Doc No. BTS-41E-000
Ver.05

Turbo Molecular Pump

STP-A2203 series

Specification

Pump Type

- STP-A2203C
- STP-A2203CV

Edwards Japan Limited

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1 Introduction

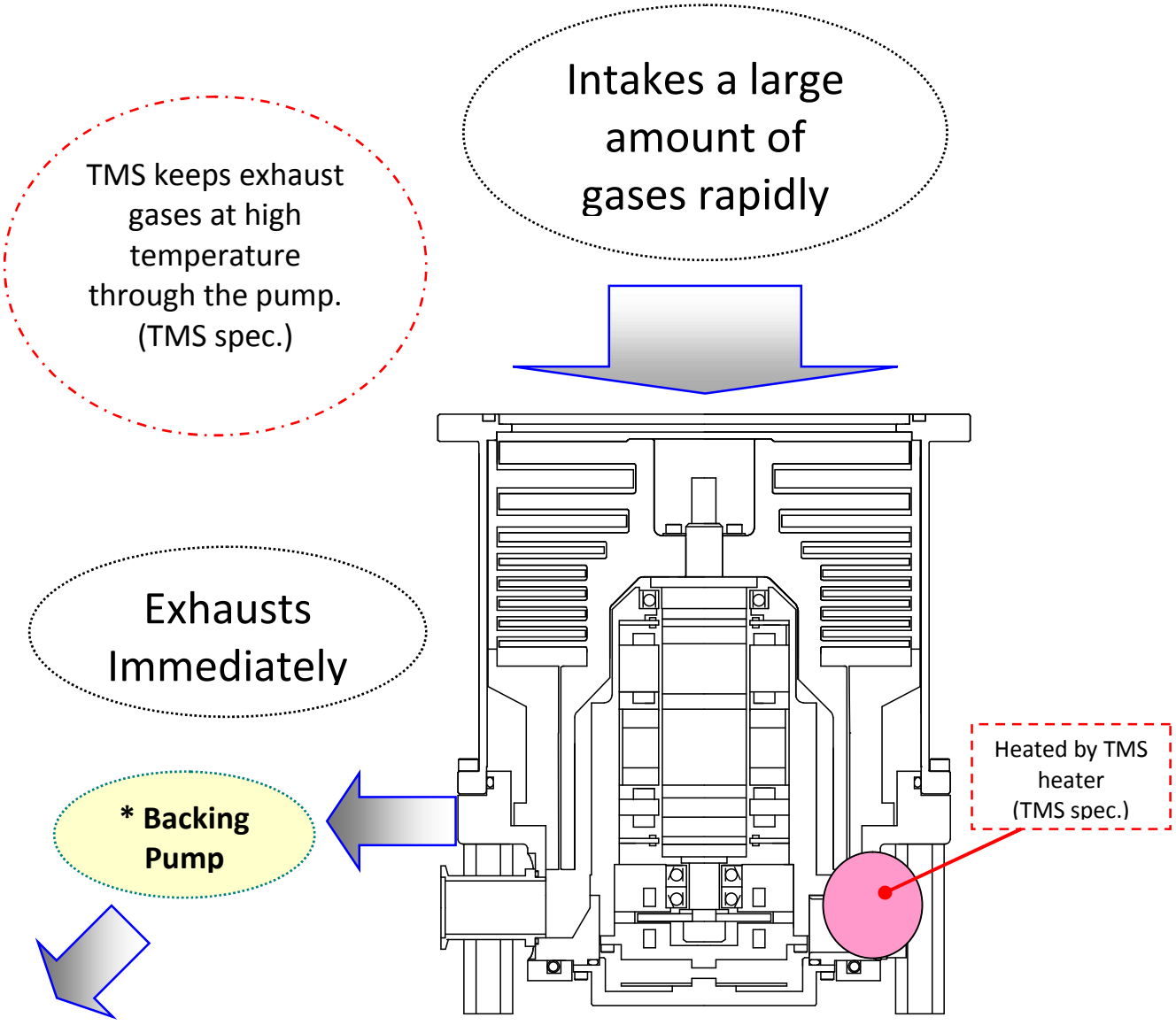
Turbo Molecular pump is one of the most important Vacuum Components in the most-advanced technologies field like Semiconductor and LCD manufacturing tools, high-energy physics, etc.

This document describes the standard specification for the magnetically levitated turbo molecular pumps of STP-A2203C and STP-A2203CV.

- STP-A2203C is one of A (Advanced high throughput) series turbomolecular pump and has features of high throughput performance.
- STP-A2203CV 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

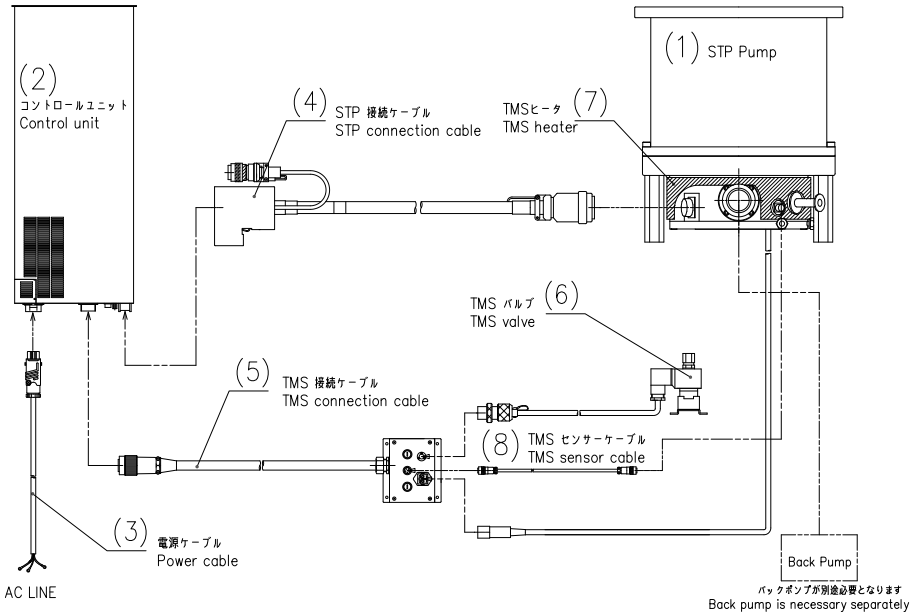


Figure. 1 STP pump assembly drawing

	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-A2203CV (CV version)	- 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.(5m/10m/15m/20m)	- 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 the L-type connector to order. (0°/ 90°) Please specify the cable length to order. (5m/10m/15m/20m)	- Cable Length - Connector type - Angle for L-type connector
The parts under this line, (5) to (8), are needed for STP-A2203CV which have TMS.				
(5)	TMS connection cable	1	This cable is to connect between TMS heater, TMS water control valve, TMS sensor and the control unit. Please specify the cable length to order. (5m/10m/15m/20m)	- Cable Length
(6)	TMS valve (with cable)	1	Cool down the pump with ON/OFF control of cooling water.	
(7)	TMS heater	1	Heat up the pump with ON/OFF control.	
(8)	TMS sensor cable	1	Connection cable for TMS sensor.	

