDRAULIC UNIT – FRONT VIEW, ANGLED

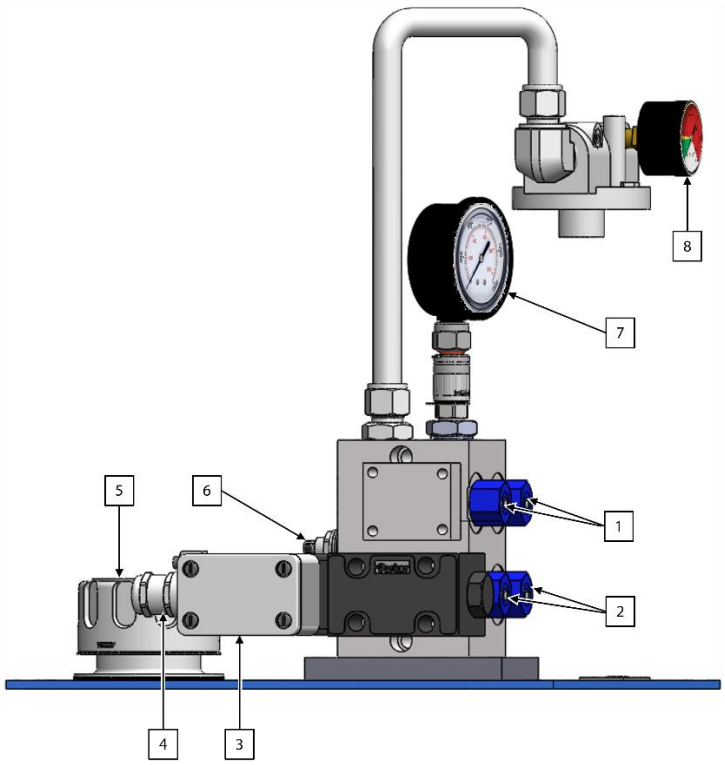


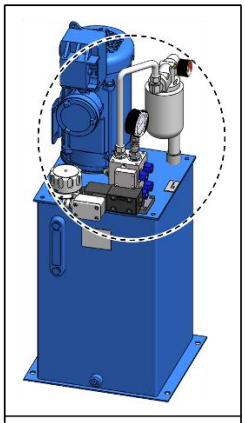


EHUC – RIGHT SIDE VIEW

No.	Description
1	Differential Pressure Gauge
2	Fluid Filter
3	Pressure Output Gauge
4	Detail: Solenoid Connections (*See Figure 2*)
5	Oil Level and Temperature Gauge
6	Base Plate Hole (Qty = 4), 9/16" Diameter
7	Hydraulic Fluid Drain, ½" FNPT
8	Motor Starter (1-Phase)
9	Motor Electrical Connection, AC 115 / 220 V, ¾" FNPT
10	Rain Cap for 10-Gallon Tank

