POWERPACK
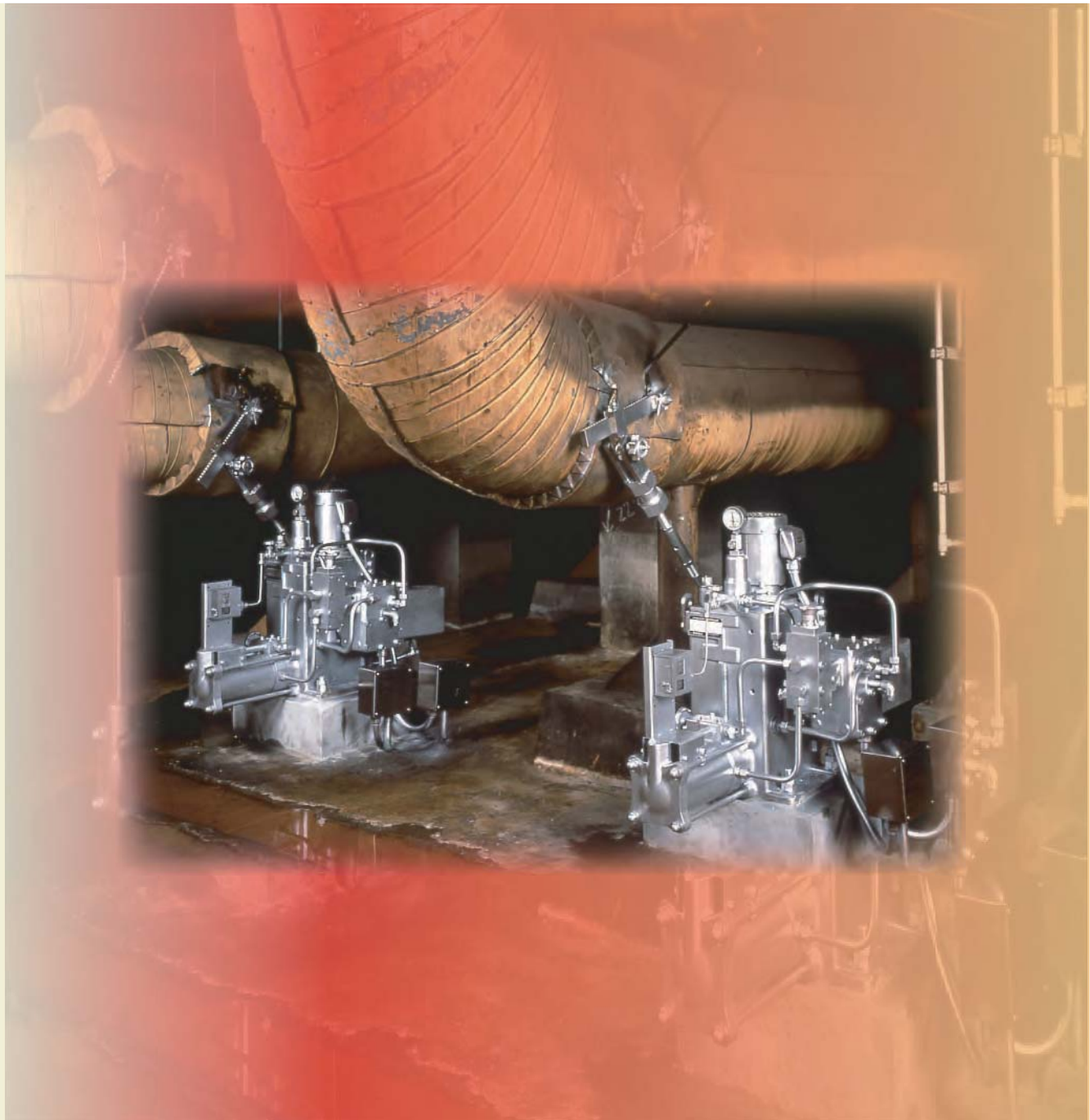## MODEL AJ11,AJ21,AJ41

The Powerpack is an actuator that controls a load such as a valve. As its output shaft performs rotary motions it is suitable for controlling a final control element of rotary type such as a butterfly valve.