* 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-A2203C	STP-A2203CV
TMS unit			Without TMS	With TMS
Flange size	Inlet port flange		VG250/ISO250F	
	Outlet port flange		KF40	
	Purge Port flange		KF10	
Pumping Speed[*1] (L/s) (See chapter 7.1)		N_2	2200	
		H_2	1700	
Compression ratio[*1]		N_2	$> 10^8$	
		H_2	2.5×10^4	
Allowable Maximum continuous flow rate [*1,*2] (sccm)		N_2	1500	1200
Ultimate Pressure[*1,*3]			10^{-6} Pa (10^{-8} Torr) order <after baking>	
Allowable maximum backing pressure[*1]			400 Pa (3 Torr)	
Enable exhaust gas			Chlorine and Fluorine gas can be used. When you want to use the following gas, pleae contact Edwards. - The gas including alkali metal, but except "Li". - The gas including "Ga", "Hg", "In" and "Sn". - HBr	
Purge gas flow rate		sccm	20 (see chapter 2.2.2)	
Back pump size		L/min	> 1300 (Recommended)	
Rated Speed		rpm	27000 (Allowable speed range: between 13500 and 27000)	
Starting time		min	7	
Stopping time		min	8	
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	N/A	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	61	
Physical size		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.

Table 2.1 (a) Destructive torque and recommended bolts

For Flange secured only

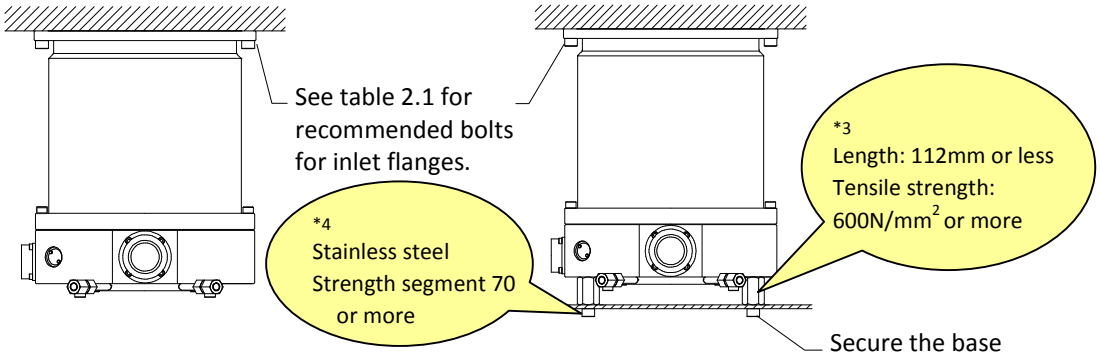
Pump type		STP-A2203	
Flange type		VG250	ISO250F
Destructive torque [Nm]		6.7×10^4	5.2×10^4
Base (8 positions) secured		Not available	
Recommended bolts for flange	Shape of bolts	M12 Standard	M10 R.D.S.B *1
		12	12
	Steel type *2	Carbon steel / Alloyed steel	
	Strength class *2	12.9 or more	

Table 2.1 (b) Destructive torque and recommended bolts

For Flange secured +Base secured

Pump type		STP-A2203	
Flange type		VG250	ISO250F
Destructive torque [Nm]		6.7×10^4	5.2×10^4
Base (8 positions) secured		Available	
Recommended bolts for flange	Shape of bolts	M12 Standard	M10 standard
		12	12
	Steel type *2	Stainless steel	
	Strength class *2	70 or more	

Use all 8 holes on the base plate for the attached legs or the 8 leg holes to secure the pump.

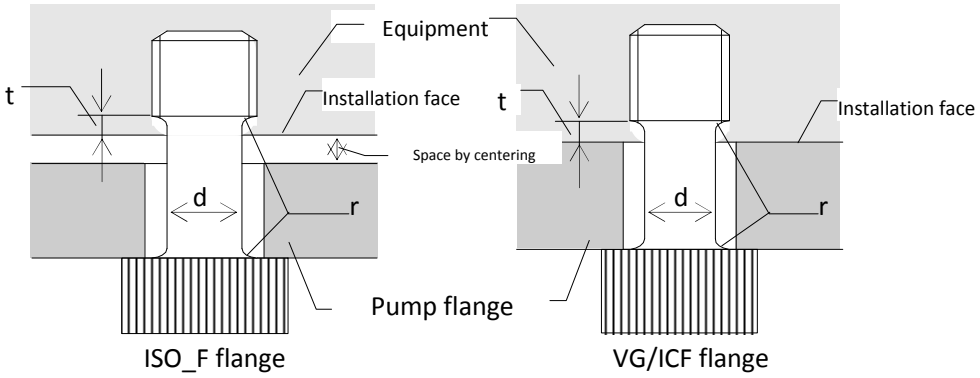


(a) Without base secured (b) With base secured

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

*1 Refer to Figure 2.2 Shape of Reduced Diameter Shank Bolts.(=R.D.S.B)
*2 Refer to JISB1051(ISO898-1),JISB1054(ISO3506),AMS6419(Aerospace Material Specification).
*3 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/mm^2 or more.
*4 The bolts for the base secure will be Stainless Steel with strength segment of 70 or more.

Reduced diameter shank bolts (R.D.S.B.) listed on Table 2.1 (a) are more reinforced bolts over standard bolts by smoothing the portion to attach flange securing bolts to the respective face at the equipment side. Refer to Figure 2.2 for Shape of R.D.S.B.
Refer to the following Figure for the shape of R.D.S.B



Bolt size	Flange size	t	d	r
M8	ISO_F	2.5 mm or more	5.9 mm or more	0.8 mm or more
	ICF	1 mm or more		
M10	ISO_F	3 mm or more	7.5 mm or more	
	VG	1.5 mm or more		
M12	ISO_F	3.5 mm or more	9.1 mm or more	
	VG	2 mm or more		

Figure 2.2 Shape of Reduced Diameter Shank Bolts

2.2.2 Purge gas for STP pump

When pumping reactive or corrosive gases, introduce the dry N_2 gas or other gas in to the STP pump in order to protect the inside of the STP pump.

