



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER LABORATORY MIXING SKID

MODELS

MSTCCO
MSTCCB
MSTCCD
MSTCCE
MSTCCF
MSTCCX

DRAWING NUMBERS

AD406CF
AD406CH
AD406CL
AD406CL.1
AD406CO

MANUAL NUMBER

IOM-036

REVISION

Rev. F, 7/16/2020

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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 Laboratory Mixing Skid, MSTCC. 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 Laboratory Mixing Skid 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 Laboratory Mixing Skid, please contact a Welker representative immediately.

Phone: 281.491.2331

Address: 13839 West Belfort Street
Sugar Land, TX 77498

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 MSTCC Laboratory Mixing Skid is designed specifically for use with Welker TCC Transportable Crude Oil Containers to provide a quality sample for basic sediment and water (BS&W) monitoring.

Over time, sample collected in a TCC may stratify. The MSTCC will mix the contents of the connected TCC to achieve a homogeneous and representative sample. In addition, the MSTCC is capable of cleaning the TCC after use.

Welker may custom design the MSTCC 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: MSTCC Specifications

Applications	Mixing Contents of Welker TCC Cleaning Welker TCC
Materials of Construction	Carbon Steel Skid With 316/316L Stainless Steel or Carbon Steel Fittings
Maximum Allowable Operating Pressure	200 psig @ -20 °F to 100 °F (13 barg @ -28 °C to 37°C)
Connections	Discharge: ½" Quick-Connect Drain: ½" FNPT Spot Sample Draw Off: ¼" FNPT Suction: ½" Quick-Connect
Electrical Connection	MSTCC0, MSTCCX: AC 110 V, ½" FNPT MSTCCB, MSTCCD, MSTCCE, MSTCCF: AC 220 V, ½" FNPT
Dimensions	24" x 28" (Length x Width)
Features	Explosion-Proof Motor Flexible Hoses With Quick-Connects Placement Ring for Welker TCC Transportable Crude Oil Container Pump With Internal Relief Sample Draw Off Valve Static Mixer
Industry Standards	API Chapter 8 ASTM D4177 ISO 3171

