

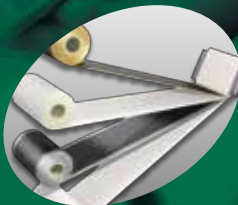
Equipment related to rechargeable batteries P4* Series

 Material
restrictions

 Countermeasures
against dust generation

 Countermeasures
against dust

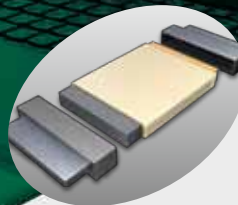
 DRY
Dry
environment



Winding



Stacking



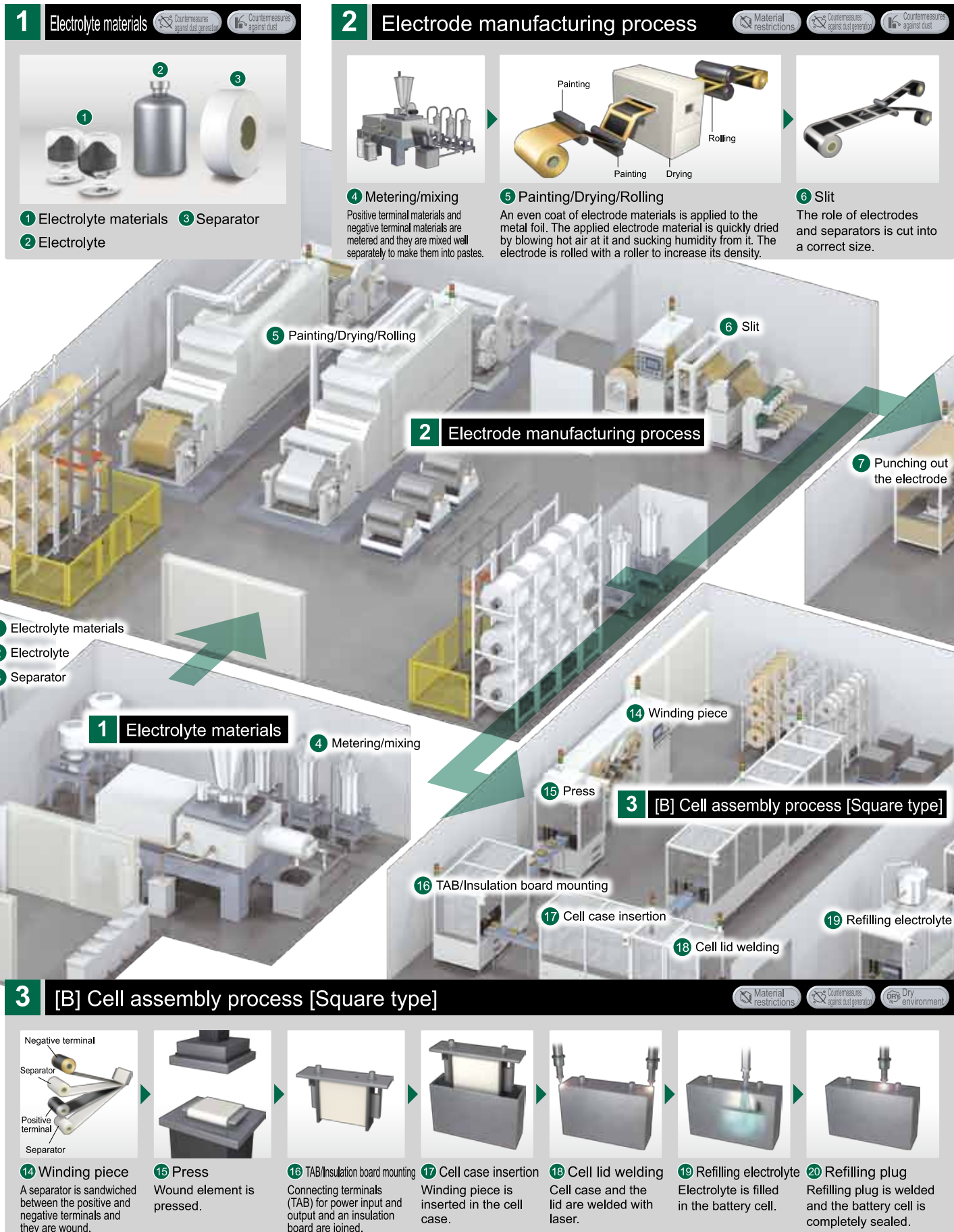
TAB Welding