Figure 2: Welker® Electrohydraulic Unit Solenoid Manifold Detail Diagram

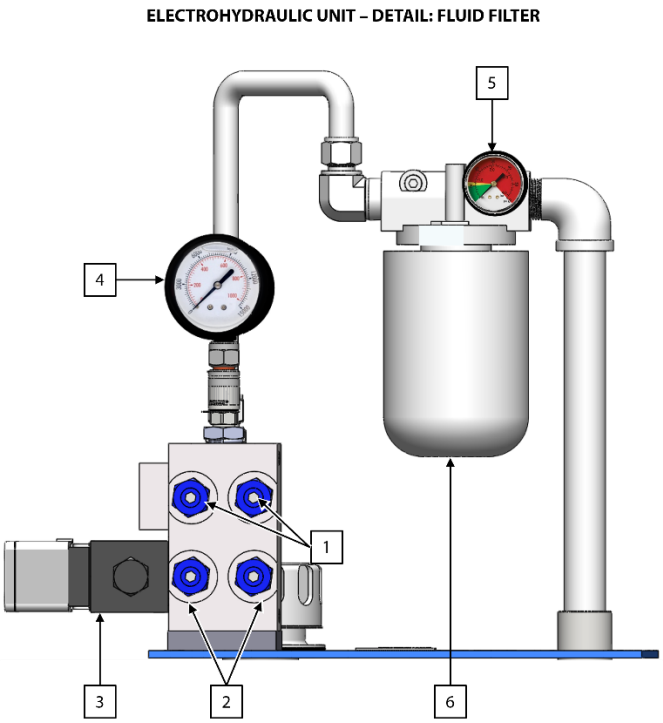


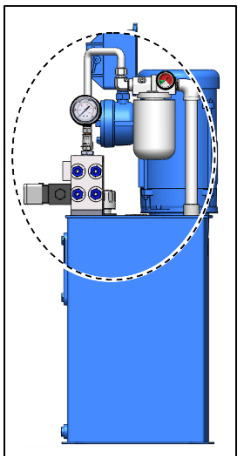


EHUC – FRONT VIEW, ANGLED

No.	Description
1	Extra Port Hydraulic Connections, ¼" FNPT (Optional)
2	Solenoid Hydraulic Connections, ¼" FNPT
3	4-Way Solenoid, Stackable
4	Solenoid Electrical Connection, DC 24 V, M20 Thread Standard (½" FNPT Adapter Provided)
5	Hydraulic Fluid Fill
6	Pressure Adjusting Valve
7	Pressure Output Gauge
8	Pressure Differential Gauge

Figure 3: Welker® Electrohydraulic Unit Fluid Filter Detail Diagram



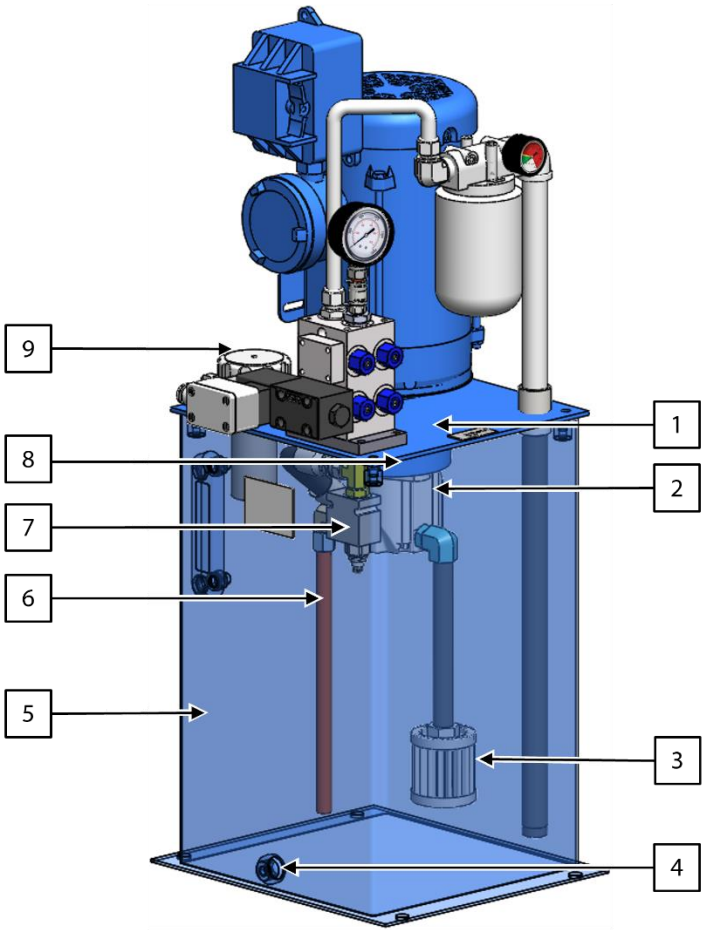


EHUC – RIGHT SIDE VIEW

No.	Description
1	Extra Port Hydraulic Connections, ¼" FNPT (Optional)
2	Solenoid Hydraulic Connections, ¼" FNPT
3	Solenoid Connection
4	Pressure Output Gauge
5	Differential Pressure Gauge
6	Fluid Filter

Figure 4: Welker® Electrohydraulic Unit Reservoir Diagram

RESERVOIR SHOWN TRANSPARENT FOR CLARITY



No.	Description
1	Removable Top
2	Pump
3	Suction Strainer
4	Drain Outlet
5	Reservoir
6	Return Line Tube
7	Pressure-Reducing Valve (10-Gallon Only)
8	Coupling
9	Breather Fill Cap & Strainer

Figure 5: Welker® Electrohydraulic Unit Electrical Schematic (5-Gallon Model)