1.4 Equipment Diagrams

Figure 1: MSTCC Connections Diagram

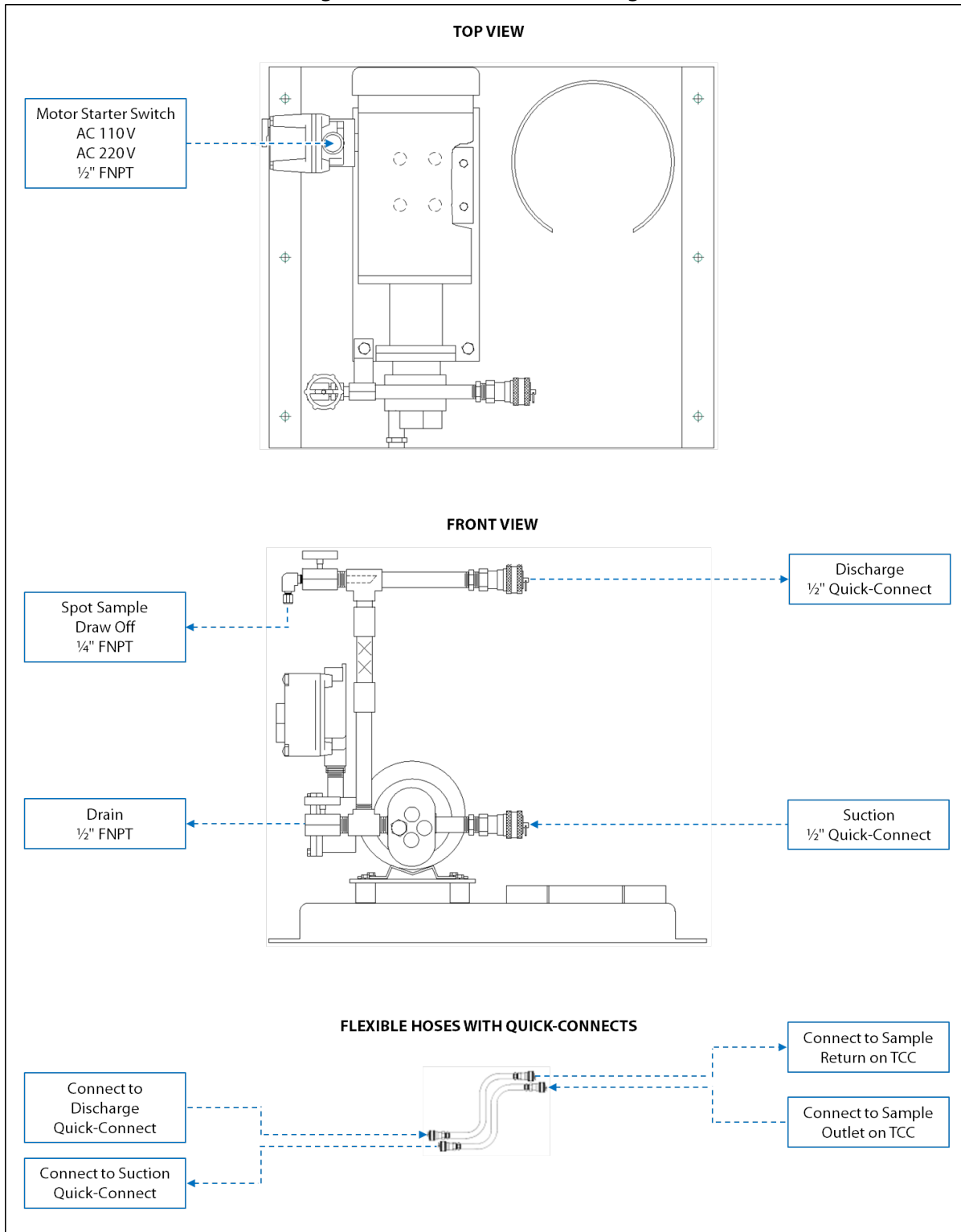
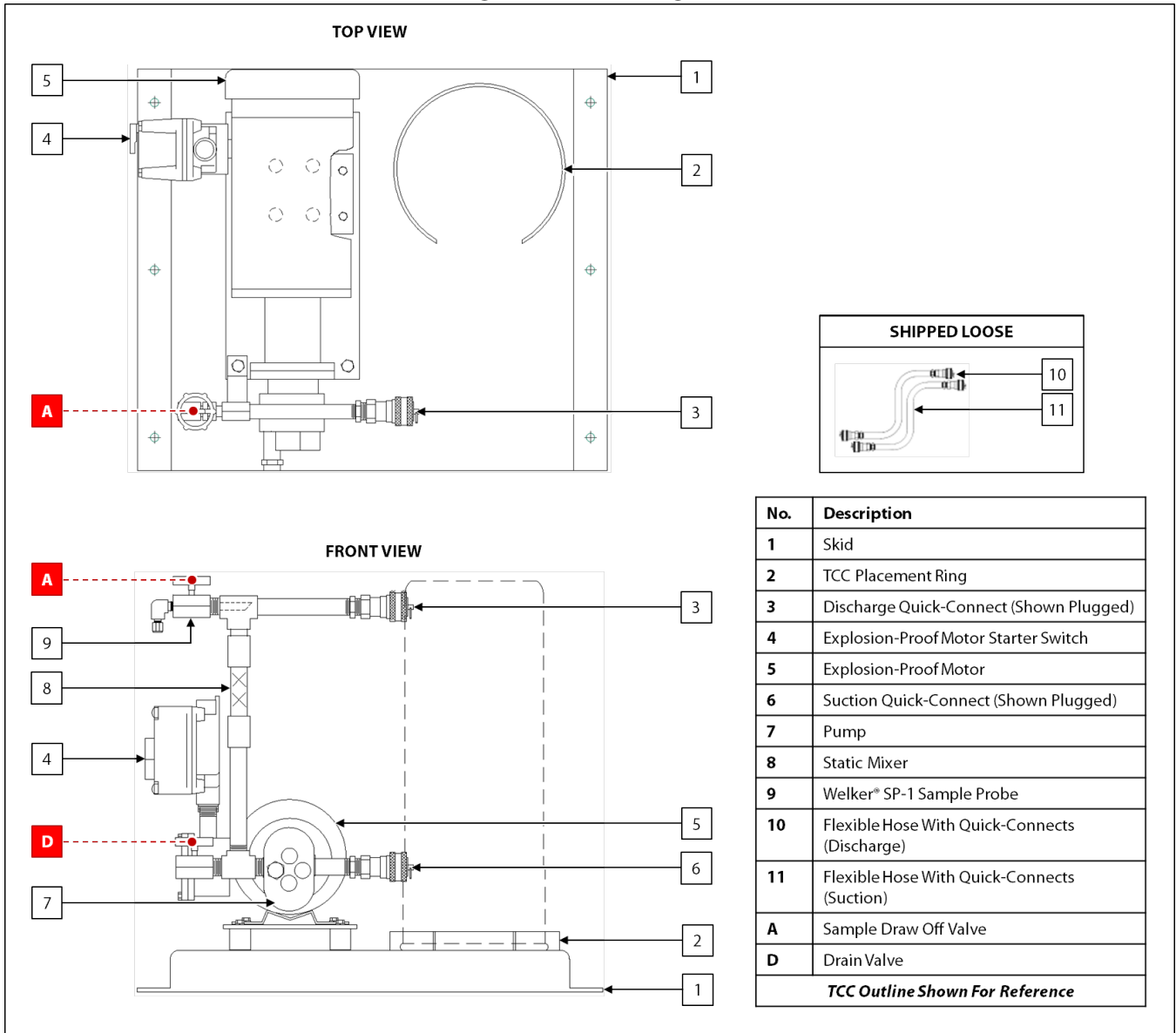