Immersion

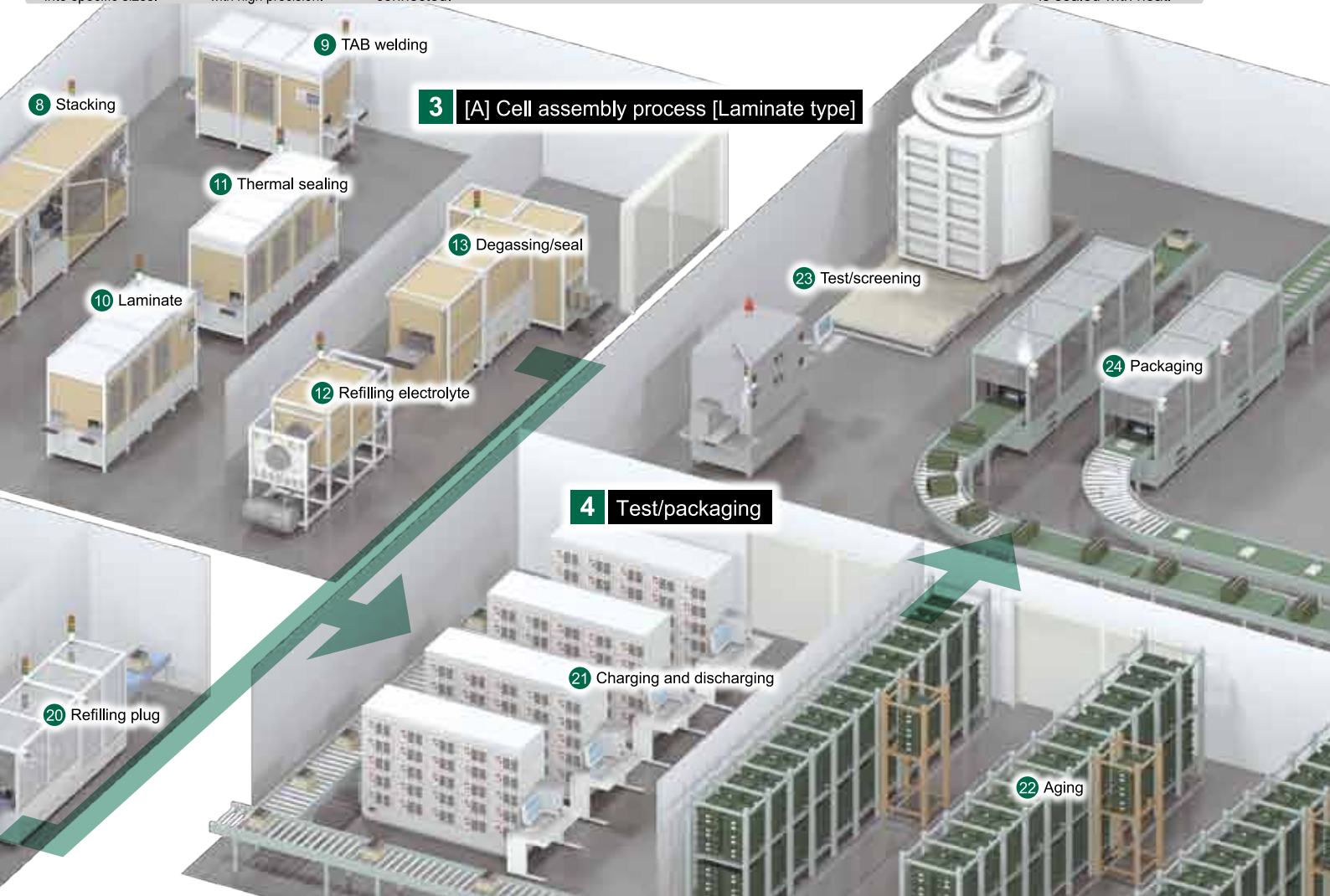
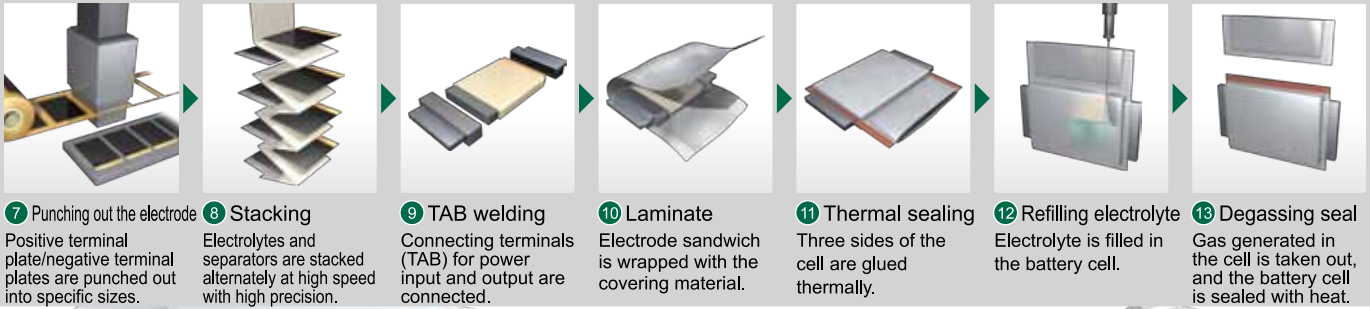
Secondary battery manufacturing process

In the secondary battery manufacturing process, various environmental requirements should be addressed such as dust prevention, explosion proof, vacuum, ultra dryness, and materials to be used.



