
Turbo Molecular Pump

STP-A1603 series

Specification

Pump Type

- STP-A1603C
- STP-A1603CV

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1 Introduction

Turbo Molecular pump is one of the most important Vacuum Components in the most- advanced technologies field like Semiconductor and LCD manufacturing tools, high- energy physics, etc.

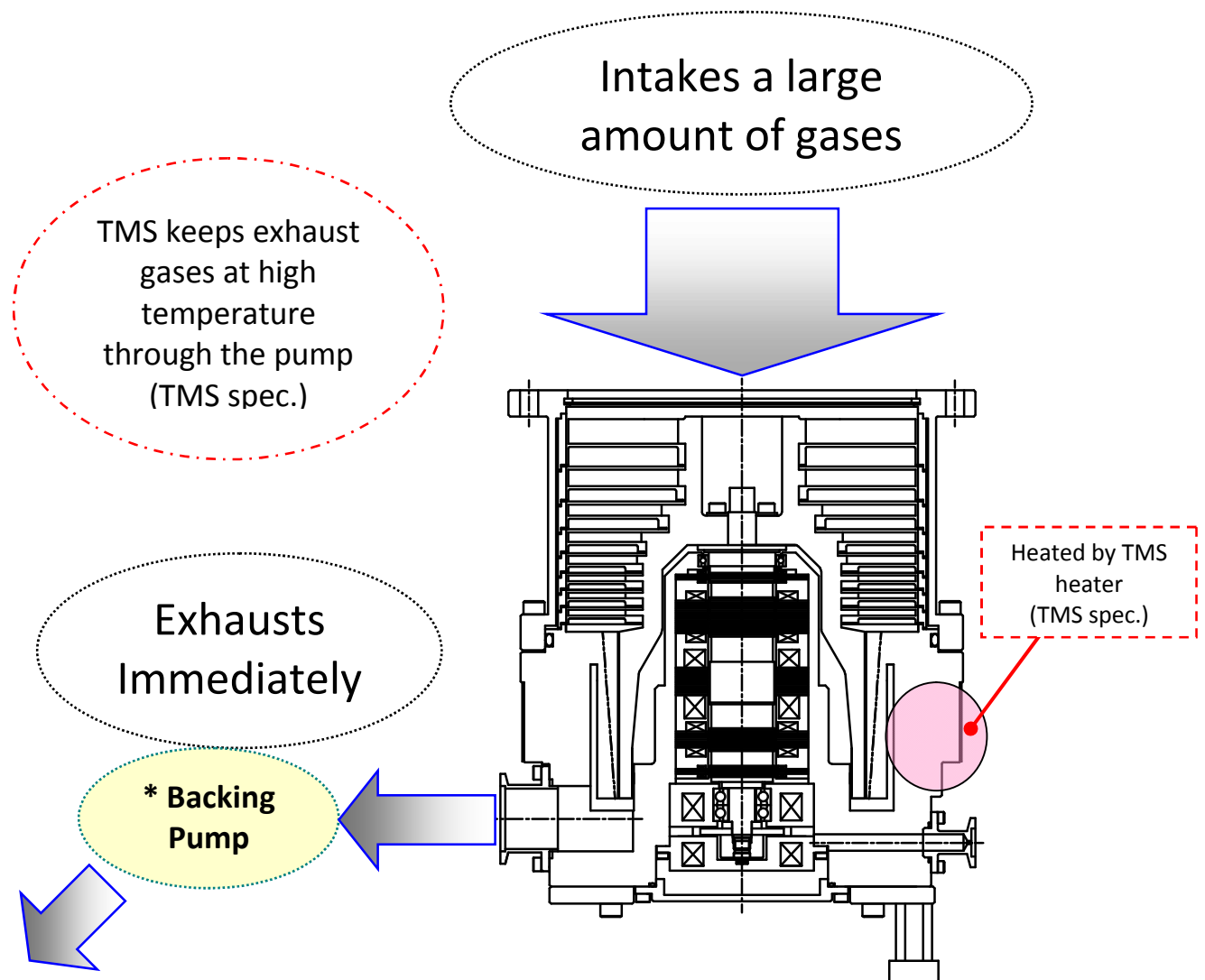
This document describes the standard specification for the magnetically levitated turbo molecular pumps of STP-A1603C and STP-A1603CV.

- STP-A1603C is one of A (Advanced high throughput) series turbomolecular pump and has features of high throughput performance.
- STP-A1603CV is one of A series turbomolecular pump with TMS*¹ in order to reduce the deposition inside the pump from by-products.

*1: TMS (Temperature Management System) keeps the pump inside temperature high. TMS controls the pump temperature based on TMS sensor information in order to make ON/OFF control of TMS heater band and TMS water control valve. If by products deposition is expected, Edwards recommends the customer to use TMS Unit as an option.

1.1 Application

Semiconductor and LCD manufacturing tools like Dry Etching, CVD, Sputtering, Ion implantation, etc.



* The backing pump is needed to operate the turbomolecular pump.

1.2 Configuration

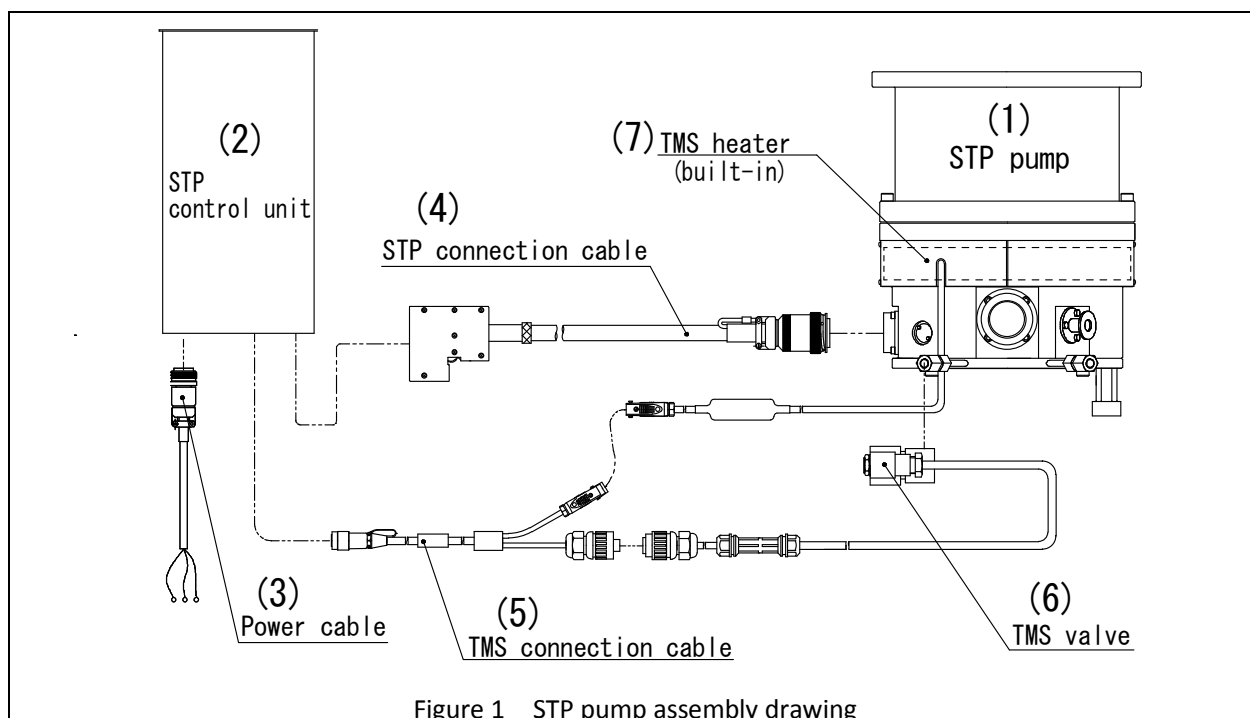


Figure 1 STP pump assembly drawing

Item	Q'ty	Description	Need to specify at order
(1) STP pump	1	Please select pump type and inlet flange type according to the customer specifications. See the chapter 2.1 for the pump specifications. If the TMS is required, select STP-A1603CV (CV type).	- Inlet flange type - TMS option
(2) STP control unit	1	The control unit has a remote function to communicate with the customer tool. The controller accepts Start/Stop commands and delivers the pump operating status (Levitation, Normal, Alarm etc)	
(3) Power cable	1	Power cable to supply AC power to the controller. Please specify the cable length to order. (5 m/10 m/15 m/20 m)	- Cable length
(4) STP connection cable	1	The connection cable between STP pump and STP control unit. Straight-type and L-type are available on the pump side connector. Please specify the angle for the L-type connector to order. (0° / 90°) Please specify the cable length to order. (5 m/10 m/15 m/20 m)	- Connector type (Angle for L-type connector) - Cable length
The parts under this line, (5) to (7), are needed for STP-A1603CV which has TMS.			
(5) TMS connection cable	1	This cable is to connect between TMS heater, TMS water control valve and the control unit. Please specify the cable length to order. (5 m/10 m/15 m/20 m)	- Cable length
(6) TMS valve (with cable)	1	Cool down the pump with ON/OFF control of cooling water.	
(7) TMS heater (built-in)	1	Heat up the pump with ON/OFF control.	