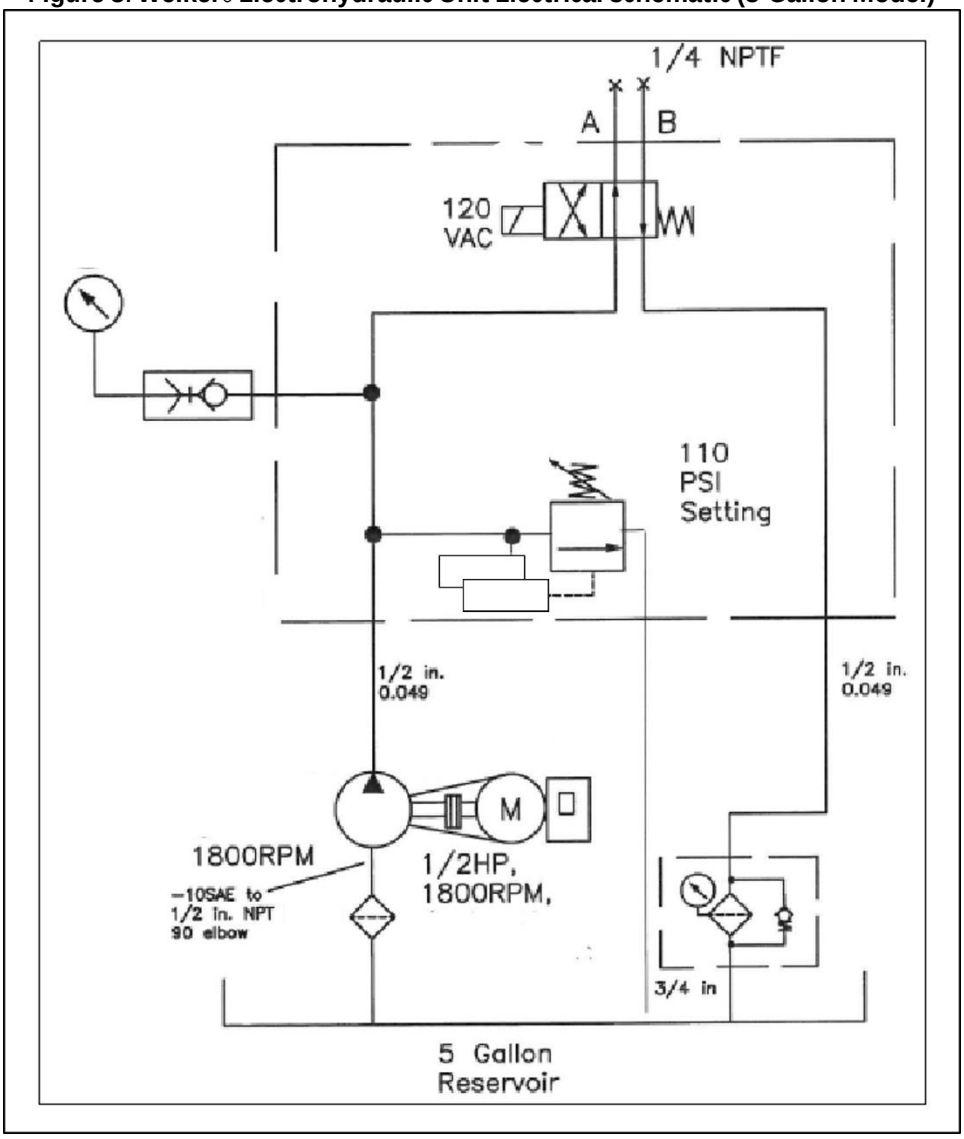


Figure 6: Welker® Electrohydraulic Unit Motor Starter Electrical Detail Schematic (5-Gallon Model)