- ◇ Introduce dry N_2 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}Pa･m^3/s (20 sccm).
- ◇ The allowable gas pressure is from 1.0×10^5 Pa (atmospheric pressure) to 4.9×10^4 Pa (0.5 kgf/cm^2) on the introduction side.
- ◇ It is possible to have some noise from the STP pump when the inlet pressure becomes higher. But there is no problem to use the STP pumps as normal.

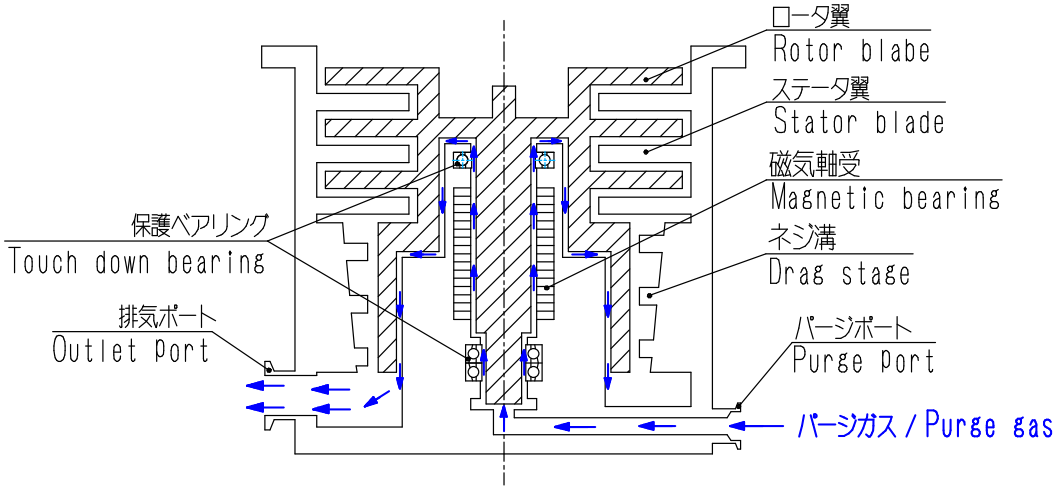
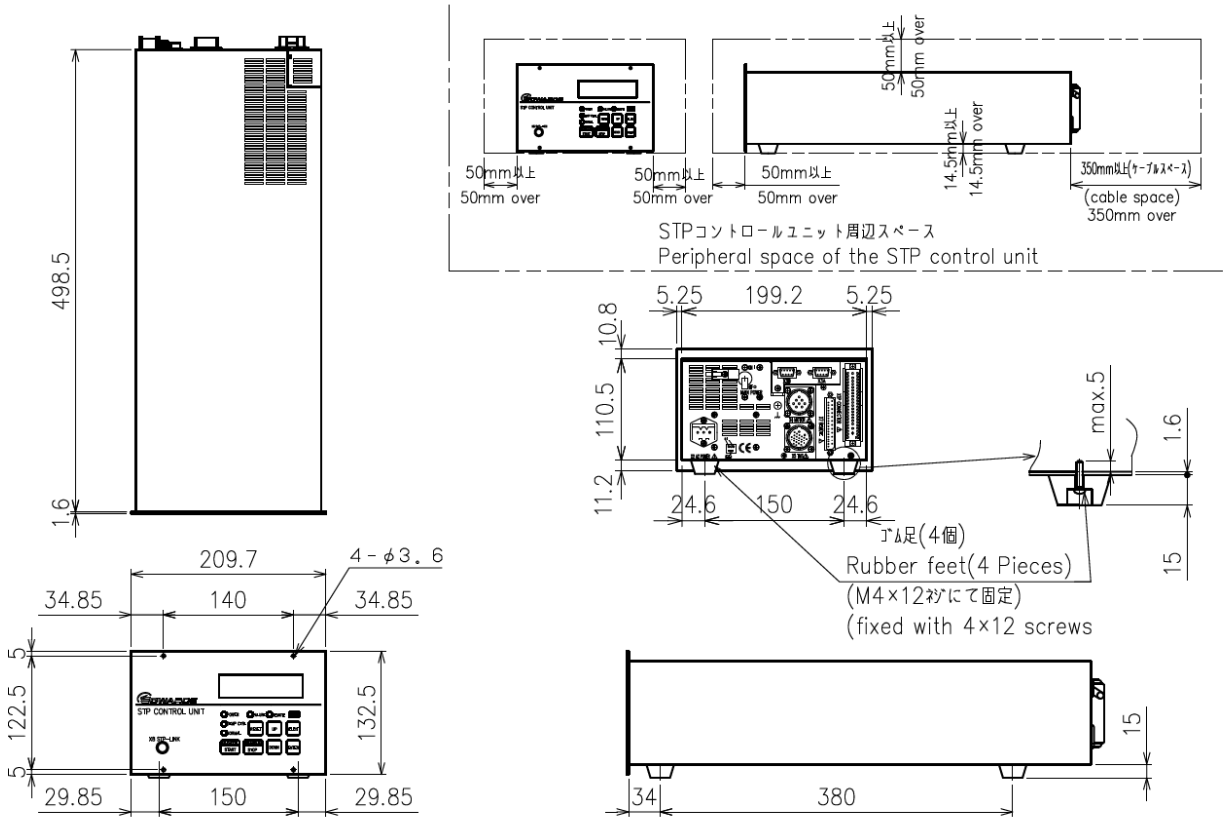


Figure 2.3 Purge gas flow inside the pump

3 STP control unit specification

Item			Specification
Controller type			SCU-1600
Input Voltage		Vac	200 to 240
Input Frequency		Hz	50 / 60 +/- 2
Input Phase			Single Phase
Input Power (Maximum value)	Without TMS	VA	1500
	With TMS	VA	1800
Inrush current		A	65 (8msec)
Leakage current		mA	3.5 or less
Main breaker	Rated current	A	15
	AIC: Ampere Interrupting Capacity	A	1000 (240 Vac : 50/60 Hz)
Allowable operating temperature		°C	0 to 40
Allowable Storage temperature		°C	-25 to 55
Mass		kg	11
Remote interface			I/O Remote (See chapter 8.1) RS232 / RS485 (See chapter 8.2)

