

Perfect Synchronization Motor Drive

MIGHTY CYLINDER

SC Series

INSTRUCTION MANUAL

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Perfect Synchronization
Mighty Cylinder

SC series Mighty Cylinder is a linear actuator which makes perfect synchronization possible by linking plural cylinders. We have standardized based on long experience and a lot of business records.

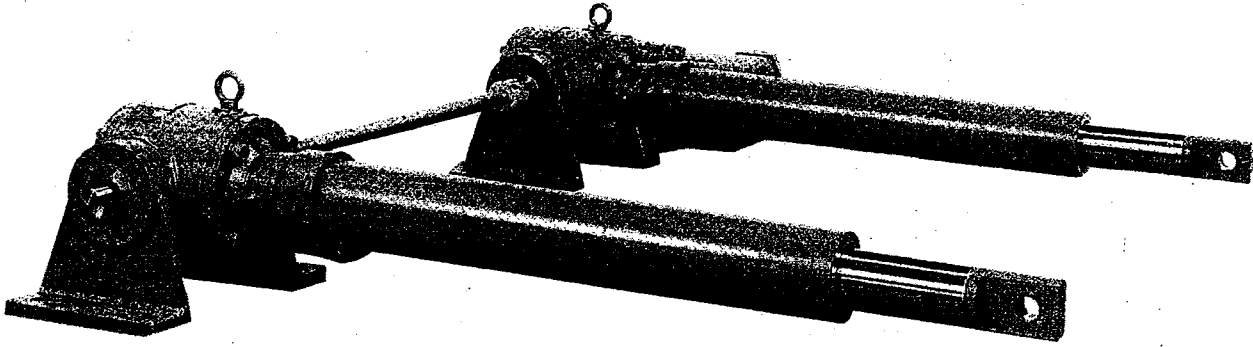


Fig. 1

■ Features

1. Perfect Synchronization
Possible by linking plural cylinders.
2. Tilting Operation
Synchronization shaft and trunnion part are the same shaft center, which enables sequential operation.
3. Easy to control
No control for sequential operation because of the operation by one motor.
4. High efficiency
Combination by high efficient ball screw and bevel gear.
5. Long Life
Adoption by ball screw and thrust bearing of large load capacity.
6. Easy Maintenance
Gears and thrust bearings are lubricated by high quality grease.