3 [A] Cell assembly process [Laminate type]

Material restrictions Countermeasures against dust generation Dry environment



4 Test/packaging

Material restrictions Countermeasures against dust generation Dry environment



Series supporting the secondary battery manufacturing process

CKD responds consistently to customer needs for the secondary battery manufacturing, from electrode production to packaging, with our product aiming the safe secondary battery production process.

Material restrictions Materials for parts are restricted

Materials and surface treatment unsuitable for the secondary battery production processes are restricted. This will help reduce defects in secondary batteries.

- Copper materials are restricted
- Zinc materials are restricted
- Nickel materials are restricted
- Zinc plating is restricted
- Electrolytic nickel plating is restricted

Countermeasures against dust Long service life in a dusty environment

Effective anti-dust features such as scraper and rod packing are adopted. Dust is blocked from entering the cylinder.

Countermeasures against dust generation Metal wear particles are minimized

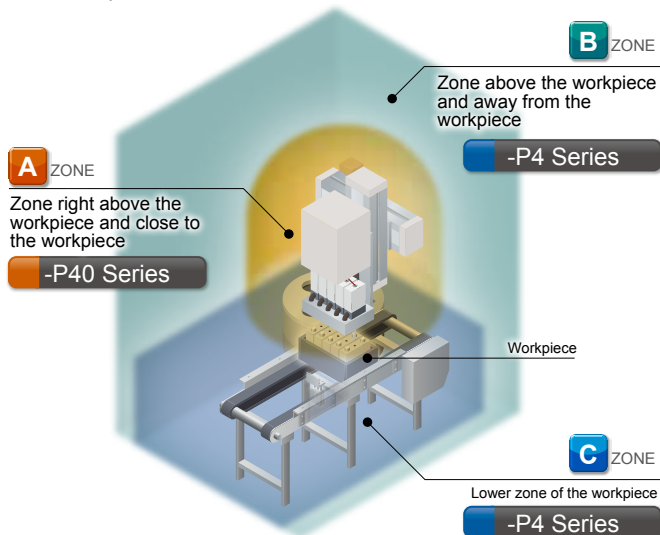
Local exhaust function (vacuum sweep port) is installed. This feature prevents metal wear particles from leaking out contaminating electrodes and cells.

DRY Dry environment Long service life in an ultra dry environment

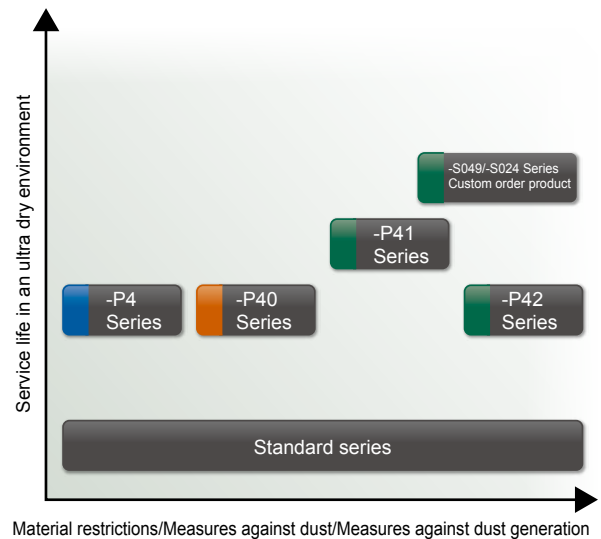
Grease compatible with ultra dry environment is used. Lubrication of the sliding areas can be maintained for an extended period of time even in a dry environment.

Series zoning

Two different grade applicable models are offered for different atmosphere and location inside the device.



Series overview



Series variation

	-P4 Series	-P40 Series	-P41 Series	-P42 Series	-S049/-S024 Series (Custom order product)
	Flow path material restrictions	Materials for all parts are restricted	Countermeasures against dry air	Countermeasures against dust generation	Countermeasures against dust
Pneumatic actuator	●	●	●	●	●
Pneumatic valve	●	●			
Clean air components	●	▲			
Vacuum components	●				
General purpose valves	●	●			
Pneumatic related products	●	●			

* Small amounts in alloy are excluded.

Restricting materials in the flow path and sliding areas

-P4 Series

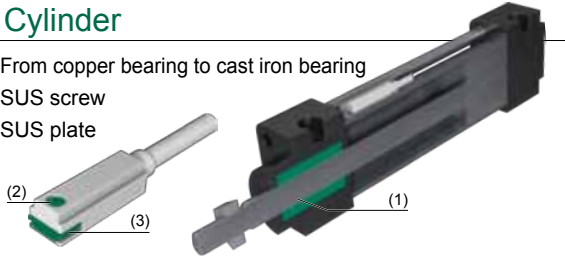
The same mounting size as the standard type



Copper/Zinc/Nickel materials and electrolytic nickel plating are restricted in the flow path and sliding areas.