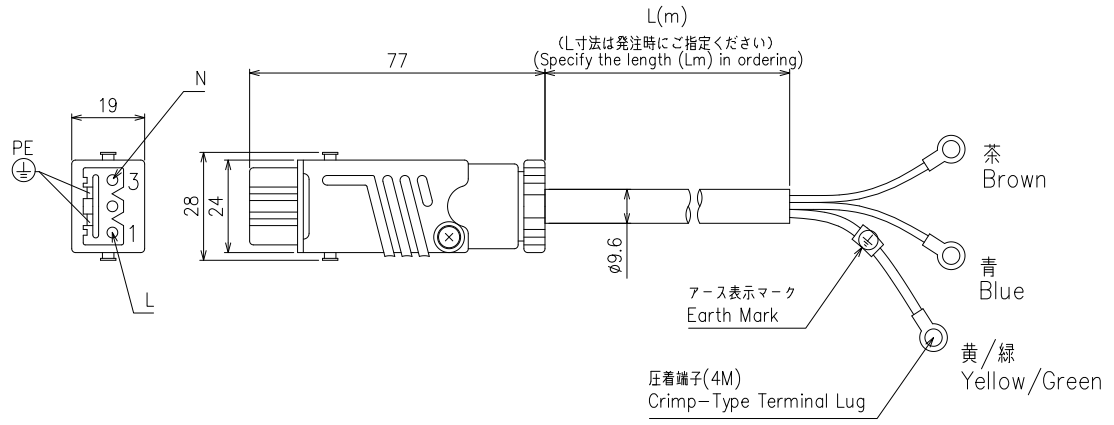


External view of STP control unit

4 Power cable specification

Control unit side	Primary power source side

Unit: mm

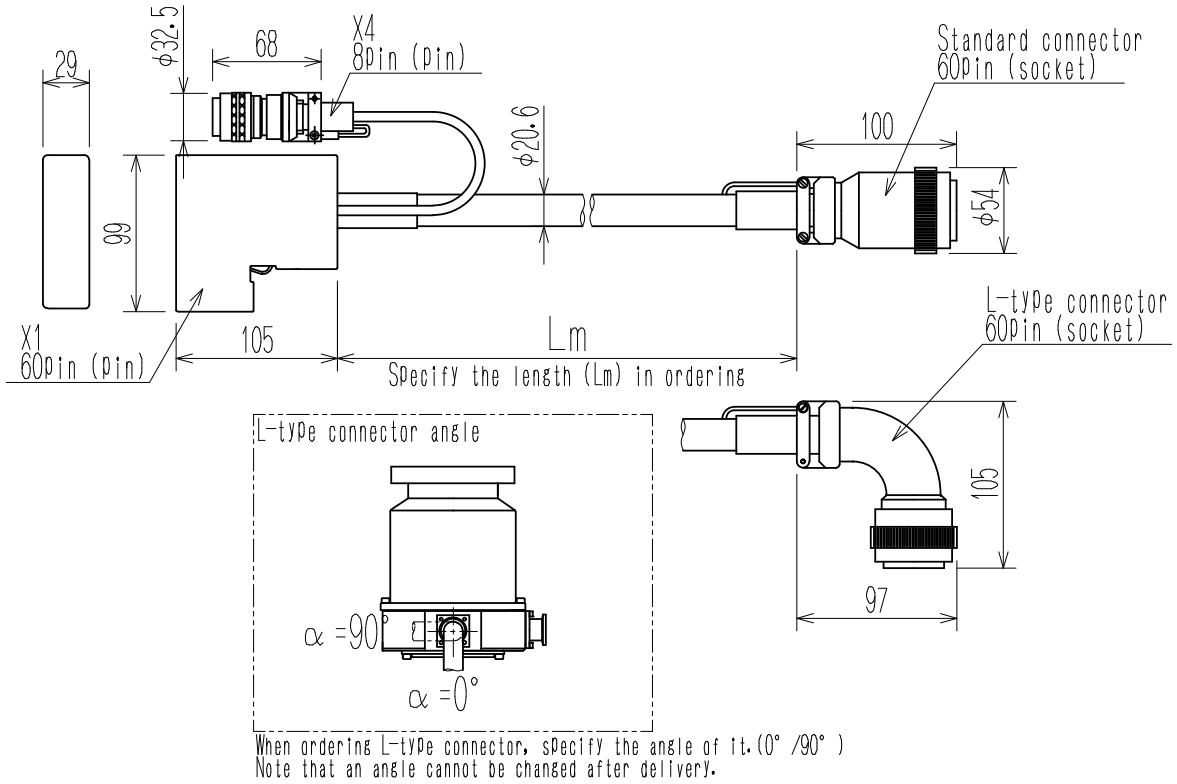


External view of power cable (Maximum length is 30 m)

5 STP connection cable specification

Control unit side	Pump side

Unit: mm



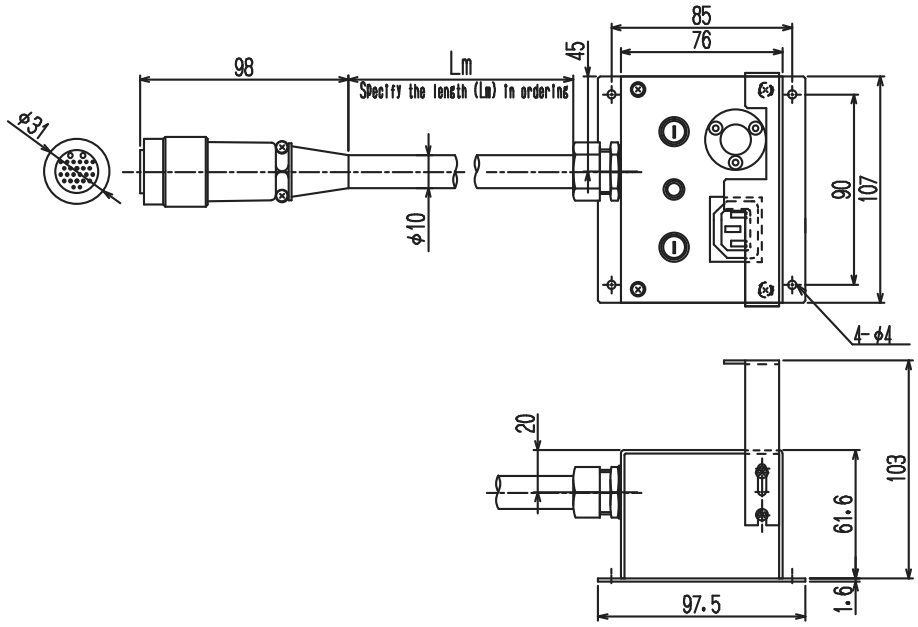
External view of STP connection cable (Maximum length is 30 m)

