

# Instruction Manual

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STP Series Turbomolecular Pumps (extract)  
STP-A803CV102/CV103  
(with TMS unit)  
(First Edition - A)

This Manual has extracted difference of the STP-A803/A1303 series and the STP-A803CV102/CV103.

For the "Safety Precautions", installation, operation and maintenance, read the STP pump Instruction Manual (A), STP-A803/A1303 series Instruction Manual (B), and STP control unit Instruction Manual (C).

Keep this Manual in a place where you can quickly access it at any time.





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**STP-A803C102/CV103 Instruction Manual (Extract)**

## INTRODUCTION

Thank you very much for purchasing Edwards' turbomolecular pump.

The turbomolecular pump is designed to be installed in the vacuum equipment to exhaust gases from it.

This manual covers all items necessary to ensure safe installation, operation and maintenance of the following STP-A803CV102/CV103 turbomolecular pump.

This Manual picks up the points of difference between the "STP-A803/A1303 series" and the "STP-A803CV102/CV103". For the "Safety Precautions", "INSURANCE", installation, operation and maintenance, refer to STP pump Instruction Manual (A), STP-A803/A1303 series Instruction Manual (B), and STP control unit Instruction Manual (C).

The differences are as follows.

- TMS Unit for STP-A803CV102/CV103
- How to secure the STP Pump
- Specifications (STP pump, TMS unit)

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# 1 TMS UNIT

## 1.1 General

The Temperature Management System (TMS) maintains the temperature of the turbomolecular pump by monitoring the temperature with thermistor in the base of the turbomolecular pump, and performing the TMS valve and base heater ON/OFF control.

## 1.2 Configuration

### 1.2.1 TMS unit parts (Standard Accessories)

	Item	Q'ty	Remarks
1	TMS connection cable	1	with connector on one side, and distribution box
2	TMS valve	1	with three ports, metal fitting, and cable with one-sided connector
3	TMS heater	1	with connector cable on one side
4	TMS sensor cable	1	with connector at each end

Table 1 - TMS unit parts

### 1.2.2 Configuration of the TMS unit

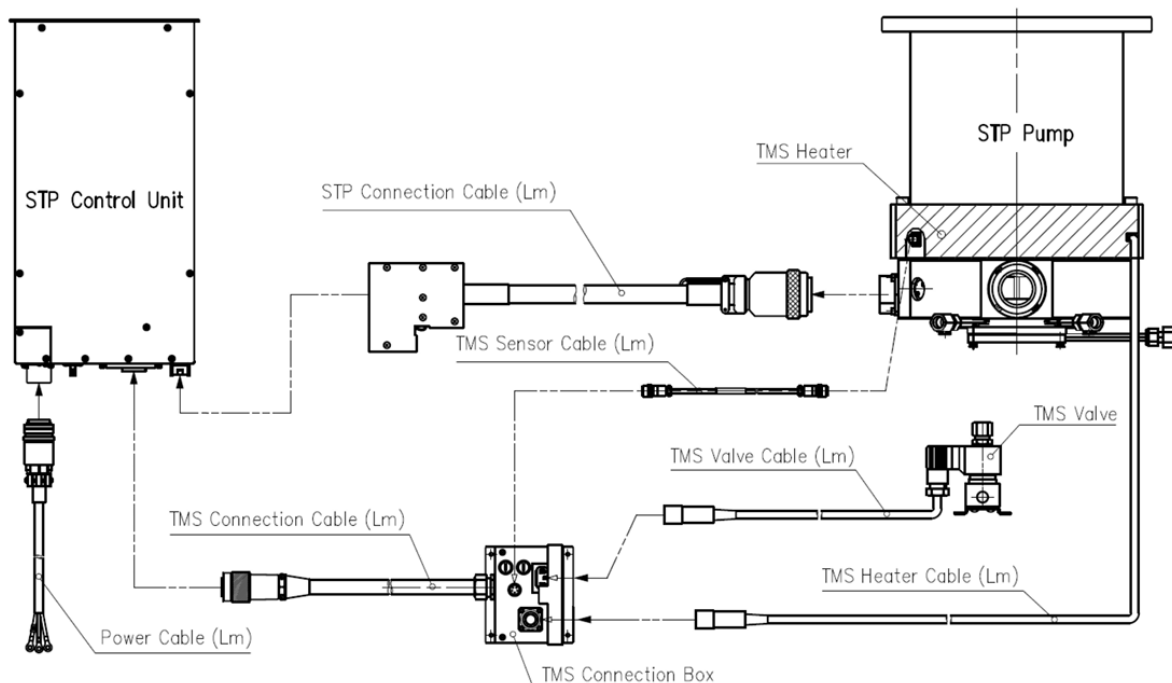


Figure 1 - Configuration of the TMS unit

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### 1.2.3 Cooling water piping

In STP-A803CV102/CV103, two cooling water pipes are installed. One is the cooling water pipe A attached in the base of the STP pump, the other is the cooling water pipe B attached on the bottom of the STP pump. It is necessary to control the cooling water pouring to the cooling water pipe A with the TMS valve. The cooling water pipe B always needs to cool. The cooling water piping for realizing above is shown below. There are two methods of installing cooling water pipes. Use one of them depending upon your equipment. Pay special attention to the port label on the cooling water valve. The position of cooling water pipes of STP pump in Figure 2 is typical. Refer to Section 3 for external appearance of each STP pump.