* Use the STP selection sheet at the end of this document when you order our pumps.

2 STP Pump

2.1 STP pump specification

Pump Type		STP-A1603C	STP-A1603CV
TMS unit		Without TMS	With TMS
Flange size	Inlet port flange	VG200/ISO200F/ISO250F	
	Outlet port flange	KF40	
	Purge port flange	KF10	
Pumping speed (L/s) * ¹ (see chapter 7.1)	N ₂	1600	
	H ₂	1200	
Compression ratio * ¹	N ₂	>10 ⁸	
	H ₂	7×10 ³	
Allowable maximum continuous flow rate * ^{1,2} (sccm)	N ₂	2500	1000
Ultimate pressure * ^{1,3}	Pa	10 ⁻⁷ order (10 ⁻⁹ Torr order) <after baking>	
Allowable maximum backing pressure * ¹	Pa	266 (2 Torr)	
Enable exhaust gas		Chlorine and Fluorine gas can be used. When you want to use the following gas, please contact Edwards. <ul style="list-style-type: none"> • The gas including alkali metal, but except "Li". • The gas including "Ga", "Hg", "In" and "Sn". • HBr 	
Purge gas flow rate	sccm	20 to 50 (see chapter 2.2.2)	
Back pump size	L/min	> 1300	
Rated speed	Rpm	36,500 (Allowable speed range: 18,000 to 36,500)	
Starting time	min	7	
Stopping time	min	9	
Baking temperature	°C	<120	No baking possible with TMS
Lubricating oil		Not necessary	
Installation position		Free	
Cooling method		Water cooling	Water cooling controlled by TMS
TMS temperature setting	°C	-	60
Water Cooling	Flow rate	L/min	2
	Temperature	°C	5 to 25
	Pressure	MPa	< 0.3
Water cooling fitting	Size	Rc 1/4 (ISO standard)	
	Material	Stainless steel	
Mass	kg	35	
Dimension	mm	See chapter 7.3 Pump Overview Chart	
Ambient air temp. range	°C	0 to 40	
Storage temp. range	°C	-25 to 55	
Connection cable length	m	30 (maximum)	

The data inside above table are the typical measured value. It's not guaranteed performance.

*¹: Pumping speed, compression ratio, allowable maximum continuous flow rate, ultimate pressure and allowable backing pressure are measured by Edwards method

*²: Allowable maximum continuous flow rate varies depend on the cooling methods. The pumping speed of 1300 (L/min) dry pump was used for the measurements.

*³: Ultimate pressure is a value after baking.

2.2 Precaution before installing the STP pump

2.2.1 How to secure the STP pump

The STP pump has a high-speed rotor. The worst-case failure may result in a jump in rotational torque leading to personal injury or equipment damages.

The generated torque during a pump failure is called "Destructive torque". Design and secure the mounting for the STP pump on the tools in order to withstand this destructive torque. Refer to Table 2.1 for destructive torque values and recommended bolts. All flange bolts size should be the size specified by the flange standard. And it is necessary to use all flange holes in order to secure the STP pump mounting.

For Flange secured only

Table 2.1 (a) Destructive torque and recommended bolts

Pump type		STP-A1603	
Flange type		ISO200F/ISO250F	VG200
Destructive torque [Nm]		4.0×10^4	4.0×10^4
Base (8 positions) secured		Not available	
Recommended bolts for flange	Shape of bolts	M10 Standard	M12 Standard
	Q'ty	12	8
	Steel type ^{*1}	Carbon steel/Alloyed steel	
	Strength class ^{*1}	12.9 or more	

For Flange secured + Base secured

Table 2.1 (b) Destructive torque and recommended bolts

Pump type		STP-A1603	
Flange type		ISO200F/ISO250F	VG200
Destructive torque [Nm]		4.0×10^4	4.0×10^4
Base (8 positions) secured		Available	
Recommended bolts for flange	Shape of bolts	M10 Standard	M12 Standard
	Q'ty	12	8
	Steel type ^{*1}	Stainless steel	
	Strength class ^{*1}	70 or more	

Secure the base with all 8 screw-holes for legs or all 8 attached legs.

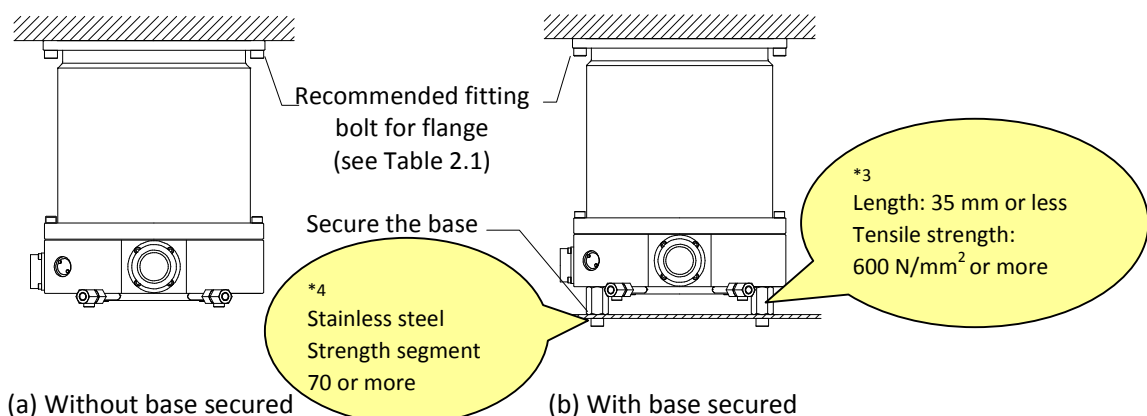


Figure 2.1 Methods of securing the STP pump using inlet flange holes

^{*1} JISB1051 (ISO898-1), JISB1054 (ISO3506), AMS6419 (Aerospace Material Specification).

^{*2} The length of the legs, when the customer would like to make, should be less than attached Legs from Edwards. And the material tensile strength should be 600 N/mm² or more.

^{*3} The bolts for the base secure will be Stainless Steel with strength segment of 70 or more.

2.2.2 Purge gas for STP pump

When pumping reactive or corrosive gases, introduce the dry N₂ gas or other gas in to the STP pump in order to protect the inside of the STP pump.

- ◇ Introduce dry N₂ or other gas into the pump through the purge port using the electromagnetic valve or the needle valve provided by the customer.
- ◇ Recommended Purge gas flow rate is 3.4×10^{-2} to 8.4×10^{-2} Pa · m³/s (20 to 50 sccm).
- ◇ The allowable gas pressure ranges from 1.0×10^5 Pa (atmospheric pressure) to 4.9×10^4 Pa (0.5 kgf/cm²) on the introduction side.
- ◇ High-pressure at the inlet port may result in a noise. This is no abnormality/error.