■ Construction

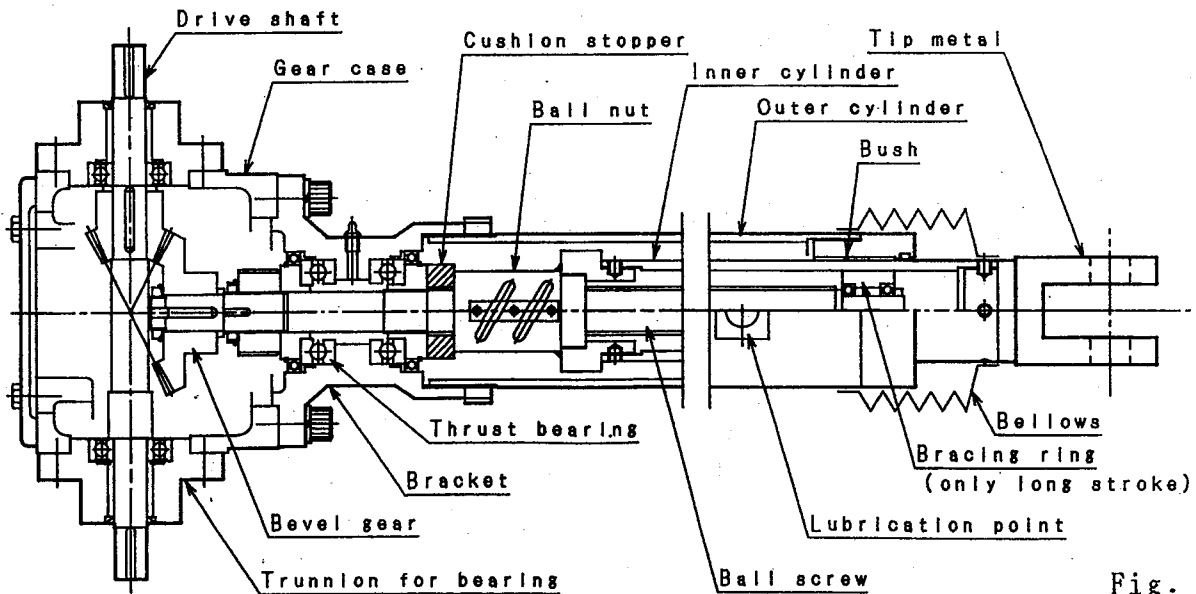


Fig. 2

I n s t r u c t i o n M a n u a l

SC series Mighty Cylinder is a kind of linear actuator combined with high efficient ball screw and bevel gears. This is totally enclosed type. Extreme care is required when handling or maintaining this cylinder following the Instruction Manual because mishandling or misuse may result in an accident.

1. Specifications

• Standard Specifications

Surroundings	Totally enclosed (available both indoors and outdoors) Bellows is recommended in case of dusty place.
Ambient temperature	-20°C ~ 80°C
Lubrication	Grease
Paint color	Munsell 7.5GY5/4.5
Screw	Ball screw

• Special Specifications

Surroundings	Anti-corrosive paint, material, anti-explosive motor, limit switches, and such are also available.
Temperature	Grease and seal material are changed to endure high or low temperature.
High speed operation	Specifications of ball screw and safety measure for both stroke ends can be met by consultation.
High frequent operation	Oil bath etc.
Trapezoidal screw	Low frequent operation and self lock is required.
Anti corrosion	Material of stainless is available.
Over load	Thrust limiter for detection of overload is available.
LS Unit	Possible to equip the LS unit to regulate stroke.

■ List of Standard type

Type	Rated thrust (ton)	Movement per revolution (mm)	Rod rotational torque (kg·m)	Torque of input shaft at rating (kg·m)	Maximum speed (mm/sec)	Maximum input revolution (rpm)	Standard maximum Stroke (mm)
SCD1	1	5	0.95	1	100	1200	1000
SCD2	2	3	2.1	1.1	90	1800	1200
SCD5A	5	5	8.7	4.5	100	1200	2000
SCD5B	5	6	10	5.1	120	1200	2000
SCD10A	10	6	21	11	120	1200	2000
SCD10B	10	8	28	14.5	150	1125	2500
SCD20A	20	8	56	29	150	1125	2500
SCD20B	20	10	70	36.4	150	900	2500
SCD30A	30	12	120	63	150	750	3000
SCD30B	30	16	168	88.4	150	562	3000

A means economic type.

B shall be chosen in case of high frequency and long life required.

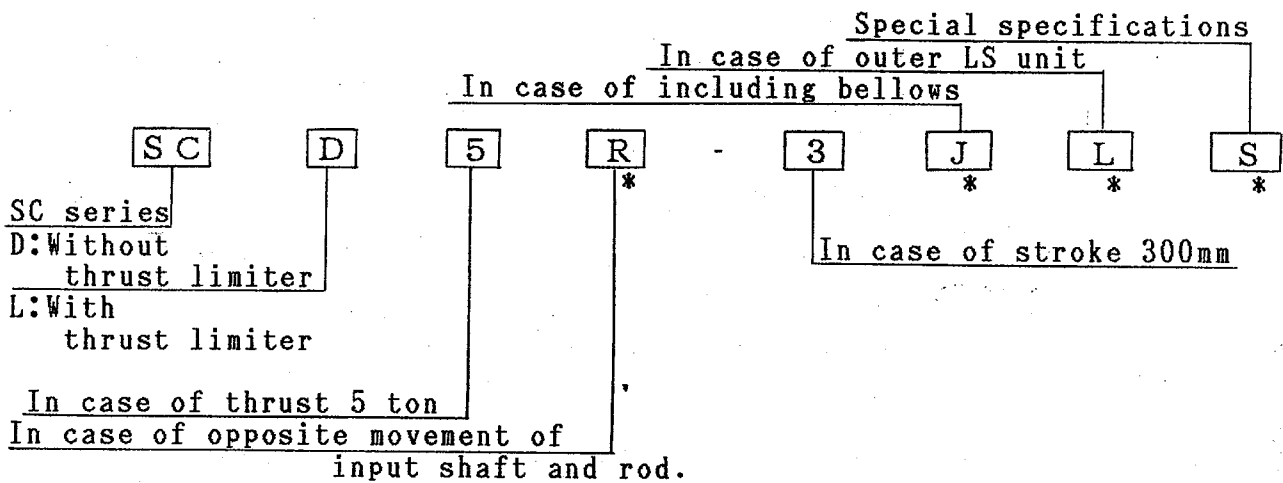
2. Inspection and check

Check the following points when the Mighty cylinder is delivered.