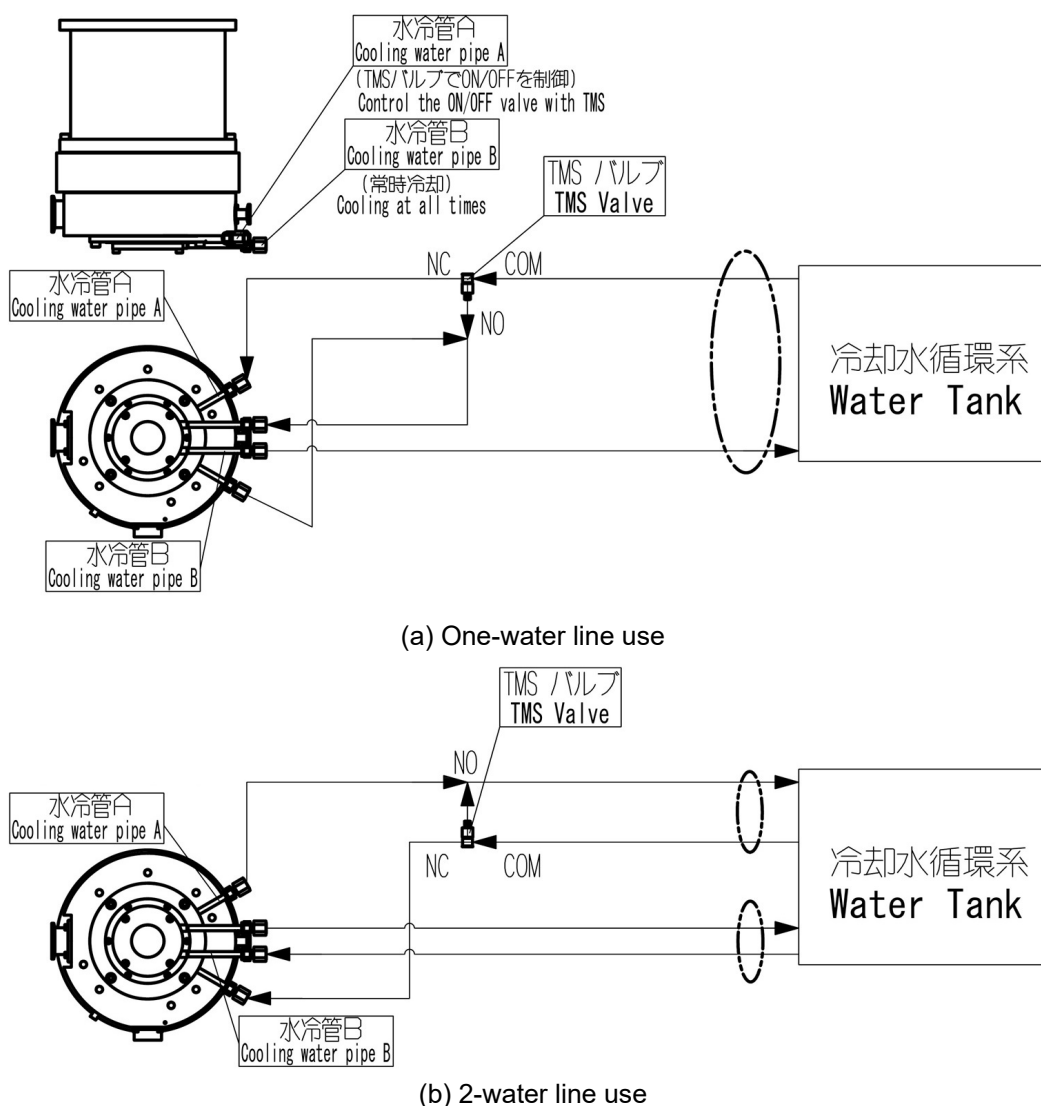


Figure 2 - Cooling water piping

**Note :** Procure and connect the cooling water pipe and affix the TMS valve at your site.

**Note :** The diameter of the valve is Rc1/4 (ISO standard) or Rt1/4 (JIS standard).

**Note :** Use cooling water that satisfies the following conditions:

Water flow rate: 2.0 L/min

Water temperature: 5 to 25 °C

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#### 1.3 Name and function of each part

