Soft Gripper

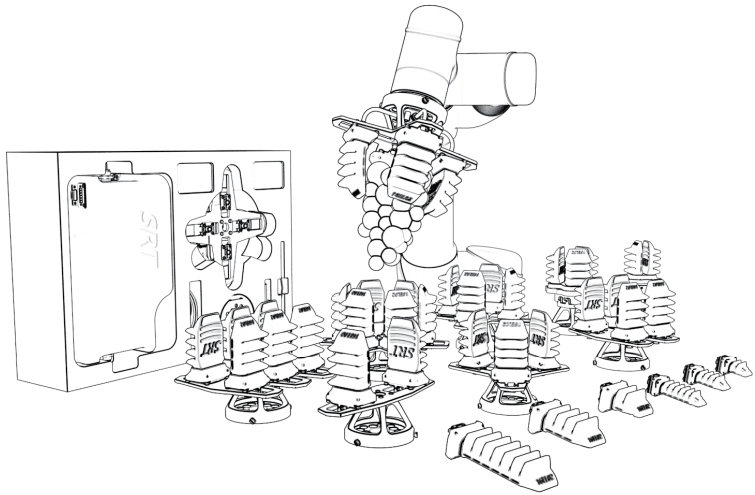
User’s Manual

About Us

Soft Robot Tech Co., Ltd (SRT) is the first high-tech company in China focused on the development of soft robot technology, with a core team coming from Harvard University, Northeastern University and Beihang University, etc. It is an ISO9001 certified new- and high-tech enterprise in Beijing.

After years of technical innovation, the soft gripper is developed with multiple domestic and overseas patents. The main structure of the gripper is made of soft materials, and is capable of quickly sorting out different sizes, shapes and damageable work-pieces, especially for sorting out foods, clamping 3C goods, and sorting out multiple types of products for packaging.

SRT is dedicated to generalizing the application of soft robot technology in the field of industrial automation, and shouldering the fundamental mission of continuously creating values for users through simple and reliable soft solutions for grasping complex products.



Points for Attention

These points for attention are prepared to help you to use the product in a safe and correct way.

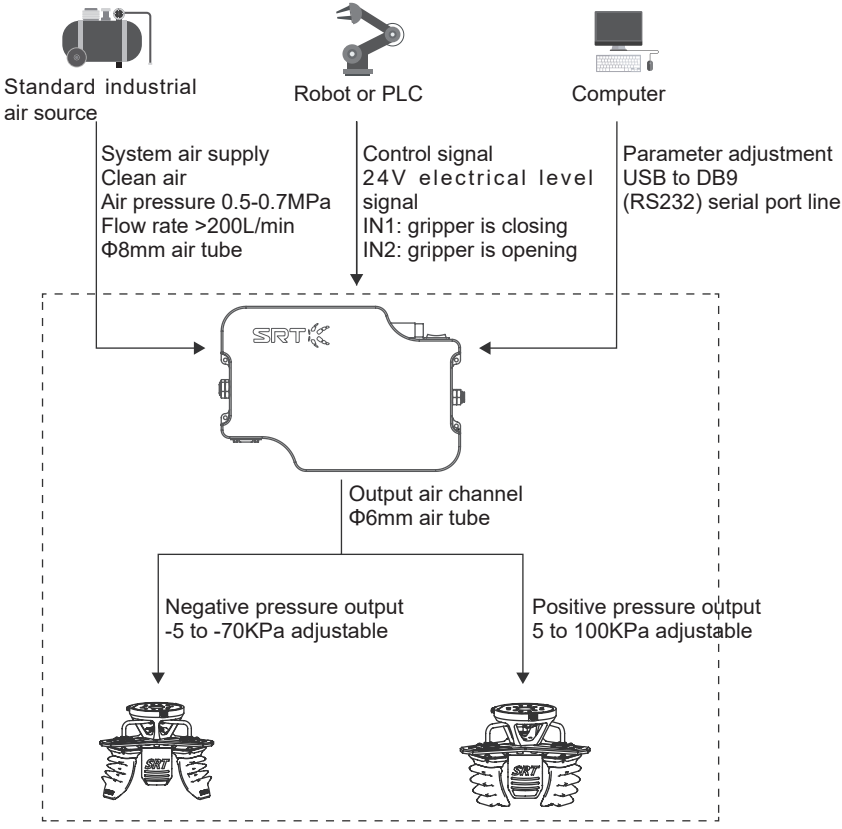
1. Please strictly abide by the Points for Attention;
2. Only when the power supply is cut off for 30s, then you can carry out maintenance and wiring to prevent electric shock hazard;
3. It is forbidden to cut off the power supply or carry out wiring connection when the SRT gripper is working;
4. Please disconnect the air channel of SRT gripper before dismantling the SRT gripper;
5. It is forbidden to dismantle the outer shell of controller in any case;
6. Don't block the air outlet of controller;
7. Please contact our sales department if the SRT gripper and controller are at fault and need repairment. We will repair them if necessary; Disassembling the gripper and controller without permission may damage the product. We will not be responsible for warranty if the controller is opened without permission.
8. If the SRT gripper or controller needs to be discarded, please comply with the standard for industrial waste disposal in order to avoid pollution to the environment;
9. If the product is used for other equipment directly involving personal safety (such as medical equipment, recreation equipment and industrial mechanical equipment), auxiliary protective measures must be taken to prevent possible injury;
10. The electronic device of controller has a service life. When the controller is operated, there must be enough safety measures to protect personnel or the controller in case of failure of the controller. The users of the product must bear the loss caused by mechanical failure or faulty operation.