6 TMS unit specification

6.1 TMS connection cable

Control unit side	Pump side

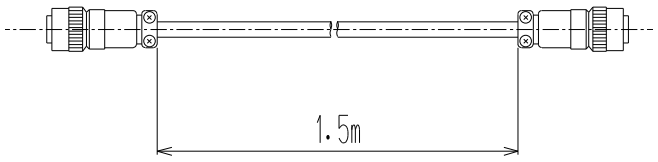
Unit: mm



External view of TMS connection cable (Maximum length is 30m)

6.2 TMS sensor cable

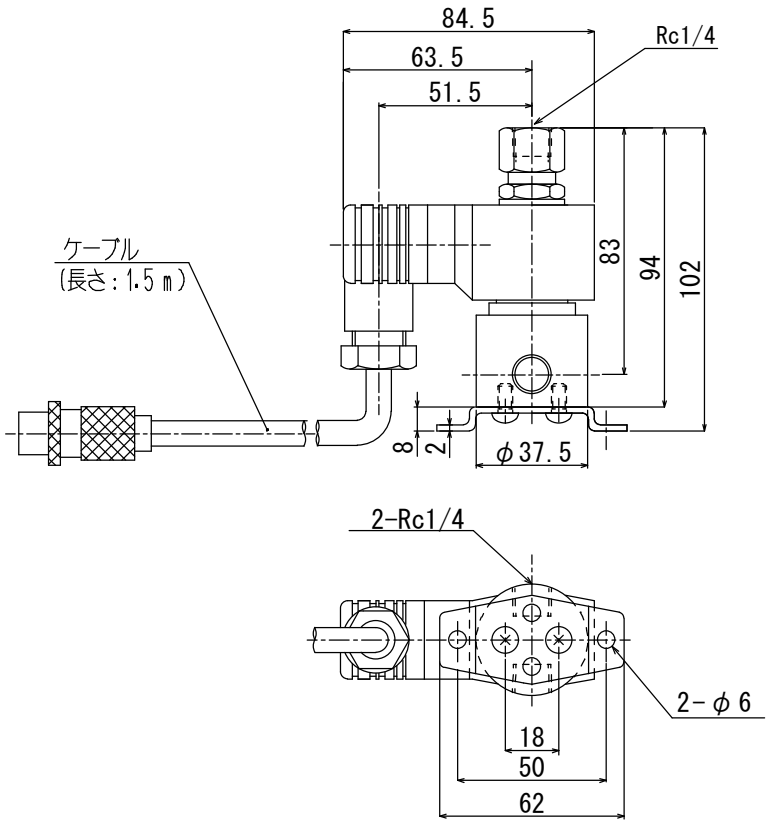
TMS connection cable side	Pump side



External view of TMS sensor cable

6.3 TMS water control valve

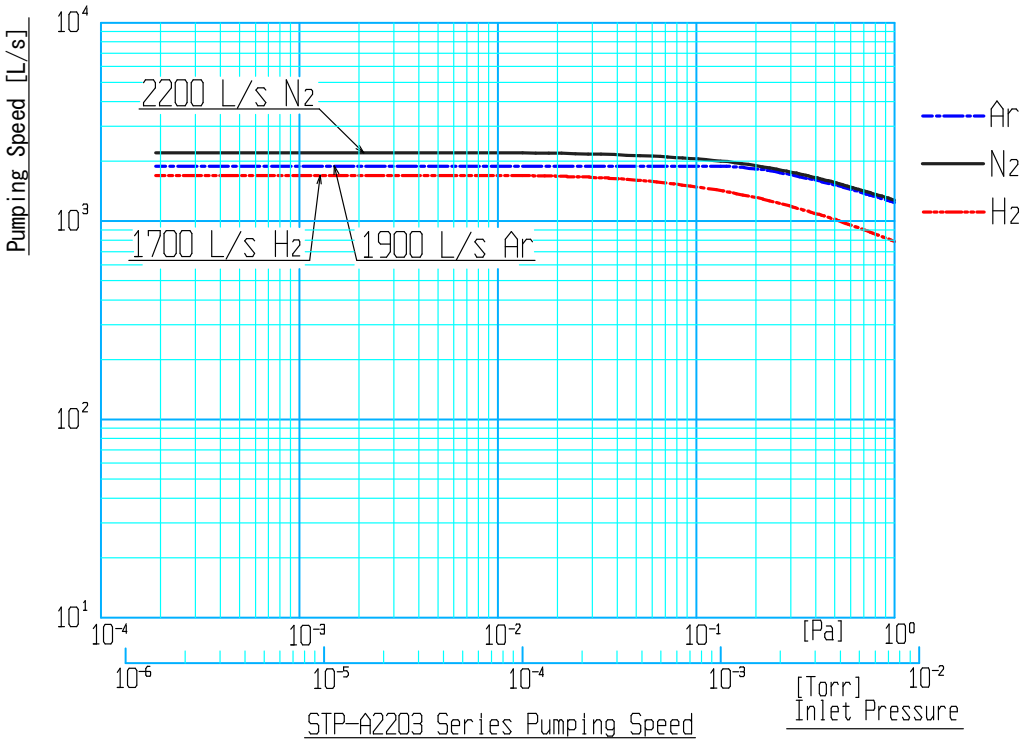
Unit: mm



External view of TMS water control valve

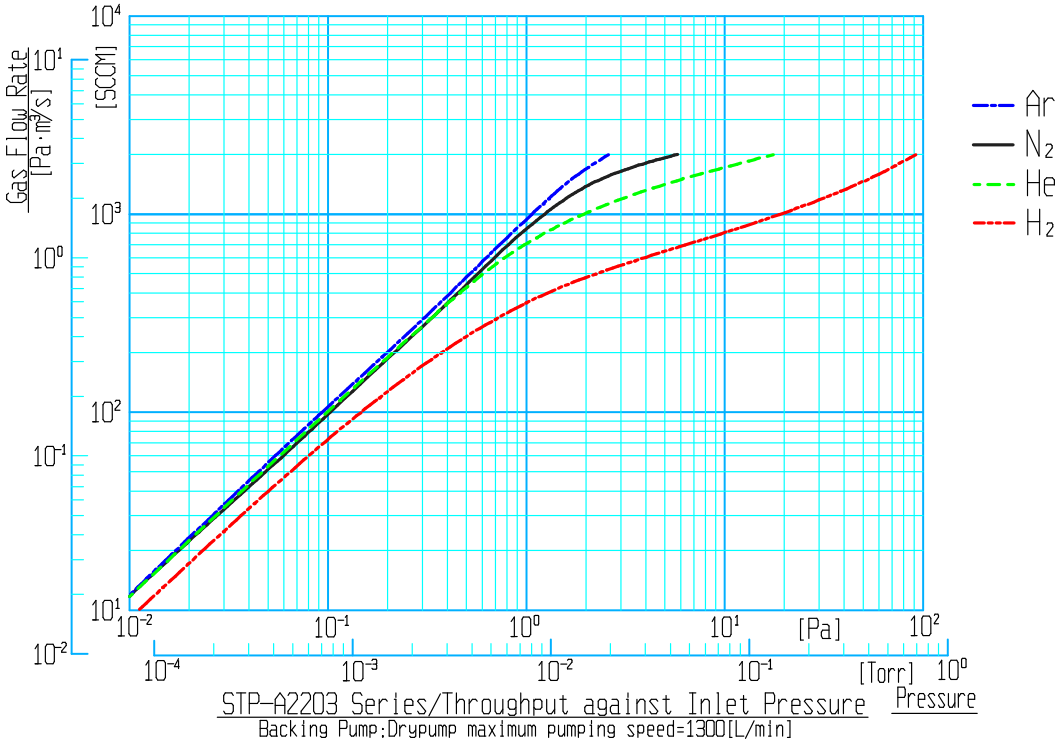
7 STP pump detailed specification

7.1 Pumping speed graph



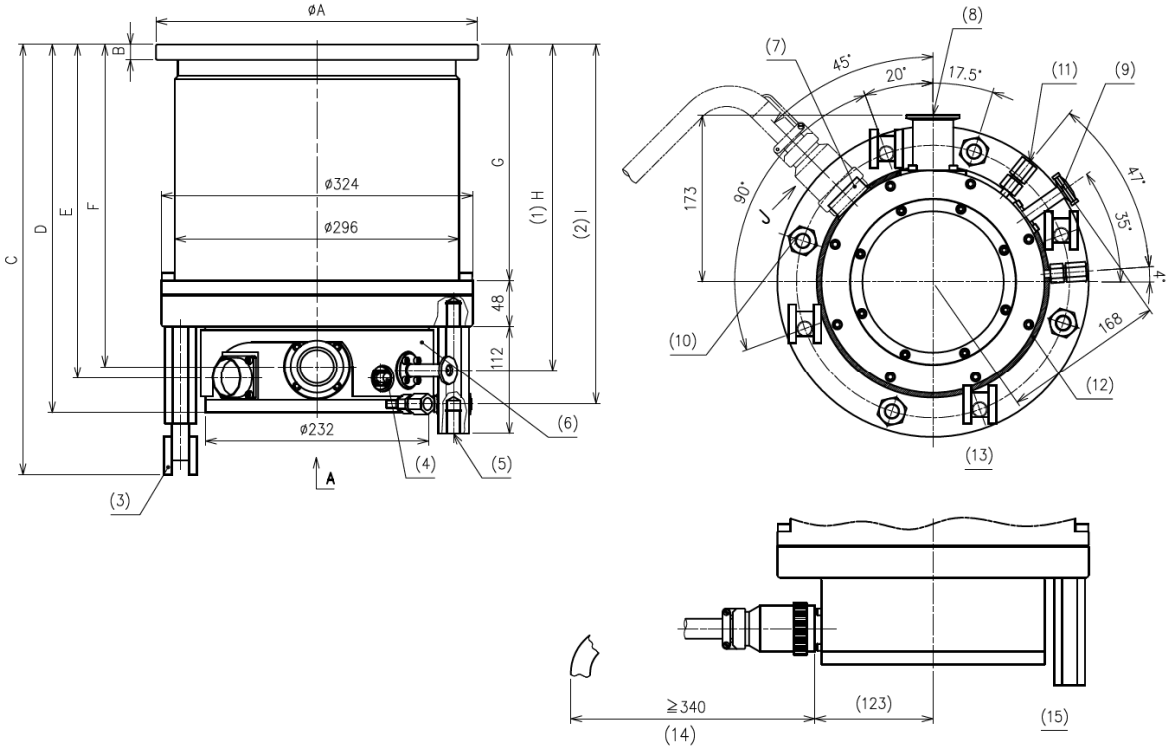
Graph 1

7.2 Throughput graph (P-Q curve)



Graph 2

7.3 STP pump external views



STP-A2203 series (VG250/ISO250F)

No.	Item	Description
1	Height of purge port	
2	Height of cooling water port	
3	Caster	4
4	TMS sensor connector	Optional accessory
5	Screw hole for casters	Rc[*1]1/4
6	TMS heater	Optional accessory
7	STP cable connector	
8	Outlet port flange	KF[*2]40
9	Purge port	KF[*2]10
10	Screw hole for legs	8-M16 depth 24
11	Cooling water port	2-Rc[*1]1/4
12	TMS heater	Optional accessory
13	Viewed from arrow A	
14	Bending dimension of the STP connection cable	
15	Viewed from arrow J	

Inlet port flange	VG250	ISO250F
ϕA	350	335
B	18	16
C	438	448
D	373.5	383.5
E	337	347
F	325	335
G	235	245
H	329	339
I	364	374

