Medical analysis process components

■ For water, pure water, chemical liquids
(fluids that do not corrode materials at wetted parts)

Overview

In recent years, medicine has greatly advanced and medical engineering has become a great priority. These advances have increased the need for highly functional, performing and accurate biomedical inspections and devices in clinical medicine.

To answer these advanced needs for medical analysis process components, CKD has set the following six target items for medical technology, and has prepared special specification control valves to match these targets. Select the component that matches your needs.

Features

Compact and lightweight
The components have been downsized and lightened to handle changes from centralized medicine to portable medicine.

Low noise
In consideration of hospital environments, the valves function with an extremely quiet drive.

Minimal residue
The fluid accumulation and fluid residue have been minimized to allow for the fluid accuracy and safety in various inspections.

Maintenance-free
The life of the parts has been increased, and a maintenance-free design has been incorporated to improve the reliability of the devices.

High sealing performance
High corrosion resistant materials and a high sealing structure have been incorporated to ensure the purity of inspection fluids.

Wide variation
A variety of models are available to match a diverse range of reagents and inspection fluids.

CONTENTS

⚠ Always read the precautions in the Introduction and page 768 before starting use.

			Model	No. of port	Material		Fluid					
					Sealant	Body	Pure water	Physiological brine	Reagent	Waste liquid	Cleaning liquid	
Solenoid valve	Metal free for chemical liquid	Diaphragm type	MR10	2, 3	FKM	PEEK	●	●	●	●	●	
			MAB1	2	PTFE	PTFE	●	●	●	●	●	
			MAG1	3	PTFE	PTFE	●	●	●	●	●	
			MYB1	2	FKM	PPS	●	●	●	●	●	
			MYG1	3	FKM	PPS	●	●	●	●	●	
			MYB2	2	FKM	PPS	●	●	●	●	●	
			MYG2	3	FKM	PPS	●	●	●	●	●	
			MYB3	2	FKM	PPS	●	●	●	●	●	
			MYG3	3	FKM	PPS	●	●	●	●	●	
			MEB2	2	PTFE FKM	PPS	●	●	●	●	●	
			MEG2	3	PTFE FKM	PPS	●	●	●	●	●	
			MJB3	2	Silicon rubber	PSU	●	●	●	●	●	
			EMB21	2	PTFE	SUS316	●					
						PTFE	●	●	●	●	●	
			EMB41/51	2	PTFE	PTFE	●	●	●	●	●	
			M	2	PTFE FKM	PTFE PVC	●			●		
		Lever type	HMTB1	2	NBR FKM EPDM	PPS	●	●	●		●	
			HMTG1	3			●	●	●		●	
	High corrosion resistant	Poppet type	USB2/3	2	NBR FKM	PPS	●					
			USG2/3	3	NBR FKM	PPS	●					
			UMB1	2	FKM	SUS304 or equiv.	●					
			UMG1	3	FKM	SUS304 or equiv.	●					
			HB	2	NBR (FKM) (PTFE)	SUS316	●					
Pinch valve	Metal free type		HYN	2, 3	-	-	●	●	●	●	●	

Note: Check the compatibility between working fluid and body/sealant materials when selecting.

Orifice (ø/mm)																	Page
0.5	0.9	1	1.5	1.6	2	2.3	3	3.2	4	5	6	7	8	10	12	15	
		●															772
				● 1.6 or equiv.													776
				● 1.6 or equiv.													776
					● 2.0 or equiv.												779
					● 2.0 or equiv.												779
							● 3.0 or equiv.										782
							● 3.0 or equiv.										782
										● 5.0 or equiv.							785
										● 5.0 or equiv.							785
							● 3.0 or equiv.										788
							● 3.0 or equiv.										788
							●										791
							●										793
											●		●	●	●	●	795
					●				●		●		●	●	●		798
				●													802
				●													802
		●	●	●		●											16
		●	●	●													16
	●																805
	●																805
		●	●	●		●	●	●	●			●					807
● Tube ID		● Tube ID					● Tube ID				● Tube ID						811

Safety precautions

Always read this section before starting use.

