

## Technical Manual 401 RO



### **Models:**

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TC 401  
TC 401c

# 401 RO

Manual part number: TC401a  
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## About this Manual

This manual will cover information needed for the proper installation and operation of your Kinetico 401 Series Commercial Reverse Osmosis System. We have also included information regarding the frequently asked questions about reverse osmosis systems. This information may be more technical in nature, but provides further insight to the continued operation of this equipment to its highest standards.

This manual will use various icons to help highlight issues that are relevant to the safe operation of this equipment. The following icons will be used as described:



General information regarding the application of this product will be highlighted by this icon. This will include technical specifications and expected operational results.



**Lock out electrical power.**

Use appropriate lockout procedures when servicing.



**Maintain safe pressure.**

This sign indicates the safe operating pressure range.



**Consult Maintenance Section.**

Refer to the maintenance section for specific instructions.



**Consult Equipment Specifications Section.**

Refer to the equipment specifications section for specific instructions.



**Consult MSDS Sheets**



A caution icon will be used to present any information that may hold a potential hazard or concern during the installation, use or maintenance of this product. **Should this information not be followed, it may result in damage of this equipment and its surroundings.**



**Electrical shock or electrocution hazard.**



**Pinch point or crushing hazard.**



**Chemical hazard**



The warning icon will be used to present any information that may result in a severe hazard or concern during the installation, use or maintenance of this product. **Should this information not be followed, it may result in severe physical harm.**



**Stay Clear.**



**Do Not Touch.**



**No Access.**

Only properly trained and authorized persons can enter area or open panel.



Any tools or materials required during the installation, use or maintenance of this equipment will be preceded by this icon. Using these specific tools will minimize time and effort. Not using the proper tool may result in damage to this equipment, its surroundings or even physical harm.

If there are any additional questions pertaining to this equipment, please contact your local Kinetico Dealer for further assistance.

## Reverse Osmosis Technology

Since its introduction into the market, RO has continued to gain popularity. RO technology offers the finest level of filtration available. The RO membrane acts as a barrier to dissolved salts and inorganic molecules, as well as organic molecules with a molecular weight greater than approximately 100. Water molecules, on the other hand, pass freely through the membrane creating a purified product stream.

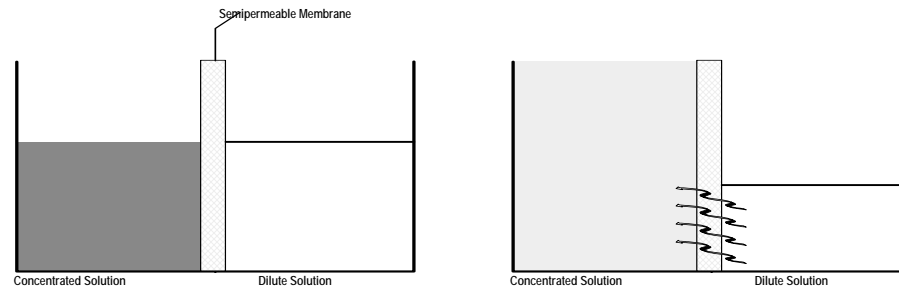


Figure 1

RO technology is not new. The process of osmosis is actually found in nature and in the human body. In this application human membranes allow nutrients or waste products to pass in and out of the blood stream. “Semipermeable” means that the membrane is permeable to some species and not permeable to others. Most semipermeable membranes allow water to pass through and not other molecules or ions. Figure 1 shows a concentrated solution will increase in volume as water from the dilute solution permeates through the membrane. In this fashion, the concentrations on either side of the membrane become equal, even though the volumes are not.

This dilution relationship can be quantified by the rise in the height of the salt solution. This height will increase until the pressure of the column of water (salt solution) is so high that the force of this water column stops the water flow. The equilibrium point of this water column height in terms of water pressure against the membrane is called osmotic pressure.