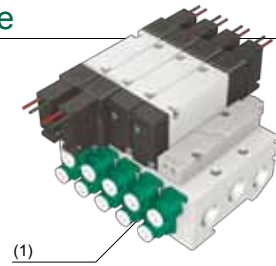
Cylinder

- (1) From copper bearing to cast iron bearing
- (2) SUS screw
- (3) SUS plate



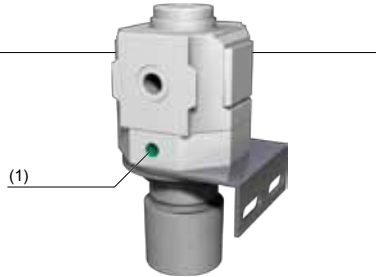
Pneumatic valve

- (1) SUS fitting



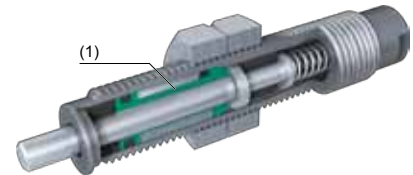
Regulator

- (1) Exhaust treatment



Shock absorber

- (1) Aluminum

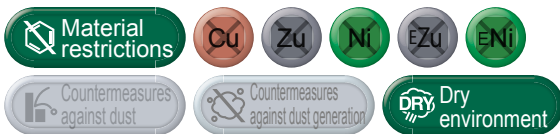


Materials for all parts are restricted

* Electrical parts (coil, circuit, wiring, etc.) are excluded.
* Small amounts in alloy are excluded.

-P40 Series

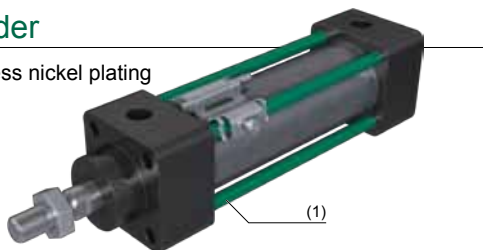
The same mounting size as the standard type



Copper/Zinc/Nickel materials and electrolytic nickel plating are restricted for all parts.

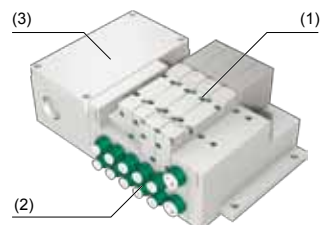
Cylinder

- (1) Electroless nickel plating



Pneumatic valve

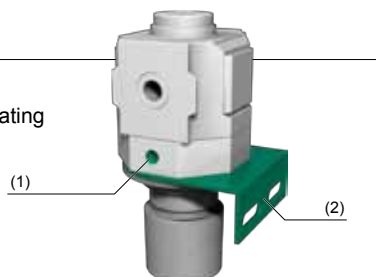
- (1) SUS screw
- (2) SUS fitting
- (3) Electrical circuit section IP65*



* IP40 is of D sub-connector specifications.

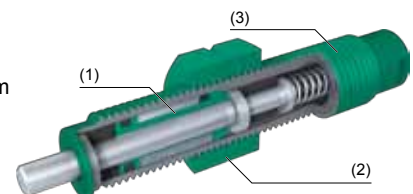
Regulator

- (1) Exhaust treatment
- (2) Electroless nickel plating



Shock absorber

- (1) Aluminum
- (2) SUS nut
- (3) Hard chromium plating



* This varies depending on our testing conditions.

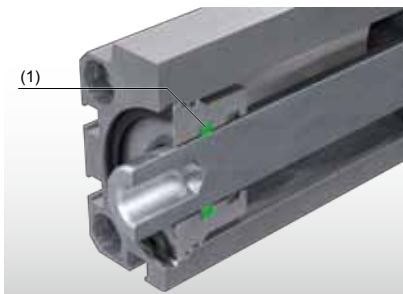
Clearing over 20 million times of endurance test for ultra dry environment

-P41 Series



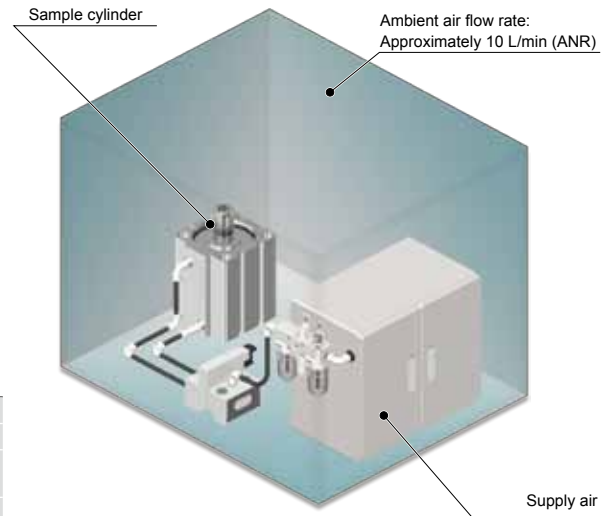
Grease impregnated fiber composite (lube keeping structure) is added to P40 specifications. This enables stable lubrication to the sliding areas for an extended period of time to achieve long service life in an ultra dry environment. SUS is used for piston rods.