Medical analysis process components

Design & Selection

⚠ WARNING

1 Working environment

When using in a place where water splashes on the valve, take appropriate measures to protect it.

⚠ CAUTION

(1) Working fluids must not adhere to the product body.
(2) Carefully select the solenoid valve taking the chemical liquid characteristics into consideration. (Presence of crystal deposits when chemical liquids dry, effect to solenoid valve component materials if chemical liquids evaporate, etc.)
(3) When using these components for a chemical liquid having a low boiling point, such as hexane, the chemical liquid in the solenoid valve could evaporate due to heating of the coils, and cause bubbles, etc. in the solenoid valve and pipe. Use an AMD type air operated valve for chemical liquid if formation of bubbles, etc. poses a problem.
(4) When using the solenoid valve with a negative pressure, such as for dispensing control, air may be sucked into the solenoid valve depending on the type of chemical liquid, type of connection joint, and type of tube, etc. Check the state carefully before starting use.

Installation, Piping & Wiring

⚠ CAUTION

1 Tighten the piping with the following torques.

Note that if the solenoid valve body is made of resin, a resin joint must be used. The port could be damaged if a metal joint is used.

<<Stainless steel body solenoid valve>>

Nominal pipe diameter	Tightening torque [N·m]
M5	2.1 to 3
Rc1/8	18 to 20
Rc1/4	23 to 25
Rc3/8	31 to 33

<<Polyvinyl chloride body solenoid valve>>

Nominal pipe diameter	Tightening torque [N·m]
R3/8	1.5 to 2.0
R1/2	2.0 to 2.5
R3/4	2.5 to 3.0

<<Fluorine resin body solenoid valve>>

Nominal pipe diameter	Tightening torque [N·m]
M6	0.05 to 0.08
Rc1/4	0.7 to 1.0
Rc3/8, R3/8	1.0 to 1.5
Rc1/2, R1/2	1.5 to 2.0
R3/4	2.0 to 2.5

<<PPS/PEEK body solenoid valve>>

Nominal pipe diameter	Tightening torque [N·m]
M5, M6	0.10 to 0.15
Rc1/8	0.5 to 0.8
Rc1/4	1.0 to 1.5
Rc3/8	1.0 to 1.5

<<Precautions for each model>>

Safety Precautions for MR10

⚠ CAUTION

(1) Before starting use, check the compatibility between the materials of the product and working fluid.
(2) Do not use for hydrochloric acid, hydrofluoric acid, nitric acid or sodium hypochlorite (soda).
(3) Foreign matter etc. inside the piping may cause malfunction and valve seat leakage. Make sure to flush the piping.
(4) When standing the secondary piping, do not make it higher than 2 m. Use tubing or piping with the same or larger bore size as the orifice to fix the pipe.
(5) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.

Safety Precautions for MAB1/MAG1

⚠ CAUTION

(1) Foreign matter in the piping and the environment during piping work could damage the valve seat or diaphragm seal, and lead to leaks. Always flush the piping before installing the valve.
(2) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.
(3) Consult with CKD if the secondary piping is laid at a high level or extremely restricted.
(4) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.

Safety Precautions for MYB$^{1}_{2}$/MYG$^{1}_{2}$/MEB2/MEG2

⚠ CAUTION

(1) Before starting use, check the compatibility between the materials of the product and working fluid.
Working fluids must not adhere to the product body.
(2) Foreign matter in the piping and the environment during piping work could damage the valve seat or diaphragm seal, and lead to leaks.
Always flush the piping before installing the valve.
(3) Do not use metal joints because they could damage the port. Use a PP or fluorine resin joint.
Tighten the joint with the recommended tightening torque shown in the table.

(4) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.
(5) Current leakage from the control circuit must be less than that specified for each voltage.
(6) Consult with CKD if the secondary piping is laid at a high level (2 m or higher) or extremely restricted.
(7) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.