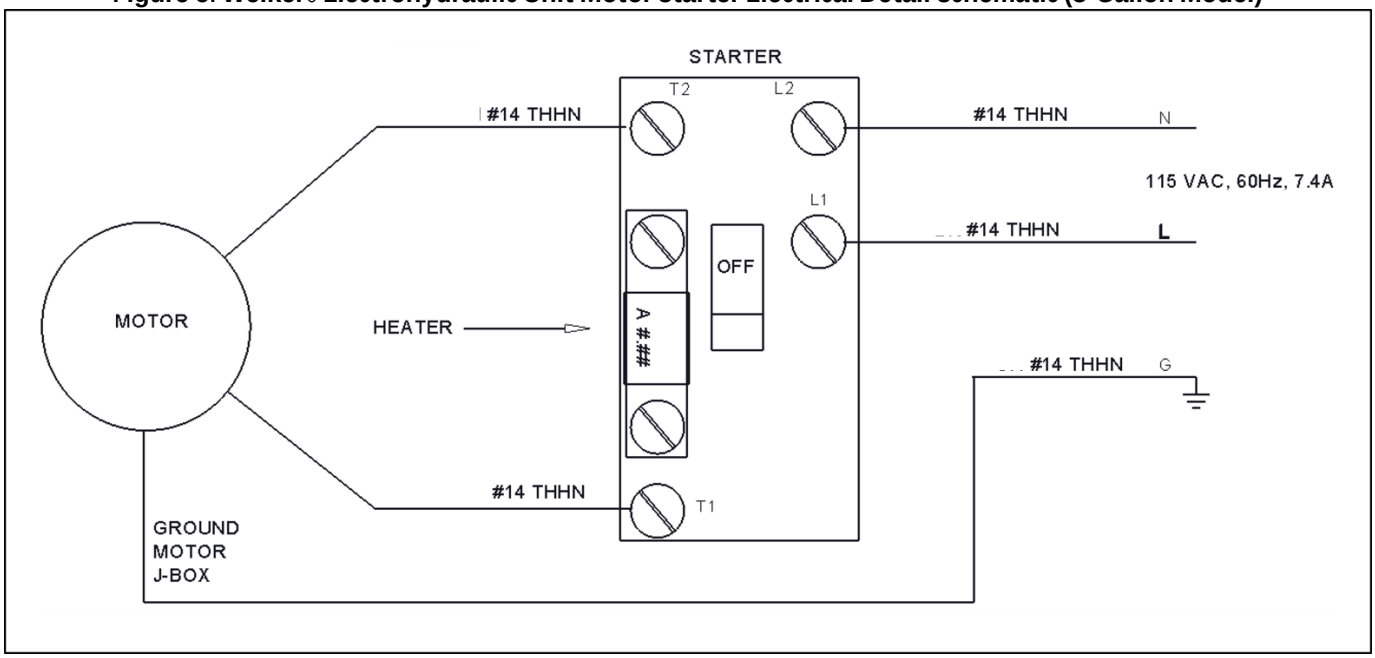
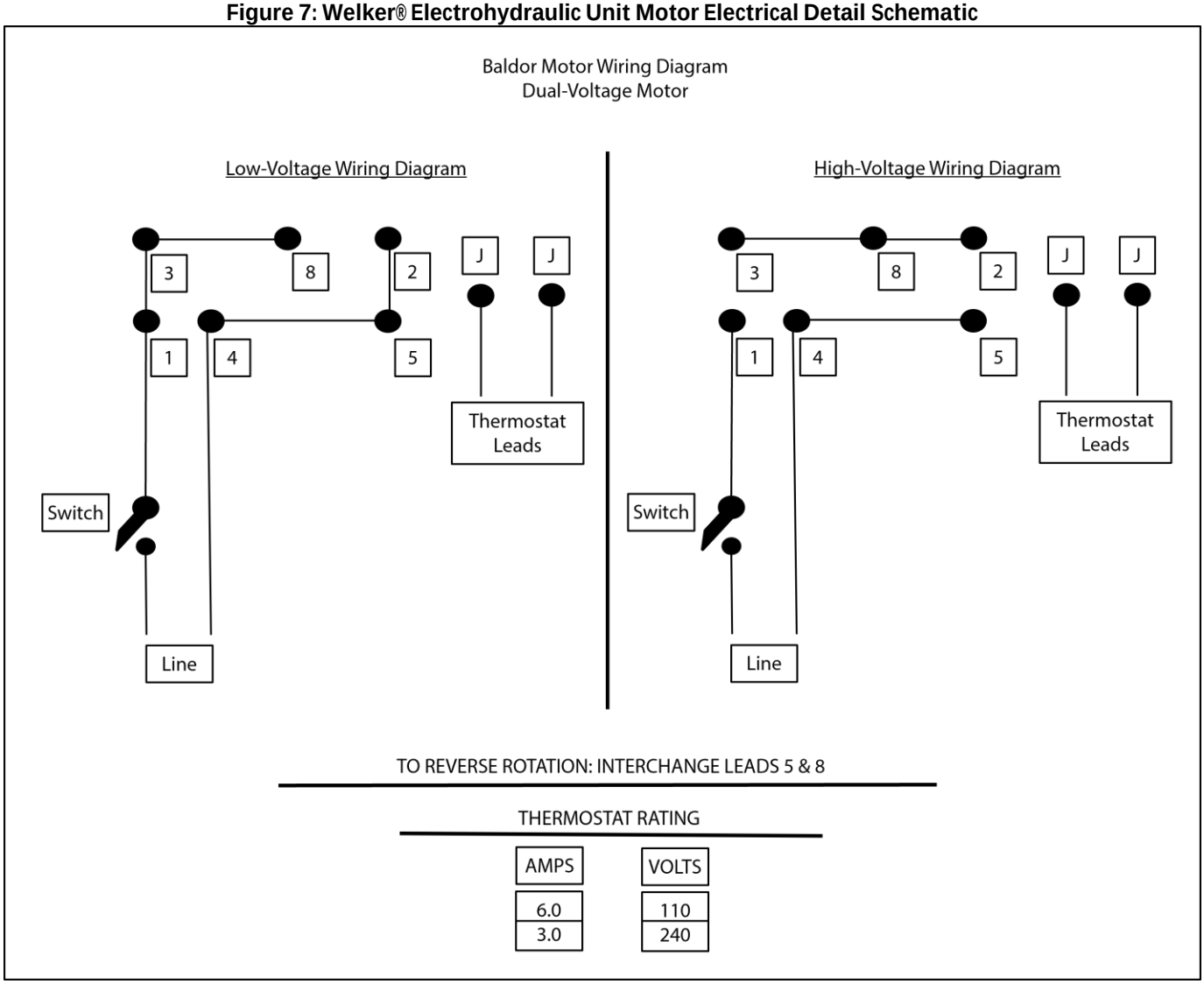


Figure 7: Welker® Electrohydraulic Unit Motor Electrical Detail Schematic



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

After unpacking the unit, check the equipment for any damage that might 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.