Cylinder



(1) Dry air countermeasures (lube keeping structure)

*Dimensions vary from the standard model.



Testing method

Cylinder is placed vertically facing upward. This is operated in an ultra dry environment for the endurance test.

Test conditions

Supply pressure	0.5 MPa
Cylinder speed	300 mm/s
Supply air atmospheric dew point	-61°C
Surrounding environment atmospheric dew point	-61°C
Load	No load

Dust generation is reduced to 1/5 or less

* Comparison with our standard cylinder.

-P42 Series



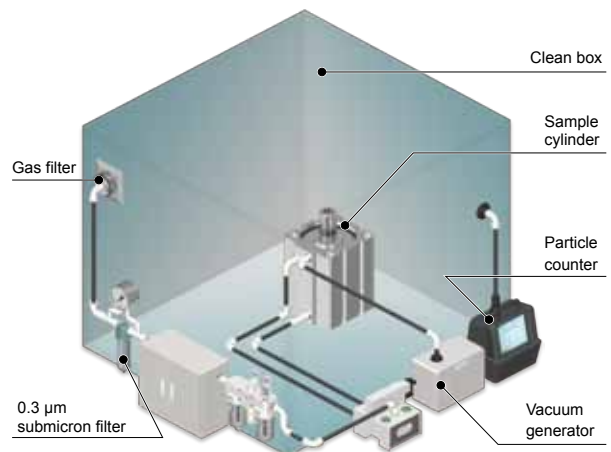
Local exhaust function (vacuum sweep port) is added to P40 specifications. This will prevent metal particles from contaminating electrodes and cells and help reduce defects in secondary batteries. SUS is used for piston rods.

Cylinder



(1) Vacuum sweep port

*Dimensions vary from the standard model.



Testing method

The device is run in a clean box to measure the amount of dust generated.

Supply pressure	0.5 MPa
Cylinder speed	200 mm/s
Frequency	30 cpm
Load	No load

* This series are custom order products. For applicable models, contact CKD.

Two different countermeasures you can choose against dust

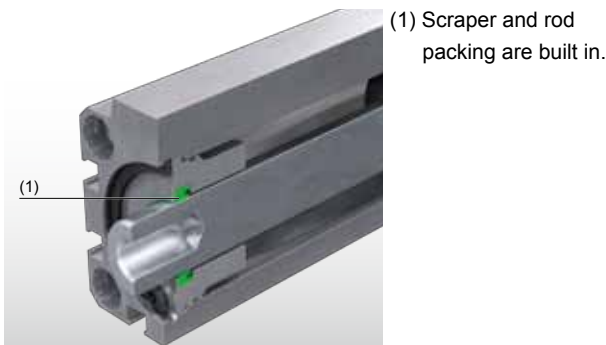
-S049/-S024 Series



You can choose from "S049 Series" to implement dust measures without changing the design of the existing system or "S024 Series" to implement more powerful dust measures.

* S024 Series supports dry environment.

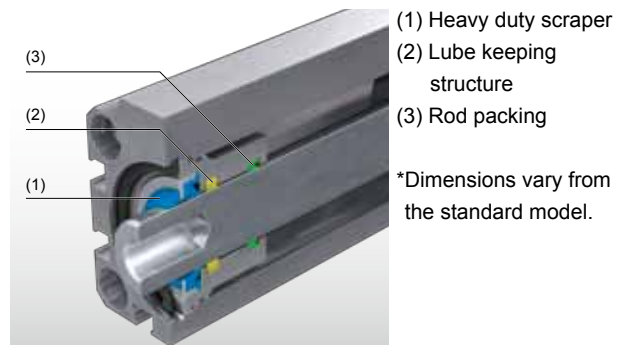
-S049 Series The same mounting size as the standard type



(1) Scraper and rod packing are built in.

- Materials and shapes of the standard rod packing are modified to achieve long service life.
- Dimensions are compatible with our standard products. Without changing the design, you can save the space.
- Dimensions are compatible with products by other companies.

-S024 Series



(1) Heavy duty scraper
(2) Lube keeping structure
(3) Rod packing

*Dimensions vary from the standard model.

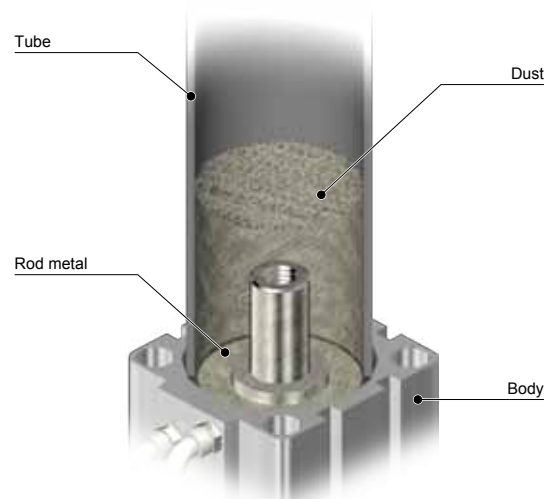
- Powerful measures against dust such as the heavy duty scraper (SCB), the lube keeping structure, and the rod packing structure are introduced to achieve long service life.
- CKD has experience in providing measures against dust in the source process.