Figure 2: MSTCC Diagram



SECTION 2: INSTALLATION & OPERATION

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.



The Welker MSTCC will ship skid-mounted and "hard-tube" connected with manufacturer-supplied fittings and hardware. However, the customer will need to supply some tubing and fittings in order to complete the installation of the system.

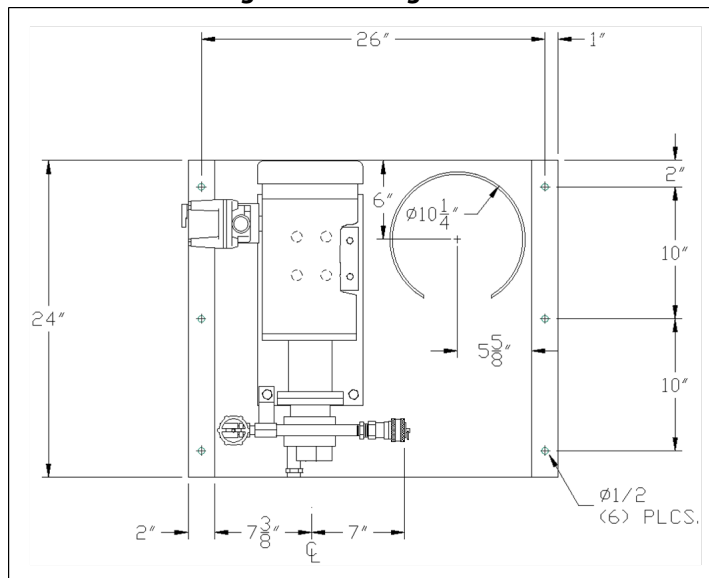


These instructions are written with the assumption that the Welker MSTCC is being used to mix the contents of a Welker TCC Transportable Crude Oil Container. While it is possible to use the MSTCC and the TCC with equivalent third-party equipment, the MSTCC has been designed to take full advantage of the features of the TCC to provide a quality sample for basic sediment and water (BS&W) monitoring.

2.2 Installing the MSTCC

1. Install the MSTCC to the desired location as close as possible to the power source.
2. Mount the MSTCC to the desired location in accordance with the bolting pattern (*Figure 3*).

Figure 3: Bolting Pattern



3. Connect a grounding wire to the MSTCC to safely ground the skid.
4. Connect an appropriate electrical supply to the motor starter switch (*Figure 1*).
5. Using tubing or pipe, connect from drain valve D to an appropriate draining location or sump (*Figure 1*).

2.3 Installing the TCC to the MSTCC



A pressure relief valve is required on the sample container.



Welker recommends grounding all containers to prevent static shock.

1. Ensure that the lid of the TCC is properly closed. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the TCC for instructions on properly closing the lid of the TCC.



If the lid of the TCC is not properly closed before operation, the sample may be compromised. An improperly closed lid may allow water to enter or vapors to escape the sample.

2. Place the TCC on the skid.
3. Position the TCC within the placement ring so that the sample outlet and sample return quick-connects on the TCC point toward the suction and discharge quick-connects on the MSTCC.
4. Using one (1) of the provided flexible hoses with quick-connects, connect from the suction quick-connect on the MSTCC to the sample outlet on the bottom of the TCC (*Figure 1* and *Figure 2*). The quick-connects will audibly click into place.
5. Using the other provided flexible hose with quick-connects, connect from the discharge quick-connect on the MSTCC to the sample return on the top of the TCC (*Figure 1* and *Figure 2*). The quick-connects will audibly click into place.