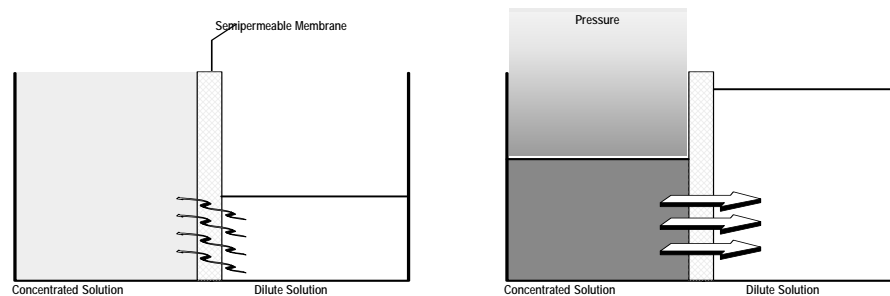
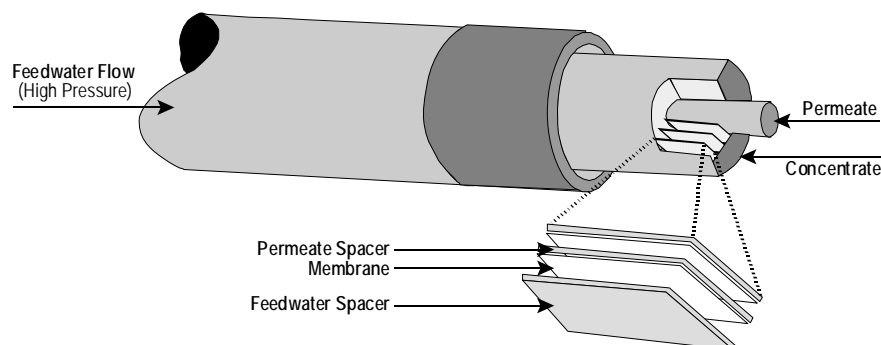


Figure 2

Reverse osmosis (Figure 2) is created if a force is applied to this column of water. Thus the direction of water flow through the membrane can be reversed. This is the basis of the term reverse osmosis. This reversed flow produces “permeate” water from the salt solution, since the membrane does not permit most salt to pass through it. The typical rejection of a semipermeable membrane is over 95%. This means that it will reject 95% of the salts and let 5% pass through.



## 401 RO Product Line Specifications

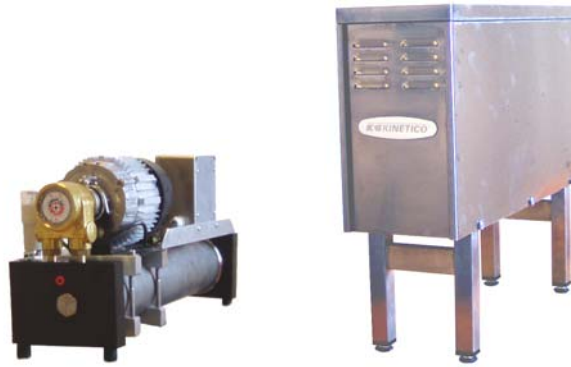
Kinetico's Reverse Osmosis product line is designed to provide high quality reverse osmosis water. The system delivers maximum production capacity in a compact design. The capacity of Kinetico's 401 RO is 180 l/h when operated to an atmospheric storage tank.

System features for the TQ Series include:

- Corrosion Resistant Stainless Steel Frame
- Stainless Steel Housing Construction
- Integrated Plumbing Manifold
- Electronic Circuit Board Controller
- High Production Membranes
- Compact System Design

A number of accessories are also available with the 401 systems including:

- Carbon Filters
- Backwashing Filters
- Softeners
- Storage Tanks



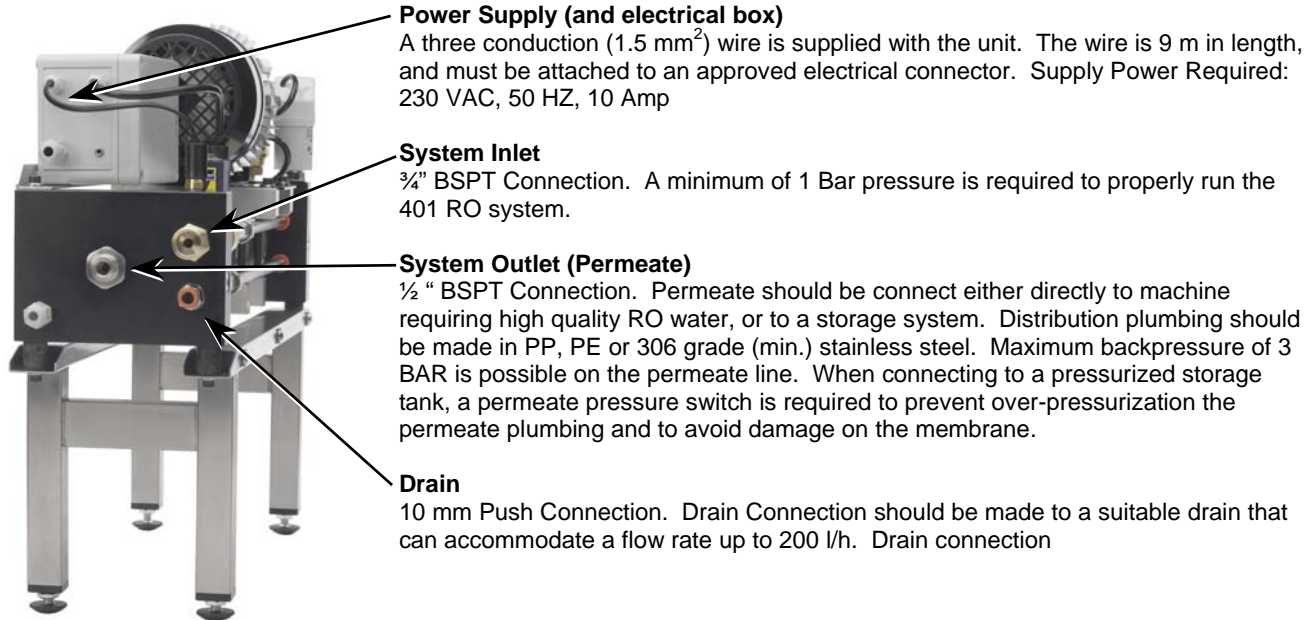
Model Name	401	401c
Part Numbers	401000	401001
Rated* Daily Production	180 l/h	180 l/h
Membrane Type	Thin Film Comp.	Thin Film Comp.
Membrane Size	4" x 21"	4" x 21"
Pump	1000 l/h	1000 l/h
Motor	560 Watts	560 Watts
Permeate Reservoir	Optional	Optional
Recovery	50%	50%
Salt Rejection	95%	95%
Electrical Service (Volt/Hz/Amp)	230/50/10	230/50/10
Power	0,6 kW	0,6 kW
Connections		
Inlet	3/4" BSPT	3/4" BSPT
Outlet	1/2" BSPT	1/2" BSPT
Reject	10 mm Push	10 mm Push
Dimensions (Height/Width/Depth)	300 x 583 x 185 mm	450 x 583 x 185 mm

\* Based on feed TDS of 500 mg/l and a water temperature of 15 °C

## EQUIPMENT COMPONENTS

A description has been provided for each of the 401 RO's major components. The photo helps depict the physical location of these components on the system.

### Connections



#### Power Supply (and electrical box)

A three conduction (1.5 mm<sup>2</sup>) wire is supplied with the unit. The wire is 9 m in length, and must be attached to an approved electrical connector. Supply Power Required: 230 VAC, 50 HZ, 10 Amp

#### System Inlet

¾" BSPT Connection. A minimum of 1 Bar pressure is required to properly run the 401 RO system.