Safety Precautions for MJB3

⚠ CAUTION

(1) Before starting use, check the compatibility between the materials of the product and working fluid.
Working fluids must not adhere to the product body.
(2) Foreign matter etc. inside the piping may cause malfunction and valve seat leakage. Always flush the piping before installing the valve.
(3) Do not use for hydrochloric acid, hydrofluoric acid or nitric acid. Before using a permeable fluid, contact CKD. The fluid could permeate the diaphragm.
(4) Consult with CKD if the secondary piping is laid at a high level (2 m or higher) or extremely restricted.
(5) Do not apply excessive force on the joint when connecting or disconnecting the tube.
(6) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.

Safety Precautions for MB21

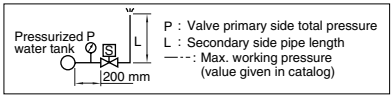
⚠ CAUTION

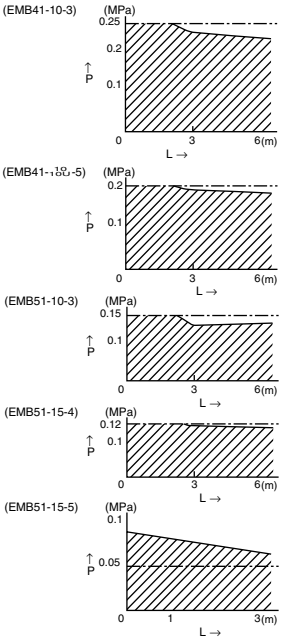
(1) Foreign matter in the piping and the environment during piping work could damage the valve seat or diaphragm seal, and lead to leaks.
Always flush the piping before installing the valve.
(2) Consult with CKD if the secondary piping is laid at a high level.
(3) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.
(4) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.

Safety Precautions for EMB41/EMB51

⚠ CAUTION

(1) Foreign matter in the piping and the environment during piping work could damage the valve seat or diaphragm seal, and lead to leaks. Always flush the piping before installing the valve.
(2) Use VCTF-0.75 (2-conductor: outer diameter 6.6) vinyl code for equipment (JISC3306) for the led out wires.
(3) Use the PFA-10-8 for the EMB41-10U tube.
(4) Consult with CKD if the secondary piping is laid at a high level.
(5) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.
(6) The working pressure changes particularly according to the OUT side piping conditions, so refer to the characteristics in the following graph before using (note that these characteristics are for water).





Safety precautions

Always read this section before starting use.

Medical analysis process components

<<Precautions for each model>>

Safety Precautions for M

⚠ CAUTION

(1) Oil is sealed inside, so do not disassemble the product.
(2) This product is not oil free.
(3) If the diaphragm is damaged during use, oil will flow into the fluid. Consider this when making a selection.
(4) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.

Safety Precautions for HMTB/HMTG

⚠ CAUTION

(1) Use a direct current power supply excluding rectified direct current.
(2) Do not apply excessive force on the joint when connecting or disconnecting the tube.
(3) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.
(4) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.

Safety Precautions for UMB/UMG

⚠ CAUTION

(1) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.
(2) Do not apply a torque exceeding 0.3 N·m on the mounting bolt (M3).
(3) Protect the product against contact with water. Water could cause insulation or operation faults.
(4) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.

Safety Precautions for HB

⚠ CAUTION

(1) Foreign matter etc. inside the piping may cause malfunction and valve seat leakage. Always flush the piping before installing the valve.
(2) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.
(3) When using strong acids, such as hydrochloric acid, hydrofluoric acid or nitric acid, or sodium hypochlorite (soda), use an AMD type air operated valve for chemical liquid.

Safety Precautions for HYN

⚠ CAUTION

(1) The power supply voltage must be 24 VDC (average) with a ripple of 4.8 VP-P or less.
(When using an average of 12 VDC, the ripple must be 2.4 VP-P or less.)
(2) When using a DC-specification product with a full wave rectified AC power supply, the power must be smoothed to attain the forementioned ripple voltage range. Consult with CKD for more information.
(3) Tighten the HYN-2/3 screw with a torque of 0.2 to 0.4 N·m, and the HYN-5/8 screw with a torque of 0.5 to 0.7 N·m.
(When the screw engagement length is 5 mm)
(4) Securely insert the tube to the designated position.
(5) The performance may not be satisfied if a tube other than the recommended ones is used.
(6) Depending on the working fluid, the silicon tube may not be resistant to chemical liquids, or chemical liquids may adhere. Check this before use.
(7) The DC specification product has polarity.
(Red = ⊕)
(8) Do not disassemble the product.
The required performance may not be satisfied even if a disassembled product is reassembled.
(9) Do not apply water on the coils.