All electrical connections must meet local and national electric codes, and excessive weight added to the conduit run must be supported.

If the unit will not be installed immediately, it should be stored indoors, covered with plastic sheet. All open ports should be plugged. If long-term (6 months or longer) storage is expected, Welker® recommends filling the reservoir completely with clean hydraulic fluid. This is to prevent the entry of moisture.

1. A key ingredient for an Electrohydraulic unit's good service and long life is cleanliness. Typically, most dirt infiltrates a hydraulic system during installation. Therefore, Welker® strongly recommends following these practices in order to avoid the introduction of dirt:
    a. All open ports on the power unit, cylinders, and so forth, must remain plugged with tape or plastic plugs until just before the hydraulic connections are made.
    b. All interconnecting tubing, pipe, or hose should be clean and free from rust, scale, and dirt. The ends of all connectors should be plugged until just before they are to be installed in the system.
    c. All openings in the reservoir—such as the filler breather and access end cover holes—must remain closed during installation.
    d. If PTFE tape or pipe dope is used, use it sparingly, apply it only to male threads, and ensure it does not extend beyond the first thread of the pipe fitting.
2. Locate the Welker® Electrohydraulic Unit as close as practical to the installed sample probe. Welker® recommends that the Welker® Electrohydraulic Unit be installed indoors in a clean, dry environment with an ambient temperature anywhere between 60–100 °F (*15–37 °C*). Ventilate the space if temperatures might rise above 100 °F. Heat if temperatures might fall below 32 °F.
3. Secure the unit's base to a flat, clean surface using the four (4) mounting holes indicated in *Figure 1*.
4. Connect a ground wire to a grounding lug to safely ground the system.

The reservoir MUST BE filled with clean fluid. Welker® recommends filling (hydraulic fluid fill, *Figure 2*) the reservoir with new, clean, high-grade oil (such as ISO 46). Fill the reservoir until the oil level gauge indicates "FULL" at the top of the sight glass (oil level and temperature gauge, *Figure 1*).

5. The reservoir must be filled with clean fluid. Welker® recommends filling (using the hydraulic fluid fill, *Figure 2*) the reservoir with new, clean, non-foaming, non-detergent, high-grade oil (such as ISO 46). Fill the reservoir until the oil level gauge indicates "FULL" at the top of the sight glass (oil level and temperature gauge, *Figure 1*).

2.2 Initiating the Electrohydraulic Unit

Do not start the unit until it is filled with clean fluid (e.g., ISO 46). Fluid "FULL" level can be seen through the oil level gauge sight glass..

1. Connect the electrical supply to the explosion-proof junction box on/off switch and make solenoid connections to the PLC as required (*Figure 6* and *Figure 7*). Refer to industry standards for appropriate electrical connections to interface with the PLC.
2. The unit next needs to be properly tubed. Minimum ⅜" diameter hydraulic hose and steel hydraulic tubing and fittings are strongly recommended. Black pipe and fittings may be used, but they must be pickled, washed, and oiled before installation.

Customer-supplied tubing must slope downward from the sample probe to the EHUC. Customer-supplied tubing must also slope downward from the EHUC to other instrumentation and devices, such as a Welker® Transportable Crude Oil sample container. The downward sloping is to ensure the crude oil and basic sediment and water (BS&W) flow to the sample containers.

3. When pipe or tubing is cut, all internal burrs should be carefully removed with a pipe reamer, and should be blown and flushed clean.
4. All pipe connections must be tight. A leaky joint in the suction line will allow air to be drawn into the system and result in a noisy pump, cavitation, and erratic motion of valves and fittings. Loose joints in the pressure line cause loss of oil, which can be hazardous and expensive. All runs of tubing should be adequately supported.
5. You may add large-ported ball valves.

2.3 Start-Up Procedures

Do not start the unit until it is filled with clean fluid (e.g., ISO 46). Check to see the fluid level is "FULL"—visible through the oil level gauge sight glass..