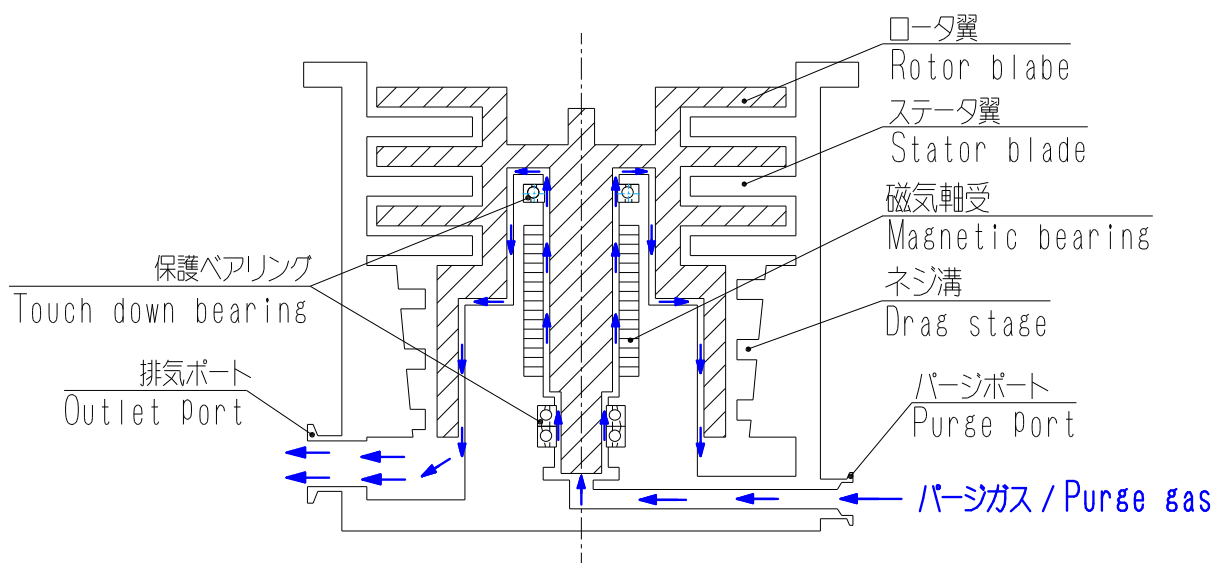
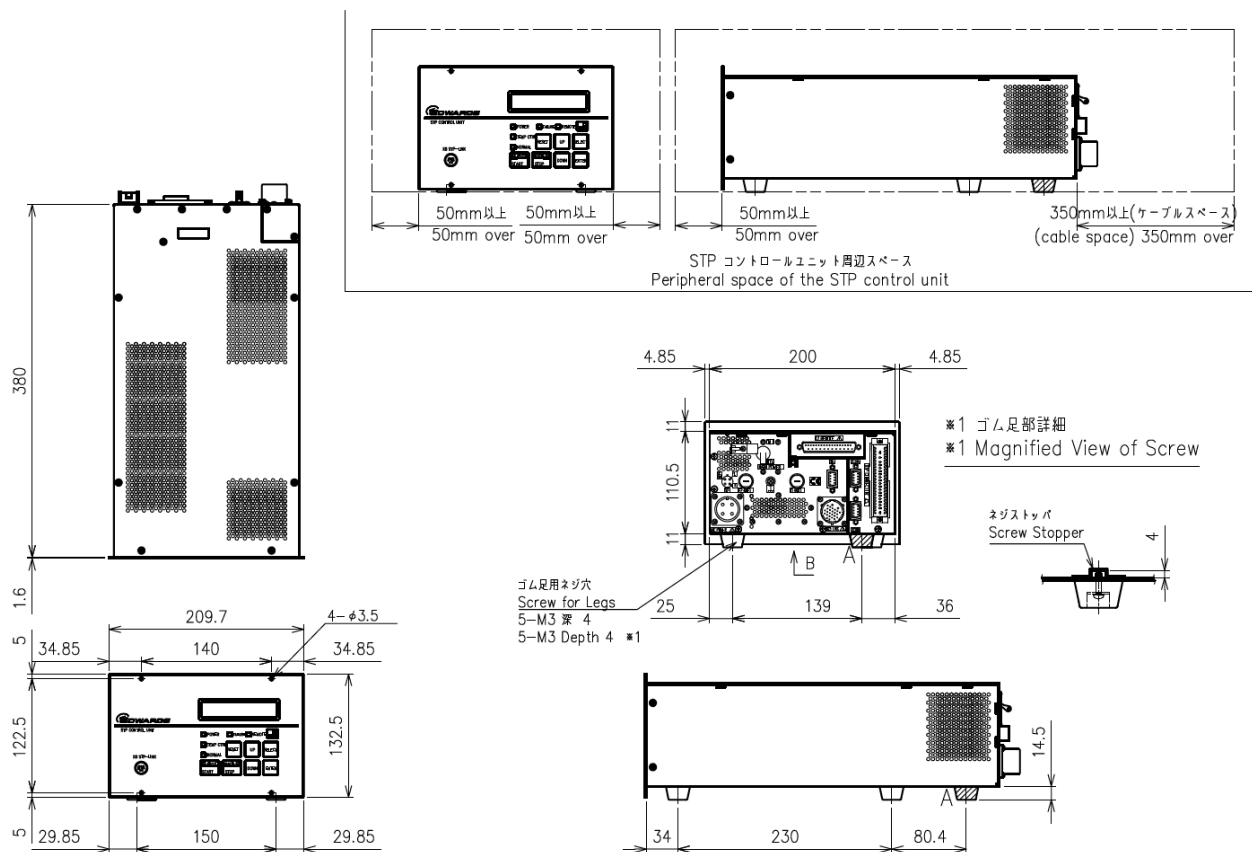


Figure 2.2 Purge gas flow inside the pump

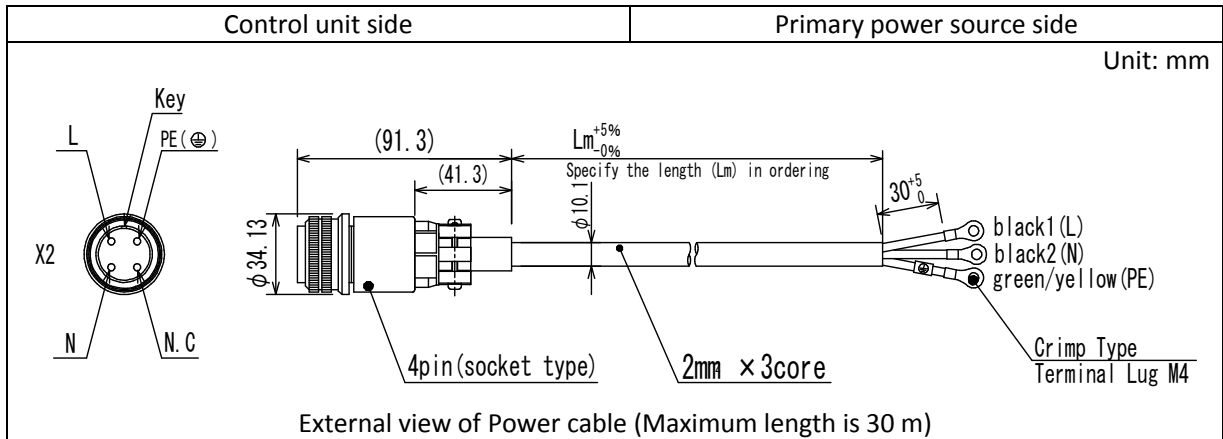
3 STP control unit specification

Item		Specification	
Controller type		SCU-800	
Input voltage	Vac	200 to 240	
Input frequency	Hz	50/60+/-2	
Input phase		Single phase	
Input power (Maximum value)	Without TMS	VA	850
	With TMS	VA	1200
Inrush current		A	25 _{0-P}
Leakage current		mA	3.5 or less
Main breaker	Rated current	A	15
	AIC:Ampere	A	1000 (240 Vac: 50/60 Hz)
	Interrupting Capacity		
Allowable operating temperature		°C	0 to 40
Allowable storage temperature		°C	-25 to 55
Mass		kg	9
Remote interface		I/O Remote (see 8.1) RS232/RS485 (see 8.2)	