(10) The noise-resistance crest values are shown below (These do not apply to HYN-2.)

Rated voltage	Noise-resistance crest values (pulse width 1 μsec)
12 VDC	120 V
24 VDC	200 V
100 VAC	1000 V

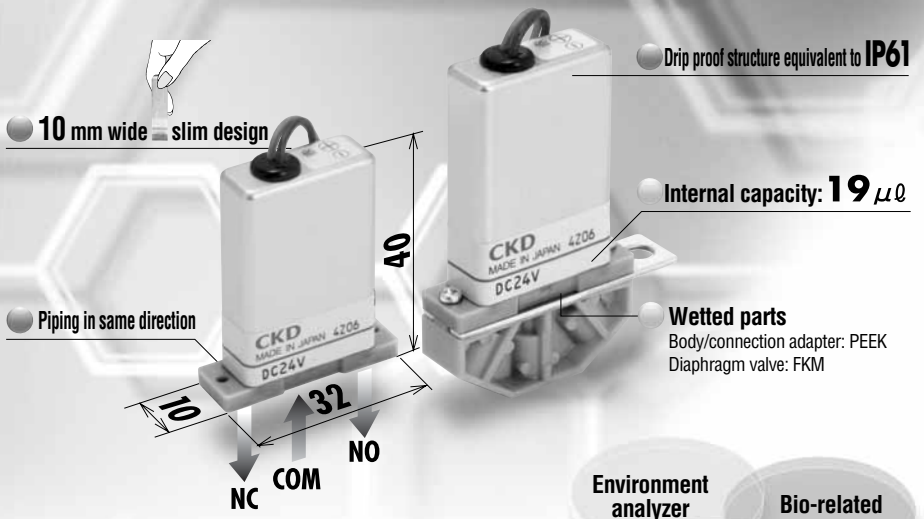
When using the product with an electrical circuit that generates noise (instantaneous overvoltage) exceeding these crest values, the transistor circuit board could be damaged causing an overvoltage to flow and burn the coils.

(11) If a silicone tube is left attached for a long time, it could stick and prevent the tube from opening. If the tube sticks, replace the tube or un-stick the tube by applying pressure or with manual work.

MR10 Series

Extracompact space saving with slim 10 mm profile

Highly accurate analysis controls even minute amounts of chemical liquids.



Environment analyzer

Bio-related devices

Medical analyzer

Ideal for analyzer dispensing

Metal sections have been eliminated from this metal-free, compact MR10 Series 2, 3 port solenoid valve for chemical liquids. Resin and rubber are used for wetted parts.

The slim console, space-saving design, outstanding installation, safety, reliability, and long-life design ensure high overall performance.

Long-life up to 10 million times

Results of tests under CKD test conditions

Internal capacity: 19 μℓ

The inside of the solenoid valve is easy to wash. Reagent wastes are reduced.

Heat-suppressing design

The effect of heat radiated from the coils onto the analysis frequency is minimized, and power is conserved.

Two piping methods

Select piping suited to your application.

●Actuator

●Direct piping

Same shape adopted for 2 port valve and 3 port valve

Compact metal free 2, 3 port solenoid valve for chemical liquid

MR10 Series

- NC (normally closed) type, NO (normally open) type, universal type
- Working fluid: water, pure water, chemical liquids
- Port size: M5, M6