##### 1.3.1 TMS connection cable (Distribution box)

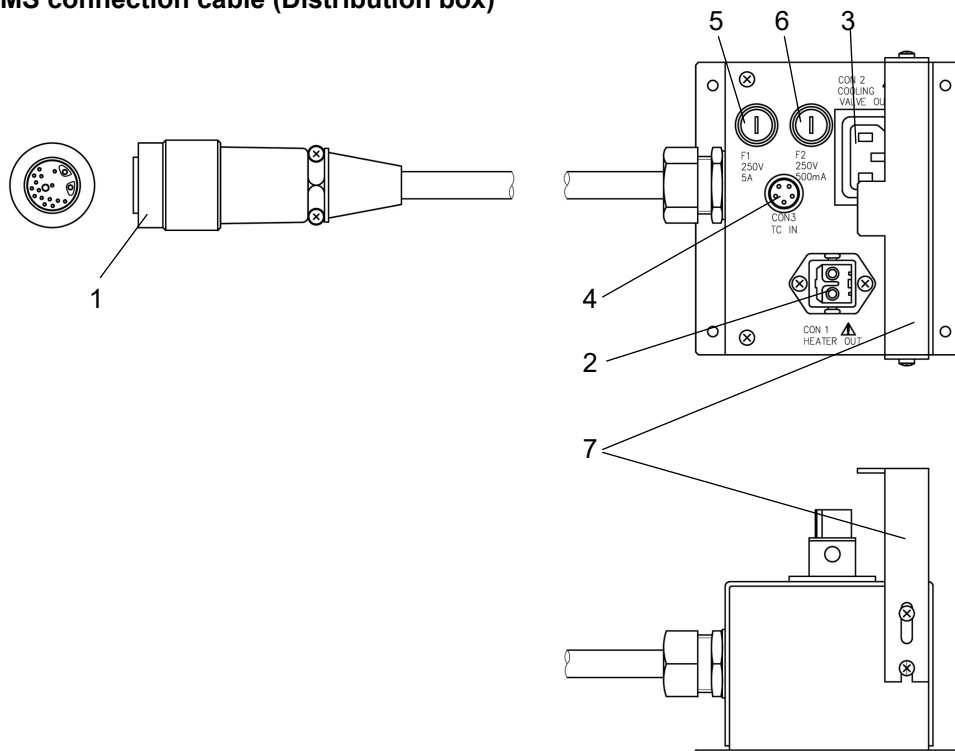


Figure 3 - TMS connection cable (with distribution box)

1. "X5A" connector
  - Connector for the STP control unit.
2. "CON1 HEATER OUT" connector
  - Connector for the TMS heater.
3. "CON2 COOLING VALVE OUT" connector
  - Connector for the TMS valve.
4. "CON3 TC IN" connector
  - Connector for the TMS sensor cable.
5. Fuse "F1"
  - Fuse for protection the TMS heater (5.0 A).
6. Fuse "F2"
  - Fuse for protection the TMS valve (0.5 A).
7. Metal fitting
  - Secures CON1 and CON2 connectors.

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**1.3.2 TMS heater**

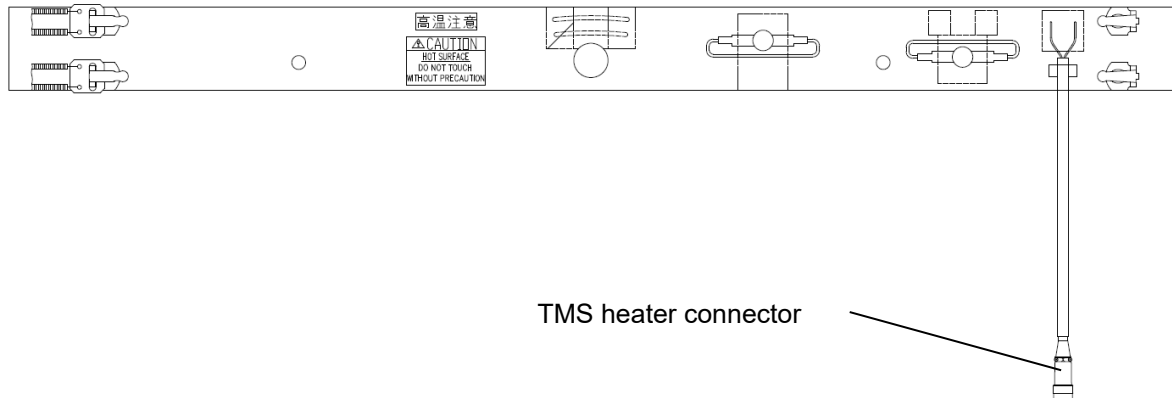


Figure 4 - TMS heater

**1.3.3 TMS valve**

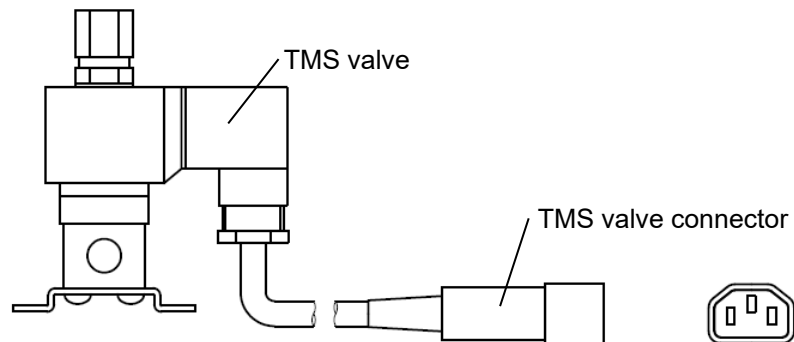


Figure 5 - TMS valve

**1.3.4 TMS sensor cable**

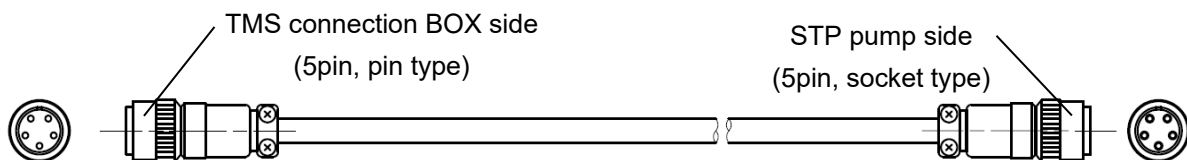


Figure 6 - TMS sensor cable



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### 1.4 Installation of the TMS unit

Install the TMS unit in the following procedure with reference Section 1.2.2, "Configuration of the TMS unit", and Section 1.2.3, "Cooling water piping".