1. The pressure adjusting valve (see part #6 in *Figure 2*) adjustment knob (also known as a system relief valve or pump pressure compensator adjustment knob) needs to be backed out so that the pressure will be near zero during start-up. Use an Allen wrench.
2. Jog the pump motor 3 to 6 times to prime the pump. Then allow the pump to run for several minutes at zero pressure. Check the piping for any leaks and adjust, repair, or replace immediately, as necessary.
3. If a secondary relief valve has been included, it is factory-set internally at 150 psig (*10.3 barg*).
4. Begin adjusting the pressure adjusting valve (see *Figure 2*) to increase pressure gradually.
5. Continue increasing pressure until normal operating pressure is obtained.
6. Cycle the system to fill all lines and equipment, then bleed air from high points throughout the entire system.
7. Continue cycling and bleeding the system until all air is removed. The system should now be operating smoothly.
8. During the start-up sequence, all filters should be monitored closely. Replace any filter elements immediately should they begin to go into bypass as indicated on the visual indicator (i.e., differential pressure gauge).
9. After the entire system has been wetted with fluid, refill the reservoir to the normal operating level (i.e., ¾ high or higher as seen in the fluid and temperature gauge sight glass).

NEVER operate the power unit with oil temperatures above 160 °F at the pump inlet. If necessary, use a heat exchanger to lower oil temperatures. The ideal operating temperature is between 100–130 °F (*37–54 ℃*). High operating temperatures lead to pump wear and failure of system component seals.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker recommends that the Welker® Electrohydraulic Unit have annual maintenance under normal operating conditions.** In case of severe, dirty conditions, excessive usage, or other unique applications that might lead to excess wear on the unit, a more frequent maintenance schedule would be appropriate.
2. **Welker® recommends that the Welker® Electrohydraulic Unit be kept clean at all times. This will require following basic rules of cleanliness during installation and also maintaining the various parts of the system according to the recommendations detailed in this section**. If the unit will not be installed immediately, it should be stored indoors, covered with plastic sheet. All open ports should be plugged. If long-term (6 months or longer) storage is expected, Welker® recommends filling the reservoir completely with clean hydraulic fluid. This is to prevent the entry of moisture.

New seals supplied in spare parts kits should be lightly lubricated before being installed to ease the installation of the seals and reduce the risk of damage when positioning them on parts. Wipe excess lubricant from the seals, because it might adversely affect the quality of the oil the EHUC uses to operate.

3. Welker® recommends having the following items available for maintenance. Please note that the exact items required might vary by model.
    - Adjustable Wrench
    - Clean Rags
    - Drain Pan
    - Filter
    - Funnel
    - New, Clean, Non-Foaming, Non-Detergent, High-Grade Oil (Such as ISO 46)
    - Oil Filter Wrench
    - Solvent
    - Sorbent Pads

3.2 General Maintenance

1. During operation, monitor the system for leaks. If leaks are present, halt operation and repair as necessary.
2. Be aware that the unit will vibrate during operation. This vibration can, over time, loosen caps and fittings. Be sure to monitor the unit and tighten loose caps and fittings when appropriate.
3. Occasionally, a system component might need to be repaired or removed for manufacturer-recommended maintenance. To perform maintenance on components:
    a. Turn OFF all electrical power to the system. Tag and lock out.
    b. If required, drain the contents of the system to an appropriate and safe draining location.
    c. Disconnect the tubing and remove individual components for maintenance.
    d. For complete and proper maintenance on individual system components, refer to their respective *Installation, Operation, and Maintenance* (IOM) *Manual*. A list of component *IOMs* is available in the *Appendix* to this manual.
    e. After performing necessary maintenance on component parts, reconnect all instrument tubing.
    f. Reinstall the system according to the instructions in *Section 2.2, Initiating the Electrohydraulic Unit*.
    g. Check oil level and refill as needed.

Oil Check and Oil Change

1. Under normal operating conditions—with all installation, operation, and maintenance procedures followed—the system should only require new oil and a new filter annually. However, periodically check to determine if the oil should be replaced sooner than that.
2. Should the system oil become contaminated, it will be necessary to replace the oil using the following procedure (do not try to reclaim contaminated oil through filtration):
    h. Depressurize the system and close all valves.
    i. Turn OFF all electrical power to the system. Tag and lock out.
    j. Drain the oil reservoir and dispose of the oil in an environmentally responsible manner according to company policy.
    k. Flush the reservoir with high-pressure diesel fuel or hydraulic oil. Wipe clean using lint-free cloths.
    l. Replace all filter elements throughout the system and clean all strainers.
    m. Fill the reservoir with new, clean, high-grade oil (such as ISO 46).
    n. Disconnect all lines to the actuators at the actuators.
    o. Activate each circuit by moving the directional control valve so that those lines are flushed with new oil. The system is now flushed with clean, new oil up to the actuators.
    p. To remove dirty oil from the actuators, examine each actuator to determine which port should be supplied with new oil to stroke it from its last position. In each case, connect a line to that port, leaving the second line to each actuator disconnected. Now stroke each actuator using new oil and forcing the old oil out of each actuator through the disconnected port into a waste container. Then reconnect the second line to each actuator.
    q. Check all filter elements and clean or replace as necessary. (Refer to the following section on *Filters*.)
    r. Refill the reservoir to the original "FULL" level.
    s. Bleed air from the system (see *Section 2.2, Initiating the Electrohydraulic Unit*).