INTRODUCTION

The Powerpack is a kind of an electro-hydraulic actuator. It is of the proportional positioning type and has a hydraulic work piston that is proportional to the electrical system, with the function of converting a DC electrical signal (DC 4-20mA) into a motion of the hydraulic work piston. The Powerpack is of a structure that unitizes the current-hydraulic pressure converter unit, the hydraulic pump and the work cylinder, and it does not require external piping.
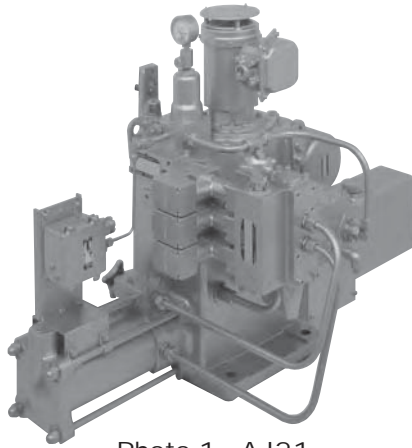

Photo 1   AJ21

FEATURES

● Usable as an actuator for various electronic controllers.
● The actuating speed is high and a large actuating force can be obtained because actuation is performed by using hydraulic pressure on reception of an electrical signal.
● Maintenance is easy and reliability is high because of a moving coil system incorporating a hydraulic jet pipe and a stable permanent magnet.
● As the casing serves as an oil tank and all parts are contained in the interior, no external piping is required.
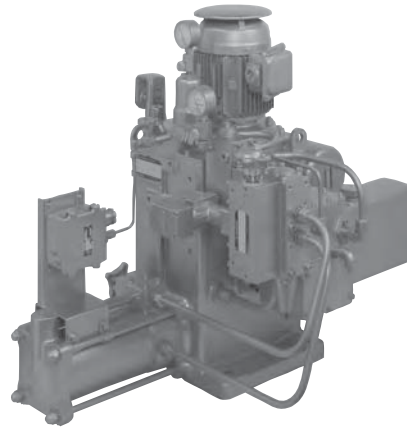

Photo 2   AJ41

SPECIFICATIONS

General specifications

Input signal·····················　DC 4 to 20mA
Resistance of moving coil ···　470Ω+0Ω/-50Ω(at25℃)
Floating band·····························　15%
Linearity·····························　±2%
Maximum crank arm rotation·················　60 degrees
Length of crank arm·····················　300mm
Control action·····················　Proportional action
Operating direction
Normal: Crank arm turns counterclockwise with input signal up.
Reverse: Crank arm turns clockwise with input signal up.
Installation·····················Horizontal
Hydraulic oil temperature···················+10 to+ 70℃
Paint color·····················Silver

Specifications by model

Model		AJ11		AJ21	AJ41
		50Hz	60Hz		
Motor	kW	0.4		0.75	1.5
Max.Operating torque kN·m	Max	1.42	1.71	2.15	4.12
	Min.	1.02	1.23	1.53	2.95
Max.speed with no load degree/sec		2.4		7	8.5
Max. operating pressure	MPa	1	1.2	1.2	2.3
Jet pipe hydraulic pressure	MPa	1	1.2	1.2	0.8
Diameter of jet pip	mm	2.0		1.6	1.6
Auxiliary piston		None		With CV2	With CV2
Cylinder dia.x stroke	mm	φ125×150		φ125×150	φ125×150
Hystresis error (no load)	%	1		1	1
Overshooting (no load)	%	1		1	1
Amount of oil required	ℓ	27(w/ACC:34)		27(w/ACC:34)	27(w/ACC:34)
Hydraulic pump type		Fixed			Variable
Rotating direction of motor		Reverse			Normal
Ambient temperature	℃	-20～+55		-20～+55	-20～+60
Mass. (including oil)	kg	175		180	195