#### 1.4.1 Connecting the TMS connection cable

##### CAUTION

DO NOT install the TMS unit in places with high temperature, humidity, noise, vibration, or other unstable environment.

##### CAUTION

DO NOT apply force to the TMS unit and cables during installation and DO NOT bend the cables excessively.

1. Place and secure the distribution box near the STP pump (See Figure 13).
2. Insert the X5A connector of the TMS connection cable into the X5 connector of the STP control unit.

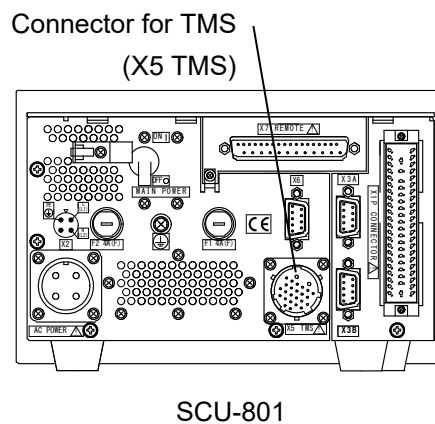


Figure 7 - STP control unit rear panel

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#### **1.4.2 Installing the TMS heater**

1. Wind the base part of the pump with the TMS heater, and secure the TMS heater with the hooks.
2. Loosen the screws on the metal fitting securing the connectors to the distribution box, and remove the hooks.
3. Connect the TMS heater connector to the "CON1 HEATER OUT" connector of the distribution box.
4. Secure the CON1 connector with the metal fitting to prevent the removal of the connectors.

#### **1.4.3 Installing the TMS sensor cable**

1. Connect the socket side of the TMS sensor cable to the connector of the TMS sensor in the base of the pump.
2. Connect the pin side of the TMS sensor cable to the "CON3 TC IN" connector of the distribution box

#### **1.4.4 Installing the TMS valve**

1. Connect the cooling water pipe to the TMS valve (see Section 1.2.3, "Cooling water piping").
2. Loosen the screws on the metal fitting securing the connectors to the distribution box, and remove the hooks.
3. Connect the TMS valve connector to the "CON2 COOLING VALVE OUT" connector of the distribution box.
4. Secure the CON2 connector with the metal fitting to prevent the removal of the connectors.

#### **1.5 How to use the TMS unit**

Refer to the STP control unit Instruction Manual (C) for details of the operating method.

##### **1.5.1 Confirmation before operating the TMS unit**

After installing and connecting the TMS unit, switch the "TMS Function" setting of the STP control unit to "ENABLE".

When the "TEMP CTRL" LED does not illuminate on the control unit after switching MAIN POWER "ON", the TMS function may be set to "DISABLE". Confirm and reset the TMS function according to "Parameter Set Mode" in the STP control unit Instruction Manual (C) for details on how to switch the function setting.

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#### **1.5.2 Starting/stopping**

Power on the STP pump to automatically start the TMS unit.

Power off the STP pump to automatically stop the TMS unit.

While the TMS unit is in operation, the "TEMP CTRL" LED illuminates on the control unit. When STP pump is in the power ON state, the TMS unit operates regardless of the status of the control unit.

When the STP pump is the cause of the malfunction, the TMS unit is stopped.

#### **1.5.3 Temperature control**

When the temperature of the STP pump base is lower than the setting value, the TMS heater is turned "ON", and the TMS valve is turned "OFF" to heat the STP pump. When the temperature of the STP pump base is higher than the setting value, the TMS heater is turned "OFF", and the TMS valve is turned "ON" to cool the STP pump. The LCD displays the actual temperature of the STP pump base as "TMS TEMP: \*\* °C".

#### **1.5.4 Abnormality/Error in the TMS Unit**

If the temperature of the STP pump base unit is higher than the setting value by 10 °C or more due to the occurrence of an abnormality/error in the TMS heater or other fault, the "FAILURE" LED illuminates and the LCD displays error message "TMS Higher Temp". The heater is switched OFF and the cooling water unit is operated. The STP pump decelerates and stops. Continue to operate the cooling water unit while "TMS Higher Temp" is displayed after the pump stops.

If the temperature of the STP pump base unit is lower than the setting value by -10 °C or more (STP-A803CV100: lower than the setting value by -25 °C or more) due to the occurrence of an abnormality/error in the TMS heater or other fault, the "FAILURE" LED illuminates and the LCD displays the error message "TMS Lower Temp". The heater and the cooling water valve are switched OFF and the STP pump decelerates and stops.

*Note : "TMS Lower Temp" is not detected for 2 hours (STP-A803CV100: 5 hours) when the STP pump starts.*

When an abnormality/error occurs in the TMS connection cable, the STP pump decelerates and stops. Output of the heater and the cooling water unit is OFF. The "FAILURE" lamp illuminates and the LCD displays error message "T.Cable Disconnected".

### **1.6 Maintenance**

#### **1.6.1 Replacing the fuse**

If the fuse blows, replace the F1 or F2 fuse in the distribution box.