#### System Outlet (Permeate)

½ " BSPT Connection. Permeate should be connect either directly to machine requiring high quality RO water, or to a storage system. Distribution plumbing should be made in PP, PE or 306 grade (min.) stainless steel. Maximum backpressure of 3 BAR is possible on the permeate line. When connecting to a pressurized storage tank, a permeate pressure switch is required to prevent over-pressurization the permeate plumbing and to avoid damage on the membrane.


#### Drain

10 mm Push Connection. Drain Connection should be made to a suitable drain that can accommodate a flow rate up to 200 l/h. Drain connection

### Plumbing Components

#### Low Pressure Switch

The low pressure switch is used to shut the system down if an inadequate feed pressure is present. The set point for the pressure switch is 1 bar.

 Do not operate the system with this safety device bypassed.

#### Plumbing Manifold Block

An integrate plumbing manifold is used to make quick and compact connections to most plumbing components.

#### Inlet Solenoid Valve

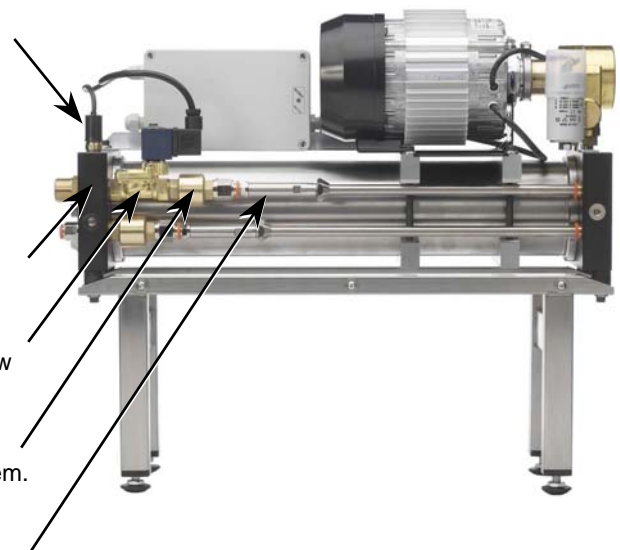
A brass, normally closed (NC) solenoid valve is used to shut flow off to the system during shutdown conditions.

#### Check Valve (Feed Line)

An in-line non-return is used to prevent back-flow from the system.

#### Feed Line Plumbing

A telescoping stainless steel pipe is used to make the plumbing connection from the plumbing manifold block to the pump manifold block.



**Reject Line Plumbing**

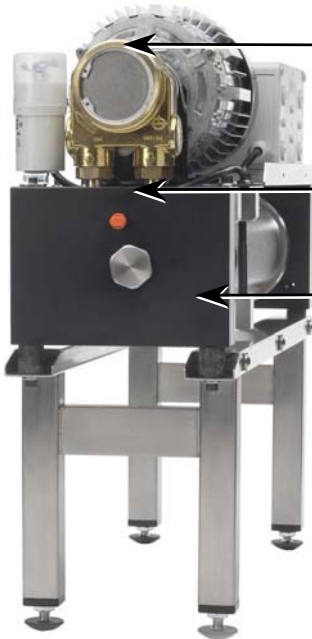
A telescoping stainless steel pipe is used to make the plumbing connection from the connection manifold block to the pump manifold block.

**Check Valve (Reject Line)**

An in-line non-return is used to prevent back-flow from the system.

**Flow Control (Recirculation Line) and  
Flow Control (Drain Line)**

These flow controls are accessed in the plumbing manifold block. These fixed orifice flow controls regulate the flow through the system.



**Pressurization Pump**

A 1,000 l/h pressurization pump is used to boost operating pressure to 12 BAR, and provide flow for internal recirculation within the system.

**Pump Pressure Port**

An optional pressure gauge can be attached to this port to provide a quick measure of the system's pressure.

**Pump Manifold Block**

A manifold block is used to make quick and compact connections to the pressurization pump.