2.4 Operation



DO NOT operate the MSTCC unless the flexible hoses with quick-connects are connected to the TCC and the TCC is filled with sample or cleaning solvent. Operating the MSTCC when the TCC is not properly installed or when the TCC is empty could damage the pump and motor.

1. Ensure that all valves are closed.
2. Ensure that the MSTCC is connected to the power source.
3. Ensure that drain valve D is connected to an appropriate draining location or sump (*Figure 1*).
4. Ensure that the TCC is properly connected to the MSTCC.
5. Ensure that the lid of the TCC is properly closed. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the TCC for instructions on properly closing the lid of the TCC.



If the lid of the TCC is not properly closed before operation, the sample may be compromised. An improperly closed lid may allow water to enter or vapors to escape the sample.

6. Turn ON the motor starter switch (*Figure 2*).
7. Allow the contents of the TCC to mix in accordance with company policy.



Take care not to overmix the sample, as overmixing can push out the light ends, create an emulsion, and heat the sample.

Taking a Spot Sample



Welker recommends grounding all containers to prevent static shock.

8. Open sample draw off valve A (*Figure 2*).
9. Hold an atmospheric container under the spot sample draw off to collect sample as it purges (*Figure 1*).
10. Once the spot sample draw off has been purged, replace the atmospheric container being held under the spot sample draw off with a graduated beaker.
11. Allow the graduated beaker to fill to the desired volume, and then close sample draw off valve A (*Figure 2*).



Consult company policy for the volume of sample required for testing.

12. After extracting the required amount of sample, proceed to *Section 3.3, Cleaning the TCC Using the MSTCC*, to clean the MSTCC and TCC while the MSTCC is still operating.

3.1 Before You Begin

1. **Welker recommends that the MSTCC and the TCC be cleaned after each use.** If the TCC is stored for some time prior to use, the TCC may need to be cleaned prior to use.
2. **Welker recommends that the unit have standard yearly maintenance under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that may lead to excess wear on the unit, a more frequent maintenance schedule may be appropriate.
3. Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit available for repairs of the system in case of unexpected wear or faulty seals.



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, as it may adversely affect analytical instrument results.



For sample-exposed seals, Welker recommends non-hydrocarbon-based lubricants, such as Krytox®. For non-sample-exposed seals, Welker recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.



After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

4. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
5. Welker recommends having the following tools available for maintenance. Please note that the exact tools required may vary by model.
 - a. Adjustable Wrench
 - b. Hex Key Set
 - c. Seal Pick
 - d. Tubing Cutters

3.2 Maintenance

1. During operation, monitor the MSTCC for leaks. If leaks are present, halt operation and repair as necessary.
2. Occasionally, a system component may need to be repaired or removed for manufacturer's recommended maintenance. To perform maintenance on components:
 - a. Depressurize the MSTCC and close all valves.
 - b. Turn OFF all electrical power to the MSTCC.
 - c. Drain the contents of the MSTCC to a safe recovery system or sump.
 - d. Disconnect the tubing and piping and remove individual components for maintenance.
 - e. For complete and proper maintenance on individual components, refer to their respective *Installation, Operation, and Maintenance (IOM) Manual*. A list of component *Installation, Operation, and Maintenance (IOM) Manuals* is available in *Appendix A, Referenced or Attached Documents*, in this manual.
 - f. After performing necessary maintenance on component parts, reconnect all instrument tubing and piping.
 - g. Install the MSTCC according to the instructions in *Section 2.2, Installing the MSTCC*.
3. Clean the TCC and MSTCC. See *Section 3.3, Cleaning the TCC Using the MSTCC*, for instructions.

3.3 Cleaning the TCC Using the MSTCC



DO NOT operate the MSTCC unless the flexible hoses with quick-connects are connected to the TCC and the TCC is filled with sample or cleaning solvent. Operating the MSTCC when the TCC is not properly installed or when the TCC is empty could damage the pump and motor.

Cleaning the TCC

1. With the TCC installed to the MSTCC and the MSTCC still operating, open drain valve D (*Figure 2*). Allow the contents of the TCC and MSTCC to pump through the system to the sump.
2. Once draining is complete, close drain valve D (*Figure 2*).
3. Turn OFF the motor starter switch (*Figure 2*).
4. Open sample draw off valve A to depressurize the TCC, and then close valve A (*Figure 2*).



The TCC must be depressurized before opening the lid of the TCC. Removing the lid of the TCC under pressure could cause severe injury.