(Fuse F1: 250 V 5.0 A, Fuse F2: 250V 0.5A).

## 2 HOW TO SECURE THE STP PUMP



### WARNING

The STP pump is provided with a high-speed rotor. The worst-case failure may result in a jump in rotational torque leading to personal injury or peripheral equipment damage.

### CAUTION

The generated torque during a pump failure is called "Destructive torque". Design and secure the mounting for the STP pump so that it can withstand the destructive torque. Refer to Table 3 for the destructive torque.

### CAUTION

Refer to Table 2 for tightening torque of the bolt.

Bolt size	Tightening torque (Nm)
M10	24

Table 2 - Tightening torque of bolt

When making the legs to secure the base, make them shorter than the ones attached to the STP pump. Use a material that has a tensile strength of 600 N/mm<sup>2</sup> or more.

When securing the base, use stainless steel securing bolts with a tensile strength class of 70 or more.

*Note : When using any securing method other than that specified in this manual, contact Edwards.*

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Refer to Table 3 for the destructive torque and the recommended securing bolts.

Secure the base with all 8 screw-holes for legs or all 8 attached legs. Follow "CAUTION" on previous page about legs and bolts for securing the base.

Make sure that the recommended securing bolt may be different depending on the method of securing the base.

Pump model		STP-A803CV102/CV103	
Flange type		ISO160F	
Destructive torque [Nm]		3.0×10 <sup>4</sup>	
Base securing (8 positions)		No	Yes
Recommended securing bolt for flange	Shape	R.D.S.B.* <sup>2</sup>	Standard
	Size	M10	M10
	Q'ty	8	8
	Material* <sup>1</sup>	Carbon steel Alloyed steel	Stainless steel
	Strength* <sup>1</sup>	Equivalent to AMS 6419	70 or more

\*1 Refer to ISO 898-1 (JIS B 1051), ISO 3506 (JIS B 1054) and AMS 6419 (Aerospace Material Specification).

\*2 Refer to Figure 9 for the shape of Reduced Diameter Shank Bolts (R.D.S.B).

Table 3 - Destructive torque and recommended securing bolt for inlet port flange

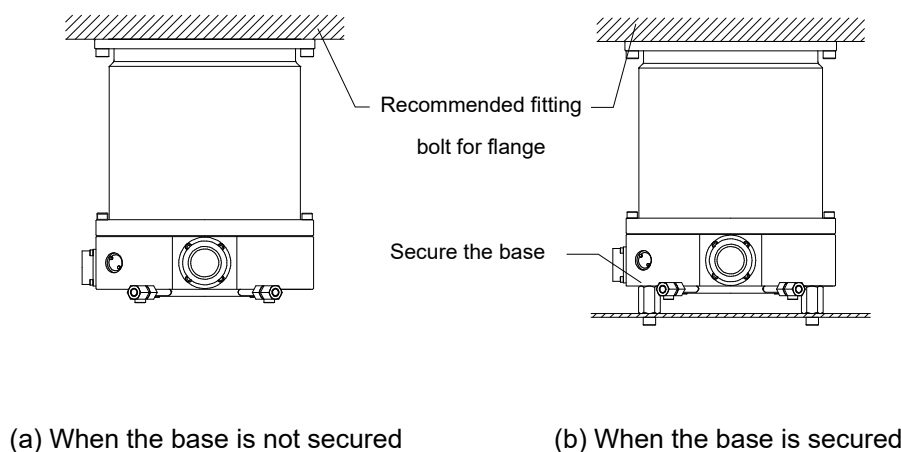
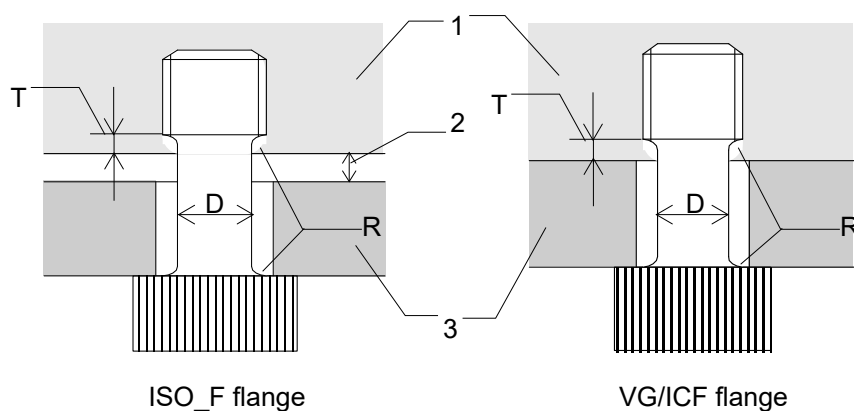


Figure 8 - Example of securing the STP pump

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Refer to Figure 9 for the shape of Reduced Diameter Shank Bolts (R.D.S.B.).



1. Vacuum equipment
2. Clearance made by cantering
3. Pump flange

Figure 9 - Shape of reduced diameter shank bolts

Use Table 4 in conjunction with Figure 9. Ensure that the surface of the levelled and smoothed area (expressed by "D" in Figure 9) is free of crack, depression, and other damages. Also, when you want to use commercially-available screws, be sure to thoroughly grind them so as not to leave spiral seams on their bottom.