Contents

01 Product Information

1.1 Soft Clamping System

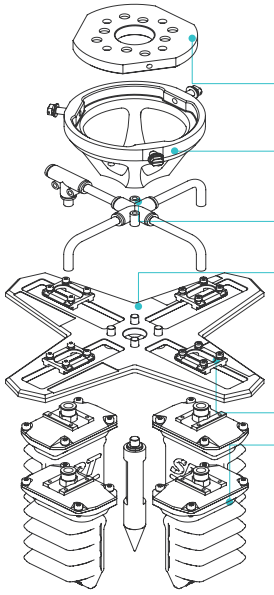
SFG soft clamping system is mainly composed of actuator, pneumatic controller and accessory air channel. A soft clamping system can be quickly built by connecting the air source and industrial robot. With the help of SRT communication protocol, SFG soft gripper can work together with industrial robot through seamless connection.



1.2 SFG Series Soft Gripper

SFG series soft gripper, as the main product of SRT, is composed of soft finger module, adjustable mounting bracket and robot arm connecting pieces. The soft finger module is made of special silicone rubber through pouring, and featured with good flexibility, long service life and high reliability, etc. The bracket and connecting pieces are made of aeronautical high strength aluminum alloy with a small weight and a high strength, which can satisfy all kinds of industrial applications.

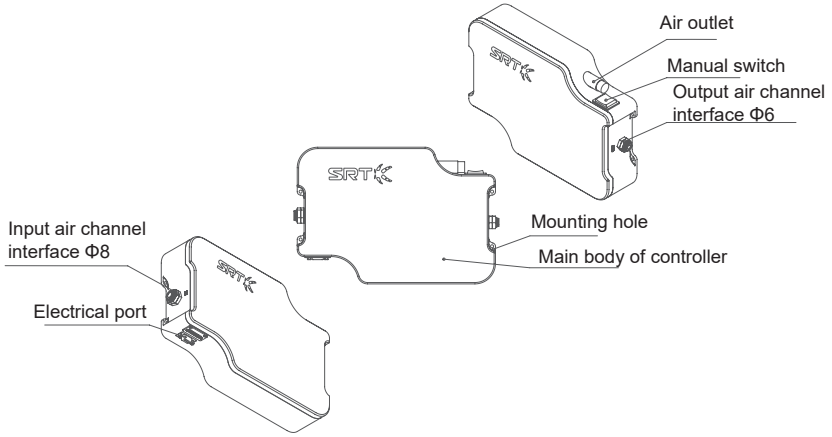
Unlike the rigid structure of traditional grippers, our gripper can perfectly simulate the grasping actions of human hands and adaptive wrap the target object through soft pneumatic “fingers” without presetting the precise size, shape and hardness of the object. Therefore, it is especially suitable for fragile products of all kinds of shapes, getting rid of the limits of traditional production line.



Universal flanged disc	Can quickly connect all kinds of commonly used robot arms
Conical connecting piece	Can match universal flange. And its disassembly/assembly is easy and fast;
Air channel	Driven by air, the jaw actions are controlled by the positive and negative air pressure, like a plug-and-play operation;
Adjustable bracket with multiple fingers	Multiple selections for different grasping tasks.In addition, compact grippers are available for objects of smaller sizes and different shapes;
Soft finger module	Applicability: suitable for grasping all kinds of workpieces and under all types of conditions; Safety: safe for human and no damage to workpieces; Reliability: Integrating biomimetic into grabbing, reliable grabbing movements. Hygiene: having passed FDA food-level certification, safe and healthy; Convenience: simple and easy to disassemble;

1.3 Pneumatic controller

Pneumatic controller is the core of the soft clamping system, and achieves the precise control of gripper's grasping force and frequency through adjusting the air pressure and delay in the gripper. The controller can communicate with the robot arm control system, achieving complete point-to-point catching and releasing actions of the clamping system.



1.4 Application fields:

The grippers are suitable for small and medium-sized automation equipment and instruments in the industries of smart assembly, automatic sorting, logistics and warehousing, and food processing, etc, or used as the functional parts for scientific research laboratory equipment, intelligent recreation equipment or service robots. It is a ideal choice for customers in intelligent, nondestructive, highly safe and adaptive grasping actions.

02 Technical Parameters

2.1 Soft Grippers

2.1.1 Type of Gripper

SFG series	Symmetric adjustable mounting MA			Circumferential adjustable mounting CA			Compact non-adjustable mounting TN	
	2 fingers	4 fingers	6 fingers	3 fingers	4 fingers	6 fingers	2 fingers	3 fingers
Finger model	FMA2	FMA4	FMA6	FCA3	FCA4	FCA5	FTN2	FTN3
Schematic diagram								

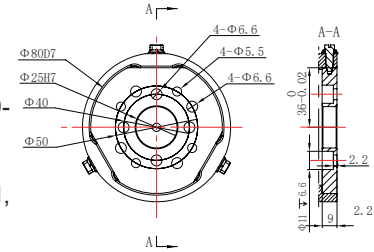
2.1.2 Operational parameters

Driving medium	Clean air
Input air pressure	-95KPa—100KPa
Pipe connection diameter	Φ6mm
Operating frequency	For M30 series fingers, 90 times/ minutes; for M50 series fingers, 70 times/ minutes;
Single-finger response speed	≥0.15s
Maximal repetition precision	0.08mm
Standard operating life	>3,000,000 times

※If the industrial gas source is used for driving, an effective filtration should be ensured, otherwise the service life of the equipment will be affected;
※The input air pressure of SRT gripper shall not exceed 100KPa, otherwise the service life is affected.

2.1.3 Dimension parameters

a. Installation dimensions
The installation interface meets IS0 9409-1: 2004 (equivalent to GB/T 14468.1: 2004) standards.
If special flange dimension is needed, please follow our technicians.