Testing method

Cylinder is placed vertically facing upward. The rod metal is covered with a tube. The device is run while buried in dust.

Test conditions

Supply pressure	0.5 MPa
Cylinder speed	200 mm/s
Frequency	30 cpm
Load	No load



Type	Sample No.	Endurance test (10 thousand times)								
		0	10	30	50	75	100	125	150	
Standard products	Standard-1	○	■	○	■	○	■	○	■	○
	Standard-2	○	■	○	■	○	■	○	■	○
-S049 Series (Compatible with the standard dimensions)	S049-1	○	■	○	■	○	■	○	■	○
	S049-2	○	■	○	■	○	■	○	■	○
-S024 Series (heavy duty scraper)	S024-1	○	■	○	■	○	■	○	■	○
	S024-2	○	■	○	■	○	■	○	■	○

Ary air supply

Super heatless air dryer

SHD Series



High polymer membrane air dryer

SU Series



Dryer

SD Series



For dry air
2, 3 port solenoid valve

AB/ADK-Z Series



Liquid supply

Chemical liquids air
operated valve

AMD Part 3R Series



Clean cylinder valve

LAD Series



Air operated type ball valve

CHB/CHG Series



Tension control

Air bearing actuator

LBC Series



Precision regulator

RP/RPE Series



Electro pneumatic regulator

EVD/EVR Series



Pneumatic cylinder low
friction type

**SCM-U/SCG-U/
SSD2-U Series**



EVR does not meet our P4 Series standard.

Equipments corresponding to the secondary cell P4* Series

Explosion proof environment

Diaphragm type cylinder valve

NAD Series



Air operated type 3 port valve

NAP11 Series



Pilot operated type explosion proof 5 port valve

4F0E** Series



Vacuum control

High vacuum control valve

AVB Series



Valve for process gas

AGD*R Series



Vacuum components

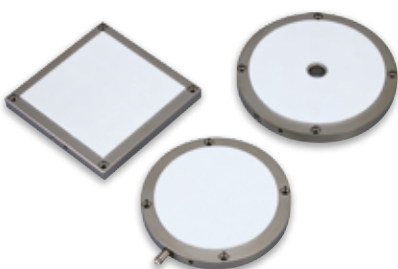
SELVACS Series



Transport using suction

Precise suction plate

PVP Series



Magnetic spring buffer

FBU2 Series



3 port direct acting valve

3QR Series



Assembling/inspection process

Super compact cylinder

SSD2 Series



Guided cylinder

STG Series



Super rodless cylinder

SRL3 Series



Compact cylinder

SMG Series



Super twin rod cylinder

STR2 Series



Linear slide cylinder
Standard model

LCR Series



Linear slide cylinder
Ultra high rigidity model

LCG Series



Table type rotary actuator

GRC Series



Compact wide parallel hand

HMF Series



Linear guide hand with
rubber cover

LHAG Series



Pilot operated type
3/5 port valve

4G Series



3 port direct acting valve

3QR Series



Equipments corresponding to the secondary cell P4* Series

Energy saving

Direct drive actuator

AX Series



This does not meet our P4 Series standard.

Electric driven actuator
Ball thread drive/low particle generation specifications

ETS/ECS Series



Electric driven actuator
Belt drive

ETV Series



This does not meet our P4 Series standard.