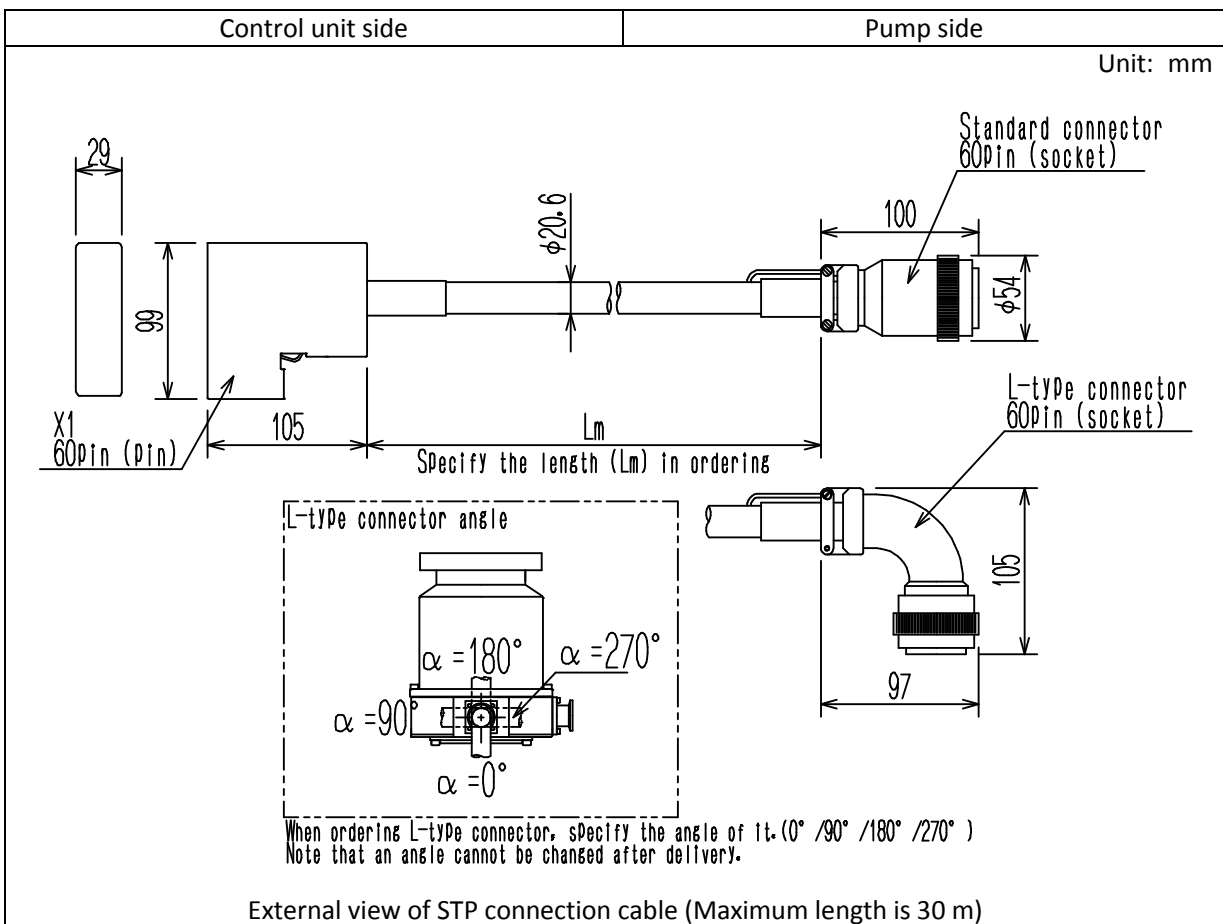


External view of STP control unit SCU-800

4 Power cable specification

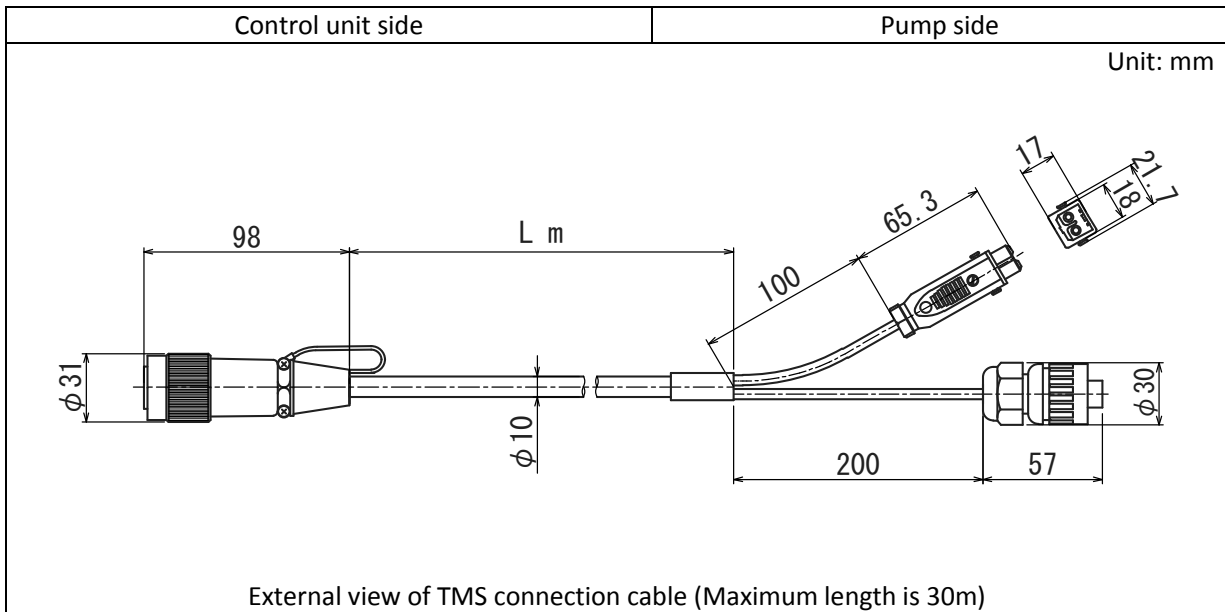


5 STP connection cable specification

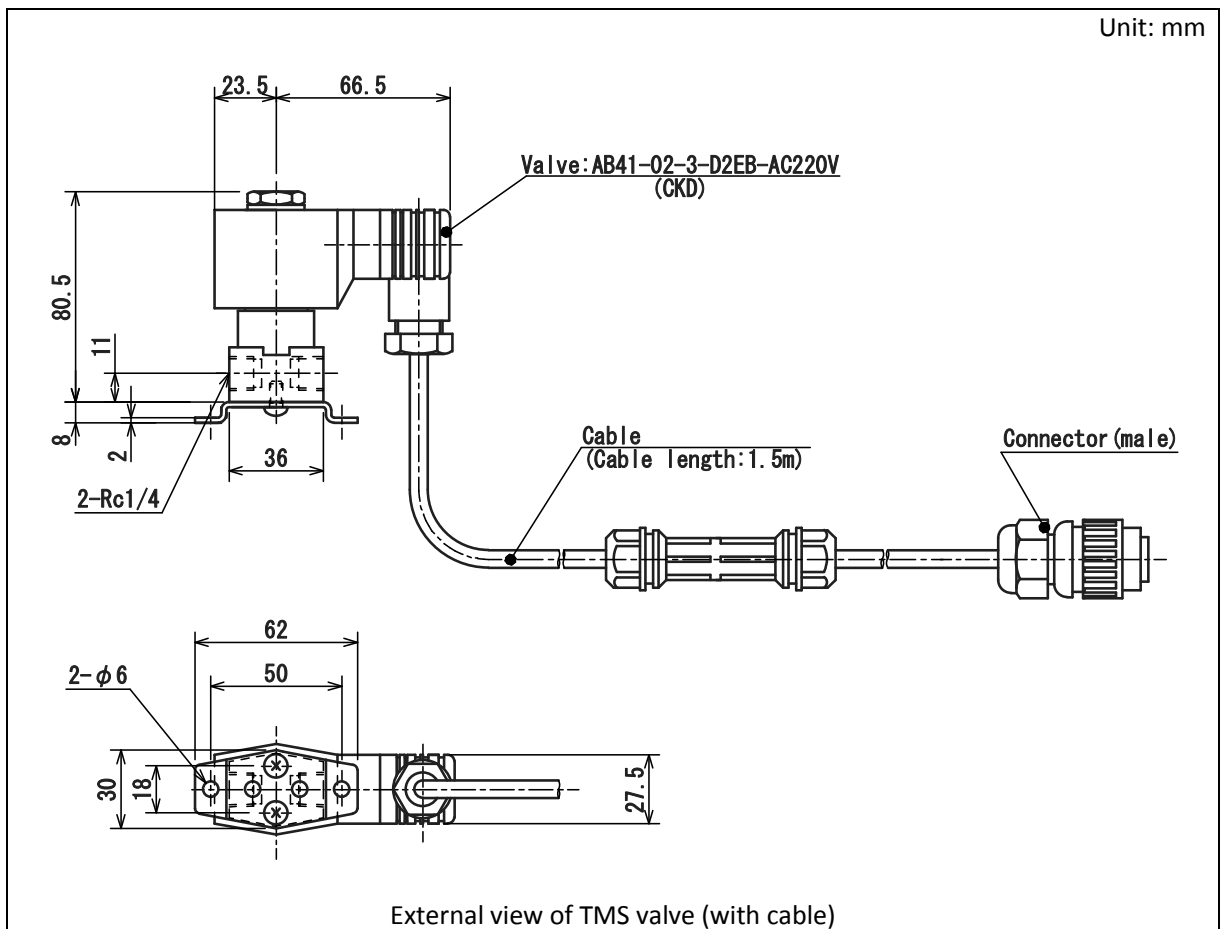


6 TMS unit specification

6.1 TMS connection cable

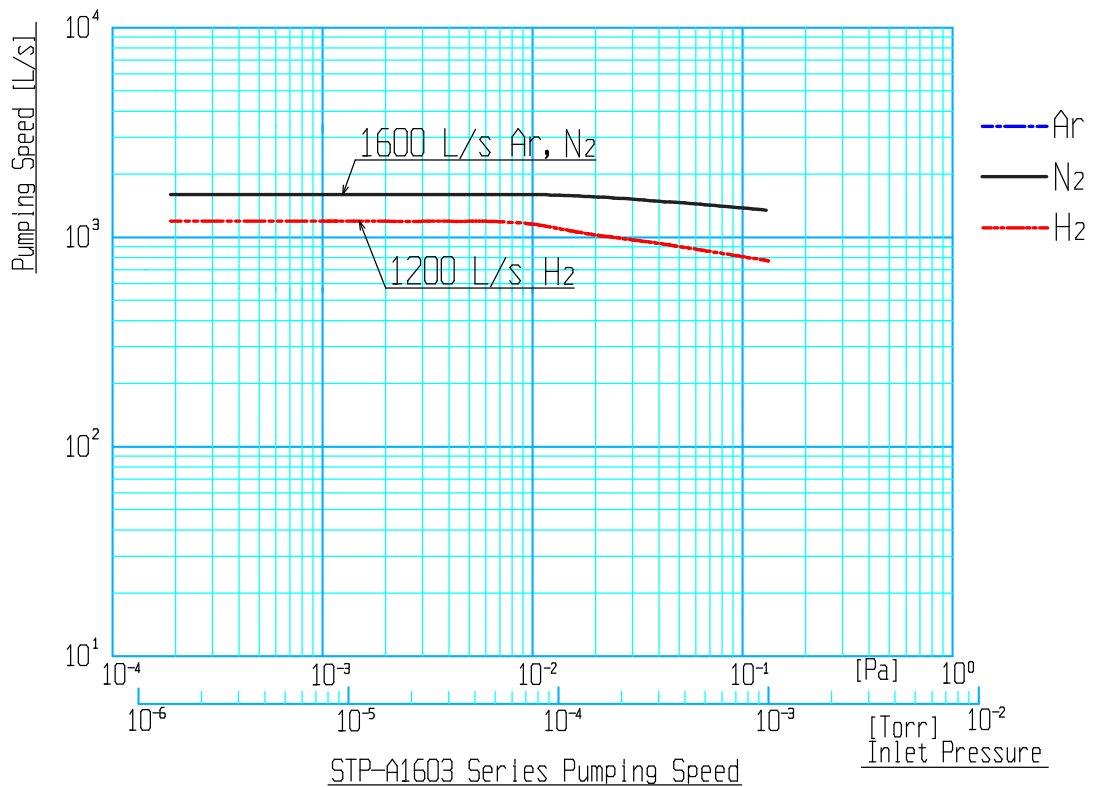


6.2 TMS valve (with cable)



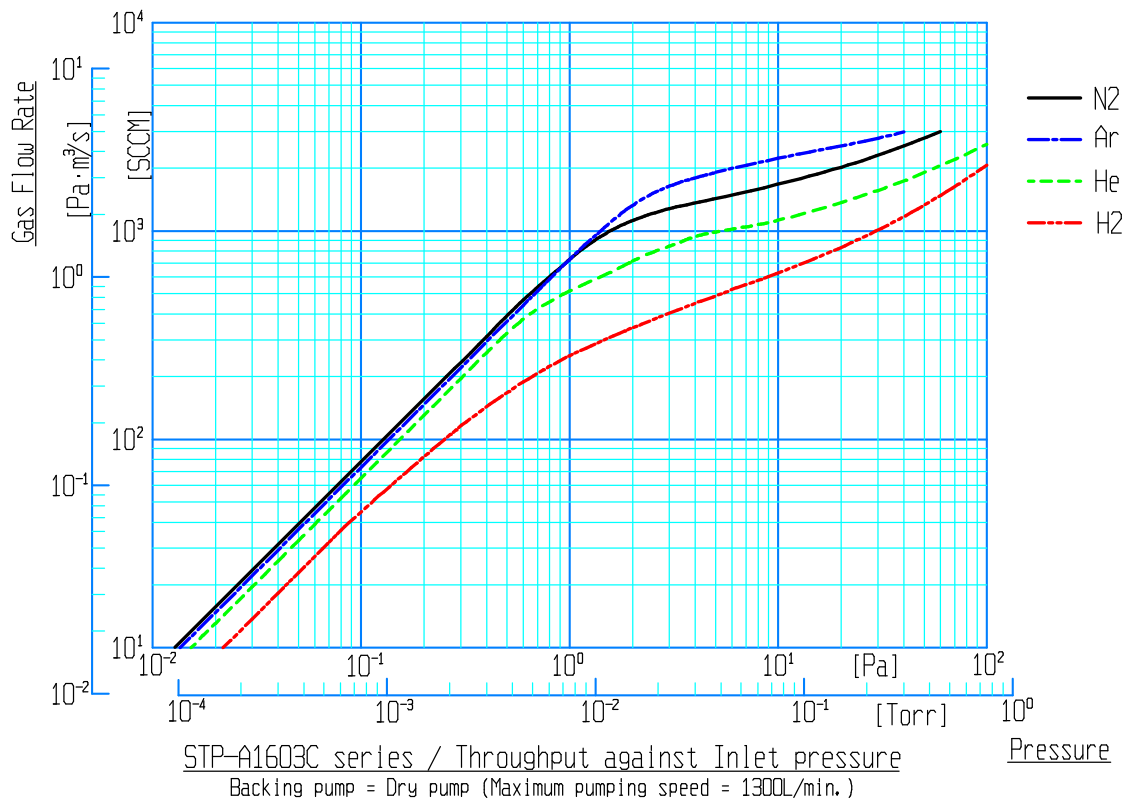
7 STP pump detailed specification

7.1 Pumping speed graph



Graph 1

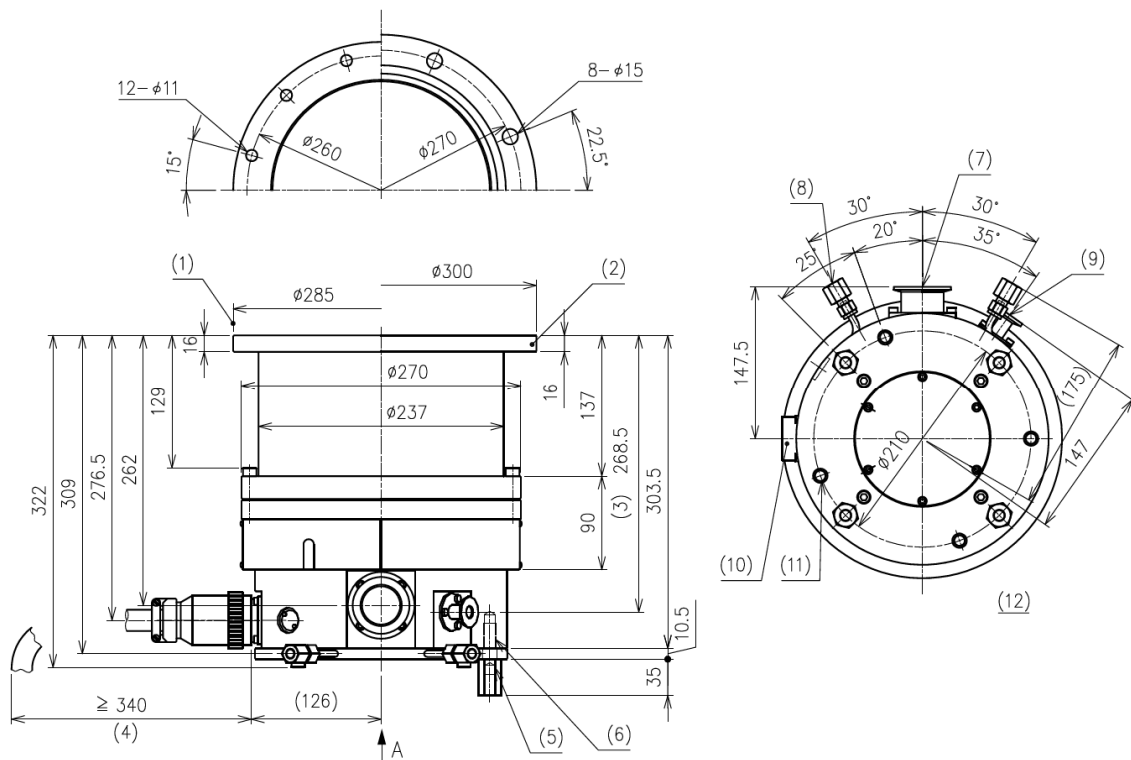
7.2 Throughput graph (P-Q curve)