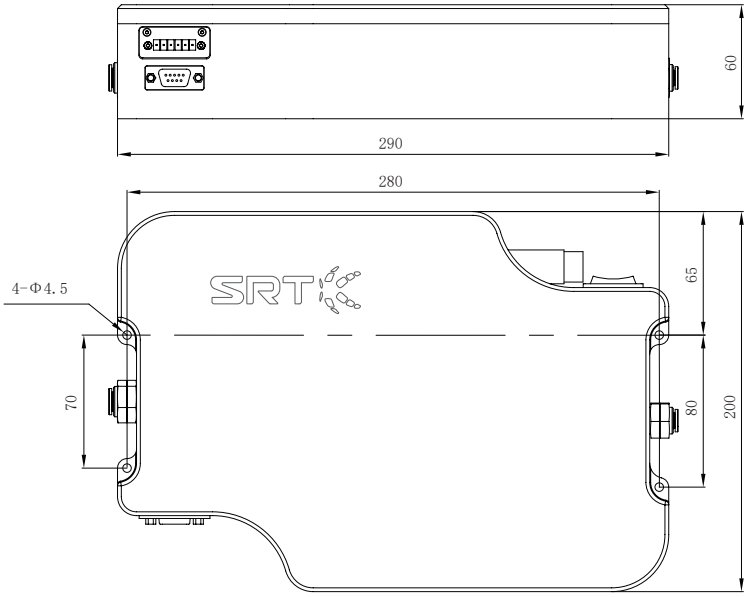
b. See Appendix II for dimensions of soft fingers and other soft grippers.

2.2 Pneumatic controller

2.2.1 Operational parameters

input voltage	24VDC±10%	Current consumption	<2A
Input air source	Φ8mm air tube, clean air; Air pressure 0.5-0.7MPa, flow rate >200L/min	Output air pressure	-70-100KPa, Φ6mm air tube
Net Weight	2,200g	Protection class	IP43
Ambient temperature	0-40℃	Ambient humidity	<85%, RH (no dew and water bead)
Cooling method	Natural cooling	Application conditions	Avoid extensive dust, oil pollution and corrosive gas

2.2.2 Dimension parameters

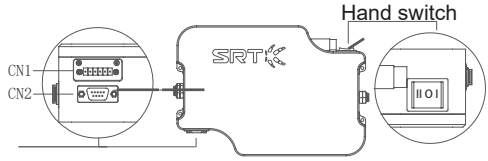


2.2.3 Definition of electrical interface

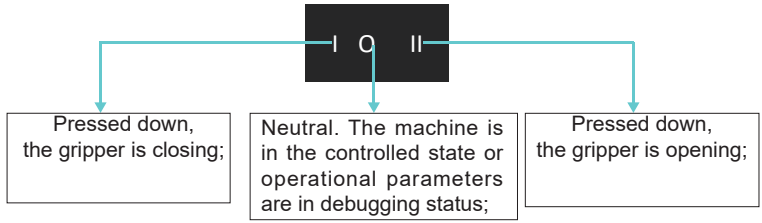
After the controller is switched on, the hand switch can be used to check whether the SRT gripper can work normally.

At the bottom left corner of controller are electrical connection ports, of which CN1 is used for controller's power supply and external electric-level control signal quick connection. CN2 is a serial port for debugging or triggering.

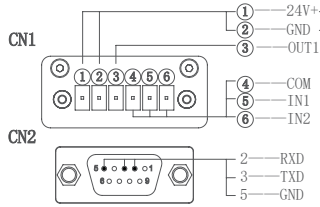
The priorities from high to low: hand switch, CN1 port, CN2 port.



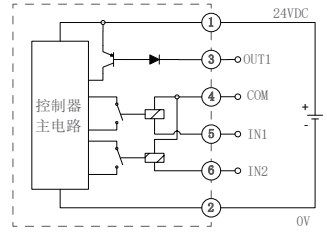
1 Hand switch: controlling the actions of the gripper manually (the first priority)



2 CN1: I/O and power input port (the second priority)



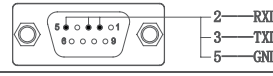
Port signal		Gripper actions
IN1	IN2	
Available	No	Closing
No	Available	Opening
Available	Available	Loosening
No	No	——



Schematic diagram of CN1

OUT1: positive pressure completion - the soft gripper receives positive air pressure to achieve grasping actions. When the pressure reaches and keeps the preset value stably, OUT1 is set, and outputs a 24V electric level, otherwise it maintains a high-impedance state.

3 CN2: communication port, used for controller parameter debugging/ triggering (the third priority)



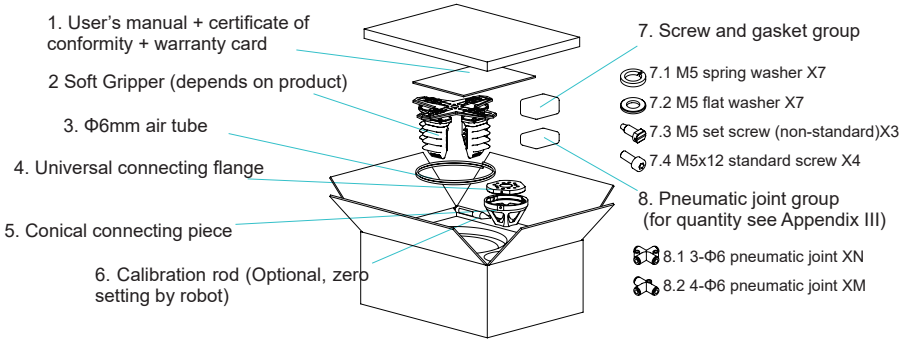
03 Installation of soft Grippers

This chapter mainly introduces the soft gripper from unpacking, assembly to connection with robot arm. The installation steps are described in the example of circumference adjustable gripper SFG-FCA4. They are for reference only, and for details see Appendix.