Electrolyte/refilling

Valve for process gas

AGD*R Series



Device for pneumatic piping



High vacuum control valve

AVB Series



Air blow

Direct acting type 2, 3 port solenoid valve for various fluid control

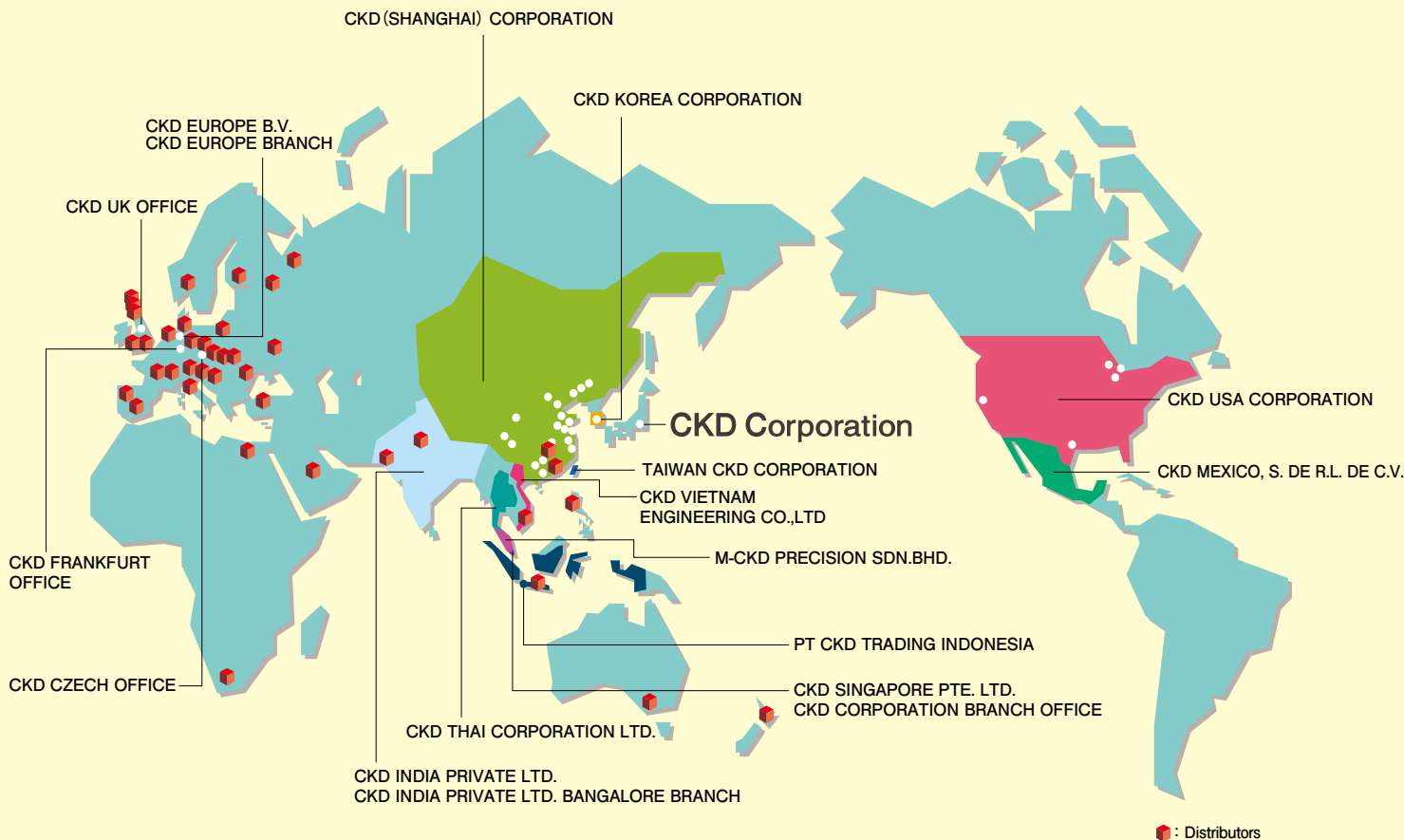
AB-Z/AG-Z/ADK-Z Series



Small size flow rate sensor

FSM2 Series





CKD Corporation

Website <http://www.ckd.co.jp/>

U.S.A.

CKD USA CORPORATION

- **CHICAGO HEADQUARTERS**
4080 Winnetka Avenue, Rolling Meadows, IL 60008, USA
PHONE +1-847-368-0539 FAX +1-847-788-0575
- CINCINNATI OFFICE
- SAN ANTONIO OFFICE
- SAN JOSE OFFICE
- DETROIT OFFICE

Mexico

CKD MEXICO, S. DE R.L. DE C.V.

- Cerrada la Noria No. 200 Int. A-01, Querétaro Park II, Parque Industrial Querétaro, Santa Rosa Jáuregui, Querétaro, C.P. 76220, México
PHONE +52-442-161-0624

Europe

CKD EUROPE B.V.

- Beechavenue 125A, 1119 RB Schiphol-Rijk, The Netherlands
PHONE +31-23-554-1490

CKD CORPORATION EUROPE BRANCH

- Beechavenue 125A, 1119 RB Schiphol-Rijk, The Netherlands
PHONE +31-23-554-1490
- CZECH OFFICE
- UK OFFICE
- FRANKFURT OFFICE

Malaysia

M-CKD PRECISION SDN.BHD.

- **HEAD OFFICE**
Lot No.6, Jalan Modal 23/2, Seksyen 23, Kawasan MIEL, Fasa 8, 40300 Shah Alam, Selangor Darul Ehsan, Malaysia
PHONE +60-(0)3-5541-1468 FAX +60-(0)3-5541-1533
- JOHOR BAHRU BRANCH OFFICE
- PENANG BRANCH OFFICE

Thailand

CKD THAI CORPORATION LTD.

- **SALES HEADQUARTERS**
Suwan Tower, 14/1 Soi Saladaeng 1, North Sathorn Road, Kwaeng Silom, Khet Bangrak, Bangkok 10500, Thailand
PHONE +66-(0)2-267-6300 FAX +66-(0)2-267-6305
- RAYONG OFFICE
- NAVANAKORN OFFICE
- EASTERN SEABOARD OFFICE
- LAMPHUN OFFICE
- KORAT OFFICE
- AMATANAKORN OFFICE
- PRACHINBURI OFFICE
- SARABURI OFFICE

- 2-250, Ouji, Komaki City, Aichi, Japan 485-8551
- PHONE +81-(0)568-74-1338 FAX +81-(0)568-77-3461

Singapore

CKD SINGAPORE PTE. LTD.