**Frame Components**

Two models of the 401 system are available. The cabinet version (401c) includes 316 SS cover and supports, While the 401 is more compact, without a cover. Vibration reducing rubber supports are included with the 401

**401c**



**401**



# INSTALLATION

## Getting Started

The following procedures have been developed to assist during the installation of your 401 RO System.



The installation of this RO should be performed by a qualified service person with an understanding of local and regional codes that may affect the installation requirements.

## Pre-Installation Review

Before beginning the installation of the RO system, confirm system configuration to be installed, and components that have been ordered.

Review of the customer's facility is also recommended, especially critical operating data that could effect the operation of the system:



### Water Pressure

Water pressure to the 401 RO system will effect that maximum flow permitted by the system. The 401 RO system will not operate if the inlet pressure fluctuates below a dynamic pressure of 1 Bar. This minimum pressure must be maintained to the system at all times. Should the pressure fluctuate below this level, a booster pump may be required.



### Temperature

Inlet water temperature must be maintained between 5°C and 40°C to prevent damage to the system's membranes. Freezing temperatures will cause breakage of equipment and void all warranties.



### System Location

The unit must be installed indoors. Failure to comply with this requirement can cause significant damage to the system and will create a safety concern.

The floor must withstand a load of approx. 40 Kg which is the weight of the unit when it is filled with water.


***The unit can only be placed in rooms with open floor drains.***




The electrical connection must be done in accordance with all local rules and regulations.

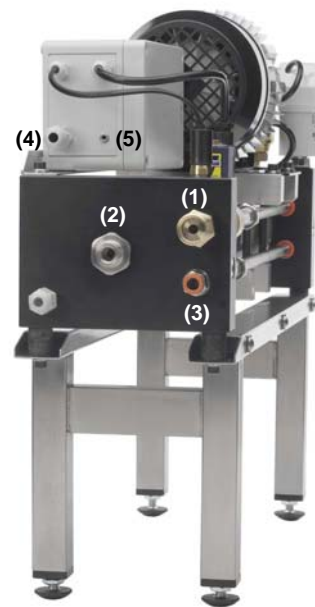


### Plumbing Hook-ups

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1) **Inlet Connection** – Remove the shipping cap from the system. Make sure the inlet screen is in place. Connect the feed water line to the inlet of the 401 RO. This requires a 3/4" BSPT connection. A shut-off valve with handle is required component to the plumbing installation. The pipe size must be **minimum** 3/4". This will ensure the necessary pressure and flow to the unit at all time.
- 2) **Permeate Connection** – Remove the shipping cap from the system. Connect the permeate water line using a 1/2" BSPT connection. The Permeate connection must be completed in a material suitable for the handling of reverse osmosis water (stainless steel or plastic.)
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3) **Drain Connection** – Use 10 mm flexible tubing, connect to the push fitting and run to a suitable drain. The tube must be pressed fully into the connection. Make sure that afterwards you cannot pull it out without releasing the locking collet. The open end is connected to an open floor drain. Do not submerge the end of the tube into the drain water. This creates a risk of siphoning when the unit is in standstill. Do not apply back pressure the drain line. **(NO BENDS)**