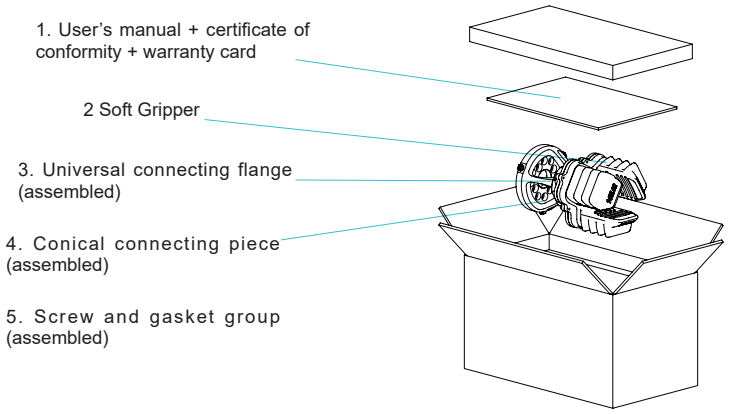
3.1 Unpacking for inspection

SFG series products are diversified, so here are two typical examples for reference. Please follow the physical goods.

3.1.1 Adjustable gripper (FMA/FCA)



3.1.2 Compact gripper(FTN)



3.2 Product installation

After confirming all parts are complete and in good condition, the following tools or raw materials need to be prepared, and then start assembly according to the following steps. Otherwise, contact our after-sale department.

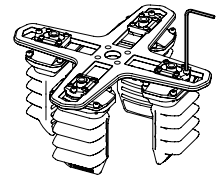
Preparation of tools:

1. M2.5 inner hexagonal spanner
2. M5 inner hexagonal spanner
3. Scissors for air tube
4. Four sets of M5/M6 screw and gasket groups for robot arms
5. M5/M6 spanner suited for the supplied 4 screw groups
6. Straight screwdriver

Step 1: Pre -tighten the fingers

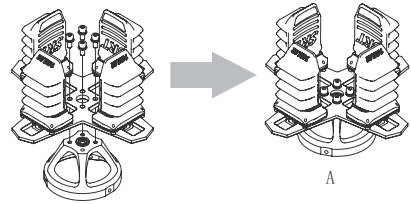
For adjustable gripper, you shall adjust the finger module to the right position and then tighten it (with 1： M2.5 inner hexagonal spanner) before use. The compact gripper does not need assembly so please directly start Step 4.

If the finger module received is not tightened reliably, please tighten it regardless of whether the position needs to be adjusted.



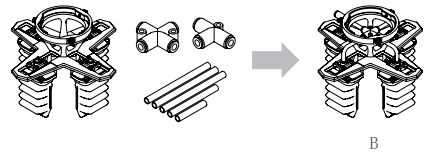
Step 2: Assembly of Conical pieces

No.	Name	Quantity
2	Soft Grippers	1
5	Conical connecting piece	1
7.1	M5 spring washer M5	4
7.2	M5 flat washer	4
7.4	M5×14 standard screw	4
Self-supply 2	M5 inner hexagonal spanner	1



Step 3: Assembly of air tube

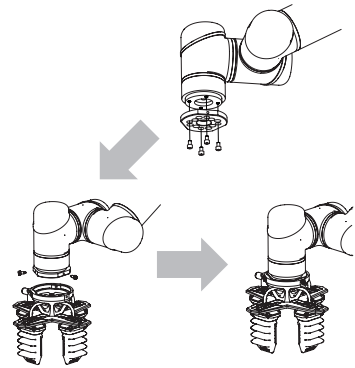
No.	Name	Quantity
A	Soft Grippers	1
3	Φ6mm air tube	5 sections
8.1	3-Φ6 pneumatic joint	1
8.2	4-Φ6 pneumatic joint	1
Self-supply 3	Scissors for air tube	1



The length of tube to be cut off depends on needs. See Appendix 3 for other tube connection methods of gripper.

Step 4: Mounted on the robot arm

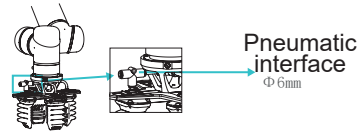
No.	Name	Quantity
B	Soft Grippers	1
7.1	M5 spring washer M5	1
7.2	M5 flat washer	4
7.3	M5 set screw	4
Self-supply 4	M5/M6 screw and gasket group suited for robot arm	4
Self-supply 5	M5/M6 spanner suited for your self-supplied 4 screw groups	1
Self-supply 6	Straight screwdriver	1



Step 5: Connecting to air channel

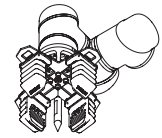
The pneumatic interface of the soft gripper is connected to the pneumatic controller or user's self-built control system through Φ6mm air tube. Then, the positive or negative pressure can be used to control the grasping and opening actions of the gripper.

Attention shall be paid to check whether there is air leakage in the gripper. If any, please contact our after-sales department.



3.3 Zero Calibration

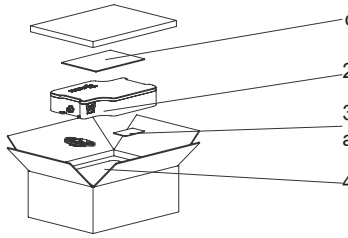
Screw the calibration rod into the bottom of gripper's installation board then can be used for mechanical arm zero calibration



04 Debugging and installation of pneumatic controller

This chapter mainly introduces the soft gripper from unpacking, assembly to connection with robot arm. The installation steps are described in the example of circumference adjustable gripper SFG-FCA4. They are for reference only, and for details see Appendix.

4.1 Unpacking for inspection



1. User's manual + certificate of conformity + warranty card
2. Pneumatic controller host
3. Card USB flash disk (including driver and relevant instructions)
4. USB to DB9(RS232) serial port line

4.2 Installation of controller, and control over electrical port

After confirming all parts are complete and in good condition, the following tools or raw materials can be prepared, and then please start assembly according to the following steps. Otherwise, contact our after-sale department.