- (1) To see if the name plate is identical with the one you ordered.
- (2) To see if it is free from damage in transit.
- (3) To see if bolts and nuts are tightened enough.

In case there are any troubles, immediately inform the agent of the manufacturing No.(MFG.No), type and situations.

■ Type



Refer to fig.16 in case of standard rotational direction

*Standard has no mark

Consult us when the type with thrust limiter is necessary.

All except for standard: S

- Feed rate
- Lubrication
- Outline dimension
- Material
- Using condition
- Other special specifications

3. Custody

Mighty cylinder shall be kept in good surroundings of the inside of the house before it is installed.

SC series Mighty cylinder is totally enclosed.

However do not leave it outdoors.

Surface treatment on the synchronizing shaft is not done, so preservative oil shall be applied in case of long custody.

4. Using surroundings

- (1) Available range of temperature
-20°C ~ 80°C. Without this range, the change of grease specifications and seal material is required.
- (2) Dustproof
Bellows is recommended in case of dusty place and bad surroundings to lengthen the life.
Accumulation of dust may damage the bellows.
Sometimes it shall be cleared before accumulation.
- (3) Anti-corrosion
Use in the place apt to corrode shall be avoided.
Consult us if necessary.
- (4) Outdoor use
Totally enclosed construction enable the Mighty cylinder to use outdoors.
However protect it with the cover when water, rain, snow, steam, oil and things like that falls on it continuously.
In case the Mighty cylinder is exposed to the direct sunlight resulting in the high temperature of its surface, equip the awning cover. In this case, exposed synchronizing shaft part may rust because surface treatment by galvanization and such is not done.

5. Installation

- (1) Installation by trunnion is recommended.
Installation direction is not limited.
- (2) The degree of parallelization between the trunnion bearer and movement direction of the main body shall be done perfectly.
When imperfect, tip metal rubs by reciprocating movement causing lateral load, which may result in the breakage of the piston rod.
- (3) Standardized bracket for installing the mainbody is prepared.
The use of it is highly appreciated. The dimension is shown on our SC series catalogue. The bush is inserted on the bracket hole because the material of bear trunnion is carbon steel.
The bush shall be inserted on the bracket hole when the bracket is produced by customer.
- (4) Trunnion mount method which supports the synchronizing shaft and bear trunnion on the same shaft center is preferable.
In case of foot mount and flange mount, lateral load tends to occur resulting in burning and breakage and such when the slide direction of the load and shaft center of the rod is not parallel.
So such method shall be avoided.
- (5) The dimensional check of the main body and moving direction of the load to prevent the rubbing on the tip metal shall be necessary.
It is possible to meet the dimension change by making the gap on the hole diameter of the tip metal and the joint part between the tip metal and the mate machine in cross direction.

6. Position Adjustment in Installation

- (1) In installation, extreme care is needed when centering the main body, driving part bearing, coupling and what not mutually.
- (2) Incomplete centering between bearing trunnion and moving direction causes the breakage of the rod and shaft.
- (3) After centering, fix the main body by welded stopper or knocking.