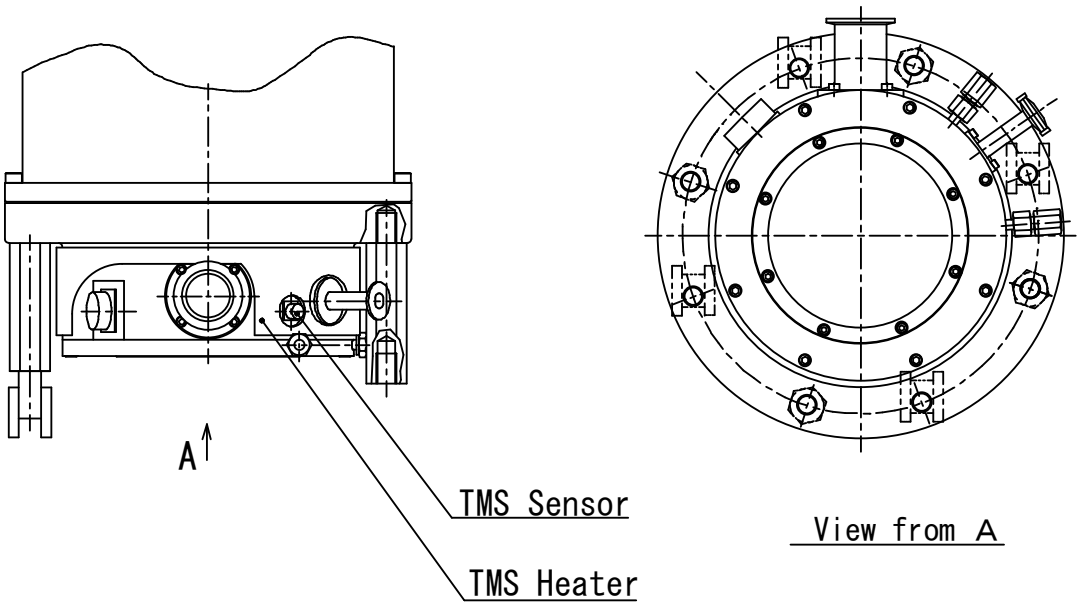
[*1] ISO

[*2] JIS

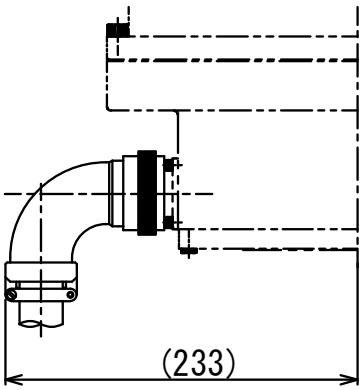
(7.3 Pump external view)

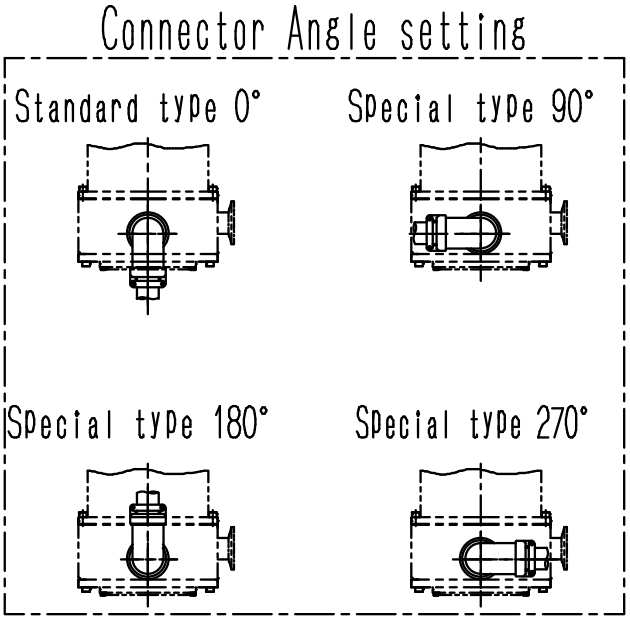
【Object pump type】
・ STP-A2203C → **STP-A2203CV**

As shown in external view below, TMS heater and TMS sensor are attached to STP Pump in TMS specification (CV type).



STP-A2203CV (base)





Angle setting for STP-A2203 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	OPT1 IN	23	OPT2 IN
5	INHIBIT IN	24	WARNING OUT (N.O)
6	WARNING OUT (COM)	25	WARNING OUT (N.C)
7	OPT OUT (N.O.) [*2]	26	OPT OUT (COM.) [*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	COM2(D+) (for RS485)
18	COM2 (D-) (for RS485)	37	OPT OUT (N.O.) [*2]
19			

IN: Input pin, OUT: Output pin.
N.O[*4]: Normal Open, N.C[*5]: Normal Close, COM.: Common
COM2: RS485 (Serial Communication Signal)
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] : Pins for optional signal output.
Emergency vent valve output or second speed selection signal is output depending on the setting.
[*3] : It is output signal when TMS become within ±10°C at 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 components

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	4	
Leg with a caster	4	
Instruction Manual	1	

10 Accessory

There is no accessory available for STP-A2203.

Doc No. BTS-41E-000
Ver.05

Turbo Molecular Pump

STP-A2203 series
Selection Guide

Pump Type
- STP-A2203C
- STP-A2203CV

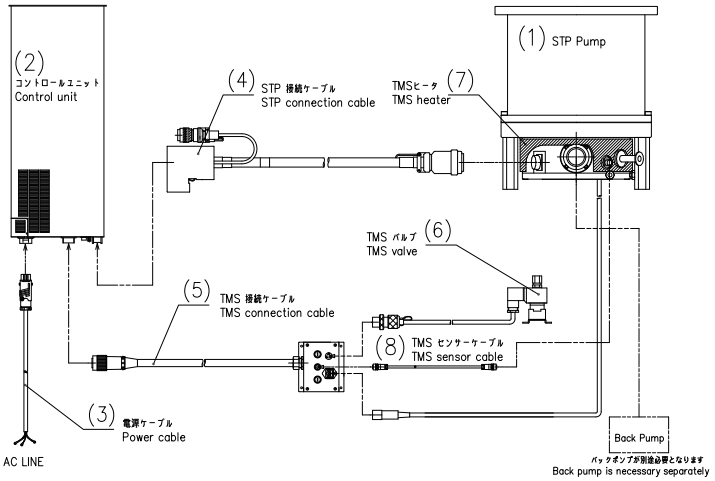
Edwards Japan Limited

STP-A2203 series Selection Guide

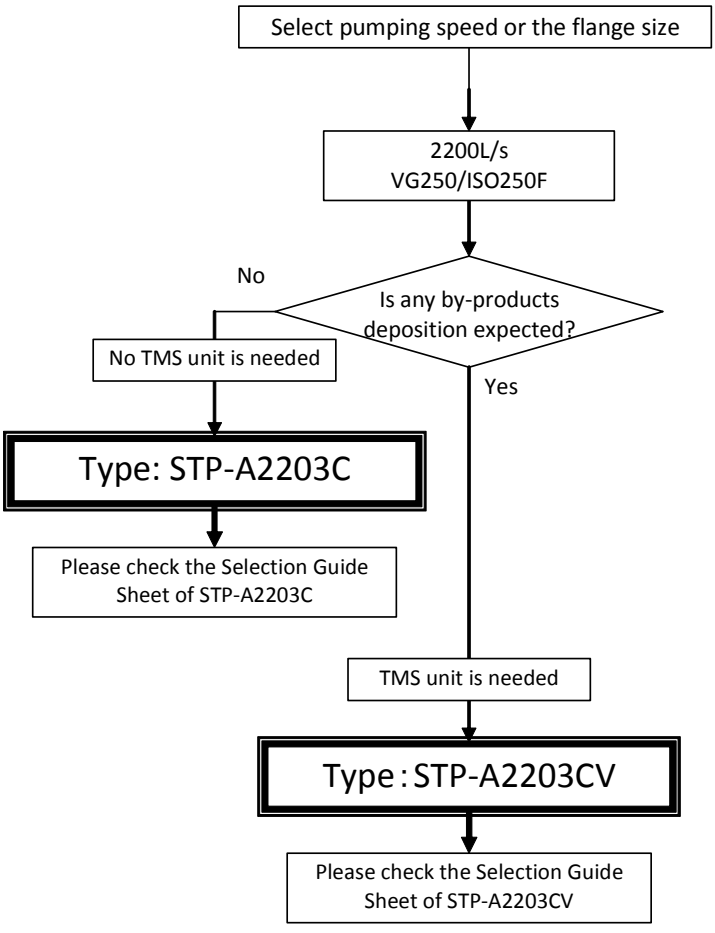
Please complete a kit using the Product Structure and the Selection Flow Chart.

