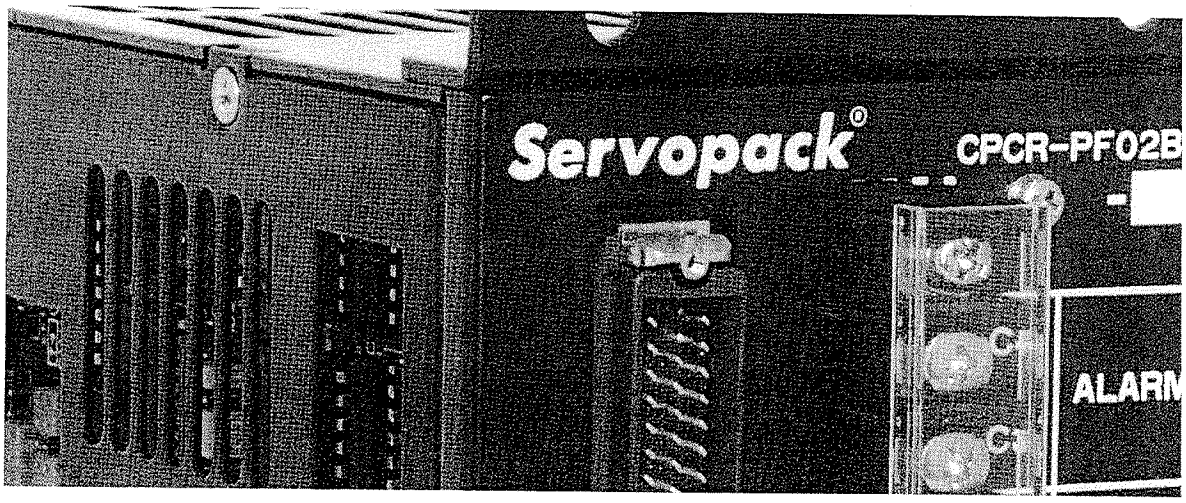
SERVOPACK

DC SERVOMOTOR CONTROLLER FOR POSITIONING CONTROL

TYPE CPCR-PF□□B



YASKAWA

Servopack Type CPCR-PF□□B is a highly-precise digital positioning controller for DC servomotors such as Print Motor Standard Series, Print Motor Super Series and Minertia Motor Mini Series.

The Servopack Type CPCR-PF□□B, thus, is useful for industrial machines in the fields where the following requirements are especially high:

- Wide range of variable speed control (1000 : 1)
- Frequent start and stop operations
- Frequent reversing operations
- High-speed precise positioning (10 μm or less)
- High-level servo characteristics

CONTROL SYSTEM

Fig.1 shows the simple positioning control system of the digital positioning control unit, Servopack Type CPCR-PF□□B and its DC servomotor.

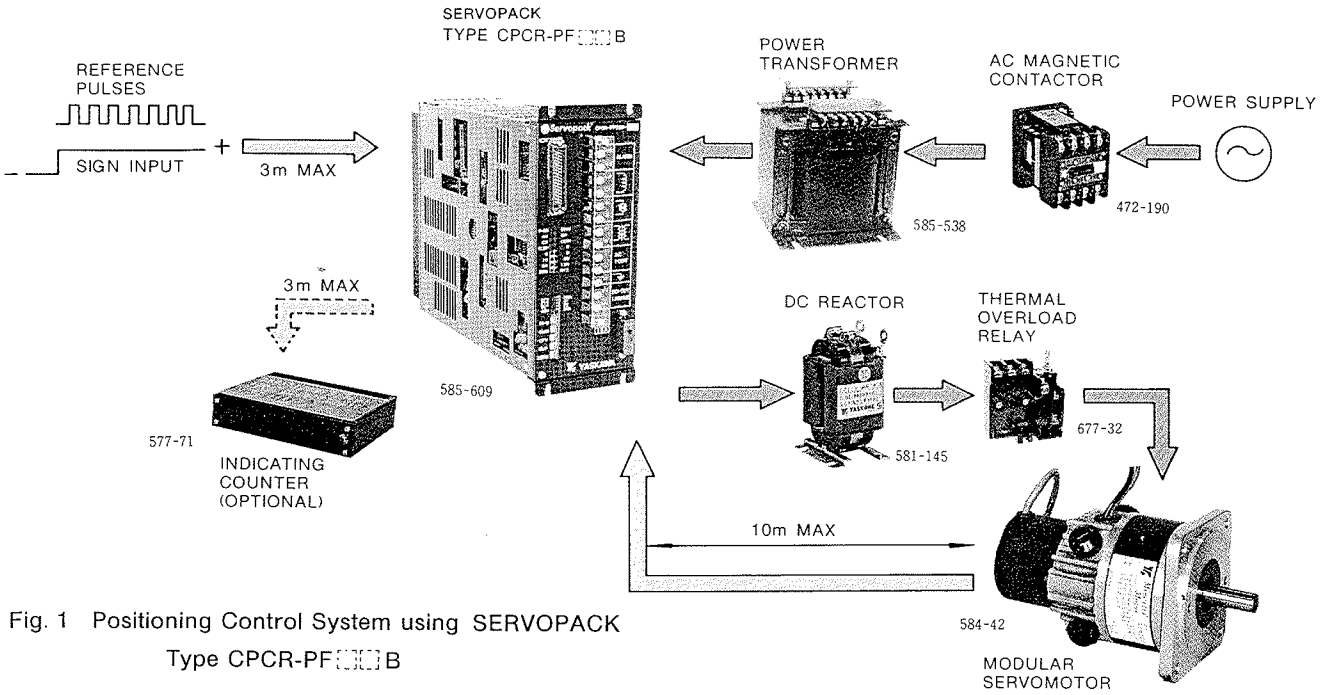


Fig. 1 Positioning Control System using SERVOPACK Type CPCR-PF□□B

CONTENTS

OPERATION PRINCIPLE

Servopack is supplied with pulses as command inputs. When a reference pulse is sent to Servopack, error counter counts the pulses. The counted reference pulses are converted to DC analog voltage by D/A converter and fed to servo section as speed reference. Then the servomotor starts to run and simultaneously the optical encoder generates feedback pulses in proportion to angular displacement. Error counter deducts feedback pulses from reference pulses. (Fig. 2)

With reference pulses fed to Servopack, pulse input and feedback operation continues and Servomotor keeps running. During the operation, constant lag pulses are counted by error counter. (Fig. 3)

Motor speed is proportional to frequency of reference pulses. When reference pulses are stopped, servomotor continues to run until lag pulse becomes zero. In the other words, motor stops after a movement by angular displacement in proportion to number of reference pulses.

Summaries of Servopack Operation

- Motor stops when motor runs by the angular displacement proportional to number of reference pulses which is equal to number of feedback pulses. [(Number of PG pulses/revolution) × (Number of motor revolutions)]
- Motor speed is in proportion to frequency of reference pulses.
  Frequency of reference pulses
  = (Number of PG pulses/revolution) × $\left[\frac{\text{Motor speed(r/min)}}{60}\right]$
  = Frequency of feedback pulses

Since Servopack system is a semi-closed-loop system, motor shaft repeats a slight forward/reverse movement by some displacement corresponding to one or two pulses.

Where the motor is gear-driven and frequency converter is provided in feedback loop to compensate for reduced movement according to reduction ratio, motor shaft repeats a slight forward/reverse movement by some displacement

corresponding to $\frac{1}{\text{frequency converting ratio}}$ × one or two pulses.