COMPOSITION AND OPERATING PRINCIPLE

The Powerpack consists of an electro-hydraulic converter, a hydraulic unit, a crank unit and a work cylinder. All of these components are installed in an oil tank made of cast iron. Fig. 1 shows the structure and operating principle of the Powerpack. The oil under pressure from the hydraulic pump is directed to the jet pipe.
The moving coil is located in a magnetic field and is connected to the jet pipe relay through a lever. When a current signal enters the moving coil, therefore, the coil moves and the lever rotates with the seal film as the pivot and thus causes the jet pipe to rotate.
The jet pipe injects oil toward two adjacent orifices. Each of these orifices is connected to one side of the work cylinder. The pressures applied to both ends of the cylinder are equal when the jet pipe is located in the center position between these two orifices and the piston is still in this position.

When the input current signal changes in this equilibrium position, and if the moving coil moves upward, for instance, the jet pipe injects oil toward the orifice located on the lower side.
Accordingly, the piston is caused to move and the crank shaft rotates counterclockwise. This rotation of the crank shaft is directly transmitted to the cam, the cam causes the return lever to move, and the jet pipe is caused to return to the center position by the feedback spring.
Therefore, the piston remains in this position.
As the force generated by the moving coil is proportional to the current and the cam has a linear characteristic, the turning angle of the crank arm and the feedback spring compression rate are proportional each other. In other words, the turning angle of the crank arm is proportional to the input current.
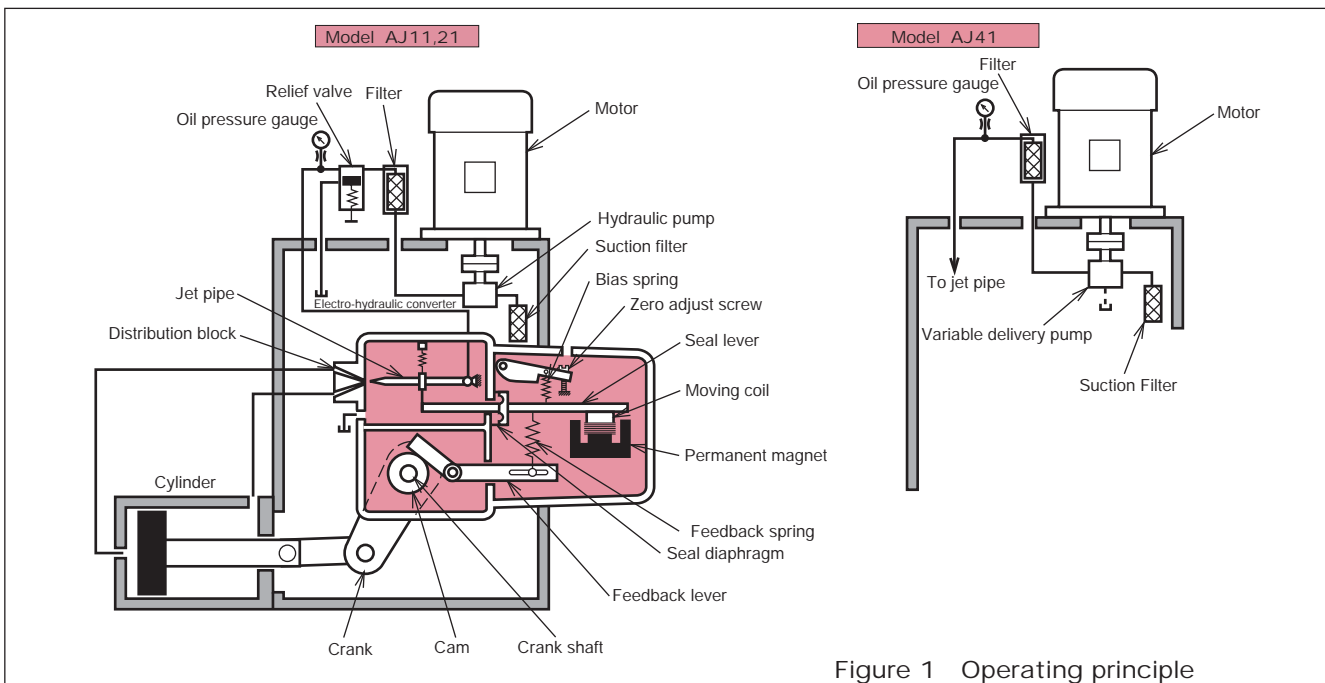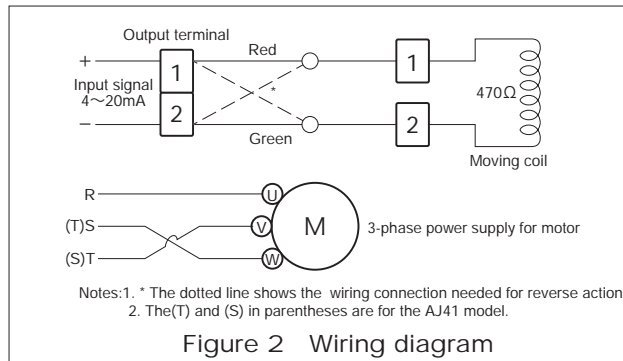
Figure 1 Operating principle