Bolt size	Type of flange	T	D	R
M10	ISO_F flange	3 mm or more	7.5 mm or more	0.8 mm or more

Table 4 - Shape of reduced diameter shank bolts

## 3 SPECIFICATIONS

### 3.1 Specifications for the STP Pump

The values shown in the table are typical; they are not guaranteed.

Item		STP-A803CV102	STP-A803CV103
Material, coating		Corrosion resistant type <sup>*1</sup>	Corrosion resistant type <sup>*1</sup> Special material/coating type <sup>*2</sup>
Flange size	Inlet port flange	ISO160F	
	Outlet port flange	KF40	
Pumping speed	L/s	N <sub>2</sub>	660
		H <sub>2</sub>	430
Compression ratio		N <sub>2</sub>	>10 <sup>8</sup>
		H <sub>2</sub>	10 <sup>3</sup>
Ultimate pressure	Pa (Torr)	10 <sup>-7</sup> (10 <sup>-9</sup> ) order (after baking)	
Maximum gas flow rate <sup>*3</sup>	Pa · m <sup>3</sup> /s (sccm)	N <sub>2</sub>	2.02 (1,200)
Allowable backing pressure <sup>*3</sup>	Pa (Torr)	270 (2)	
Rated speed	rpm	26,000	
Starting time	min	≤7	
Stopping time.	min	≤8	
TMS setting temperature	°C	100	
Baking temperature	°C	<120	
Lubricating oil		Not necessary	
Installation position		Free	
Cooling method		Water cooling	
Recommended backing-pump	L/min	>1,300	
Mass <sup>*4</sup>	kg	44	
Ambient temperature range	°C	0 to 40 (no dew condensing)	
Storage temperature range	°C	-25 to 55 (no dew condensing)	

Table 5 - Specifications for the STP Pump

\*1 : Corrosion resistant: STP pump with anti-corrosive treatment.

\*2 : Special material / coating: STP pump with special material and coating.

\*3 : The pressure is applicable under conditions that N<sub>2</sub> or other similar gas is vacuumed and the backing pump (pumping speed: 1,300 L/min) is used. When the gas is exhausted intermittently, the gas more than the maximum gas flow-rate can be exhausted. In this case, contact Edwards.

\*4 : Mass is a value of state that the only standard accessory was installed (except the optional accessory).

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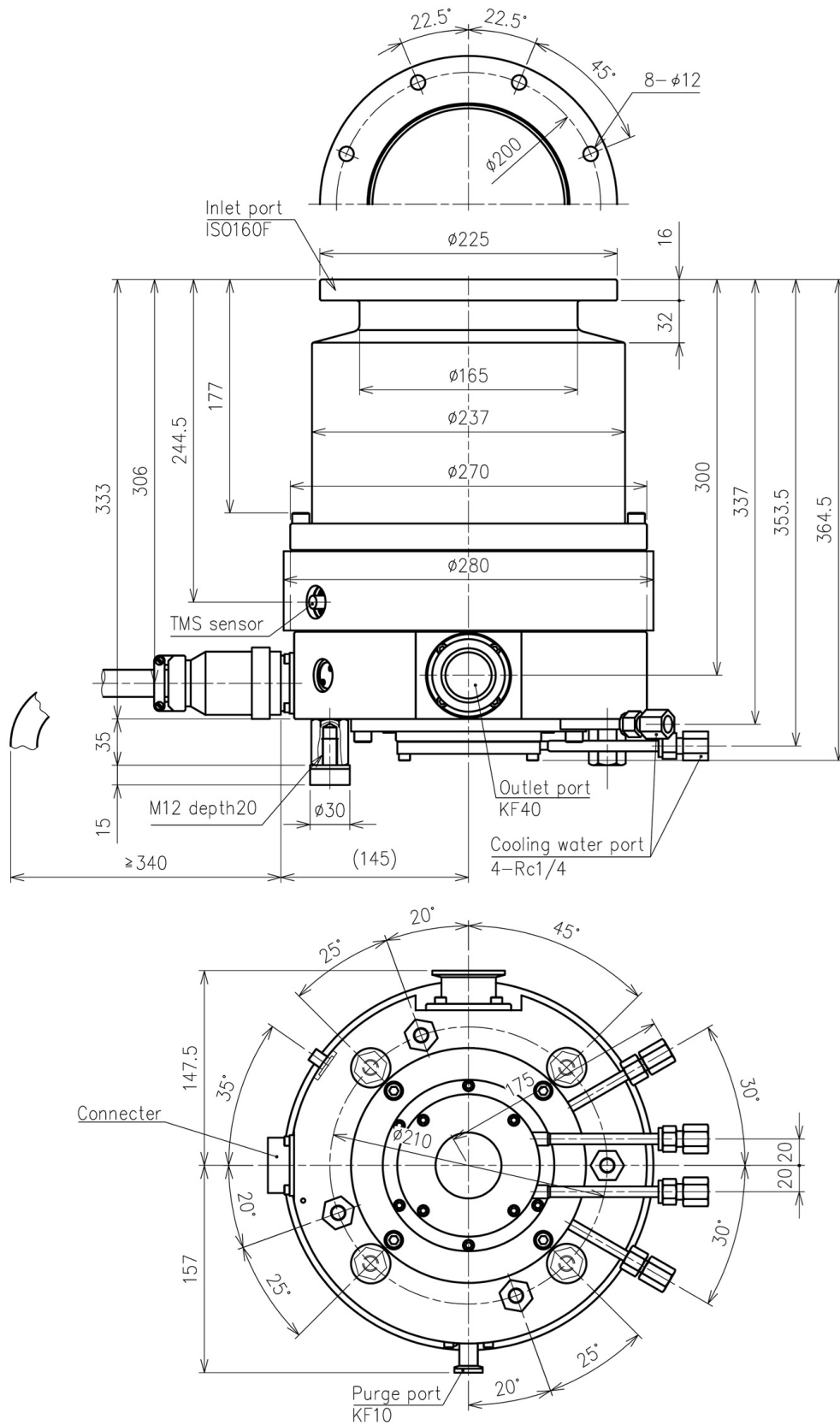