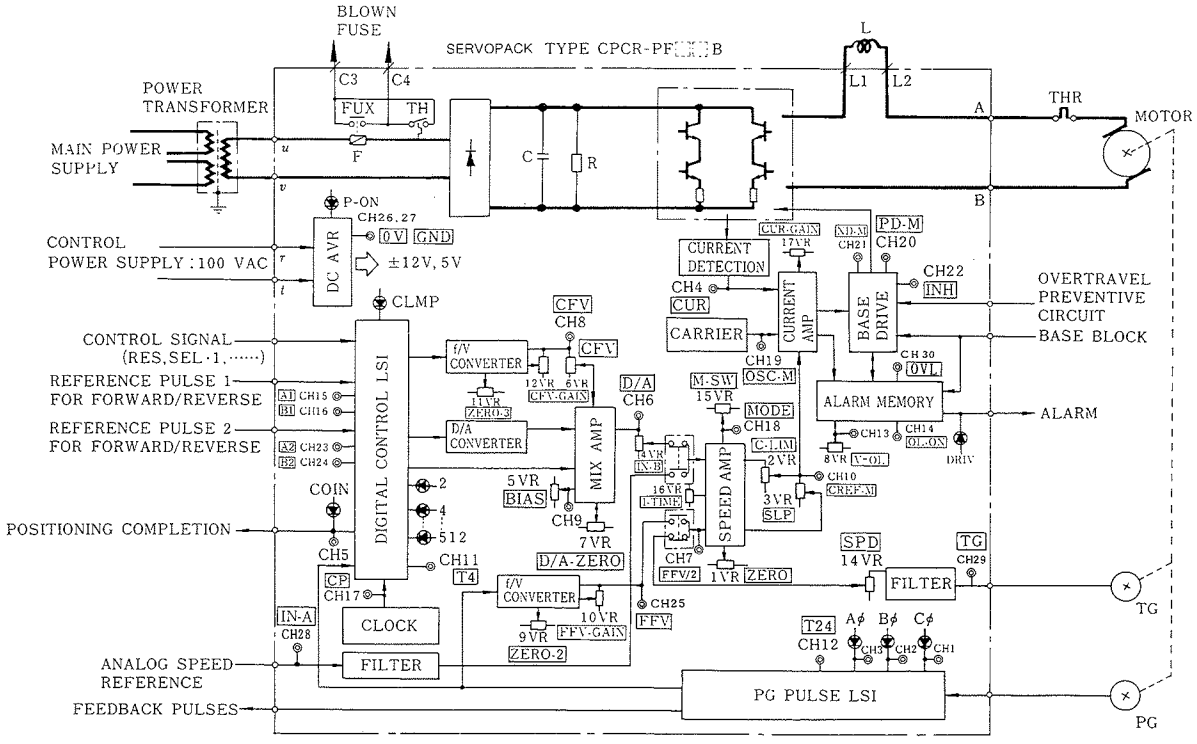


Fig. 2 Functional Block Diagram for Positioning Unit

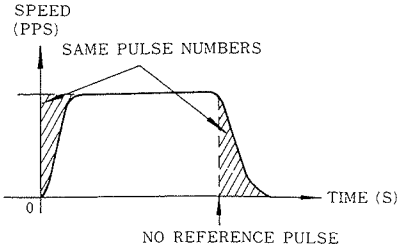
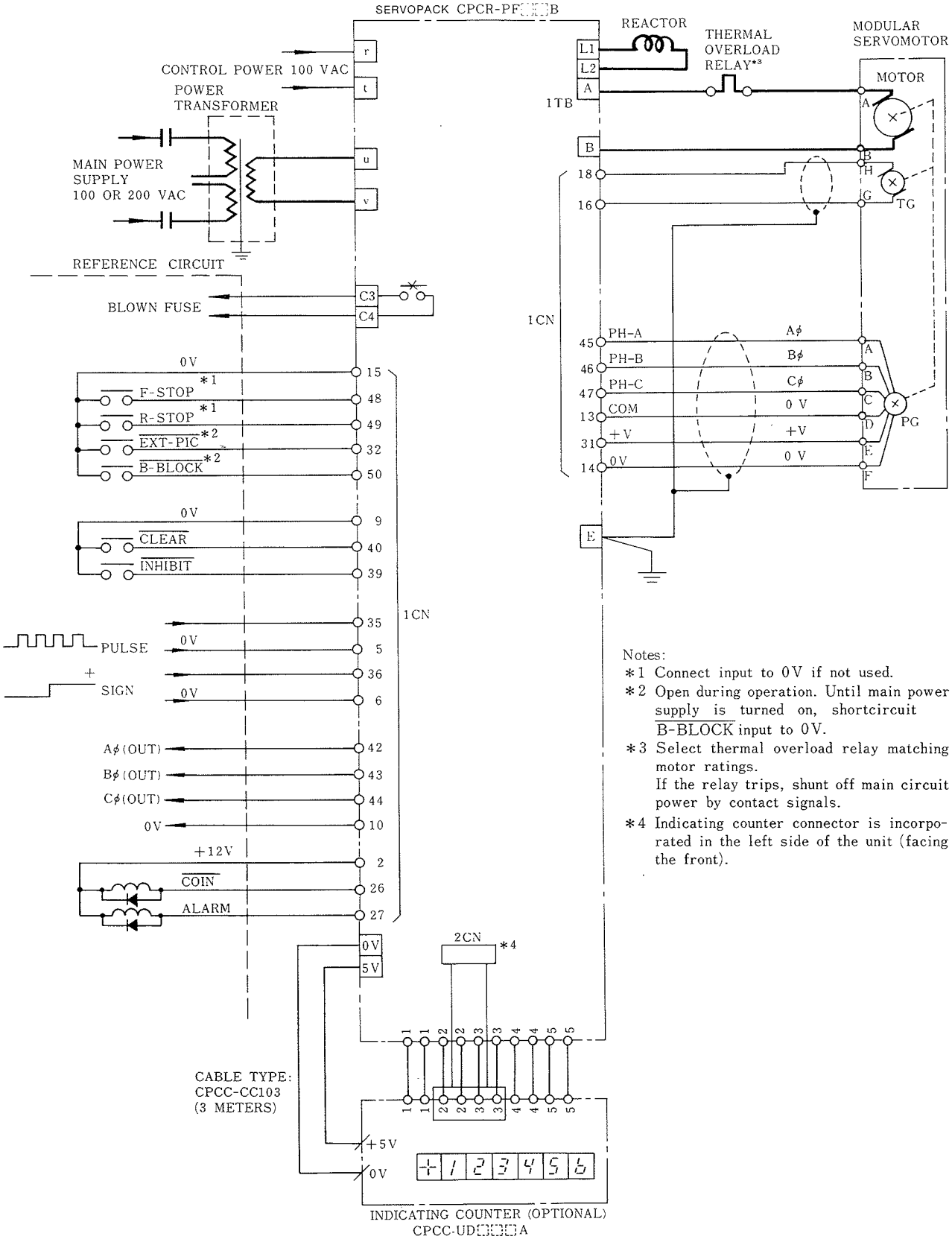


Fig. 3 Pulse Difference Numbers into Error Counter

SPECIFICATIONS

CONNECTION DIAGRAM



Notes:
*1 Connect input to 0V if not used.
*2 Open during operation. Until main power supply is turned on, shortcircuit $\overline{\text{B-BLOCK}}$ input to 0V.
*3 Select thermal overload relay matching motor ratings.
If the relay trips, shunt off main circuit power by contact signals.
*4 Indicating counter connector is incorporated in the left side of the unit (facing the front).

Fig. 4 Connection Diagram of SERVOPACK Type CPCR-PF

RATINGS AND SPECIFICATIONS

Table 1 Ratings and Specifications of Servomotor and Servopack

Servopack Type CPCR-		PF01B	PF02B	PF05B	Remarks
Servomotor Output		100W	200W	500W	
Control Method		Power transformer (installed separately), FEF-PWM			Carrier frequency: 15kH
Main Circuit Voltage		100/110VAC or 200/220VAC ±10%, 50/60Hz (single-phase)			Power transformer connected
Control Circuit Voltage		100VAC ±10%, 50/60Hz (single-phase)			—
Rated Voltage and Current		30V/5.6A	42V/6.4A	81V/7.5A	—
Max Instantaneous Current		12A ±10%	20A ±10%	20A ±10%	Servomotor specifications
Waveform Factor		1.05 max			—
Derating Factor		95% min			—
Speed Control Range		1: 1000 min			—
Speed Regulation	Load (0 to 100%)	±0.1% max			At motor rated speed, use of TG
	Voltage (±10%)	±0.1% max			
	Temperature (25° ±25°C)	±0.5% max			
Reference Pulse		+12V level (sign + pulse train input)			with optional function
Reference Pulse Frequency		f_{IN}: 0 to 100kpps max			—
Feedback Pulse (f_{PG})		Two-phase pulse with 90° phase difference, with frequency dividing ratio • $0 < f_{IN} \leqq 50$kpps: $f_{PG} \times 1$ • 50kpps $< f_{IN} \leqq 100$kpps: $f_{PG} \times 2$, $f_{PG} \times 4$			with optional function
Alarm Detection	Blown Fuse/ Temperature	Built-in (contact output: normally open)			—
	Overload/ Overcurrent	Built-in (non-contact output: open collector output)			—
Protective Function	Overtravel	Available			—
	Proportional Drive Command				
	External Base-Block				
Fuse		7.5A	10A	15A	AC input
Cooling		Natural		Externally cooled	—
Temperature	Ambient	0 to 50°C (derating at 45°C or above)			—
	Storage	−20 to +70°C			—
Humidity		85% RH (non-condensing)			—
Dimensions in mm		90 × 220 × 300		100 × 220 × 300	W × H × D
Vibration, Shock		0.5 G (30-minute) max			—
Applicable GD^2_L*		$GD^2_L \leqq GD^2_M \times 3$			Not applied under minus load or continuous regeneration.

*The Servopack is not provided with a regenerative processing function. If large GD^2_L is required, use another Servopack with a regenerative processing unit, type CPCR-MR[ ]C.