STP-A1603C series / Throughput against Inlet pressure
Backing pump = Dry pump (Maximum pumping speed = 1300L/min.)

Graph 2

7.3 STP pump external views

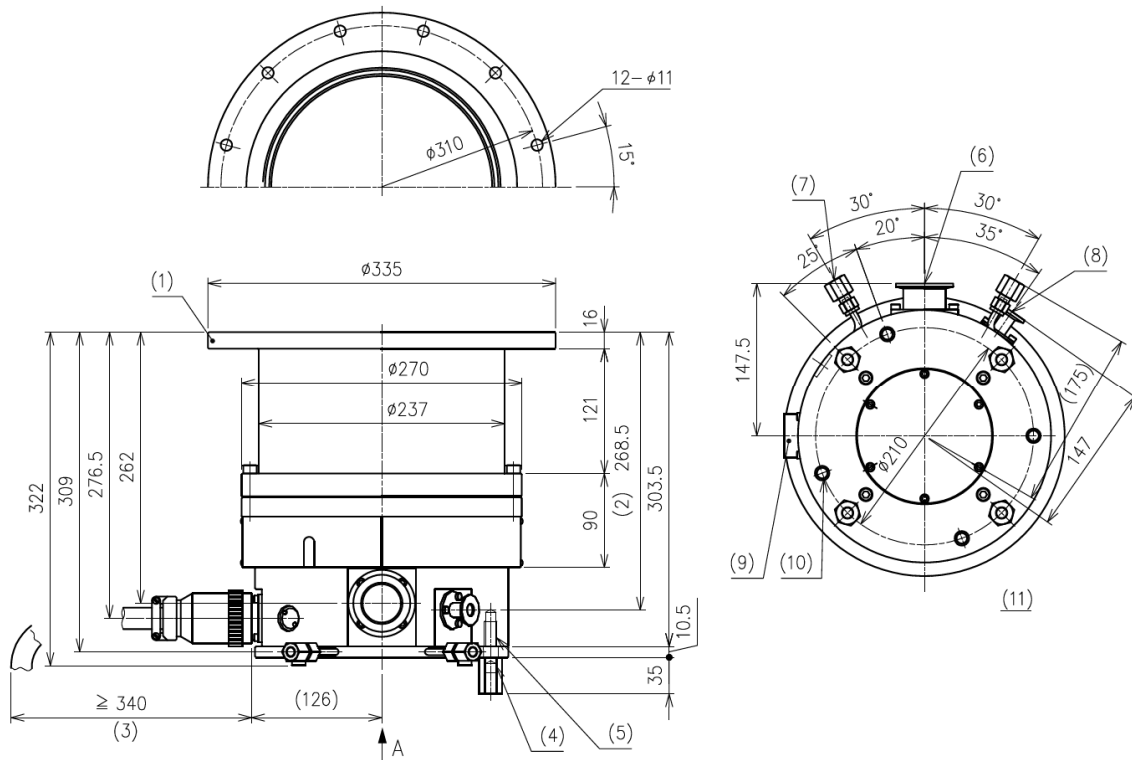


STP-A1603C (ISO200F/VG200)

No.	Item	Description
1	Inlet port flange	ISO ^{*2} 200F
2	Inlet port flange	VG ^{*1} 200
3	Height of the purge port	
4	Bending dimension of the STP connection cable	
5	Screw hole of legs	M12 ^{*1} depth 20
6	Screw hole for legs	M12 ^{*1} depth 24
7	Outlet port flange	KF ^{*1} 40
8	Cooling water port	2-Rc ^{*2} 1/4
9	Purge port	KF ^{*1} 10
10	STP connector	