JIS symbol

- 2 port: NC (normally closed) type

- 2 port: NO (normally open) type

- 3 port: universal type

Specifications

Item		2 port		3 port
		MR10-2NC	MR10-2NO	MR10-3
Actuation		NC (normally closed) type	NO (normally open) type	Universal type
Working fluid		Water, pure water, chemical liquids (fluids that do not corrode materials at wetted parts)		
Working pressure range	MPa (*2)	-0.05 to 0.1		
Sealing pressure range	MPa (*3)	-0.05 to 0.2		
Withstanding pressure (water)	MPa	0.4		
Fluid temperature	˚C	5 to 50		
Ambient temperature	˚C	5 to 50		
Valve seat leakage	cm^3/min.	0 (water pressure)		
Cv flow factor		0.03		
Orifice	mm	1		
Volumetric capacity	μℓ (*4)	19		
Protection grade		Equivalent to IP61		
Valve structure		Diaphragm type direct acting (rocker type)		
Mounting attitude	(*5)	Free		
Weight	gr	18		
Durability	(*6)	10 million times		
Electric specifications				
Rating		Continuous		
Voltage	(*7)	24 VDC /12 VDC		
Allowable voltage fluctuation		±5%		
Power consumption W (*8)	Starting	3.6 (24 VDC) / 4.2 (12 VDC)		
	Holding	1		
Leakage current mA (*9)		1.0 or less (24 VDC) / 2.0 or less (12 VDC)		
Heat proof class		B		

*1: Read the safety precautions for MR10 (page 768).
*2: Pressure range at which the solenoid valve can be switched ON or OFF.
*3: Pressure range at which the valve seat can be sealed.
*4: Volume of wetted parts formed by the product and diaphragm. Note that piping volume is excluded.
*5: Install vertically so that the coil where little fluid accumulates is at the top.
*6: These test results are based on CKD test conditions.
*7: A solenoid valve has polarity. Connect the red lead wire to the plus (+) side.
*8: Time from energizing to 50 ms.
*9: Keep leakage current from the control circuit within the levels below.
*10: Do not use for hydrochloric acid, hydrofluoric acid, nitric acid or sodium hypochlorite (soda).

How to order

● Direct piping type

MR10 - **2NC** - **5** - **DC24V**

● Actuator type

MR10 - **2NC** — **DC24V**

Model no.

Ⓐ No. of port, type

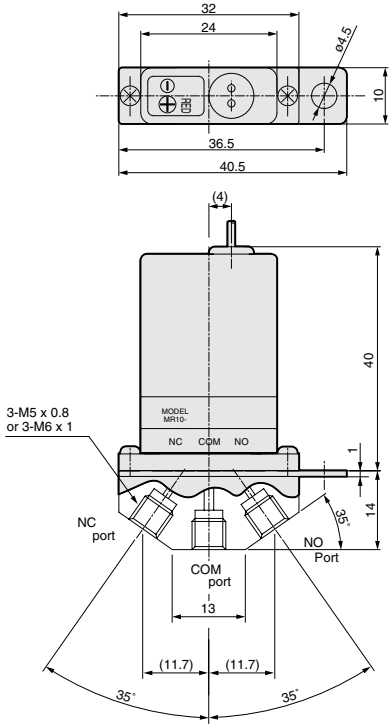
Ⓑ Port size

Ⓒ Rated voltage

Symbol	Descriptions
Ⓐ No. of port, type	
2NC	2 port, NC (normally closed) type
2NO	2 port, NO (normally open) type
3	3 port, universal type
Ⓑ Port size	
Blank	Actuator type
5	M5
6	M6
Ⓒ Rated voltage	
DC24V	24 VDC
DC12V	12 VDC

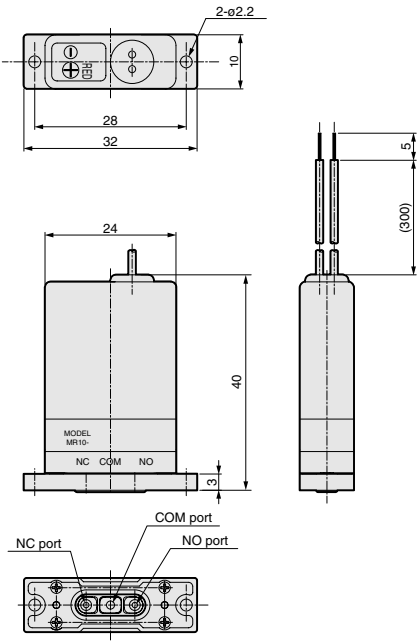
Dimensions

● Direct piping type



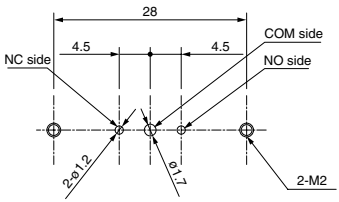
Note: The MR10-2NC has no hole machined for the NO port.
The MR10-2NO has no hole machined for the NC port.