Model AJ11,21

Relief valve
Filter
Oil pressure gauge
Motor
Hydraulic pump
Suction filter
Bias spring
Zero adjust screw
Electro-hydraulic converter
Jet pipe
Seal lever
Distribution block
Moving coil
Permanent magnet
Cylinder
Feedback spring
Seal diaphragm
Feedback lever
Crank
Cam
Crank shaft

Model AJ41

Filter
Oil pressure gauge
Motor
To jet pipe
Variable delivery pump
Suction Filter

Figure 1 Operating principle

Figure 2 Wiring diagram

Output terminal
Red
+
1
1
Input signal
4～20mA
470Ω
2
2
−
Green
Moving coil

R ———— U
(T)S ———— V   M   3-phase power supply for motor
(S)T ———— W

Notes:1. * The dotted line shows the wiring connection needed for reverse action.
2. The(T) and (S) in parentheses are for the AJ41 model.

Figure 2 Wiring diagram

EXTERNAL DIMENSIONS

CONN. ROD L1

530
OIL LEVEL GAUGE AND OIL FILLER
CRANK ARM CAN BE SET IN ANY POSITION IN 7.5° INCREMENTS
☆ LIMIT SWITCH
☆ POSITION TRANSMITTER
CONDUIT CONN. G1/2 1 CONDUIT CONN. PROVIDED PER SOLENOID VALVE
CONDUIT CONN. FOR INDOOR TYPE MOTOR φ22
☆ SOLENOID VALVE(S)
300mm MIN. TO REMOVE COVER
351
C-VALVE
CONDUIT CONN. FOR OUTDOOR TYPE MOTOR G3/4

L±35 L=2000 MAX.
295
L−385
90
64 61
125
45
26 64
MIN. 24 MIN. 24
35
35
19.5
φ16
φ26
φ26
66
M16
φ16
M16
MAX. 22
PIPE (SGP 1B) TO BE PROVIDED BY OTHER

PRESS. GAUGE ANT1/4×60×3MPa
CABLE CONN. FOR OUTDOOR TYPE JIS F8801 20C
CABLE CONN. FOR INDOOR TYPE φ22
☆ OUTDOOR TYPE PRESS SWITCH
☆ INDOOR TYPE PRESS SWITCH
CONDUIT CONN. 2-G1/2
300mm MIN. TO REMOVE MOTOR AND PUMP
APPROX. 30
APPROX. 740
178
240
320
APPROX. 895
45
4-φ24 MTG. HOLES

(※A) OUTDOOR TYPE MOTOR
(※B) INDOOR TYPE MOTOR
DRAIN PORT Rc1/2
INPUT SIGNAL CONDUIT CONN. G1/2
40
45
34
320
380
21
297
252
APPROX. 735
240
300
42
φ16