11	Screw hole for legs	8-M12 ^{*1} depth 24
12	Viewed from arrow A	

^{*1} JIS

^{*2} ISO



STP-A1603C (ISO250F)

No.	Item	Description
1	Inlet port flange	ISO ^{*1} 250F
2	Height of the purge port	
3	Bending dimension of the STP connection cable	
4	Screw hole of legs	M12 ^{*2} depth 20
5	Screw hole for legs	M12 ^{*2} depth 24
6	Outlet port flange	KF ^{*2} 40
7	Cooling water port	2-Rc ^{*1} 1/4
8	Purge port	KF ^{*2} 10
9	STP connector	
10	Screw hole for legs	8-M12 ^{*2} depth 24
11	Viewed from arrow A	

^{*1} ISO

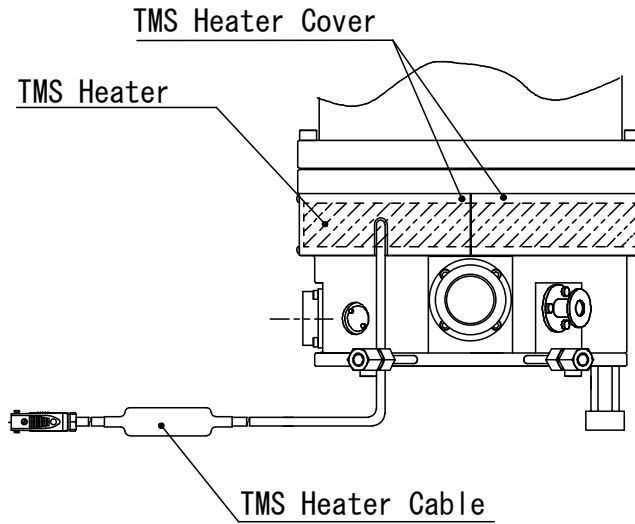
^{*2} JIS

(7.3 Pump external views)