Self-supply:
1. Four M4 screws and relevant spanner used for fixing the controller;
2. Φ8mm air tube, Φ6mm air tube (not exceed 5m, otherwise the operation efficiency of the gripper is affected)
3. Small straight screwdriver for wiring connection;

4.2.1 Mechanical and air channel connection

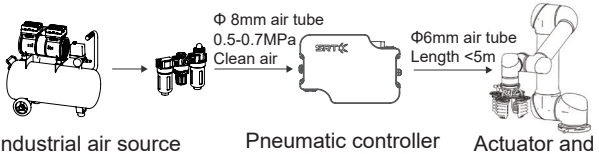
Install and fix the controller at the right position, and connect the input and output air tubes:

1) Apply four MM4 screws to install and fix the controller;

2) The input air channel interface, through Φ8mm air tube, is connected to the standard industrial air source capable of supplying 0.5 to 0.7MPa clean air;

3) The output air channel interface is connected to SRT gripper through Φ6mm air tube (not exceeding 5m):

Please prevent the tube bending, blocking and leakage.



4.2.2 Circuit and control loop connection

The steps for connection are as followed:

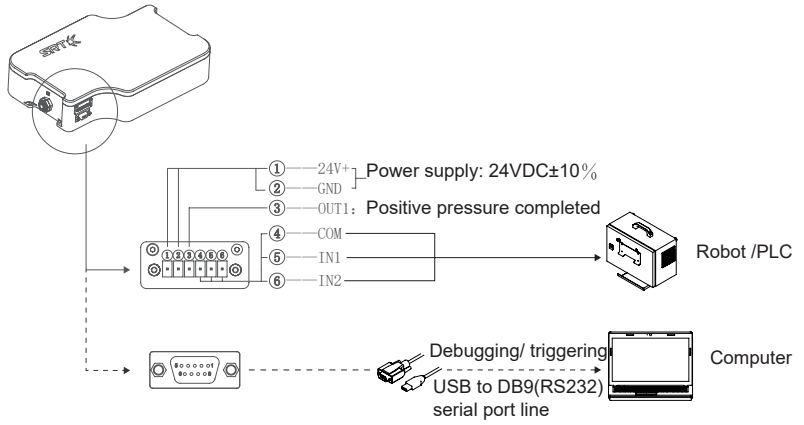
1) IN1, IN2 and COM ports are connected to the robot control cabinet or PLC control system: when IN1 gets signal, SRT gripper grasps tightly; when IN2 gets signal, SRT gripper opens; when both IN1 and IN2 both get signal, the gripper is loosened.

2) OUT1 is connected to the robot control cabinet or PLC control system.

This port is the signal monitoring output port for monitoring the grasping action and counting the times of grasping.

3) The controller is connected to the 24V DC power supply.

After power on, the hand switch can be used for testing whether SRT gripper works normally: at I position, the gripper grasps tightly. At II position, the gripper is opened. Attention, the hand switch shall be turned to 0 position after debugging is completed.



Till now, programming debugging of robot control cabinet or PLC control system can be carried out. If the relevant parameters of controller need to be adjusted, please see Section 4.3.

4.3 Adjustment of operating parameters of controller

Under different operating conditions , different grasping forces and response speeds are needed. The controller can read the current operating pressure, and realize the optimal grasping action by adjusting relevant positive/ negative pressure set value, positive/ negative pressure deviation and positive/ negative pressure delay.

Parameter	Default value	Definition
Positive pressure set value, negative pressure set value	80KPa -50KPa	i.e. the maximum and minimum output air pressure values. These values affect the free deformation of the gripper: the positive pressure determines the relative grasping force while the negative pressure determines the opening range of the gripper (related to the operating space. If the operating space is smaller, these values can be set near 0). The unit is KPa. The setting range of positive pressure: 0-95, and the setting range of negative pressure: -70-0.
Positive pressure delay Negative pressure delay	0ms 0ms	i.e. after the controller receives an external control signal, there is a certain time delay before the output air pressure is controlled. additional function, collaborating with simple mechanical system to realize point-to-point catching and releasing. The unit is ms, and the maximum set value is 100000ms.
Deviation of positive pressure Deviation of negative pressure	10KPa 10KPa	i.e. after the air pressure of output reaches the set value (output loop is closed), the pressure decreases or jumps out of the set value due to some air leakage or load variation in the external loop. That is allowed, and the output air pressure is to be rectified after exceeding the range. The unit is KPa. Generally, it is set to 10, which not only the needs of the grasping force of the gripper can be satisfied, but also prevent vibration and energy loss from frequent air filling or extracting. What's more, it can prevent the gripper from abnormal damages resulted in higher pressure of secondary punching (exceeding the set value).

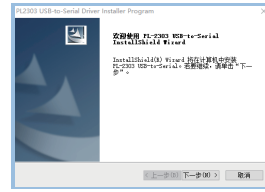
4.3.1 Preparation

Install the serial port line driver and connect the serial port line.

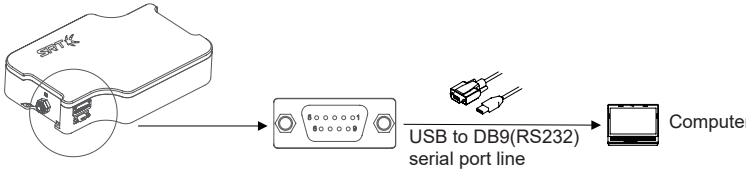
1) Install the serial port line driver (not needed by Win8 and above). For details see USB flash disk or optical disc.

a) Open the “Serial port line driver” file, and select the type of driver according to the host computer system.

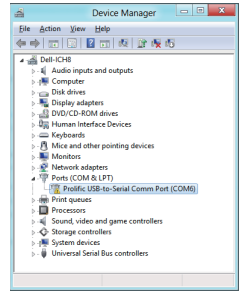
b) Taking windows system as example. Click to run PL-2303 Windows Driver Installer. An installation interface of PL-2303 USB-to-Serial will appear. Click on Next until the installation is completed.