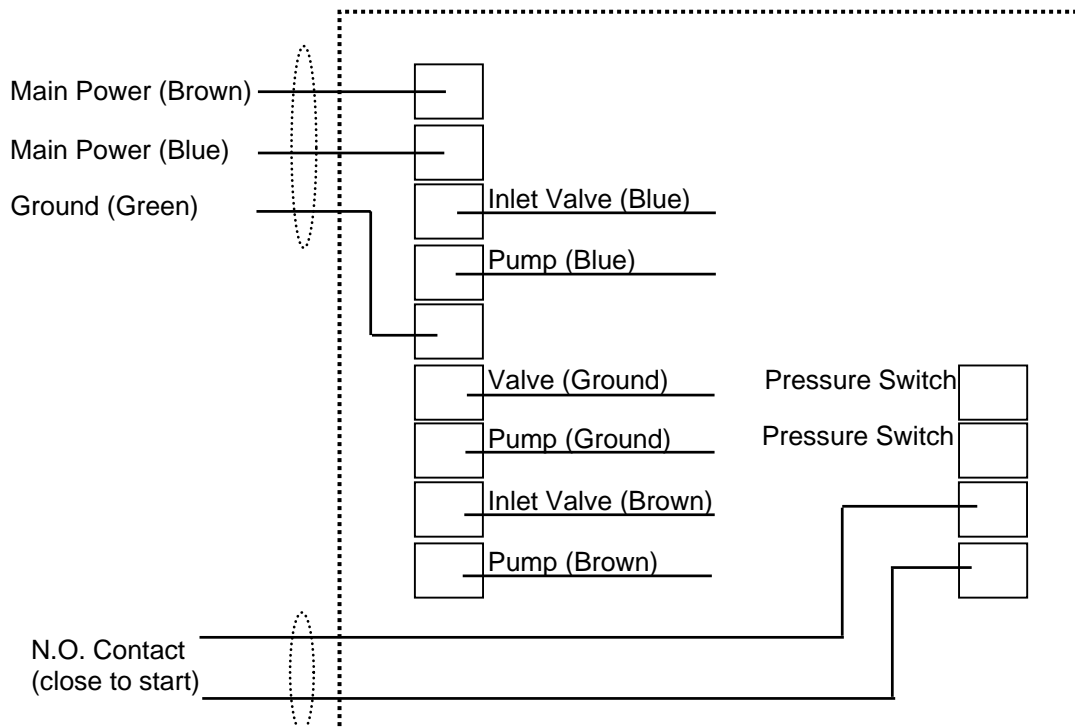


### Electrical Hook-up

(4) After installing the skid connections, bring power to the 401 RO. Dual phase main power is required:

Unit	Voltage	Frequency	Amperage	Power
401	220 Volt	50 Hz	10 Amp	0,6 kW

(5) To turn the system on and off, a normally open (N.O.) dry contact switch is provided. To begin operation of the RO, connect contacts to a trigger control such as a manual switch, pressure switch, or level switch. Closing this circuit will activate the RO.



# PARTS

ID	Description	Part Number
1	Motor 550W 230V 50Hz	160005
2	Pump (PO1000) for RO 150-C	160001
3	Pump Connector 1/2" x 10 mm	
4	Back Plate for 4" Vessel	
5	End Plug 1/4"	
6	Vibration Damper	
7	Seal Holder SS for 4" Vessel	
8	Cartridge Ø12 x 10 mm	
9	Pump Stand, Upper, Right	
10	Pressure Vessel SS 4"	
11	Pump Stand, Lower	
12	Pump Stand, Upper, Left	
13	Connector Pipe 10 mm, Short	
14	Connector Pipe 10 mm, Long	
15	Union Nut	
16	Base Connector, Female 12 mm	
17	Pipe Coupling	
18	Base Connector, Male 12 mm	
19	Solenoid Valve	170263
20	Non Return Valve 3/8"	

ID	Description	Part Number
21	Nipple Coupling 3/8"	
22	Front Plate for 4" Vessel	
23	Base Connector, Female 10 mm	
24	End Nut/Outlet Permeate 1/2"	
25	Inlet Connector 3/4"	
26	Pressure Switch 1/8"	170311
27	Aluminum Bar, Control Box	
28	Cable Socket for Solenoid	170265
29	Control Box Assembly	
NS	End Plug 1/8"	
NS	Nozzle Recirculation, Ø 2,8 mm	
NS	Nozzle Drain, Ø 1,4 mm	
NS	RO Element, 4,0 x 21	160505
NS	Set of O-Rings, Nuts and Bolts	
NS	End Nut, 32 mm	

A	SS Stand	400010
B	SS Hood	400010
C	SS Washer for Hood Screws	

## System Part Numbers

401	RO System	401000
401c	RO System	401001