< 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 (8) under this line are for STP-A2203CV (with TMS) only		
(5)	TMS connection cable	1
(6)	TMS valve (with cable)	1
(7)	TMS heater (attached on the pump)	1
(8)	TMS sensor cable	1



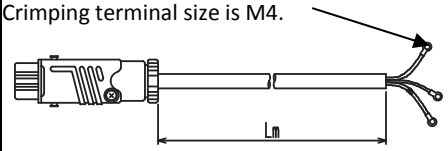
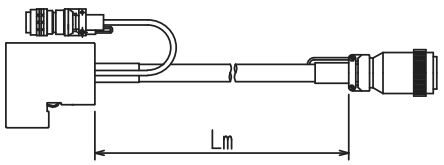
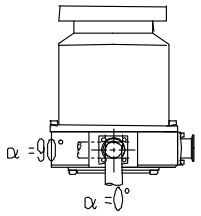
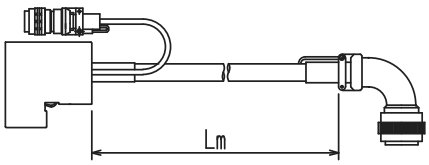
< Selection Flow Chart >



STP-A2203C Selection Guide Sheet

Please tick the boxes to order the components.

☐ Pump type: STP-A2203C (without TMS unit)

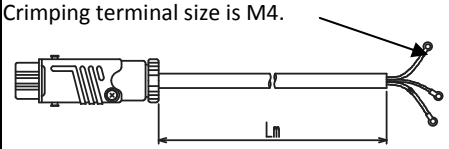
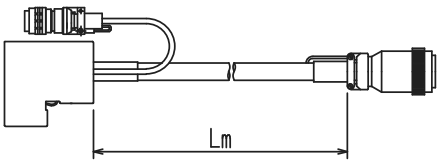
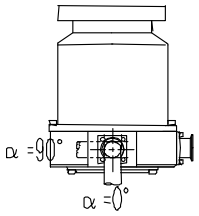
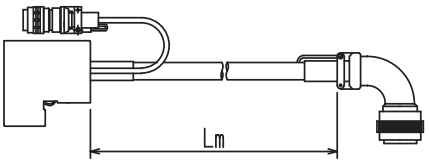
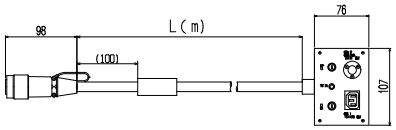
	Item		Part number	Select	Note
(1)	STP pump	VG250	YT41B0090	☐	Select flange size. Outlet port: KF40 Purge port: KF10 Water pipe fitting: Rc1/4(ISO standard)
		ISO250F	YT41B0080	☐	
(2)	STP control unit	SCU-1600	YT76Z0Z00	✓	Input voltage: 200Vac to 240Vac
(3)	Power Cable	Please select cable length.			
		5m	YT76Y0A01	☐	Crimping terminal size is M4. 
		10m	YT76Y0A02	☐	
		15m	YT76Y0A03	☐	
		20m	YT76Y0A04	☐	
(4)	STP connection cable	Please select connector type and cable length.			
	Both side straight connector	5m	B75030010	☐	
		10m	B75030040	☐	
		15m	B75030220	☐	
		20m	B75030230	☐	
	- Pump side L-type connector (α =0°) - Controller side straight	5m	PT35Y1B05	☐	
		10m	B75030280	☐	
		15m	B75032000	☐	
		20m	B75030270	☐	
	- Pump side L-type connector (α =90°) - Controller side straight	5m	PT35Y1B00	☐	Need to select angle for L-type connector. 
		10m	PT35Y1B01	☐	
		15m	PT35Y1B02	☐	
		20m	PT35Y1B03	☐	
	Instruction Manual			✓	CD

*Maximum length of all cables is 30 m.

STP-A2203CV Selection Guide Sheet

Please tick the boxes to order the components.

☐ Pump type: STP-A2203CV (with TMS unit)

	Item		Part number	Select	Note
(1)	STP pump With TMS heater (7)	VG250	YT4166000	☐	Select flange size. Outlet port: KF40 Purge port: KF10 Water pipe fitting:Rc1/4(ISO standard)
		ISO250F	YT4166010	☐	
(2)	STP control unit	SCU-1600	YT76Z0Z00	✓	Input voltage: 200Vac to 240Vac
(3)	Power Cable	Please select cable length.			
		5m	YT76Y0A01	☐	Crimping terminal size is M4. 
		10m	YT76Y0A02	☐	
		15m	YT76Y0A03	☐	
		20m	YT76Y0A04	☐	
(4)	STP connection cable	Please select connector type and cable length.			
	Both side straight connector	5m	B75030010	☐	
		10m	B75030040	☐	
		15m	B75030220	☐	
		20m	B75030230	☐	
	- Pump side L-type connector (α =0°) - Controller side straight	5m	PT35Y1B05	☐	
		10m	B75030280	☐	
		15m	B75032000	☐	
		20m	B75030270	☐	
	- Pump side L-type connector (α =90°) - Controller side straight	5m	PT35Y1B00	☐	Need to select angle for L-type connector. 
		10m	PT35Y1B01	☐	
		15m	PT35Y1B02	☐	
		20m	PT35Y1B03	☐	
(5)	TMS connection cable Kit Include TMS connection cable, TMS valve (6), and TMS sensor cable (8). TMS heater (7) is included in the pump.	Please select cable length.			
		5m	PT350V001	☐	
		10m	PT350V002	☐	
		15m	PT350V003	☐	
		20m	PT350V004	☐	
	Instruction Manual			✓	CD

*Maximum length of all cables is 30 m.