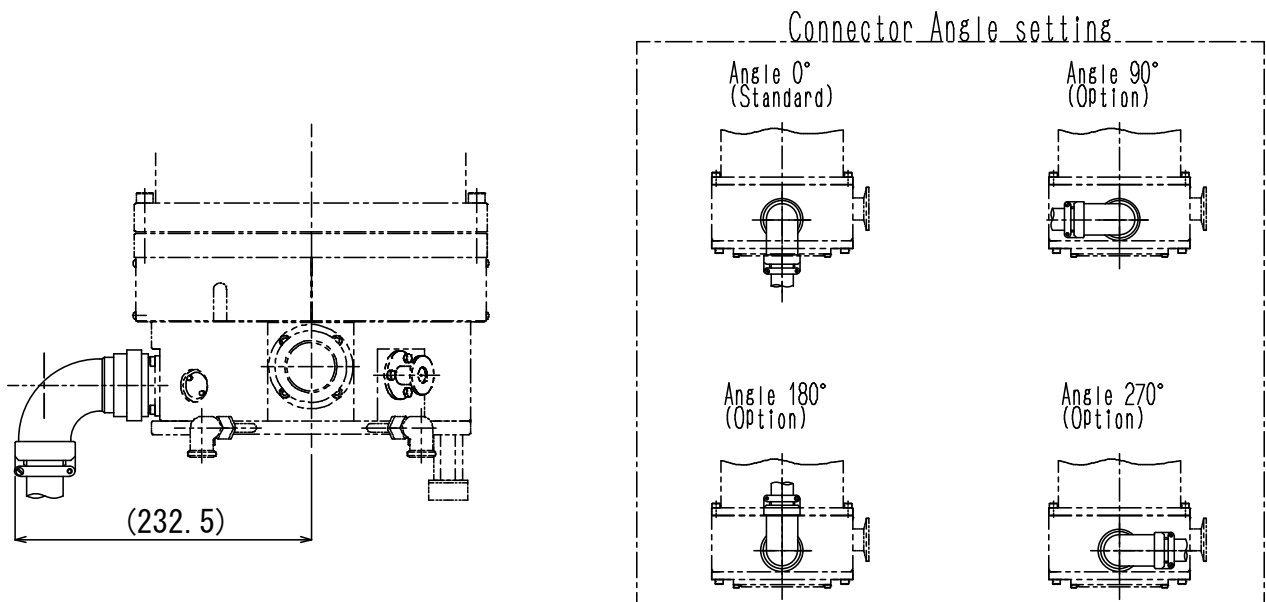
【Object pump type】

•STP-A1603C → STP-A1603CV

As shown in external view below, TMS heater is attached to STP pump in TMS specification (CV type).



STP-A1603CV (No dimension change at the base)



STP-A1603 series L- type connector

8 STP control unit detailed specification

8.1 I/O Remote

Specification for Remote input and output signal on Remote Connector X7 ^{*1}

Pin No.	Description	Pin No.	Description
1	COM. (IN)	20	
2		21	STOP IN
3	START IN	22	RESET IN
4	REM_IN_OPT1 ^{*2}	23	REM_IN_OPT2 ^{*2}
5	INHIBIT IN	24	WARNING OUT (N.O.)
6	WARNING OUT (COM)	25	WARNING OUT (N.C.)
7	L.VALVE OUT (N.O.) ^{*2}	26	L.VALVE OUT (N.O.) ^{*2}
8	REMOTE OUT (N.O.)	27	REMOTE OUT (N.O.)
9	POWER OUT (N.O.)	28	POWER OUT (N.O.)
10	ACCELERATION OUT (N.O.)	29	ACCELERATION OUT (N.O.)
11	NORMAL OUT (N.O.)	30	NORMAL OUT (COM.)
12	NORMAL OUT (N.C.)	31	
13	BRAKE OUT (N.O.)	32	BRAKE OUT (N.O.)
14	ALARM OUT (N.O.)	33	ALARM OUT (COM.)
15	ALARM OUT (N.C.)	34	
16	AT TEMP. OUT (N.O.) ^{*3}	35	AT TEMP. OUT (N.C.) ^{*3}
17	AT TEMP. OUT (COM.) ^{*3}	36	OPT.1 OUT (N.O.) ^{*2}
18	OPT.1 OUT (COM) ^{*2}	37	OPT.1 OUT (N.C.) ^{*2}
19			

IN: Input pin, OUT: Output pin. COM.: Common,
N.O. ^{*4}: Normal Open, N.C. ^{*5}: Normal Close,
Input signal specification: Operation by Close/Open between COM. (IN) and each Input pin.
Output signal specification: Relay contact output.
Contact point ratings is 125Vac/0.5A, 24Vdc/1A
Connector type: D-sub 37 pin (Socket), The screw for the remote connector is M2.6.
Connector for the remote cable needs to be provided by the customer.
It is recommended to use a remote cable with shield type, and connect both terminals to ground.

^{*1}: Please refer to the Instruction Manual for the detail explanations.

^{*2}: This is not used in the standard specification pump.

^{*3}: This signal will be set when TMS detects the measured temperature is inside +/- 10 °C from the setting temperature.

^{*4}: N.O; The contact will close when the STP pump status becomes the stated status.

^{*5}: N.C; The contact will open when the STP pump status becomes the stated status.

8.2 RS232/RS485

Specification of Serial port COM1 (X3A, X3B) for both RS232 and 485 *1

	STP control unit side X3A (D-sub 9 pin, Socket)	STP control unit side X3B (D-sub 9 pin, Socket)	PC side connector (example of DOS/V compatible machine)	
			D-sub 9 pin	D-sub 25 pin
RS232	2 (TxD)	-	2 (TxD)	3 (TxD)
	3 (RxD)	-	3 (RxD)	2 (RxD)
	5 (GND)	-	5 (GND)	7 (GND)
RS485	7 (D-)	7 (D-)	-	-
	8 (D+)	8 (D+)	-	-
Not for use	1, 4, 6, 9	1, 2, 3, 4, 5, 6, 9	-	-

Screw size of the connector housing for X3A and X3B is M2.6.
The connectors for the serial cables need to be provided by the customer.
It is recommended to use a serial communication cable with shield type, and connect both terminals to ground. DO NOT connect anything to these unused pins.

9 Attachment component

Below parts are attached with the pump as standard.

Item	Q' ty	Note
Blank Flange for Parge port (KF10)	1	
Clamper for purge port (KF10)	1	
O-ring for the purge port (KF10)	1	
Leg	8	
Instruction Manual	1	

10 Accessory

There is no accessory available for STP-A1603 series.

Turbo Molecular Pump

STP-A1603 series Selection Guide

Pump Type

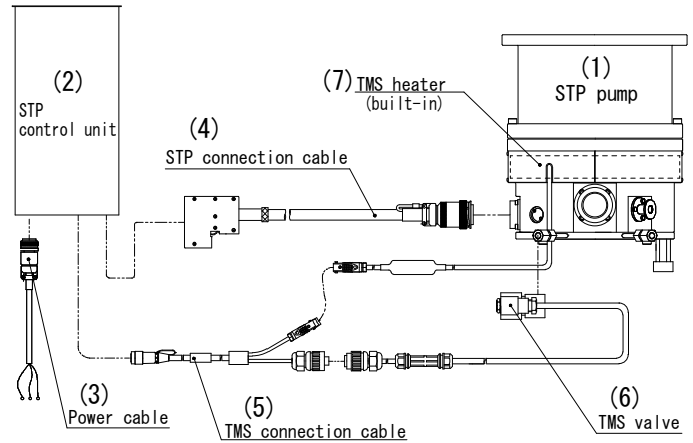
- STP-A1603C
- STP-A1603CV

STP-A1603 series Selection Guide

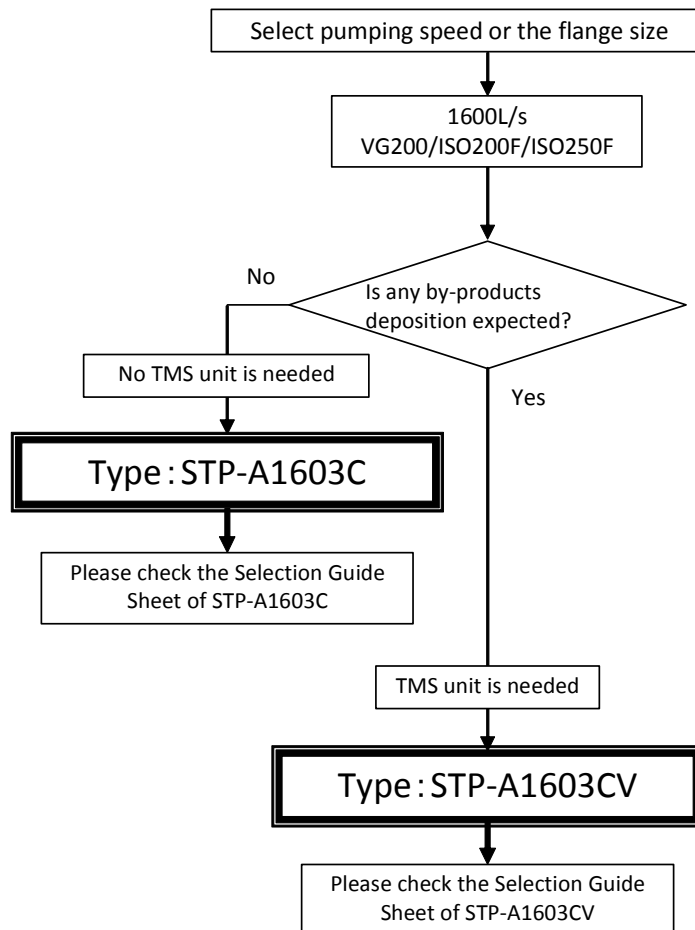
Please complete a kit using the Product Structure and the Selection Flow Chart.