AUXILIARY UNITS

Table 2 List of Auxiliary Units

Servopack Type CPCR-	Applicable Servomotor						Thermal Overload Relay Type	DC Reactor Type	Power Transformer Type	Magnetic Contactor Type
	Type	Effective Output W	Rated Speed r/min	Rated Torque N·m	Rated Voltage/ Current V/A	Applicable Inertia $\left(\frac{GD^2}{4}\right)$ kg·m²				
PF01	PMES-09	95	4000	0.238	26/5.5	0.0138	RHP-15/5.7	×3064 (1mH, 8A)	CPT10096 (300VA)	HI-10E
PF01-T3S	UGTMEM-03S	46.8	2000	0.235	24.4/3.6	0.00705	RHP-15/3.6		CPT10094 (200VA)	
PF01-T3M	UGTMEM-03M	54.2	1500	0.363	17/5.6	0.01	RHP-15/5.4F			
PF01-T3L	UGTMEM-03L	46.8	1000	0.470	21.2/4.4	0.0112	RHP-15/4.4F			
PF01-T6S	UGTMEM-06S	50.7	1300	0.392	19.8/4.8	0.0285		—		
PF01-T6M	UGTMEM-06M	58.5	1000	0.588	21/5.4	0.0315	RHP-15/5.4F			
PF01-T6L	UGTMEM-06L	61.5	700	0.882	22.1/5.6	0.0529				
PF01-R1S	UGRMEM-01S	28.5	3000	0.0951	25/2	0.00138	RHP-15/2.1F	×3064 (1mH, 8A)		
PF01-R2S	UGRMEM-02S	57	3000	0.191	25/3.9	0.0047	RHP-15/3.9F			
PF01-R2M	UGRMEM-02M	95	3000	0.319	32/4.5	0.00838	RHP-15/4.5F		CPT10096 (300VA)	
PF01-R4S	UGRMEM-04S	114	3000	0.382	32/5.3	0.0288	RHP-15/5.3F			
PF02	PMES-12	190	3000	0.637	42/6.4	0.045	RHP-15/6.6		CPT10097 (500VA)	
PF02-S03	UGSMEM-03A	114	4000	0.284	26.7/6.7	0.001	—		CPT10096 (300VA)	
PF02-S12	UGSMEM-12B	108.3	3000	0.363	27/6.2	0.0014				
PF02-R4M	UGRMEM-04M	190	3000	0.637	42/6.2	0.0503	RHP-15/6.2F		CPT10097 (500VA)	
PF05	PMES-16	475	2500	1.91	83/7.3	0.186	RHP-15/7.5	×5006 (2mH, 8A)	CPT10117 (1kVA)	
PF05-R8S	UGRMEM-08S	285	3000	0.955	49.6/7.5	0.153	RHP-15/7.5F			
PF05-R8M	UGRMEM-08M	475	3000	1.59	79.5/7.3	0.25				
PF02-M	UGMMEM-06AA1	185	3000	0.588	40.5/6.2	0.017	RH-35/6.2HV	×3064	CPT10097 (500VA)	
PF05-M	UGMMEM-13AA1	401	3000	1.27	68.5/7.4	0.0425	RH-35/6.9HV	×5006	CPT10117 (1kVA)	

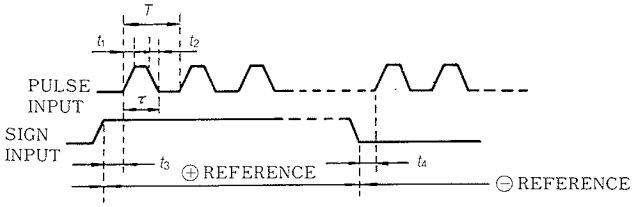
ELECTRICAL SPECIFICATIONS

Table 3 Electrical Specifications

Items		Specifications	Description
Power Supply		• Main circuit: 100/110VAC or 200/220VAC ±10%, 50/60Hz • Control circuit: 100VAC ±10%, 50/60Hz	Single phase
Reference Pulse*	Form	Sign signal + pulse train	—
	Voltage Level of Signals	+12V level/+5V level switchable...Semi-fixed by internal switch. • +12V level: H level = +10.8V to +12V, L level = 0V to +1.2V • +5V level: H level = +4.2V to +5V, L level = 0V to 0.8V	For input circuit, see Figs. 8 and 9.
	Sign Signal (SIGN)	⊕: H level, ⊖: L level	—
	Pulse Signals (PULSE)	Pulse frequency (max.) = $\frac{\text{Motor speed(r/min)}}{60}$ × f/f Ratio × Pulse No. of PG (Pulse/Rev.) × K ≦ 100kpps (K...PG multiple coefficient: 1, 2, 4) Pulse width = 50% Duty at max. frequency ≧ 5 μsec	Max. frequency of input pulse depends on specifications of servomotor and machine. Ramp input (automatic accel/decel) may be needed.

ELECTRICAL SPECIFICATIONS (Cont'd)

Table 3 Electrical Specifications (Cont'd)

Items		Specifications	Description
Reference Pulse*	Sign Signal and Pulse Signals	 $t_1, t_2 \leqq 0.1\,\mu$sec $\quad \frac{\tau}{T} \times 100 \leqq 50\%$ (Note) $\tau \geqq 5\,\mu$sec $\quad t_3, t_4 > 5\,\mu$sec	Note: Duty cycle less than 50% of max. frequency.
Feedback Pulses	Form	Two-phase pulse input with 90° phase difference.	—
	Voltage Level of Signals	+12V level/+5V level switchable • +12V level: H level = +10.8V to +12V, L level = 0V to 1.2V (cable length: 10m or less) • +5V level: H level = +4.2V to +5V, L level = 0V to +0.8V (cable length: 3m or less)	For input circuit, see Figs. 8 and 9.
	F.B Pulse Frequency	≦ 50kpps at input terminal of Servopack. After F.B pulse multiplied, the frequency must be 100kpps or less: $\left(\frac{\text{Number of motor revolutions}}{60} \times K \times \text{Number of PG pulses} \leqq 100\text{kpps}.\right)$	When input reference pulse frequency is from 50 to 100 kpps, increase F.B pulse 2 or 4 times.
Other Control Input Signal	Reference Pulse Inhibit Signal (INHIBIT)	Input reference pulse is inhibited.	−12V level/−5V level switchable... Semi-fixed by internal switch.
	Clear Signal (CLEAR)	Reference and F.B pulses are inhibited and D/A output is changed to 0V.	For input circuit, see Fig. 8.
	Forward OFF· Reverse OFF Signal (F-STOP, R-STOP)	Used for the followings: • Stopping forward/reverse running of the motor. • Preventing overtravel. • Together with dynamic braking circuit. When not used, connect input to 0V.	For input circuit, see Fig. 10.
	Proportional Drive Command Signal (EXT-PIC)	Used to put servo control section in proportional drive. When not used, open input.	
	Base Block Signal (B-BLOCK)	Makes clear, forward/reverse OFF and proportional drive command states: all reset status (Servopack does not control servomotor, resulting in free condition).	
Other Control Output Signal	Positioning Completion Signal (COIN)	Outputs when lag pulses of error counter are within the setting value. (±1 to ±7 pulses or ±63 pulses)	With certain specifications of servomotor and machine, the desired value may not be obtained. For output circuit, see Fig. 11.
	Servo Alarm Signal (ALARM)	Outputs when Servopack has any trouble.	—
	Feedback Pulse (Aϕ, Bϕ, Cϕ)	Outputs Aϕ, Bϕ and Cϕ pulses of optical encoder (PG).	For output circuit, see Fig. 12.
Ambient Temperature		0 to +50°C	—
Indicating Counter (Optional)		Command or prevent value indication: sign +6 digits indicating counter	Decimal point

*For reference pulse, two-phase pulse input with 90° phase difference signal is also available by setting internal switch.

PARTS FUNCTIONS ON FRONT PANEL

Fig. 5 shows the name and the functions of parts on the front panel of the Servopack.

INDICATING LAMPS

LED Functions

Symbol	Functions
P·ON	Lights when power supplies (+12V, −12V, +5V) are normal.
Aϕ	Lights when phase A pulse of PG "PH-A" is H level. (Also lights when PH-A input is open.)
Cϕ	Lights when phase C pulse of PG "PH-C" is H level. (Also lights when PH-C input is open.)
CLMP	Lights when lag pulses of error counter exceed saturation values. Saturation value differs with D/A gain.
4	Lag pulses of error counter: 4
16	Lag pulses of error counter: 16
64	Lag pulses of error counter: 64
256	Lag pulses of error counter: 256
DRIV	Controller in normal condition (If error, this lamp is OFF.)
Bϕ	Lights when phase B pulse of PG "PH-B" is H level. (Also lights when PH-B input is open.)
COIN	Lights in the range of "Positioning completion pulse width".
2	Lag pulses of error counter: 2
8	Lag pulses of error counter: 8
32	Lag pulses of error counter: 32
128	Lag pulses of error counter: 128
512	Lag pulses of error counter: 512

Error Indicating Lamp – Lag Pulse Relationship

The relationship between No. of error counter lag pulses, ε and total D (ε) of numbers indicated by error display varies with D/A gain.
The number of lag pulses is obtained by conversion as follows:

9 Bit→ $\varepsilon = D(\varepsilon)/2$
10 Bit→ $\varepsilon = D(\varepsilon)$
11 Bit→ $\varepsilon = 2 \times D(\varepsilon)$
12 Bit→ $\varepsilon = 4 \times D(\varepsilon)$

When the number of lag pulses exceeds the saturation limit, all the error indicating LEDs light and, at the same time, the CLMP LED lights.