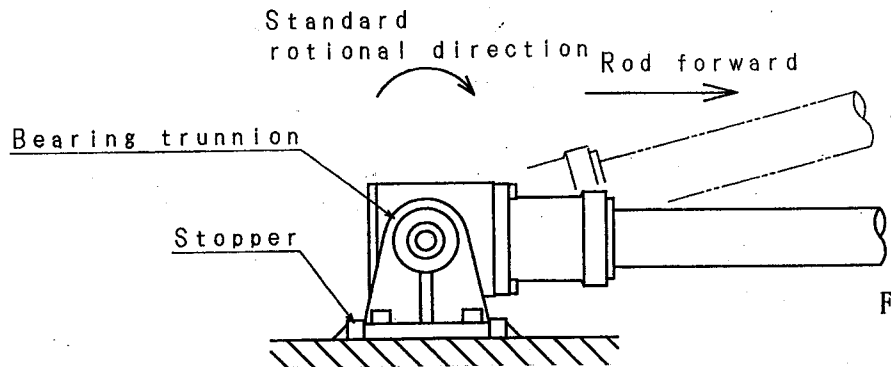


Fig.16

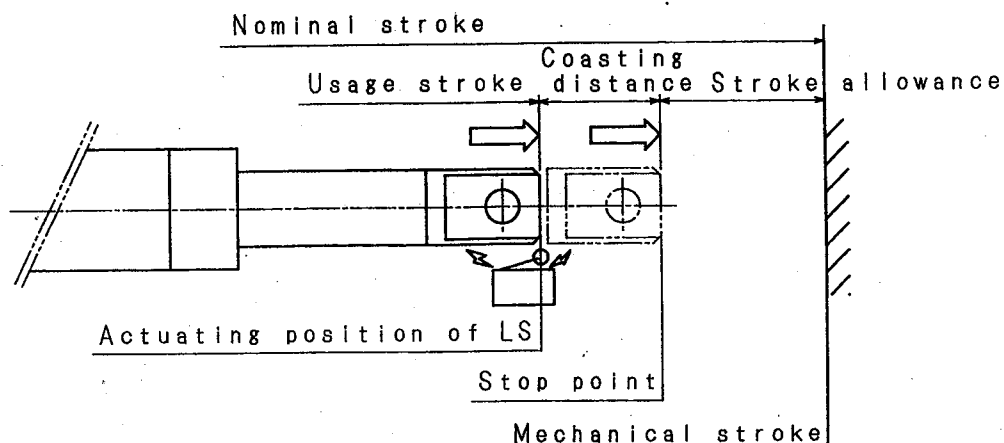
7. Reciprocal movement (Stoppage and collision)

Synchronizing operation is possible by linking two or more cylinders through linking shaft driven by one motor.

- (1) Stoppage shall be done by limit switches equipped at both ends or intermediate position etc.
- (2) Pushing stop is not available because SC Mighty cylinder does not have the thrust limiter. When the piston rod comes to a dead end the mechanical shock caused by rotational inertia of the motor occurs on the linking shaft, piston rod and other mechanical system, resulting in the breakage of the cylinder. Take care not to collide the piston rod both ends.

8. Positioning and stroke allowance

- (1) The limit switches for stoppage shall be installed taking the coasting distance into consideration. The higher the speed is, the longer the allowance dimension is required.
- (2) Nominal stroke means mechanical stroke.
- (3) Stroke setting shall be done by outer limit switches or things like that. Two stage limit switches - one for stroke setting, another for extreme safety - are recommended in case of high frequency, high speed such as 100mm/sec or more. In case of linking operation by two or more cylinders, limit switches for stroke setting shall be installed only one cylinder.
- (4) When the accurate positioning is required, DC motor, pole change motor or variable speed motor shall be used, which enables speed down before stop position.
- (5) As an option, outer LS unit can be supplied.



9. Maintenance

SC series Mighty cylinder can be used as it is because grease is supplied on the necessary parts before shipment. The kind of recommended grease and the supply cycle are as follows.

(1) Screw part

Screw and nut are supplied with grease beforehand.

Refer to the table as to the supply cycle and recommended grease.

(2) Thrust part

Grease is supplied. Lubricate through grease nipple.

(3) Bevel gear part

Grease is supplied. There is no need for lubrication for one year or more in case of low frequency.

Check and supply of grease is necessary after long hours' operation or when the cylinder is left unoperated for long time.

(4) Input shaft bearing

Sealed ball bearing is used. Grease can not be supplied however it can be used for long time as it is.

In case of repair, it shall be changed.

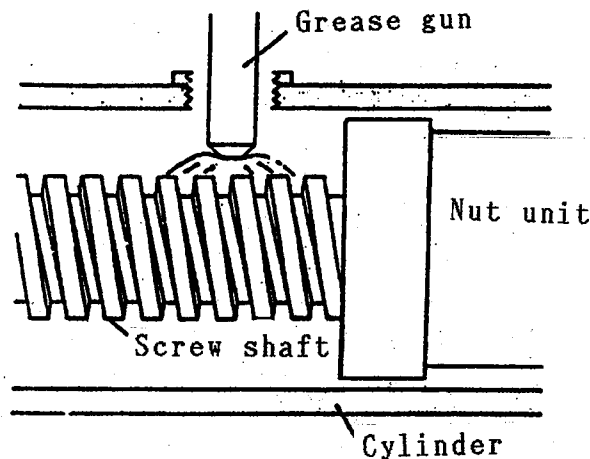
(5) Grease supply on the screw shaft

The supply method is shown on the fig.11.