2) Connect to the computer and pneumatic controller (attention : turn on the power supply of controller) through USB to DB9(RS232) serial port line.



3) Open Device Manager on the control panel. The identified USB to serial port device ca be seen, with a COM port number.



At this point, the installation of serial port debugging line driver is completed. If there is a problem in installing process, please see the file PL2303 Windows Driver User Manual v1.16.0 in the USB flash disk or optical disc.

4.3.2 Parameter Adjustment

Next, modify the parameters of controller through the serial port debugging software provided by SRT.

The three buttons [Grasping by positive pressure], [Grasping by negative pressure] and [Release] are used for debugging and controlling the actions of the gripper. “Current air pressure” is used for monitoring the pressure in the gripper, and its displayed value shall be near to the set value of relevant pressure in theory, and is related to the positive or negative pressure deviation. “Times of use” is used for displaying the times of operation of the gripper.

1)Find SrtConfig.exe under SRTConfig-zh_CN directory, and double click to open it (free from installation).

2) Click on [Connect the controller of gripper]. Successful connection is shown!

3) Set values of positive or negative pressure:

Drag the scrollbar through mouse to set the “Grasping pressure setting (i.e. positive pressure)” and “Release pressure setting (i.e. negative pressure)”. After dragging to the desired value, click on [Apply pressure] to complete pressure setting.

4) Positive or negative pressure deviation and delay:

Clicking on [Advanced] can modify positive or negative pressure deviation and delay. Enter the desired value (positive number), and click on [Write in] to finish the modification. Click on [<< Return] to return to the homepage.

If the negative pressure deviation is 10 and the negative pressure set value is -50, the allowed range is -60 to -40KPa. Accordingly, if the positive pressure deviation is 10 and the positive pressure set value is 80, the allowed range of positive pressure is 70 to 90KPa.

05 Cleaning and Maintenance of Soft Gripper

5.1 Cleaning

A dustless cloth can be used to clean slight dust. Clean the slight dirt with clear water. If the position needs to be cleaned is out of reach, please scrub it slightly with a hairbrush. In the course of cleaning, mild cleaning agents like cleanser essence and toothpaste can be used. Wipe it until dry with an absorbent cloth after cleaning.

5.2 Disinfection

It is recommended to adopt steam for disinfection, because the color variation of product due to temperature change is normal. If the alcohol is used for disinfection, its amount shall be small, otherwise it may lead to yellowing of product. It is not recommended to adopt UV, ozone and 84, etc for disinfection, otherwise users shall bear the liabilities for aging of product.

5.3 Protection

Silicon rubber has stable chemical properties, and it can bear common weak acid and weak base. However, contacting some strong acid and base or organic solutions for a long time can affect its performance.

	Acid	Base	Organic solutions	Other
⊗	HCl, H_2SO_4, HF, PhCOOH	Alkali Hydroxide, Quaternary acid, Phosphate alkali	Gasoline, Diesel Oil, Kerosene, Acetone, Xylene	Hydrogenates capable of hydrolyzing HCl ($TiCl_4$, $SiCl_4$,.etc)

06 Pneumatic flexible gripper common problems and solutions

Problem	Cause	Solution
The controller does not respond after pressing the manual switch.	1.No power plugged or positive or negative pole reversed. 2.No air supply or no air pressure	1.Check if the power terminal is securely installed and reversed, and re-plug the terminal. 2.Check the tightness of the intake pipe and the air pressure in the intake pipe
Frequently inflating the grippers when the grippers are clamped.	Air leaks from the outlet pipe.	Reconnect the controller and grippers air circuit to ensure good sealing.
When the grippers are open, the vacuum generator continues to work.	1. The air outlet pipe leaks. 2. The air pressure in the intake pipe is lower than the normal working pressure of the controller.	1.Reconnect the controller and the grippers air circuit to ensure good sealing. 2.Check the air source output pressure and adjust the output air pressure value to 0.5~0.7MPa
Voltage signal control does not respond	1.Control voltage is lower than 22V 2.The manual switch is not in the debugging position.	1.The control voltage is adjusted to 24V±10%. 2.Put the manual switch in the debugging position.
Serial communication control does not respond	1.The serial cable is not connected. 2.The voltage signal is not reset or the manual switch is not in the debug position.	1.Connect the serial cable to DB9 firmly. 2.Reset the voltage signal and place the manual switch in the debug position
After the power is turned on, the burnt smell occurs, and the controller does not work.	The voltage is too high and the internal circuit has burned.	Please contact the supplier for after-sales matters.

07 Appendices

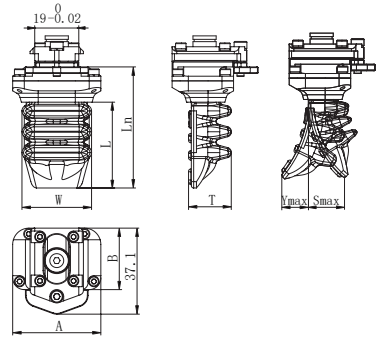
Appendix 1: Model of SFG series gripper

SFG series Fixed connection F	Number of fingers	Finger model								
		M30				M50				
		28	37	46	64	43	58	72	87	115
Symmetric adjustable mounting MA	2 fingers	SFG-FMA2-M3028/M3046/…M5043…								
	4 fingers	SFG-FMA4-M3028/M3046/…M5043…								
	6 fingers	SFG-FMA6-M3028/M3046/…M5043…								
Circumferential adjustable mounting CA	3 fingers	SFG-FCA3-M3028/M3046/…M5043…								
	4 fingers	SFG-FCA4-M3028/M3046/…M5043…								
	6 fingers	SFG-FCA5-M3028/M3046/…M5043…								
Compact non-adjustable mounting TN	2 fingers	SFG-FTN2-M3028/M3046/…M5043…								
	3 fingers	SFG-FTN3-M3028/M3046/…M5043…								