Figure 10 - External appearance of STP pump (STP-A803CV102)



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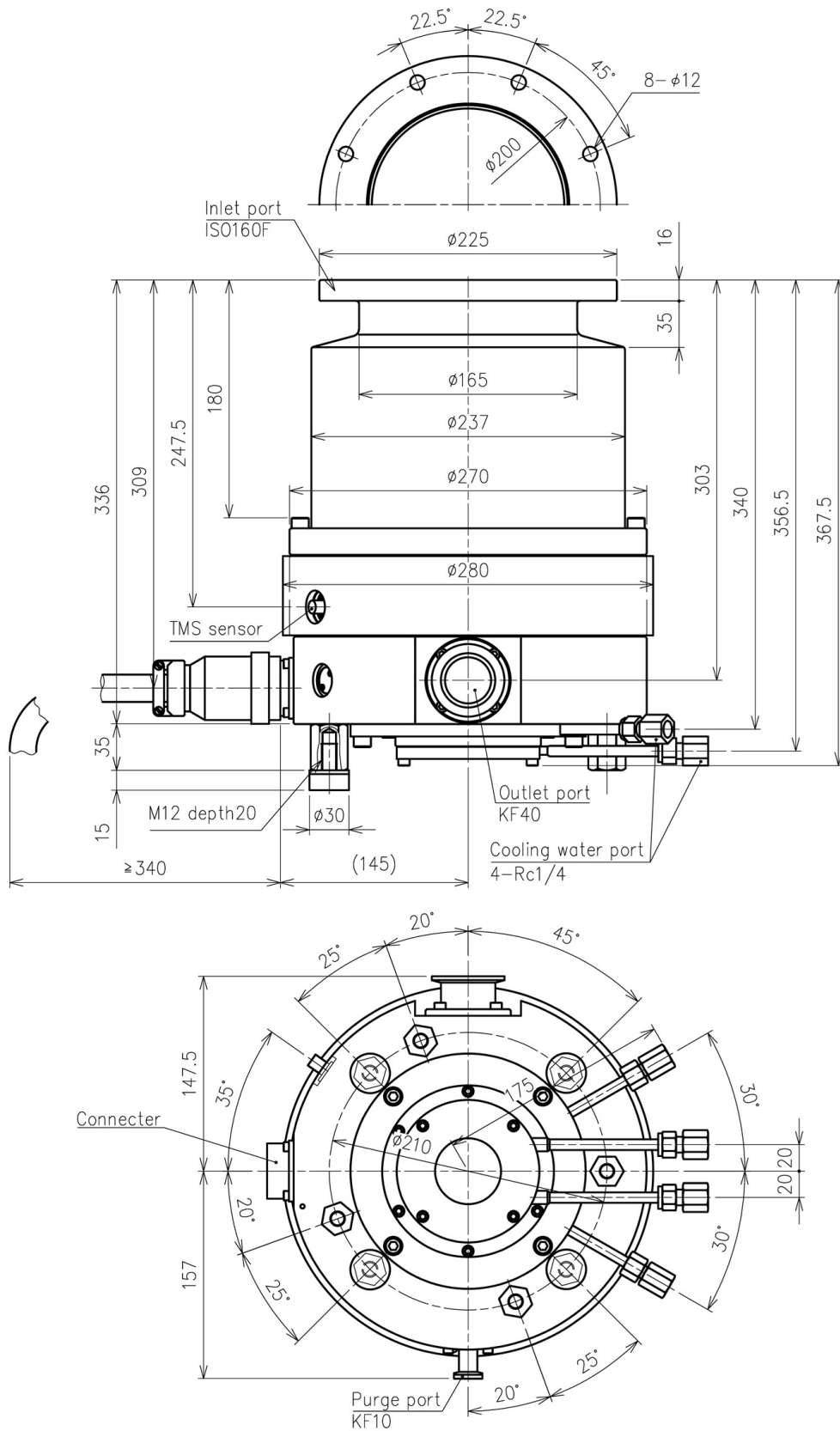


Figure 11 - External appearance of STP pump (STP-A803CV103)

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**3.2 Label affixing positions**

Refer to the STP pump Instruction Manual (A) for the details of the labels 1 to 7.