Advance the piston rod to the dead end.

Supply the grease little by little with a grease gun or spatula through the supply port of grease on the middle of the cylinder.

Reciprocate the piston rod several times and repeat its work 3 to 4 times.



• Grease supply cycle

Frequency	Supply cycle
500~1000 times/day	3months ~ 6months
100~500 times/day	6months ~ One year
10 ~100 times/day	One year ~ 1.5years

• Recommended grease

Name of company	Grease name
Nippon Sekiyu	Multinoc No.1
Mobil Sekiyu	Mobilux No.1
Idemitsu Kosan	Daphni Eponex No.1
Cosmo Sekiyu	Dinama No.1
Showa Shell	Alvania No.1

(6)Supply method

Supply part	Method
Screw shaft	Supply through the supply port with grease gun or spatula.
Gear	Supply with a hand after opening the cover. Once two years or after 100,000times' operation.
Bearing	Supply with grease gun.

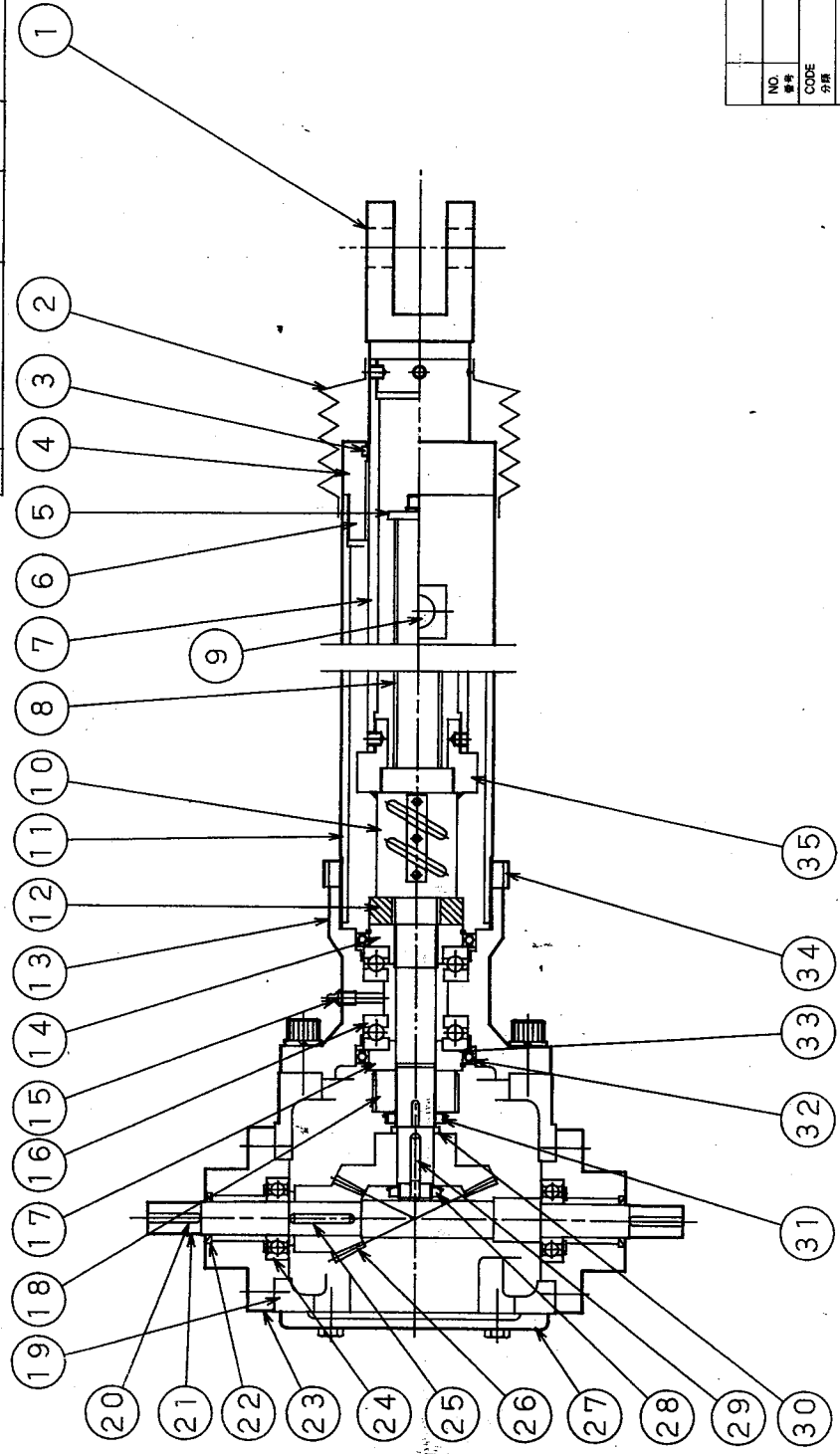
10. Disassembling method

- (1) Gear case and bracket are disassembled by unscrewing the bolts.
- (2) Screw shaft and large Bevel gear can be pulled out because outer diameter of Bevel gear is smaller than inner diameter of spigot joint.
- (3) The small bevel gear of the driving shaft side can be detached with the shaft, because the outer diameter of the bevel gear is smaller than the inner diameter of the bearing trunnion.
- (4) The cylinder (Outer tube) can be disassembled with cylinder collar (bush case) by turning the cylinder after unscrewing the tightening nut.
- (5) When the cylinder is not disassembled the cylinder collar can be detached by turning it.
Take care not to blemish the surface of the piston rod.
- (6) When the piston rod and ball nut or the piston rod and tip metal is to be detached, unscrew the set screw for turning stop and turn them.