Filters

1. Change or clean annually or as indicated when the differential pressure gauge indicates a filter issue. Spare filter elements should be purchased with the EHUC and be generally available, including during the start-up operation.
2. Operating the EHUC with a dirty filter will deliver non-filtered fluid. To prevent compromising the function of the filter, regularly inspect the differential pressure gauge and replace the filter as soon as it becomes dirty.
3. Set up a filter maintenance schedule and follow it.
4. Inspect filter elements that have been removed to determine whether the filter is at or near failure. This might indicate that maintenance frequency should be increased.

Reservoir

1. Keep the reservoir lid (i.e., rain cap and/or hydraulic fluid fill, *Figure 1* and *Figure 2*) closed at all times.
2. Maintain the oil level at all times.
3. The oil should be checked after the first 100 hours. The operator should verify that the class of oil meets the requirements of the pump being used. The oil should be non-foaming, non-detergent, high-grade oil (such as ISO 46).

4. Under normal operating conditions—with all installation, operation, and maintenance procedures followed—the system should only require new oil and a new filter annually. However, periodically check to determine if the oil should be replaced sooner than that.
5. Maintain reservoir level at "FULL" as indicated by the level gauge. If there is a loss of oil level, check to find the cause. Refer to the *Troubleshooting Guidelines* section.
6. Do not return to the system any fluid that has leaked out.
7. Always keep the supply of fresh fluid tightly covered.
8. Use clean hoses and funnels when filling the reservoir. Welker® recommends changing the filter when adding oil.
9. To prevent dirt from entering components, be sure to set the components aside in a clean environment when they have been removed from the system.
10. Make sure all clean-out holes, filler caps, and breather cap filters on the reservoir are properly fastened.
11. Do not operate the system unless all normally provided filtration devices are clean, secure, and in place.
12. Welker® recommends the use of a high-quality oil such as ISO 46.
13. Should it be necessary to change from one type of fluid to another (e.g., from a petroleum-based oil to a fire resistant fluid), consult component and filter manufacturers regarding the selection of the fluid and the filters that should be used. A useful publication—*Recommended Practice – Hydraulic Fluid Power – Use of Fire Resistant Fluids for Industrial System*, written by the National Fluid Power Association—is available for a fee at the online ANSI Webstore.

Maintaining Proper Oil Temperature

1. It is crucial that EHUC operators maintain oil temperature within the stipulated range. Hot oil in the Welker® Electrohydraulic Unit is one of the key causes of poor operation, component failure, and downtime. NEVER operate the unit with oil temperatures above 160 °F at the pump inlet. If necessary, use a heat exchanger to lower oil temperatures. The ideal operating temperature is between 100–130 °F (*37–54 °C*). High operating temperatures lead to pump wear and failure of system component seals.
2. If you run your EHUC unit continuously at temperatures above 130 °F (*54 °C*), the unit will operate poorly and eventually key components will fail.
3. To determine how hot your EHUC unit is running, take an oil temperature reading at the reservoir (*Figure 1*)—not at a component or any of the piping.
4. Check the reservoir thermometer at frequent intervals (i.e., every few hours) after the equipment has been running for more than an hour.
5. Should your system be overheating, you will need to identify which components are running hot and are responsible for heating the oil to high levels. Feel outlet fittings and lines at the valves, pumps, and motors. If the oil feels normal going into a component but hot coming out, that component is likely causing overheating.
6. For example, a sticking valve can cause excessive heat. If a spool does not return promptly to the neutral position, the pump flow will be continuously dumped, which builds up heat rapidly.

When diagnosing the source of overheating, ALWAYS remove and check the hot components first, before checking the others.

9. Another key method for determining whether your EHUC's oil has been running too hot is to periodically siphon an oil sample from the reservoir and compare it with a sample of clean new oil. Oil that has been running too hot will look darker and feel thinner than new oil. It will also smell burnt. There is a strong likelihood it will contain contaminants, because hot oil leads to accelerated wear of component parts.