Appendix 2: Dimension parameters some SFG series grippers

1.Soft finger

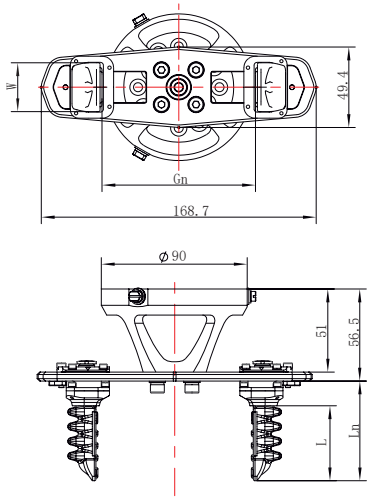
Finger model	W	L	Ln	T	A	B	H	Smax
M3028	30	28	43	18.5	38	26.5	> 5	8
M3037		37	53					13
M3046		46	61					21
M3064		64	79					42
M5043	50	43	64	28.5	59	37.5		20
M5058		58	78					30
M5072		72	93					42
M5086		86	107					55
M50115		115	136					85



Unit: mm

2.SFG-FMA2

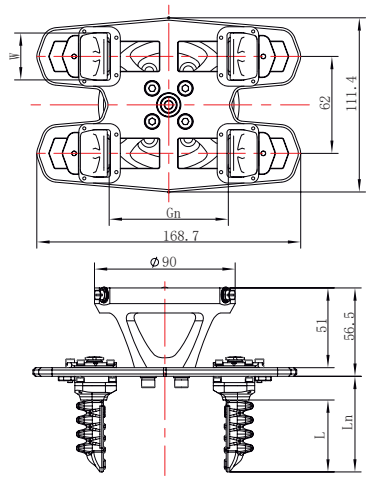
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		Gn	Smax	load (g)	Frequency (cpm)	
SFG-FMA2-	M3028	54-106	8	200	≤110	410
	M3037		13	300		415
	M3046		21	350		422
	M3064		42	400		432
	M5043	52-100	20	1500	≤80	542
	M5058		30	1600		566
	M5072		42	1400		589
	M5086		55	1300		611
	M50115		85	1000		643



Unit: mm

3.SFG-FMA4

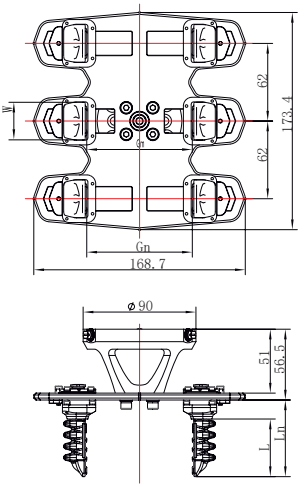
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		Gn	Smax	load (g)	Frequency (cpm)	
SFG-FMA4-	M3028	35-102	8	400	≤110	603
	M3037		13	600		614
	M3046		21	700		628
	M3064		42	800		652
	M5043	52-100	20	3000	≤80	867
	M5058		30	3500		916
	M5072		42	3000		961
	M5086		55	2800		1006
	M50115		85	2500		1067



Unit: mm

4.SFG-FMA6

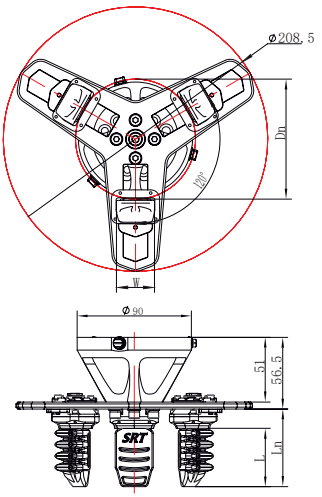
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		Gn	Smax	load (g)	Frequency (cpm)	
SFG-FMA6-	M3028	26-103	8	600	≤110	812
	M3037		13	900		829
	M3046		21	1000		850
	M3064		42	1200		885
	M5043	21-100	20	4500	≤80	1208
	M5058		30	5000		1282
	M5072		42	4500		1349
	M5086		55	4200		1417
	M50115		85	4000		1511



Unit: mm

5.SFG-FCA3

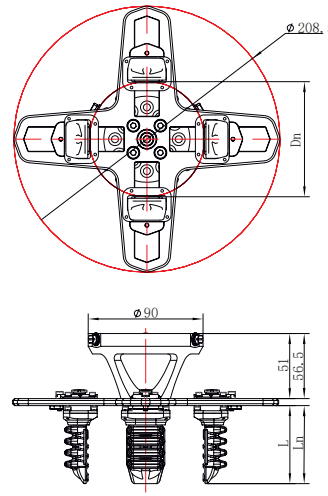
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		Gn	Smax	load (g)	Frequency (cpm)	
SFG-FCA3-	M3028	54-141	8	300	≤110	511
	M3037		13	400		519
	M3046		21	500		530
	M3064		42	600		548
	M5043	61-135	20	2000	≤80	709
	M5058		30	2500		746
	M5072		42	2000		779
	M5086		55	1800		814
	M50115		85	1500		861



Unit: mm

6.SFG-FCA4

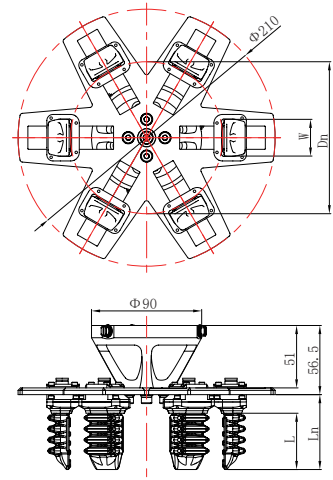
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		Gn	Smax	load (g)	Frequency (cpm)	
SFG-FCA4-	M3028	50-147	8	400	≤110	594
	M3037		13	550		605
	M3046		21	700		619
	M3064		42	800		643
	M5043	70-141	20	3000	≤80	858
	M5058		30	3500		907
	M5072		42	3000		951
	M5086		55	3000		997
	M50115		85	2500		1060