- (7) Make sure the set screw is screwed fully or the head of the set screw is not protruded on the surface of the piston rod when it is reassembled. Apply the screw lock agent to the set screw before screwing.
- (8) After disassembling, the ball screw and bevel gear shall be covered by vinyl or things like that to prevent odd things, dust and such from attaching.

SURFACE ROUGHNESS 仕上面粗さ	(μ) 0.8S	6S	25S	100S	WITHOUT MACHINING 加工なし	0.5 \leq	6<	30<	120<	315<	1000<
SMA記号	▽▽▽▽	▽▽▽	▽▽	▽	~	(mm)	± 0.1	± 0.2	± 0.3	± 0.5	± 1.2

Item	Name	Material	Quantity	Remark
28	Bearing nut	SS41	1	
29	Key	S45C	1	
30	Spacer	S45C	1	
31	Bearing nut	SS41	1	
32	Ball bearing	MARKETING	2	
33	Bearing seat	S45C	1	
34	Tightening nut	SS41	1	
35	Joint	S45C	1	

Item	Name	Material	Quantity	Remark
1	Tip metal	SS41	1	
2	Bellows	Neoprene	1	
3	Scraper	NBR	1	
4	Cylinder collar	STKM13A	1	
5	Stopper	S45C	1	
6	DU bush	MARKETING	1	
7	Piston rod	STKM13A	1	
8	Ball screw	SCM4150	1	
9	Grease supply port	SS41	1	
10	Ball nut	SCM420H	1	
11	Cylinder	STKM13A	1	
12	Cushion	S45C	1	
13	Bracket	FCD50	1	
14	Bearing seat	S45C	1	
15	Grease nipple	BsBM	1	A-PT1/8
16	Thrust bearing	MARKETING	2	
17	Bearing seat	S45C	1	
18	Bearing nut	S45C	1	
19	Gear case	FCD50	1	
20	Key	S45C	1	
21	Input shaft	S45C H	1	
22	Oil seal	NBR	1	
23	Bear trunnion	S45C	2	
24	Ball bearing	MARKETING	2	
25	Key	S45C	1	
26	Bevel gear	S45C	1	
27	Gear case cover	SS41	1	



PL	NO.
部品表	項番

△ DATE 日付 BY 担当者 DESCRIPTION 記号

NO. 番号	PARTS NAME 部品名	MATERIAL 材質	QTY 数量	WT./ONE 重量(g)	REMARKS 備註
CODE 分類					
CHECK 確認					
DESIGN 設計	TITLE 名称		Mighty Cylinder Construction Drawings		
DRAWN 作図	DRAWING NO. 図番番号		A3000585 - Δ		
DATE 日付	SCALE 縮尺		UNITEC INDUSTRY CO.,LTD. ユニテック工業株式会社		