5. Open the lid of the TCC.
6. Fill the TCC half full with cleaning solvent.



Welker recommends cleaning the TCC with a quick-evaporating solvent, such as acetone. Refer to the appropriate company policy for the approved quick-evaporating solvent. Use chemical solvents safely, following all personal protective equipment (PPE) and usage directions listed on the solvent label and Material Safety Data Sheet (MSDS).

7. Close the lid of the TCC. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the TCC for instructions on properly closing the lid of the TCC.
8. Turn ON the motor starter switch (*Figure 2*).
9. Allow the cleaning solvent to circulate through the system for approximately two (2) minutes or until any sample remaining in the system is diluted.

10. Open drain valve D and allow the contents of the TCC and MSTCC to pump through the system to the sump (*Figure 2*).
11. Once draining is complete, close drain valve D (*Figure 2*).
12. Turn OFF the motor starter switch (*Figure 2*).
13. Repeat steps 4–12 until the cleaning solvent runs clear when drained.

Disconnecting the TCC From the MSTCC

14. Ensure that the motor starter switch is OFF (*Figure 2*).
15. Disconnect the discharge flexible hose with quick-connects from the sample return on the TCC (*Figure 2*). The discharge flexible hose with quick-connects may remain connected to the MSTCC.
16. Disconnect the suction flexible hose with quick-connects from the sample outlet on the TCC (*Figure 2*). The suction flexible hose with quick-connects may remain connected to the MSTCC.
17. Manually remove the TCC from the skid.

Drying the TCC

18. Depressurize the TCC.



The TCC must be depressurized before opening the lid of the TCC. Removing the lid of the TCC under pressure could cause severe injury.

19. Open the lid of the TCC.
20. Carefully dry the inside of the TCC with a clean, dry cloth.
21. Close the lid of the TCC. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the TCC for instructions on properly closing the lid of the TCC.
22. The cleaned TCC may be installed to a sampling system. If the TCC will be stored prior to use, tape, cap, or plug the ports on the TCC to prevent moisture and/or insects from entering.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-035: Welker SP-1, SP-1W, SP-2, SP-3, and SP-5 Sample Probes
- IOM-117: Welker TCC-1 Transportable Crude Oil Container
- IOM-197: Welker TCC-5 Transportable Crude Oil Container
- IOM-206: Welker TCC-2 Transportable Crude Oil Container
- IOM-207: Welker TCC-3 Transportable Crude Oil Container
- IOM-208: Welker TCC-10 Transportable Crude Oil Container

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

- Apollo Valves 73A-100 Series Carbon Steel Ball Valve (Welker IOM-V151)
- Apollo Valves 76-100 Series Stainless Steel Ball Valve with Mounting Pad 1/4" - 1" (Welker IOM-V141)
- Baldor Electric Company CL5023-50 Integral Horsepower AC Inductions Motors (Welker IOM-V324)
- Baldor Electric Company CL5023-I Integral Horsepower AC Induction Motors (Welker IOM-V212)
- BSM Pump Corporation S-Series Rotary Gear Pumps (Welker IOM-V323)
- Dayton® 4KHA9 to 4KHC4, 4KHD1 to 4KHE1, 4KHC5 to 4KHC9, and 4KHE2 to 4KHF2 Heavy-Duty Cast Iron and Bronze Gear Pumps (Welker IOM-V449)
- Hubbell Incorporated Killark® Manual Motor Starting Switches XSD/XSX/FXSD/FXSX Series (Welker IOM-V116)
- Parker Hannifin Corporation Ball and Plug Valves (Welker IOM-V213)
- Parker Hannifin Corporation Hose, Fittings and Equipment (Welker IOM-V162)
- Parker Hannifin Corporation Instrumentation Quick Coupling Products (Welker IOM-V293)

Welker drawings and schematics suggested for use with this unit:

- Assembly Drawing: AD406CF (MSTCCE, AC 220 V, 50 Hz Motor, Stainless Steel Fittings)
- Assembly Drawing: AD406CH (MSTCCD, AC 220 V, 50 Hz Motor, Carbon Steel Fittings)
- Assembly Drawing: AD406CL (MSTCCF and MSTCCX, AC 220 V and AC 110 V, 60 Hz Motor, Stainless Steel Fittings)
- Assembly Drawing: AD406CL.1 (MSTCCB, AC 220 V, 60 Hz Motor, Carbon Steel Fittings)
- Assembly Drawing: AD406CO (MSTCC0, AC 110 V, 60 Hz Motor, Carbon Steel Fittings)