Unit: mm

7.SFG-FCA6

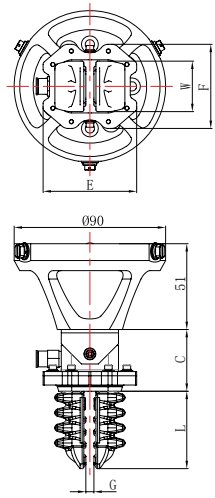
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		Gn	Smax	load (g)	Frequency (cpm)	
SFG-FCA6-	M3028	70-155	8	600	≤110	771
	M3037		13	800		788
	M3046		21	1000		809
	M3064		42	1200		845
	M5043	113-150	20	4500	≤80	1168
	M5058		30	5000		1241
	M5072		42	4000		1308
	M5086		55	4000		1377
	M50115		85	3500		1471



Unit: mm

8.SFG-FTN2

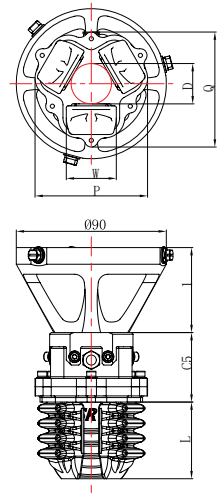
Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		G	Smax	load (g)	Frequency (cpm)	
SFG-FTN2-	M3028	5	8	250	≤110	147
	M3037		13	300		154
	M3046		21	200		160
	M3064		42	150		170
	M5043	11	20	800	≤80	319
	M5058		30	900		347
	M5072		42	700		371
	M5086		55	600		389
	M50115		85	400		419



Unit: mm

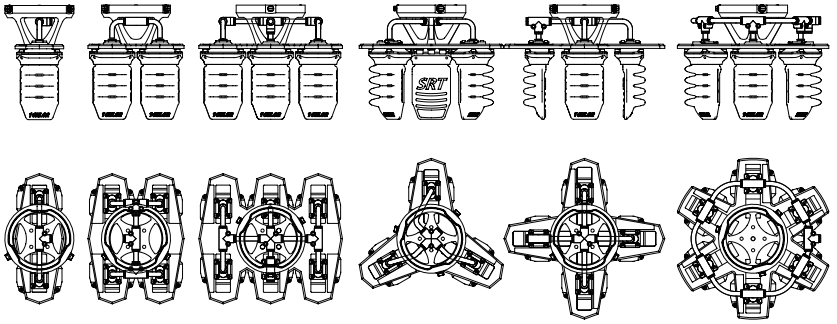
9.SFG-FTN3

Model		Dimensions (mm)		Gripping Capacity		Net weight (g)
		D	Smax	load (g)	Frequency (cpm)	
SFG-FTN3-	M3028	24	8	350	≤110	242
	M3037		13	400		253
	M3046		21	300		261
	M3064		42	250		320
	M5043	43	20	1200	≤80	560
	M5058		30	1300		603
	M5072		42	1100		640
	M5086		55	1000		594
	M50115		85	900		711



Unit: mm

Appendix 3: Connection mode of air tube of each type of gripper



SFG-FMA2 SFG-FMA4 SFG-FMA6 SFG-FCA3 SFG-FCA4 SFG-FCA6

Product model		SFG-FMA2	SFG-FMA4	SFG-FMA6	SFG-FCA3	SFG-FCA4	SFG-FCA6
Number of 3-Φ6 joints		1	3	3	0	1	7
Number of 4-Φ6 joints		0	0	1	1	1	0
Air tube 1	Length	75	55	75	90	80	80
	Quantity	2	4	5	3	3	5
Air tube 2	Length		45	60		60	40
	Quantity		2	2		1	2
Air tube 3	Length			40		35	
	Quantity			1		1	
Air tube 4	Length			35			
	Quantity			1			

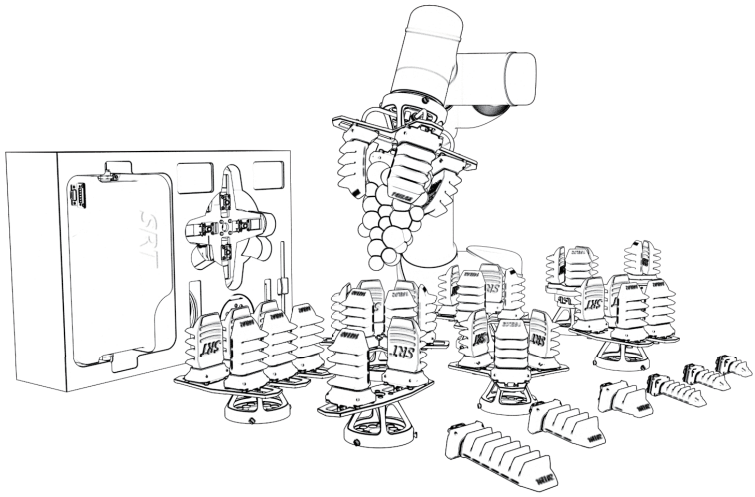
The length of air tube is for reference only. Different grasping tasks need different finger spacing and different lengths correspond to different air tubes.

Pre-sale and after-sale guarantees

We provide customers with free pre-sale testing service. Customers can send the samples to be grasped to us, and we will verify the feasibility of SRT grippers.

The warranty period of the product is half a year or 3,000,000 times. During the period, if there is a fault due to our product's problem, we provide repair or replacing without charge. However, the loss (extended responsibility) caused by equipment fault is not within the range of warranty. In addition, the loss or fault caused by the following reasons are not included the range of warranty:

1. Loss and damages caused by fire, earthquake, and flood, etc;
2. Incorrect operation;
3. Incorrect repair and alteration;



SRT™

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