NOTES 1. EITHER (※A) OR (※B) IS MOUNTED.
2. ☆MARK : OPTION

Figure 3 POWERPACK
AJ11 Dwg.No.AD11O1.3-EA

Figure 4 POWERPACK
AJ21 Dwg.No.AD1301.3-EA

NOTES 1. EITHER (※A) OR (※B) IS MOUNTED.
      2. ☆MARK : OPTION

Figure 5 POWERPACK
AJ41 Dwg.No.AD1411.3-EA

NOTES 1. EITHER (※A) OR (※B) IS MOUNTED.
      2. ☆ MARK : OPTION
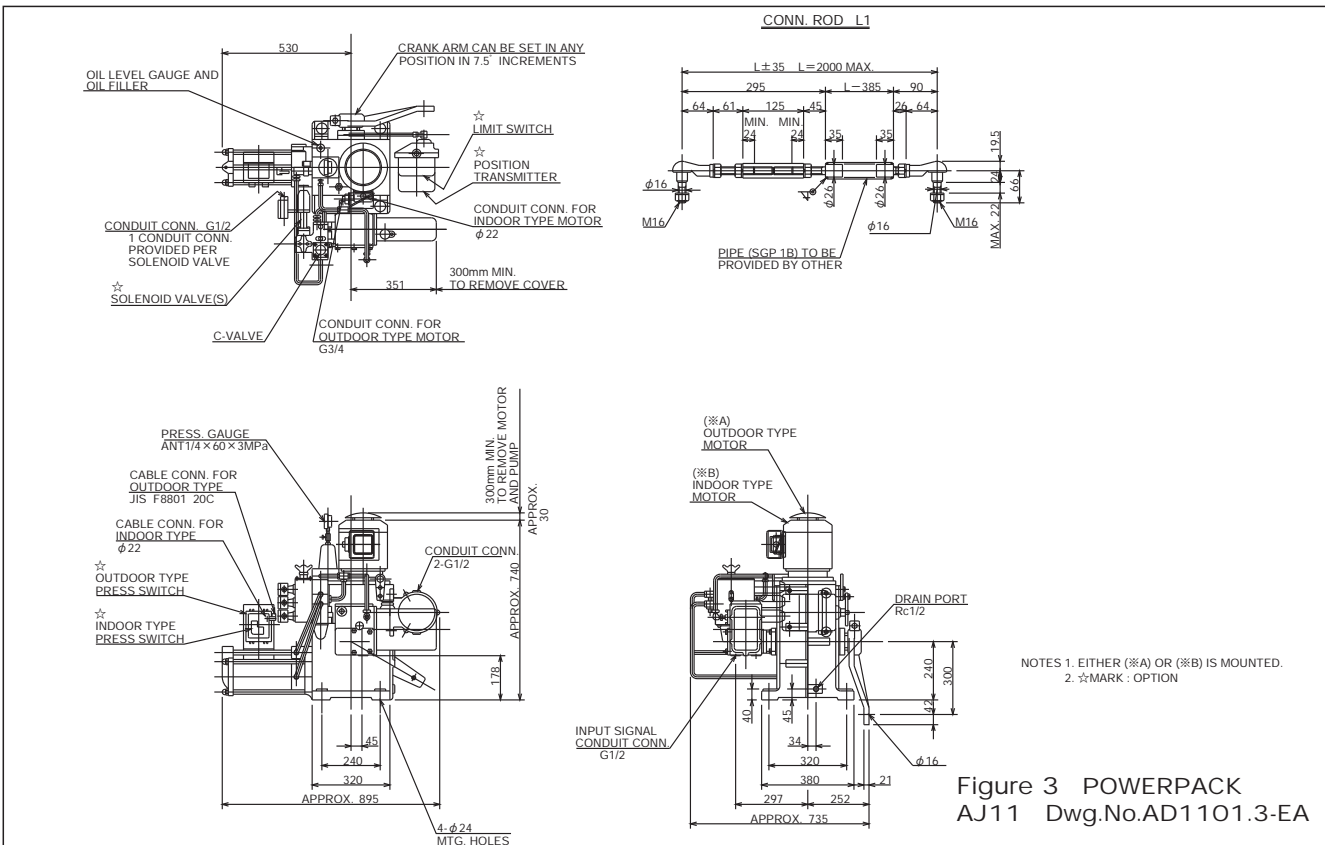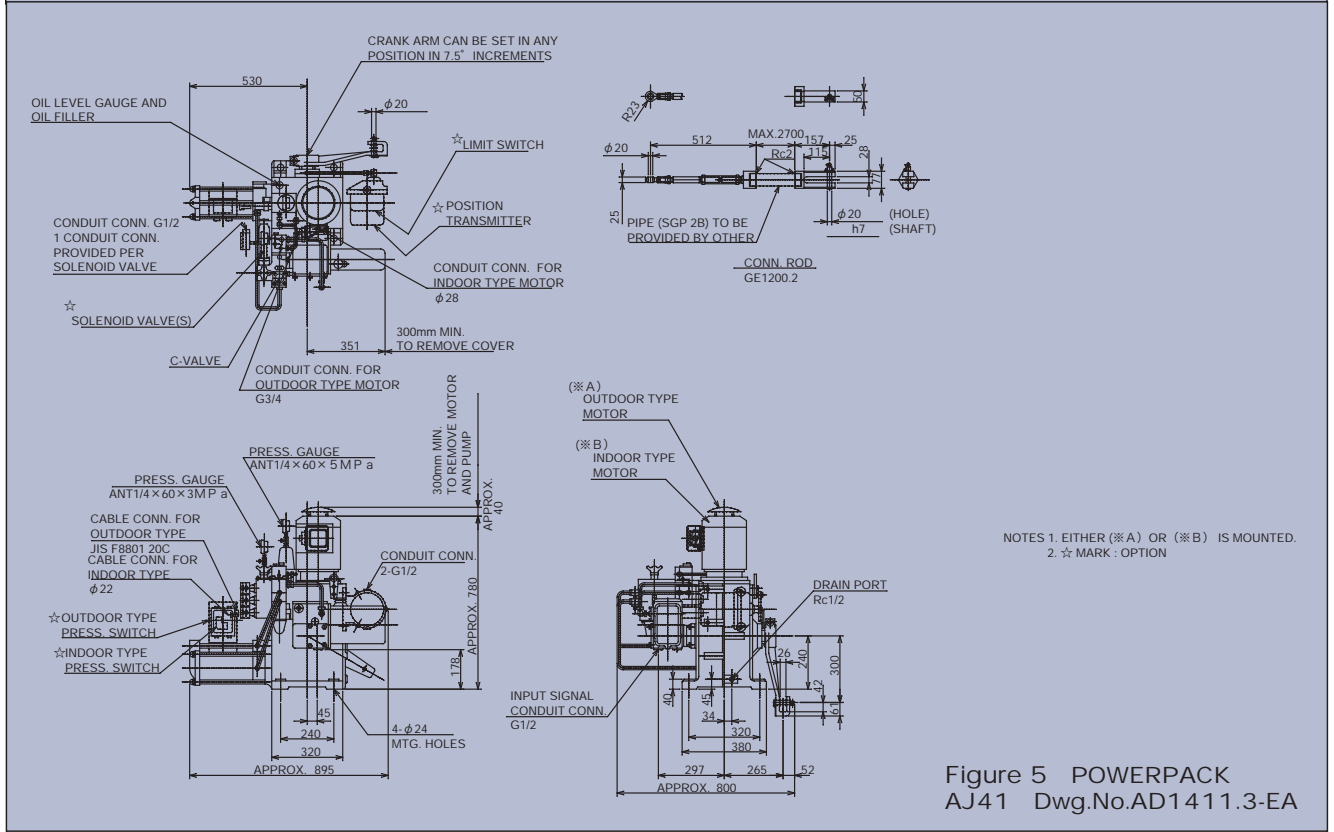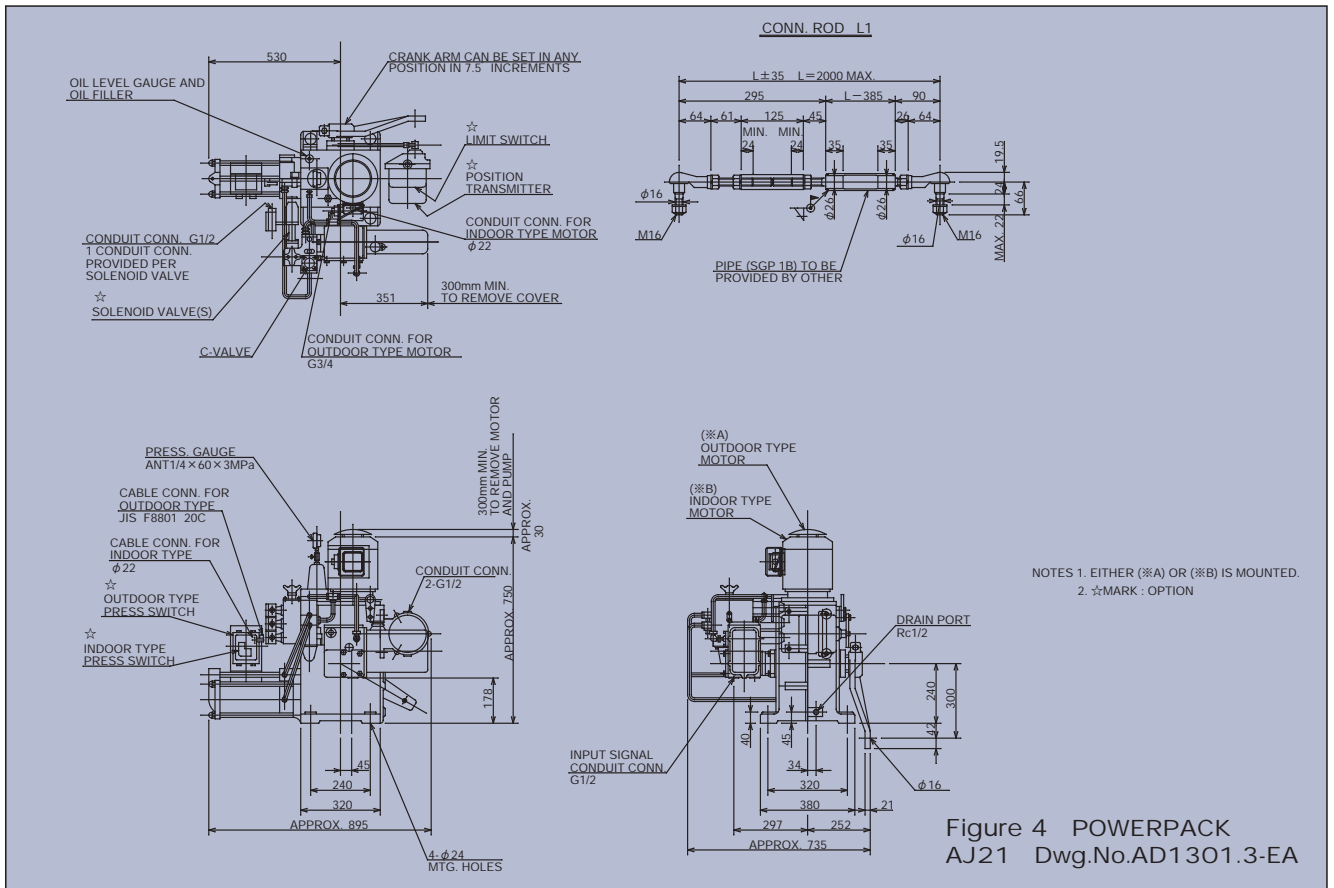
We reserve the right to change the specifications in this catalog without prior notice for improving and updating our products.

NIRECO

NIRECO CORPORATION

Kyobashi Office
Kyobashi 1-chome Bldg.,13-1,Kyobashi 1-chome,
Chuo-ku,Tokyo Japan 104-0031
Tel:+81-3-3562-2201 Fax:+81-3-3564-4316