3.3 Preventive Maintenance

1. Set up a regular schedule for checking the oil temperature, appearance, smell, and feel. Instead of an annual oil and filter change, the unit might require an oil and/or filter change every six (6) months or more often if the system is regularly running hot. For example, on hot days and in hot climates, it is likely necessary to change the oil more frequently than every year. Be sure to use an oil that is recommended for hot-weather operation. Check with a Welker® service representative for this information.
2. Promptly check, repair, remove, or replace valves, pumps, or other components that you have identified are running hot.
3. If relief or flow-control valves are running hot, check and adjust their settings.
4. Break in new components gradually. New, close-fitting parts expand at different rates and are particularly prone to seize up when they get too hot.
5. Start a cold pump or motor on hot oil by jogging just enough to draw the hot oil into the component. Then wait a few moments to allow the temperature to equalize in all the pump's parts. Repeat until the temperature on the outside of the pump is the same as that on the piping.
6. Keep your equipment clean. A layer of dirt acts as insulation that will prevent the Welker® Electrohydraulic Unit from getting rid of heat.

Special Note on Fluid Analysis

Hydraulic system operational malfunction is almost always caused by a component other than the pump. When pump failure causes system malfunction, the root cause of such failures is usually dirt or debris in the system as indicated by hot operation and low fluid levels. Dirt or debris in the system—causing hot operation and low fluid levels—is also the root cause for most other system component failures.

Fluid analysis is crucial in diagnosing the system condition *before* it causes a failure. One key way is to check the quality of the system oil by siphoning off a small amount from the oil reservoir and comparing it to a sample of clean new oil. Oil that has been running too hot will look darker and feel thinner than new oil. It will also smell burnt. There is a strong likelihood it will contain contaminants, because hot oil leads to accelerated wear of component parts.

Do not assume that a new machine is clean. Instead, check to make certain. Most failure chains start with new machines after they have been operating only a few hours. Be sure to conduct any repairs or maintenance under the cleanest conditions possible. Consistently doing so will prevent future issues from developing.

Familiarize yourself with all sections of this manual—including the following *Troubleshooting Guidelines*—and follow the advice contained in it. The two most important guidelines are these:

- Use a clean, non-foaming, non-detergent, high-grade oil, such as ISO 46. Under normal operating conditions, it should only be necessary to change the oil and filter annually.
- A key ingredient for an Electrohydraulic Unit's good service and long life is cleanliness. Typically, most dirt infiltrates a hydraulic system during installation. Therefore, Welker® strongly recommends following the procedures contained in *Section 2.1: Before You Begin* in order to avoid the introduction of dirt.

3.4 Troubleshooting Guidelines

Table 2: Welker® Electrohydraulic Unit Troubleshooting Guidelines		
Issues	**Possible Causes**	**Solutions**
The oil is dirty.	Components were not properly cleaned after servicing.	Change the filter.
	Inadequate screening in fill pipe.	Change the filter.
	The air breather was left off.	Put the air breather on correctly.
	The tank is not properly gasketed.	Replace the tank.
	Pipe lines were not properly covered while serving the unit.	Change the filter.
	The filter is dirty or ruptured.	Replace the filter.
The oil is foaming.	There is a suction leak to the pump that is aerating the oil.	Check connections and repair or replace as necessary.
	There is a lack of anti-foaming additives.	Drain all the oil from the system and be sure to replace it with high-quality oil, such as ISO 46.
There is moisture in the oil.	There was moisture in the cans containing the oil used to replace that in the tank.	Ensure the can that will contain the oil used to replace that in the tank is absolutely dry.
	Snow and/or rain infiltrated the oil cap or the EHUC.	Protect the EHUC and the can containing the oil from snow and/or rain.
	The oil is white or gray—meaning there is water in the oil.	Replace the oil and filter. Secure the EHUC from snow, rain, and condensate.
The system is overheating.	There is improper air circulation around the reservoir.	Provide adequate ventilation for the system.
	The power unit is operating in direct sunlight or the ambient temperature is too high.	Move the EHUC unit indoors or to a shaded location.
The pump is failing to deliver fluid.	There is low fluid level in the reservoir.	Investigate the cause. Drain the existing fluid from the system and clean the EHUC. Replace malfunctioning root-cause components and refill the tank with the recommended quality of oil (such as ISO 46).
	Reversed rotation.	Check and correct the rotation according to the diagram in *Figure 6*.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-029: InLoop™ Crude Oil Sampler
- IOM-052: inFlow™ Crude Oil Sampler With AI Control™
- IOM-211: LSSM-1PM Composite Liquid Sampler
- IOM-224: InLoop™ ACE Crude Oil Sampler

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

- None

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

- System Drawing: EHUCBSBYB10000003 (External Hydraulic Unit, 10 US Gallon Model)

NOTES

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

welker.com