<Product Structure>

Item	Q'ty
(1) STP pump	1
(2) STP control unit	1
(3) Power cable	1
(4) STP connection cable	1
Parts (5) to (7) under this line are for STP-A1603CV (with TMS) only	
(5) TMS connection cable	1
(6) TMS valve (with cable)	1
(7) TMS heater (built in the pump)	1



< Selection Flow Chart >

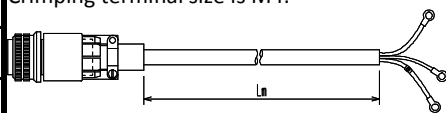
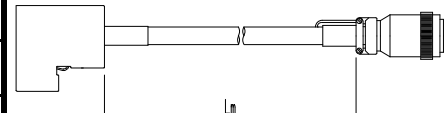
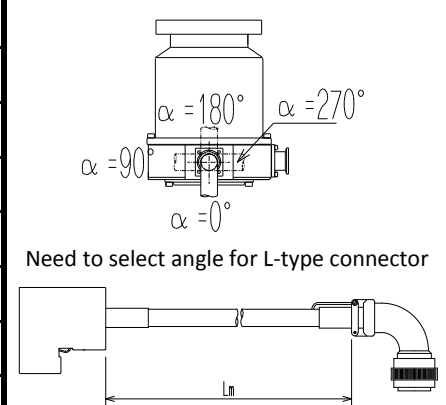


STP-A1603C Selection Guide Sheet

Please tick the boxes to order the components.



Pump type : STP-A1603C (without TMS unit)

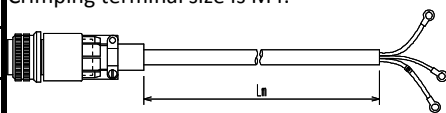
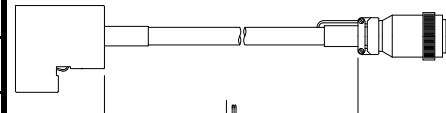
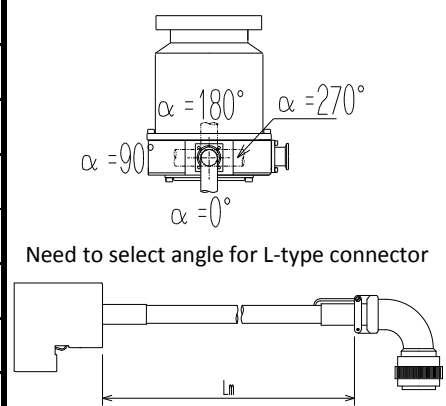
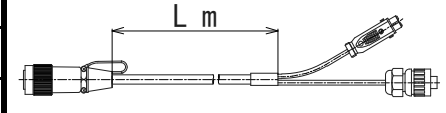
Item		Part number	Select	Note
(1) STP pump	VG200	YT460Z000	<input type="checkbox"/>	Select flange size. Outlet port: KF40 Purge port: KF10 Water pipe fitting: Rc1/4(ISO standard)
	ISO200F	YT46B0060	<input type="checkbox"/>	
	ISO250F	YT460Z030	<input type="checkbox"/>	
(2) STP control unit	SCU-800	YT49Z2Z00	<input checked="" type="checkbox"/>	Input voltage: 200 Vac to 240 Vac
(3) Power cable	Please select cable length.			Crimping terminal size is M4. 
	5 m	PT49Y0A00	<input type="checkbox"/>	
	10 m	PT49Y0A01	<input type="checkbox"/>	
	15 m	PT49Y0A02	<input type="checkbox"/>	
	20 m	PT49Y0A03	<input type="checkbox"/>	
(4) STP connection cable	Please select connector type and cable length.			  Need to select angle for L-type connector
Both side straight connector	5 m	B75130020	<input type="checkbox"/>	
	10 m	B75130060	<input type="checkbox"/>	
	15 m	B75130070	<input type="checkbox"/>	
	20 m	B75130190	<input type="checkbox"/>	
- Pump side L-type connector ($\alpha=0^\circ$) - Controller side straight	5 m	PT46Y1B00	<input type="checkbox"/>	
	10 m	PT46Y1B01	<input type="checkbox"/>	
	15 m	PT46Y1B02	<input type="checkbox"/>	
	20 m	B71830060	<input type="checkbox"/>	
- Pump side L-type connector ($\alpha=90^\circ$) - Controller side straight	5 m	PT46Y1B05	<input type="checkbox"/>	
	10 m	PT46Y1B06	<input type="checkbox"/>	
	15 m	PT46Y1B07	<input type="checkbox"/>	
	20 m	PT46Y1B28	<input type="checkbox"/>	
Instruction Manual			<input checked="" type="checkbox"/>	CD

*Maximum length of all cables is 30 meters.

STP-A1603CV Selection Guide Sheet

Please tick the boxes to order the components.

Pump type : STP-A1603CV (without TMS unit)

Item	Part number	Select	Note	
(1) STP pump With TMS heater (7)	VG200	YT4616003	Select flange size. Outlet port: KF40 Purge port: KF10 Water pipe fitting: Rc1/4(ISO standard)	
	ISO200F	YT4616004		
	ISO250F	YT4616030		
(2) STP control unit	SCU-800	YT49Z2Z00	<input checked="" type="checkbox"/> Input voltage: 200Vac to 240Vac	
(3) Power cable	Please select cable length.		Crimping terminal size is M4. 	
	5 m	PT49Y0A00		<input type="checkbox"/>
	10 m	PT49Y0A01		<input type="checkbox"/>
	15 m	PT49Y0A02		<input type="checkbox"/>
	20 m	PT49Y0A03		<input type="checkbox"/>
(4) STP connection cable	Please select connector type and cable length.		  Need to select angle for L-type connector	
Both side straight connector	5 m	B75130020		<input type="checkbox"/>
	10 m	B75130060		<input type="checkbox"/>
	15 m	B75130070		<input type="checkbox"/>
	20 m	B75130190		<input type="checkbox"/>
- Pump side L-type connector ($\alpha=0^\circ$) - Controller side straight	5 m	PT46Y1B00		<input type="checkbox"/>
	10 m	PT46Y1B01		<input type="checkbox"/>
	15 m	PT46Y1B02		<input type="checkbox"/>
	20 m	B71830060		<input type="checkbox"/>
- Pump side L-type connector ($\alpha=90^\circ$) - Controller side straight	5 m	PT46Y1B05		<input type="checkbox"/>
	10 m	PT46Y1B06		<input type="checkbox"/>
	15 m	PT46Y1B07		<input type="checkbox"/>
	20 m	PT46Y1B28	<input type="checkbox"/>	
(5) TMS connection cable Kit Include TMS connection cable and TMS valve (6). TMS heater (7) is included in the Pump.	Please select cable length.			
	5 m	PT461V000		<input type="checkbox"/>
	10 m	PT461V001		<input type="checkbox"/>
	15 m	PT461V002		<input type="checkbox"/>
	20 m	PT461V003	<input type="checkbox"/>	
Instruction Manual			<input checked="" type="checkbox"/> CD	

*Maximum length of all cables is 30 meters.