CHECK TERMINALS

Check Terminal Functions

CH	Symbol	Functions
8	CFV	Reference pulse—f/V output
25	FFV	Feedback pulse—f/V output
6	D/A	D/A converter output (speed reference)
29	TG	TG feedback signal
4	CUR	Motor current (feedback current)
5	COIN	Positioning completion
3	Aϕ	PG: phase A pulse
2	Bϕ	PG: phase B pulse
1	Cϕ	PG: phase C pulse
27	GND	Signal 0V

OPERATIONAL SIGNAL

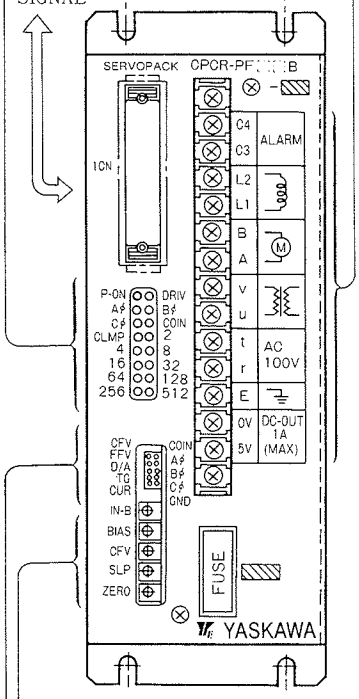


Fig. 5 Front Panel of Servopack

Terminal Functions

Symbol	Functions
C4	Contact output of thermal switch and blown fuse (normally contact)
C3	
L2	DC reactor connection
L1	
B	Motor connection
A	
v	Main power input (from power transformer)
u	
t	Control power input (100VAC)
r	
E	Ground
0V	5VDC output for indicating counter
5V	

Note: Indicating counter is optional unit which counts pulse signal. The unit indicates accumulated value.

Type Designation:
CPCC-UD□□□□A
- Indicating digits after the decimal point (0 to 2)
- Total indicating digits (4 to 6)
- Sign indication (+ or −)
  1: Use of sign,
  0: No sign

POTENTIOMETERS

Potentiometer Functions

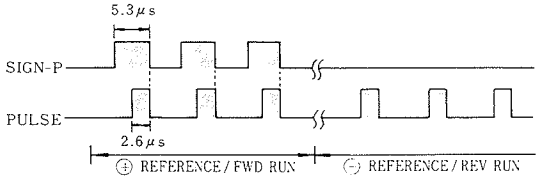
VR	Symbol	Functions
4	IN-B	Position loop gain
5	BIAS	Speed reference bias compensation
6	CFV	Speed reference feed forward compensation
3	SLP	Speed loop gain
1	ZERO	Zero adjustment of speed amplifier

PARTS FUNCTIONS ON FRONT PANEL (Cont'd)

Table 4 Pin Number, Signal Name and Function of 2CN Connector
(For Indicating Counter Connection)

Pin No.	Signal Name	Functions	Pin No.	Signal Name	Functions
2CN-A1	PULSE (CO)	Digital pulse output to indicating counter. (TTL level)	2CN-B3	$\overline{\text{SIGN-P (CO)}}$	Code reference output to indicating counter. (TTL level)
2CN-B1	$\overline{\text{PULSE (CO)}}$	Digital puise output to indicating counter. (TTL level)	2CN-A4	0V	0V common line.
			2CN-B4	0V	0V common line.
2CN-A2	0V	0V common line.	2CN-A5	RES (CO)	Reset reference output to indicating counter. (TTL level)
2CN-B2	0V	0V common line.			
2CN-A3	SIGN-P (CO)	Code reference output to indicating counter. (TTL level)	2CN-B5	$\overline{\text{RES (CO)}}$	Reset reference output to indicating counter. (TTL level)

Notes:
1. Connector 2CN is placed into the left side of Servopack.
2. Relationship between sign and output pulse for the indicating counter:



Connections of 1CN

50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
$\overline{\text{B-BLK}}$	R-STP	F-STP	PH-C	PH-B	PH-A	Cϕ (OUT)	Bϕ (OUT)	Aϕ (OUT)		$\overline{\text{CLEAR}}$	$\overline{\text{INH}}$			SIGN-1	PULS-1		
		32	31	30	29	28	27	26	25	24	23	22	21	20	19		
		$\overline{\text{E-PIC}}$	Vcc (PG)				ALAM	$\overline{\text{COIN}}$									
18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
TG		0V (TG)	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	+12V	+12V	

Note: Use the following connector and its receptacle made by Honda Tsushin Co.,Ltd:

PRINTED CIRCUIT BOARD SIDE

- Connector—Type MR-50RMA
- Receptacle—Type MR-50F
- Receptacle case—Type MR-50L

Table 5 Correspondence of 1CN and Control Signals

Pin No.	Signal	Functions
1		
2	+12V*	+12V output for relay drive
33		
3	+12V*	+12V output for relay drive
4	0V	
34		
35	PULSE-1	First reference pulse signal input
19		
5	0V	0V line for PULSE-1 signal
36	SIGN-1	First reference sign signal input
20		
6	0V	0V line for SIGN-1 signal
37		
21		
7	0V	
38		
22		
8	0V	
39	$\overline{\text{INHIBIT}}$	Reference pulse inhibit signal
23		
40	$\overline{\text{CLEAR}}$	Reset signal
24		
41		
25		
9	0V	0V line for $\overline{\text{INHIBIT}}$ and $\overline{\text{CLEAR}}$ signals
42	Aϕ(OUT)*	PH-A pulse output (open-collector)
43	Bϕ(OUT)*	PH-B pulse output (open-collector)
44	Cϕ(OUT)*	PH-C pulse output (open-collector)
10	0V	0V line for Aϕ, Bϕ and Cϕ signals
26	$\overline{\text{COIN}}$*	Positioning completion signal output (open-collector)
27	ALARM*	Alarm signal output (open-collector)
11	0V	0V line for $\overline{\text{COIN}}$ and ALARM signals
45	PH-A	Aϕ pulse input from optical encoder (PG)
28		
12	0V	0V line for PH-A signal
46	PH-B	Bϕ pulse input from optical encoder (PG)
29		
13	0V	0V line for PH-B signal
47	PH-C	Cϕ pulse input from optical encoder (PG)
30		
14	0V	0V line for PH-C signal
31	VCC (PG)*	Power supply (+5V or +12V) for optical encoder (PG)
32	$\overline{\text{EXT-PIC}}$	Proportional drive command signal
48	F-STOP	Forward run stop signal (for overtravel)
49	R-STOP	Reverse run stop signal (for overtravel)
50	$\overline{\text{B-BLOCK}}$	Base block signal
15	0V	0V line for $\overline{\text{EXT-PIC}}$, F-STOP, R-STOP and $\overline{\text{B-BLOCK}}$ signals
17		
16	0V (TG)	0V line for TG signal
18	TG	Speed feedback signal from TG: ±7V/1000 r/min

*Output signal
Note: Do not use the pins of no signal names and functions, for they are used for other signals.

PARTS FUNCTIONS ON FRONT PANEL (Cont'd)