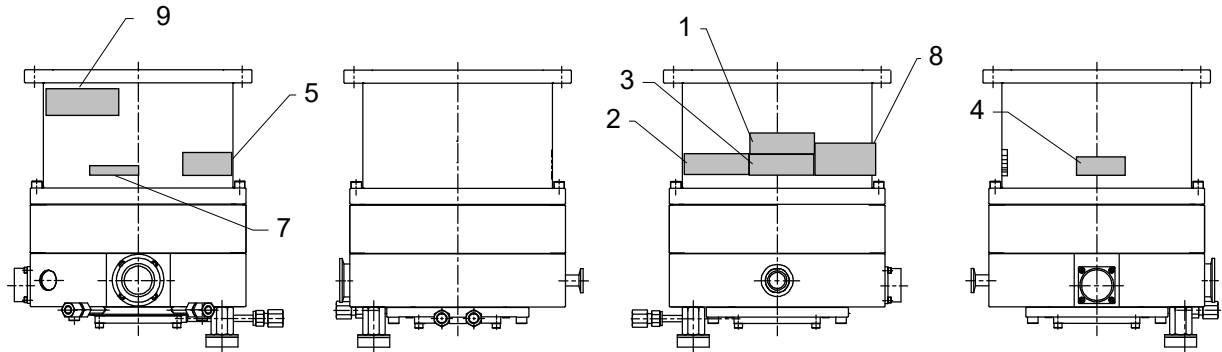


Figure 12 - Label affixing position for the STP pump

- 1 STP pump installation warning label
- 2 Hot surface warning label
- 3 Heavy product caution label
- 4 Connector caution label
- 5 STP pump/control unit caution label
- 7 Rotational direction instruction label
- 8 Name plate
- 9 Company logo

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### 3.3 Specifications for the TMS Unit

Ambient temperature range	0 to 40 °C
Storage temperature range	–20 to 55 °C
Input voltage	200 to 220 VAC ± 10% (Same voltage as the STP Control Unit)
Temperature control method	Control ON/OFF of the heater and cooling water
Setting temperature	100 °C
Cooling water temperature	5 to 25 °C
Quantity of cooling water flow	2.0 L/min
Alarm output	Alarm outputs from the STP control unit

Table 6 - TMS unit specifications

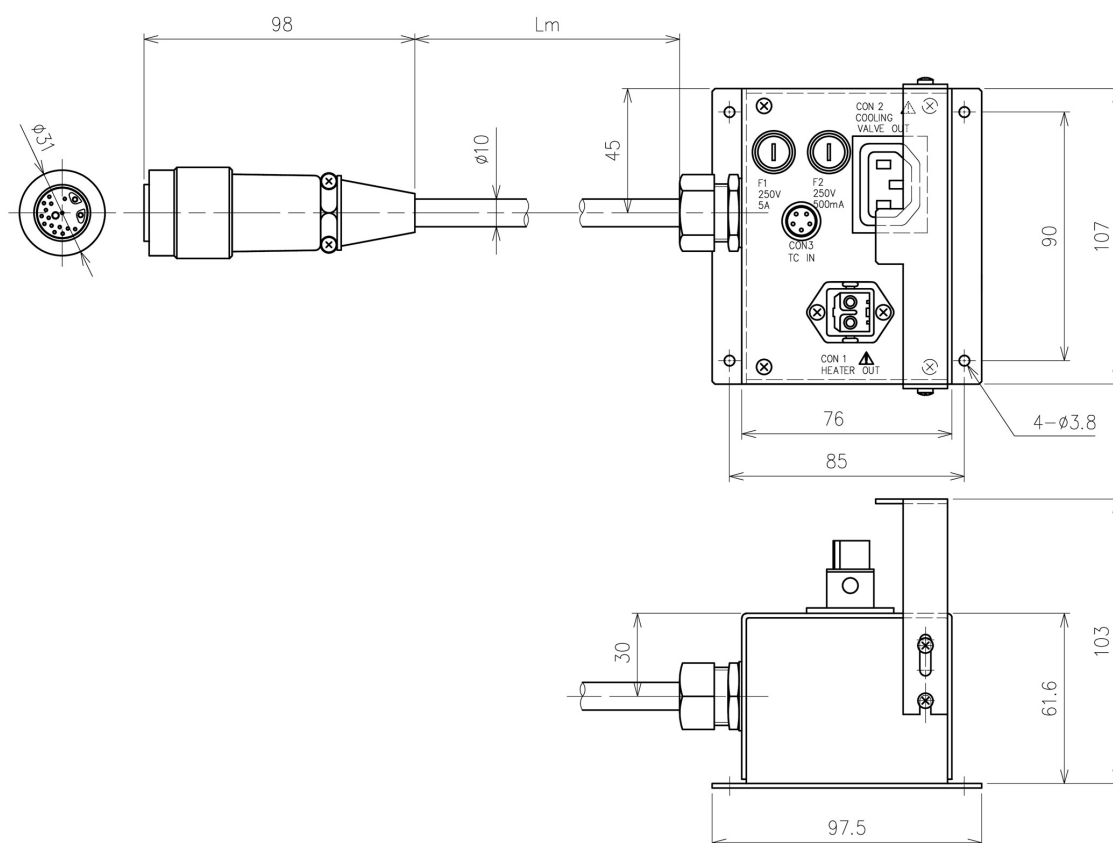


Figure 13 - External appearance of TMS connection cable (with distribution box)

For more information, contact the nearest Service Office.  
( <http://www.edwardsvacuum.com/> )

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