- No.33 Tannery Lane #04-01 Hoesteel Industrial Building, Singapore 347789, Singapore
PHONE +65-67442623 FAX +65-67442486

CKD CORPORATION BRANCH OFFICE

- No.33 Tannery Lane #04-01 Hoesteel Industrial Building, Singapore 347789, Singapore
PHONE +65-67447260 FAX +65-68421022

India

CKD INDIA PRIVATE LTD.

- Unit No. 607, 6th Floor, Welldone Tech Park, Sector 48, Sohna Road, Gurgaon-122018, Haryana, India
PHONE +91-(0)124-418-8212

CKD INDIA PRIVATE LTD. BANGALORE BRANCH

- No. 201/B, 2nd Floor, Museum Terraces Apartment, No. 29, Museum Road, Bangalore-560001, Karnataka, India
PHONE +91-(0)80-4212-7008/7009 FAX +91-(0)80-4212-7007

Indonesia

PT CKD TRADING INDONESIA

- Menara Bidakara 2, 18th Floor, Jl. Jend. Gatot Subroto Kav. 71-73, Pancoran, Jakarta 12870, Indonesia
PHONE +62 21-2938-6601 FAX +62 21-2906-9470

Vietnam

CKD VIETNAM ENGINEERING CO.,LTD.

- 18th Floor, CMC Tower, Duy Tan Street, Cau Giay District, Hanoi, Vietnam
PHONE +84-4-37957631 FAX +84-4-37957637

Taiwan

台灣喜開理股份有限公司

TAIWAN CKD CORPORATION

- 16F-3, No. 7, Sec. 3, New Taipei Blvd., Xinzhuang Dist., New Taipei City 242, Taiwan
PHONE +886-(0)2-8522-8198 FAX +886-(0)2-8522-8128
- 新竹營業所 (HSINCHU OFFICE)
- 台中營業所 (TAICHUNG OFFICE)
- 台南營業所 (TAINAN OFFICE)

China

喜開理(上海)機器有限公司

CKD(SHANGHAI)CORPORATION

- **營業部 / 上海浦西事務所 (SALES HEADQUARTERS / SHANGHAI PUXI OFFICE)**
Room 601, 6th Floor, Yuanzhongkeyan Building, No. 1905 Hongmei Road, Xinhui District, Shanghai 200233, China
PHONE +86-(0)21-61911888 FAX +86-(0)21-60905356
- 上海浦東事務所 (SHANGHAI PUDONG OFFICE)

- 無錫事務所 (WUXI OFFICE)
- 杭州事務所 (HANGZHOU OFFICE)
- 寧波事務所 (NINGBO OFFICE)
- 南京事務所 (NANJING OFFICE)
- 蘇州事務所 (SUZHOU OFFICE)
- 昆山事務所 (KUNSHAN OFFICE)
- 北京事務所 (BEIJING OFFICE)
- 天津事務所 (TIANJIN OFFICE)
- 長春事務所 (CHANGCHUN OFFICE)
- 大連事務所 (DALIAN OFFICE)
- 青島事務所 (QINGDAO OFFICE)
- 濟南事務所 (JINAN OFFICE)
- 煙台事務所 (YANTAI OFFICE)
- 瀋陽事務所 (SHENYANG OFFICE)
- 重慶事務所 (CHONGQING OFFICE)
- 成都事務所 (CHENGDU OFFICE)
- 西安事務所 (XI'AN OFFICE)
- 武漢事務所 (WUHAN OFFICE)
- 鄭州事務所 (ZHENGZHOU OFFICE)
- 長沙事務所 (CHANGSHA OFFICE)
- 廣州事務所 (GUANGZHOU OFFICE)
- 深圳西事務所 (WEST SHENZHEN OFFICE)
- 深圳東事務所 (EAST SHENZHEN OFFICE)
- 東莞事務所 (DONGGUAN OFFICE)
- 廈門事務所 (XIAMEN OFFICE)

Korea

CKD KOREA CORPORATION

- **HEADQUARTERS**
(3rd Floor), 44, Sinsu-ro, Mapo-gu, Seoul 121-856, Korea
PHONE +82-(0)2-783-5201~5203 FAX +82-(0)2-783-5204
- 水原營業所 (SUWON OFFICE)
- 天安營業所 (CHEONAN OFFICE)
- 蔚山營業所 (ULSAN OFFICE)

The goods and/or their replicas, the technology and/or software found in this catalog are subject to complementary export regulations by Foreign Exchange and Foreign Trade Law of Japan.

If the goods and/or their replicas, the technology and/or software found in this catalog are to be exported, law requires that the exporter makes sure that they will never be used for the development and/or manufacture of weapons for mass destruction.