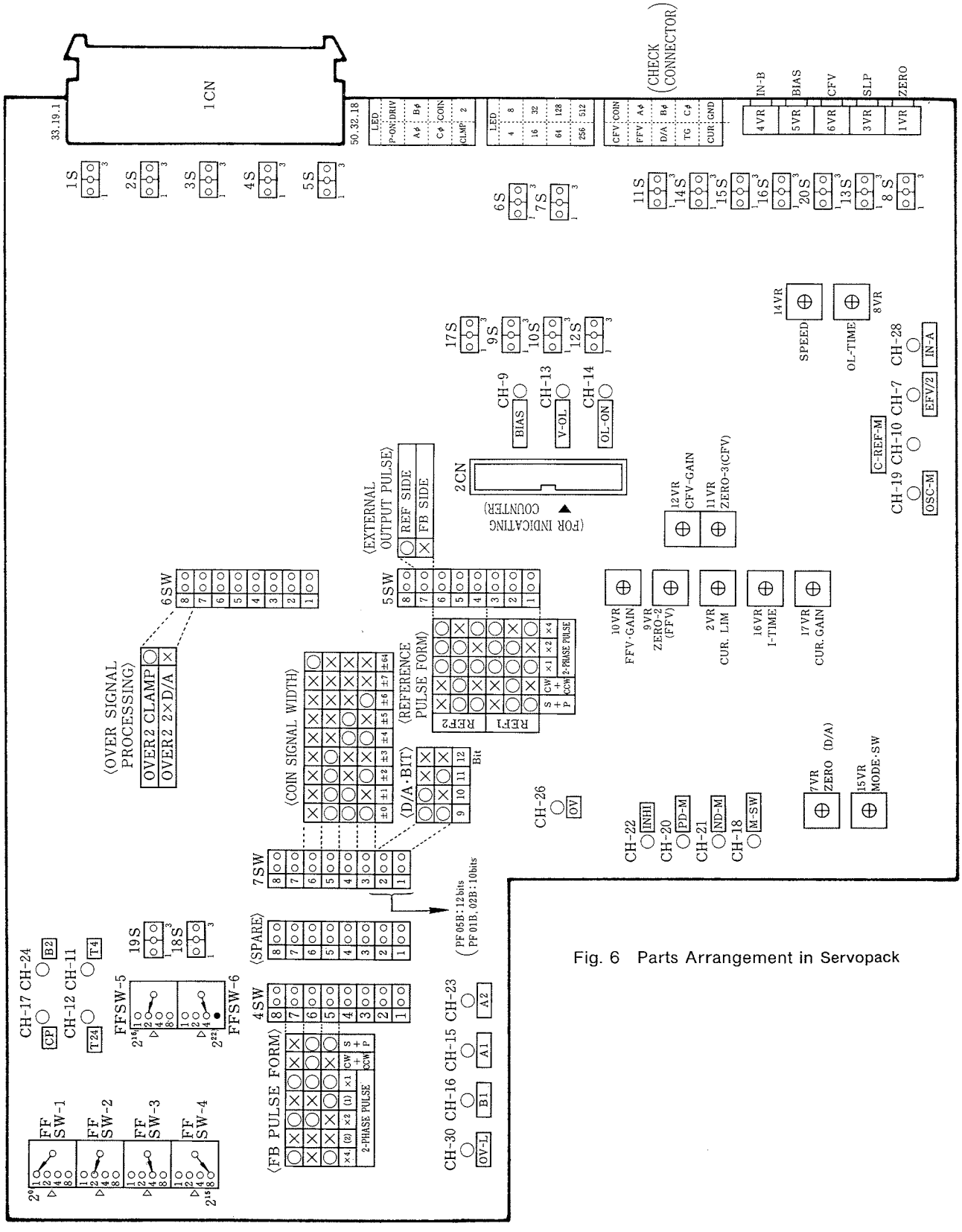


Fig. 6 Parts Arrangement in Servopack

Table 6 Potentiometer Functions

VR	Symbol	Functions
1	ZERO	Zero adjustment of speed amplifier
2	C-LIM	Current reference limit
3	SLP	Speed loop gain
4	IN-B	Position loop gain
5	BIAS	Speed reference bias compensation
6	CFV	Speed reference feed forward compensation
7	D/A-ZERO	Zero adjustment of speed reference
8	OL-TIME	Overload detection time setting
9	ZERO-2	Zero adjustment of PG pulse f/V converter
10	FFV-GAIN	Output voltage setting of PG pulse f/V converter
11	ZERO-3	Zero adjustment of reference pulse f/V converter
12	CFV-GAIN	Output voltage setting of reference pulse f/V converter
14	SPD	Motor speed adjustment
15	M-SW	Operational voltage setting of mode switch
16	I-TIME	Integral time setting of speed amplifier
17	CUR-GAIN	Current amplifier gain

Table 7 Check Terminal Functions

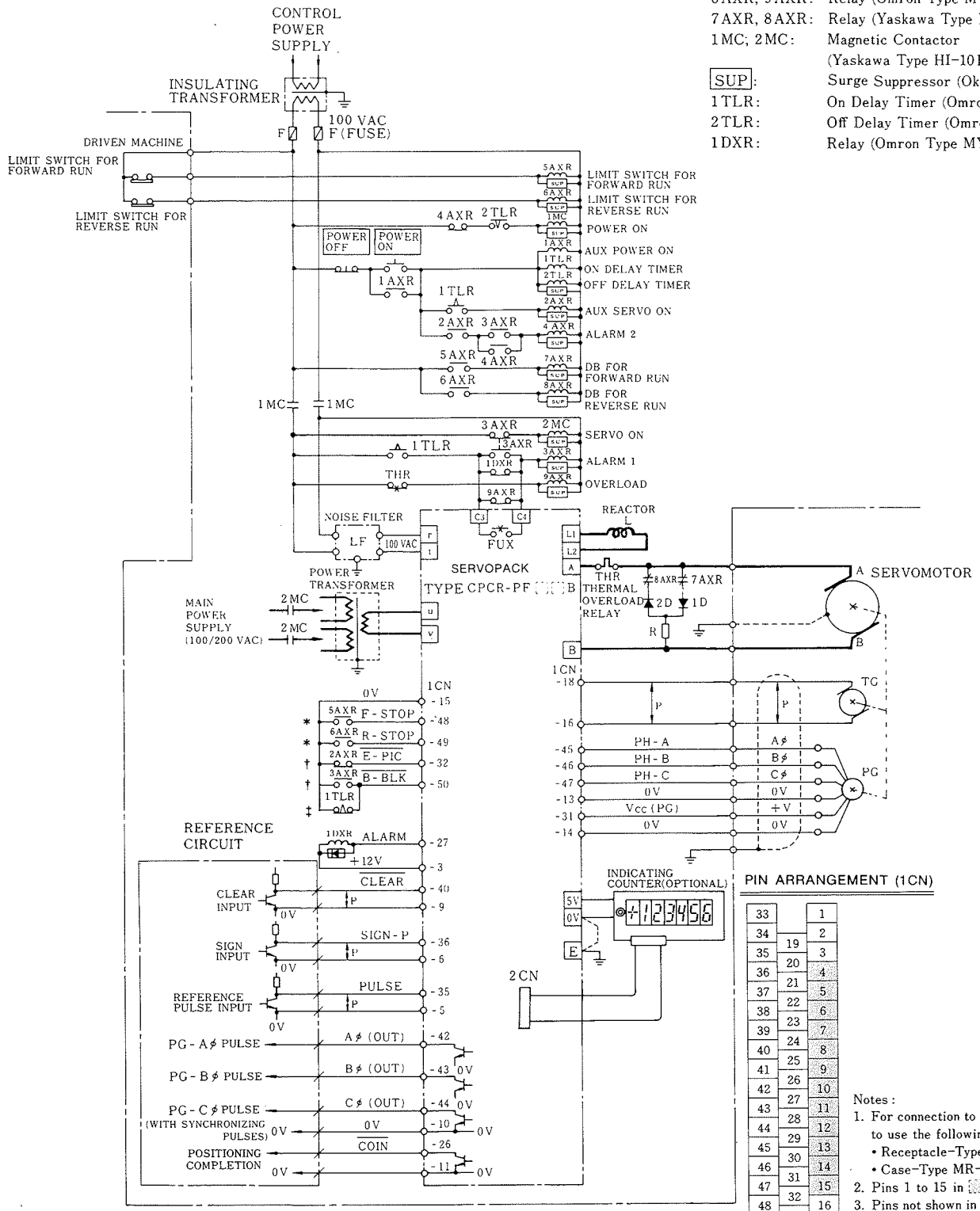
CH	Symbol	Functions
1	Cϕ	PG: phase C pulse
2	Bϕ	PG: phase B pulse
3	Aϕ	PG: phase A pulse
4	CUR	Motor current (feedback current)
5	COIN	Positioning completion
6	D/A	D/A converter output (speed reference)
7	FFV/2	Feedback pulse-f/V output (1/2 value)
8	CFV	Reference pulse-f/V output
9	BIAS	Speed reference bias compensation
10	C·REF-M	Speed amplifying output (current reference)
11	T4	Clock signal (LSI for counter)
12	T24	Clock signal (LSI for f/f)
13	V-OL	Overload detecting voltage
14	OL-ON	Overload detecting signal
15	A1	Pulse (reference) signal
16	B1	Sign (reference) signal
17	CP	Basic clock
18	MODE	Mode switch
19	OSC-M	PWM carrier signal
20	P·D-M	Base drive signal (forward run)
21	N·D-M	Base drive signal (reverse run)
22	INHI	Gate driver power error (alarm at H level)
23	A2	Pulse (aux. input) signal
24	B2	Sign (aux. input) signal
25	FFV	Feedback pulse-f/V output
26	0V	Power 0V line
27	GND	Signal 0V line
28	IN-A	Speed reference input
29	TG	TG feedback signal
30	OVL	Overvoltage level signal

CONNECTION DIAGRAM

Fig. 7 shows the connection diagram for Servopack Type CPCR-PF□□B and motor. Connection should be made correctly, referring to the figure below.

COMPONENT SYMBOLS AND NAMES

1AXR to 6AXR, 9AXR:	Relay (Omron Type MY-4N, 100 VAC)
7AXR, 8AXR:	Relay (Yaskawa Type RA-6E2)
1MC; 2MC:	Magnetic Contactor (Yaskawa Type HI-10E, 100 VAC)
SUP:	Surge Suppressor (Okaya Type CR50500)
1TLR:	On Delay Timer (Omron, 1s)
2TLR:	Off Delay Timer (Omron, 1s)
1DXR:	Relay (Omron Type MY-4N, 12 VDC)



PIN ARRANGEMENT (1CN)

*F-STOP and R-STOP inputs should be shortcircuited to 0V when no using these inputs.
†EXT-PIC and B-BLOCK inputs should be open while normal operation.

Notes:
1. Use a noise filter for external noise.
2. Since base block signal (B-BLOCK) is also used for operation preparation, the signal is turned on and should be maintained for more than 0.5s, after main and control powers are turned on.

Notes:
1. For connection to connector 1CN, be sure to use the following receptacle:
   • Receptacle-Type MR-50F'
   • Case-Type MR-50L,
2. Pins 1 to 15 in ▨ are used for 0V line.
3. Pins not shown in the figure at left should not be used because they are applied to other functions.
4. Connector 2CN is placed into the left side of the module.