● Actuator type



Note: The MR10-2NC's NO port is plugged.
The MR10-2NO's NC port is plugged.

● Mounting dimensions of actuator



* Different adaptors and manifolds are custom-made.
Consult with CKD for details.

● Main part materials

Parts name		Material	
Wetted parts	Diaphragm	**FKM**	Fluoro rubber
	Body	**PEEK**	Polyether ether ketone
	Packing seal	**FKM**	Fluoro rubber
	Connection adaptor	**PEEK**	Polyether ether ketone

Medical analysis process components

Compact metal free 2, 3 port solenoid valve for chemical liquid

Electronic Catalog file list is applied to "CAD DATA 2006".

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
● MAB1/MAG1: Page 778			
MAB1-M6	MA_	mab1_m6	CKD-MAB1-M6
MAG1-M6		mag1_m6	CKD-MAG1-M6
● MYB1/MYG1: Page 781			
MYB1	MY_	myb1	CKD-MYB1
MYG1		myg1	CKD-MYG1
● MYB2/MYG2: Page 784			
MYB2-6	MY_2	myb2_6	CKD-MYB2-6
MYG2-6		myg2_6	CKD-MYG2-6
● MYB3/MYG3: Page 787			
MYB3-6-AC	MY_	myb3_6_ac	CKD-MYB3-6-AC
MYB3-8-AC		myb3_8_ac	CKD-MYB3-8-AC
MYB3-10-AC		myb3_10_ac	CKD-MYB3-10-AC
MYB3-6-DC		myb3_6_dc	CKD-MYB3-6-DC
MYB3-8-DC		myb3_8_dc	CKD-MYB3-8-DC
MYB3-10-DC		myb3_10_dc	CKD-MYB3-10-DC
MYG3-6-AC		myg3_6_ac	CKD-MYG3-6-AC
MYG3-8-AC		myg3_8_ac	CKD-MYG3-8-AC
MYG3-10-AC		myg3_10_ac	CKD-MYG3-10-AC
MYG3-6-DC		myg3_6_dc	CKD-MYG3-6-DC
MYG3-8-DC		myg3_8_dc	CKD-MYG3-8-DC
MYG3-10-DC		myg3_10_dc	CKD-MYG3-10-DC
● MEB2/MEG2: Page 790			
MEB2-6	ME_2	meb2_6	CKD-MEB2-6
MEG2-6		meg2_6	CKD-MEG2-6
● Lever type HMTB1/HMTG1: Page 804			
HMTB1	HMTB	hmtb1	CKD-HMTB1
HMTG1	HMTG	hmtg1	CKD-HMTG1
● MJB3: Page 792			
MJB3-4TN	MJB3	mjb3_4tn	CKD-MJB3-4TN

High corrosion resistant

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
● 2, 3 port valve UMB1/UMG1: Page 806			
UMB-T1	UMB_UMG	umb_t1	CKD-UMB-T1
UMG-T1		umg_t1	CKD-UMG-T1
● 2 port valve HB: Page 810			
HB11	HB	hb11	CKD-HB11
HB21		hb21	CKD-HB21
HB31-6(8)		hb31_6_8	CKD-HB31-6(8)
HB41-8-5		hb41_8_5	CKD-HB41-8-5
HB41-8(10)		hb41_8_10	CKD-HB41-8(10)

Pinch valve (page 812)

Model no.	DXF		MICRO CADAM
	Folder name	Filename	Filename (GROUP: CAD, USER: STDLIB)
HYN-2	HYN	hyn_2	CKD-HYN-2
HYN-3		hyn_3	CKD-HYN-3
HYN-5		hyn_5	CKD-HYN-5
HYN-8		hyn_8	CKD-HYN-8