Fig. 7 Connection Diagram of Servopack Type CPCR-PF

SEQUENCE AND WIRING

INPUT SIGNAL

Input Reference Pulse and Sign Signal

- For timing of pulse train and sign signal, refer to Table 3.
- Input circuit (Configurations of SIGN and PULSE circuits are same.)

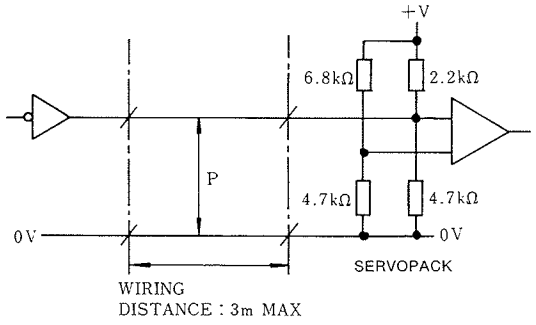


Fig. 8 Input Circuit 1

Feedback Signal (PH-A, PH-B, PH-C)

- For timing of feedback signal, refer to Table 3.
- Input circuit (same circuit for PH-A, PH-B and PH-C).

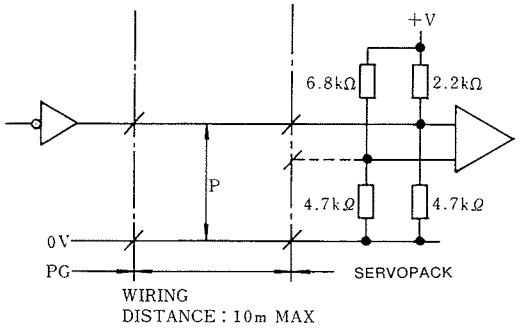


Fig. 9 Input Circuit 2

$\overline{\text{CLEAR}}$, $\overline{\text{INHIBIT}}$ Signal

- L level is effective for each signal. (When not used, open contact or connect to selection level, +12V or +5V.)
- Input $\overline{\text{CLEAR}}$ signal for 50 μs to 50 ms. (Inputting the signal more than 50 ms causes the motor to run continuously in a single direction.)
- Input circuit: Same as Fig. 9.

Overtravel Preventive Circuit (F-STOP, R-STOP)

The motor overtravel preventive circuit is to prevent motor further rotation in forward or reverse direction. The circuit interrupts the output voltage for driving motor to cause a motor to coast to a stop. To put on brake to stop a motor, set the speed reference voltage to 0V or provide a dynamic braking circuit.

The circuit operates by opening terminals (48), (49) and (15). Terminals (48) and (15) makes forward run OFF circuit and (49) and (15) operates reverse run OFF circuit.

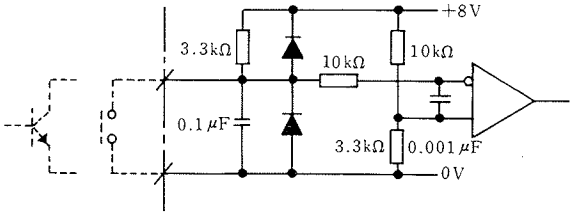


Fig. 10 Input Circuit 3

Proportional Drive Circuit

To retain Servopack unit in RESET condition, the position may shift due to drift of preamplifier.

To avoid this, short-circuit the terminals (32) and (15). This kills the integral operation of PI operation, resulting in controller loop gain reduction and drift decrease. In this case, by five or six percent of the friction torque, motor stops positively. Fig. 10 applies to input circuit.

Base Block Signal

Inputting base block signals (short-circuiting terms. (50) and (15)) sends any one of the following commands and causes a motor to coast to a stop.

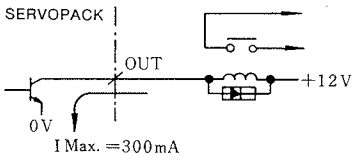
- CLEAR
- F-STOP, R-STOP
- Proportional drive

Fig. 10 applies to input circuit.

OUTPUT SIGNAL

Positioning Completion Signal ($\overline{\text{COIN}}$)

$\overline{\text{COIN}}$ signal turns on when lag pulses reach preselected values (±1 to ±7 pulses, or ±63 pulses). This is used as a positioning completion signal to start the next action. It outputs open collector signals. Operate the relay and use the contact signals.



Notes:
1. Use miniature relay type MY4Z rated 12 VDC made by Omron Corporation or the equivalent.
2. Be sure to connect a surge suppressor in parallel with the relay.

Fig. 11 Output Circuit

Servo Alarm Signal (ALARM)

ALARM signal is turned off when the following troubles are detected. At the time, output transistor is turned off (Base off) and a function of motor drive circuit is stopped.

- Error counter overflow
- Motor locked condition for more than 2 seconds
- Overcurrent
- Overvoltage
- Open phase of feedback pulses
- Defective or short-circuited control power of +5 V or ±12 V

Activation of alarm circuit will activate base block circuit and stop motor operation.

Alarm circuit is a memory circuit. To erase the memory, use either of the following methods:

① Shut off control power,

② Input base block signal externally.

Fig. 11 applies to output circuit which outputs open collector signals.

Feedback Pulses

[Aϕ(OUT), Bϕ(OUT), Cϕ(OUT)]

- Aϕ(OUT), Bϕ(OUT)

Phase A, B, and C (Zero point pulses) pulses from PG are of open collector outputs. They are received by Servopack and then output.

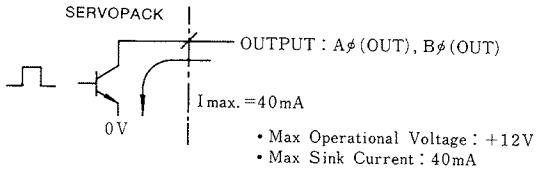


Fig. 12 Pulse Output Circuit

Cϕ (OUT)

Zero point pulse signals from PG. Used only for PG with zero-point pulses.

Power Supply (+12V) for Relay Drive

Relay drive for $\overline{\text{COIN}}$ and ALARM.
Since allowable output current is 160 mA, up to 2 relays can be connected.

Power Supply (Vcc) for Optical Encoder

This power supply (+5 V or +12 V) is used for optical encoder (PG). Voltage level is set to +5 V or +12 V by an internal switch.

WIRING FOR POWER SUPPLY

(1) Be sure to make a sequence so that base block (B-BLK) signal is released after control power (100 VAC) and main circuit power are applied to Servopack 0.5 second and over.

(2) Disconnect the main circuit power supply to the Servopack at least 1 second before control power is turned off.

(3) If Servopack is applied for control of vertical shaft, separate mean should be added to prevent lowering of the shaft at power-on or power-off.

SEQUENCE CIRCUIT FOR PROTECTION

(1) Alarm signals such as thermal relay, Servopack, and blown fuse indication should be connected correctly. Make a sequence so that Servopack power is shut off if these alarm signals are activated.

(2) Where operation distance of driven machine is limited, limit switches should be provided in order to protect the driven machine and Servopack unit. The following sequence circuits should be formed.

- Activation of alarm limit switches will stop motor by dynamic braking.
- Activation of overtravel limit switches will turn off all the powers and protect the machine.

WIRING PRECAUTIONS

(1) Make tap connection of power transformer (1T) for Servopack as shown in Table 8.

(2) Use shielded cable provided for signal line (PG) to Servopack.

(3) Do not apply any tension to leads for I/O signals because Servopack is wired through the connectors using leads of 0.2 mm^2 or 0.3 mm^2.

(4) To avoid malfunction caused by noise.

- Insert an insulating transformer (2T) and noise filter (1LF) between control power supply (100 VAC) and AC main power supply.
- Be sure to install the noise filter, Servopack unit and the indicating counter as close as possible to each other.
- Be sure that connections to primary and secondary windings of the transformer and noise filter are not run together. Ground terminal should be connected to ground pole or the equivalent by ground conductor.
- Be sure to connect surge-absorbing circuit to coils of relays, contactors and solenoids, respectively.
- Be sure to make connection with a space of 30 cm between AC power lines and DC power lines or signal lines such as PG or reference circuit and do not run within same bundle or duct.

(5) Make one point ground connection (up to 100Ω in accordance with Japanese standards, or refer to the national local codes) and use a larger conductor (braided-copper wire or the leads of 3.5 mm^2 or more).

(6) If motor should be electrically insulated from machine by oil, etc., make a separate connection from motor base to ground.

(7) Transformer for Multi Servopack Units

Where two or more Servopack units are applied to one transformer, each Servopack units requires an independent secondary winding of the transformer. For an exclusive transformer for multiple Servopack units, contact your Yaskawa representative.

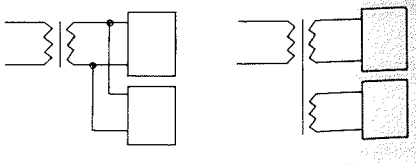
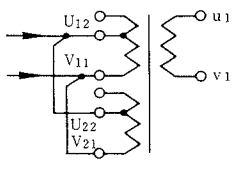
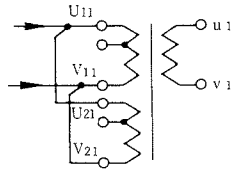
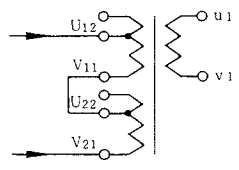
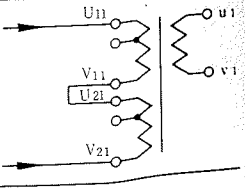
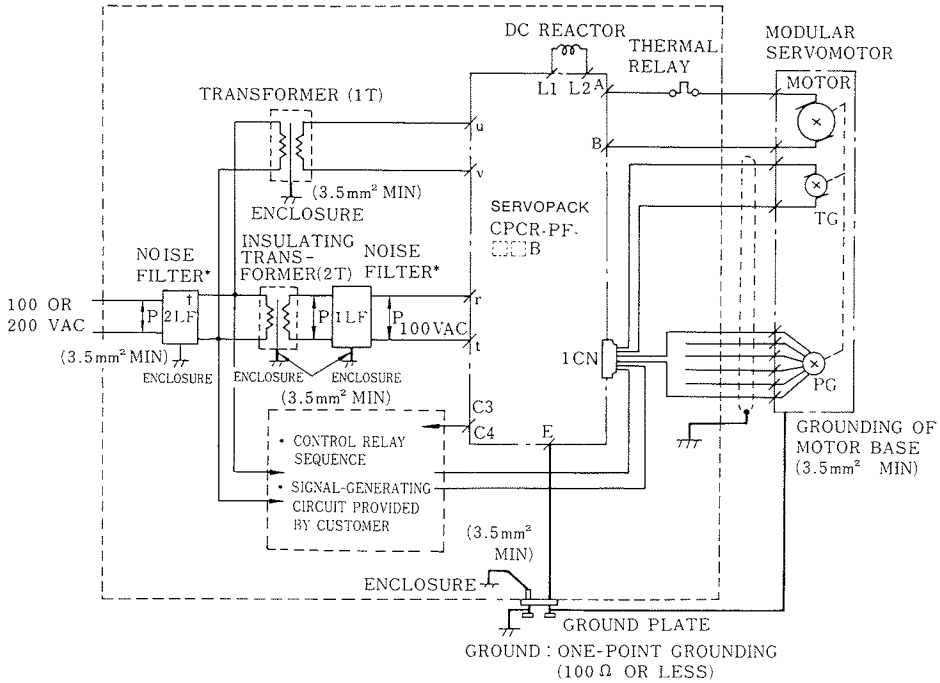


Fig. 13 Connections of Transformer for Multi Servopack Units

Table 8 Tap Connection of Power Transformer (1T) for Servopack Type CPCR-PF□□B

Supply Voltage	100V AC (50/60Hz)	110V AC (50/60Hz)	200V AC (50/60Hz)	220V AC (50/60Hz)
Tap Connection				



* Recommended noise filter
  - 1LF: Type LF-205A
  - 2LF: Type LF series

+ If noise is superposed on AC input, connect 2LF as shown in figure left.

Notes:
1. Use braided-copper conductor of 3.5 mm^2 or larger for grounding.
2. Zero volt lines in the circuits should be connected to ground at the terminal E of Servopack (CPCR-PF□□B).

Fig. 14 Typical Grounding

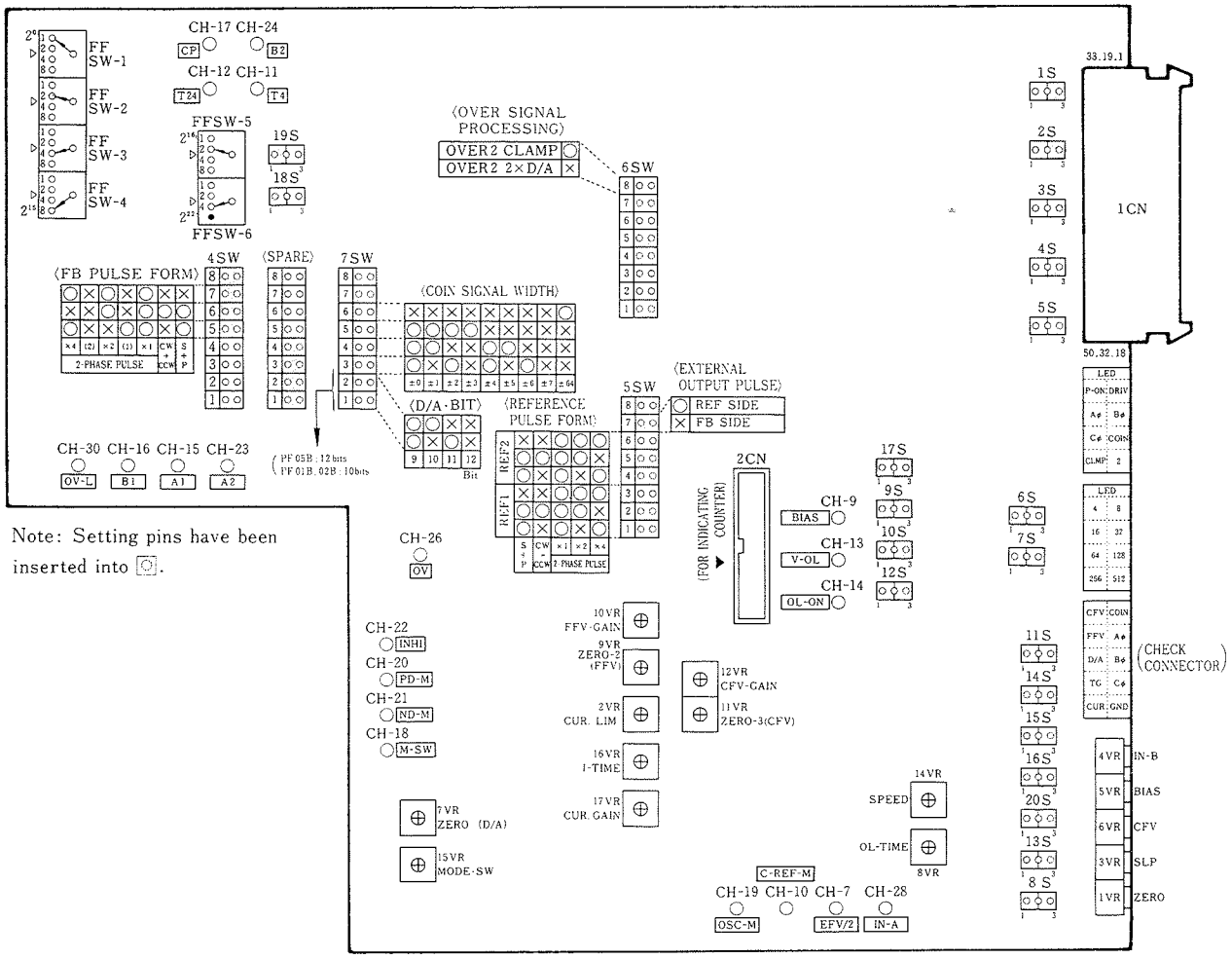
INTERNAL SWITCH SETTING

STANDARD SETTING

Servopack has been factory-adjusted in basis of standard setting specifications given in Table 9, before shipping. Fig. 15 shows switch arrangement and standard setting.

Table 9 Servopack Standard Setting Specifications

Item		Standard Specification
Reference Pulse	Voltage Level	+12V
	Signal Form	Sign + pulse train
FB Pulse	PG Power Supply	+12V
	Signal Form	90° Phase shift, 2-phase pulses (Multiplier: 1)
	PG Output Stage	Collector output, +12V
	Freq. Div. Ratio (f/f Ratio)	×1 (Without f/f conversion)
$\overline{\text{CLEAR}}$, $\overline{\text{INHIBIT}}$ Signal Level		+12V
No. of Bits of D/A Converter (D/A gain)		10 Bits
Set Width of Positioning Comp. Signal ($\pm\Delta\varepsilon$)		±7 Pulses
Value Indicated by Indicating Counter (optional)		Reference pulse Indication



Note: Setting pins have been inserted into ⊡.

Fig. 15 Setting Switch Arrangement and Standard Setting

CHANGING OF SWITCH SETTING

When changing of switch setting is required, use the switch setting procedure shown in Fig. 16.

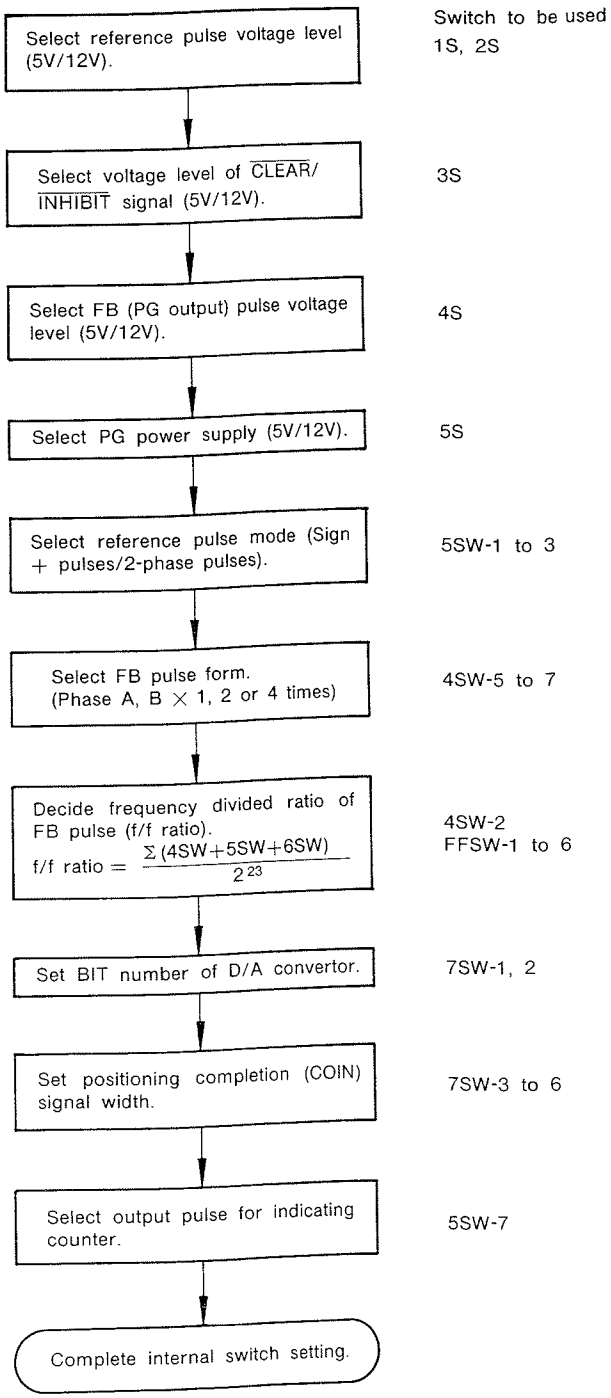


Fig. 16 Internal Switch Setting Procedure

Voltage Level Setting

Voltage level (+5 V or +12 V) of signal or optical encoder (PG) should be checked, and then set by using 1S to 5S.

Table 10 Voltage Level Setting

Item	+5V	+12V
Reference Pulse Voltage Level	1S (1 ○○○ 3)	1S (1 ○○○ 3)
	2S (1 ○○○ 3)	2S (1 ○○○ 3)
CLEAR, INHIBIT Voltage Level	3S (1 ○○○ 3)	3S (1 ○○○ 3)
Feedback (FB) Pulse Voltage Level	4S (1 ○○○ 3)	4S (1 ○○○ 3)
PG Power, Voltage	5S (1 ○○○ 3)	5S (1 ○○○ 3)

Reference Pulse Form Setting

Only for 90° phase difference, 2-phase signals as shown below, set switch 5SW-1, 2 and 3 according to the reference pulse form and the multipliers.

Table 11 Setting in Accordance with Reference Pulse Form

Reference Pulse Form	Multiplier	Setting of 5SW-1, 2, 3
Sign + Pulse Train	–	3 ○○ 2 ○○ 1 ○○ — CM MODE
90° Phase Difference 2 Phase Pulses	×1	3 ○○ 2 ○○ 1 ○○ — CM MODE
	×2	3 ○○ 2 ○○ 1 ○○ — CM MODE
	×4	3 ○○ 2 ○○ 1 ○○ — CM MODE

Feedback (FB) Pulse Form Setting

Set the switch 4SW-5, 6 and 7 according to FB pulse multipliers (90° phase difference 2-phase signals) as shown in Table 12.

Table 12 Switch Setting According to FB Pulse Multiplier

Multiplier	Setting of 4SW-5, 6, 7
×1	7 ○○ 6 ○○ 5 ○○
×2	7 ○○ 6 ○○ 5 ○○
×4	7 ○○ 6 ○○ 5 ○○

Setting of FB Pulse Frequency Dividing Ratio (f/f Ratio)...4SW-2, FFSW-1 to 6

(1) Where frequency dividing ratio = 1 :

When f/f conversion is not made, turn off 4SW-2 (no installation of setting plug). When 4SW-2 is OFF, setting of FFSW-1 to 6 is ineffective.

(2) When f/f conversion is to be made :

Frequency dividing ratio k ($0<k<1$) for f/f conversion is obtained by the formula below, when the following data are given from the specifications:

- Load displacement per motor revolution = ΔL mm
- Displacement per pulse (lowest setting unit) = $\Delta \ell$ mm/pulse
- Number of output pulses of PG per motor revolution = n pulses

$$0 < k = \frac{\Delta L / \Delta \ell}{n \times K} < 1$$

K : Multiplier (1, 2, 4)

The positioning accuracy is influenced by the value of the frequency dividing ratio k. Calculate it to at least 8 digits after the decimal point.

(a) Turn on switch 4SW-2 (install the setting plug).

(b) Convert the value of [8388608 × k] into binary form

$$[8388608 \times k] = 1 \times (\underline{\text{FFSW-1}}\ \text{Data}) + 16 \times (\underline{\text{FFSW-2}}\ \text{Data}) + 16^2\ (256) \times (\underline{\text{FFSW-3}}\ \text{Data}) + 16^3\ (4096) \times (\underline{\text{FFSW-4}}\ \text{Data}) + 16^4\ (65536) \times (\underline{\text{FFSW-5}}\ \text{Data}) + 16^5\ (1048576) \times (\underline{\text{FFSW-6}}\ \text{Data})$$

(c) Set each scale of FFSW-1 to 6 according to each data (0 to 15) shown in Table 13.

Table 13 f/f Ratio Setting List

Data of FFSW-1 to 6	Scale of FFSW
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F

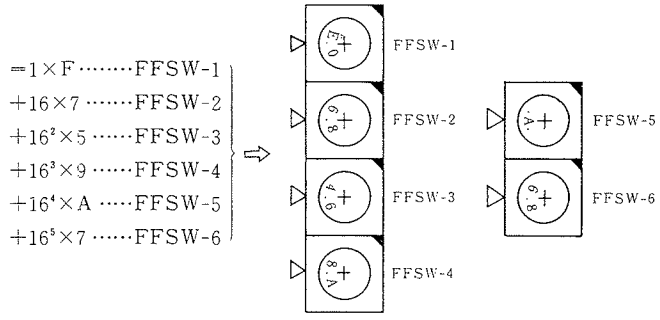
(3) Setting example:

Where frequency dividing ratio
k = 0.95768726,

(a) 8388608 × 0.95768726 = 8033663.011

(b) Round out decimals larger than 0.5 or otherwise disregard them and convert the result into hexadecimal form.

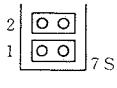
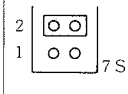
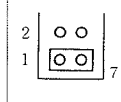
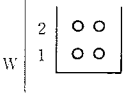
(c) 8033663 = (7A957F) HEX



Setting of Number of Bits for D/A Converter

Set number of bits (9 bits, 10 bits, 11 bits, 12 bits) for the D/A converter specified by lag pulses in the error counter with 7SW-1 and 2.

Table 14 Setting of Number of Bits for D/A Converter

9 Bits	10 Bits	11 Bits	12 Bits
			

Calculation method for starting time, positioning loop gain, and number of bits for D/A converter

Table 15 Machine Specifications and Electrical Specifications

Machine Specifications		Motor		*Servopack*	
Axis		Type		Type	CPCR-
Moving Member Speed (Max.)	/min	Rated Speed (N)	r/min	AC Input	V, ϕ
Overall Reduction Ratio		Rated Motor Torque (TM)	kg·cm	Max. Output Voltage	V
Load Torque at Motor Shaft (T_L)	kg·cm	Rotor Inertia (GD^2_M)	kg·cm²	Max. Output Current	A
Load Inertia at Motor Shaft (GD^2_L)	kg·cm²	Rated Motor Current (ia)	A	Continuous Output Current	A
Electrical Resolution	/pulse	Feedback Unit Type	TFUE-	Max. Set Current (Ip)	A
Electrical Accuracy (At Motor Shaft End)	±pulse	TG = ___V/___r/min PG = _____p/rev		—	

. Starting time

$$ta = \frac{(GD^2_M + GD^2_L) \times N \times 10^{-2}}{375 \times (ip/ia \times T_M \times 0.95 - T_L)} = \square\ \text{s}$$

. Positioning loop gain

$$kp = \frac{2}{1.4 \times ta} = \square\ \text{s}^{-1}$$

. No. of lag pulses in error counter

$$\varepsilon = \frac{fin}{kp} = \square\ \text{pulses}$$

fin: Reference pulse frequency (pps)

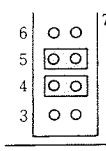
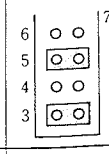
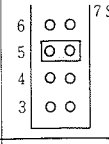
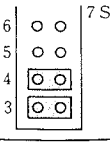
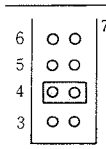
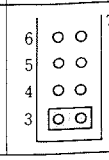
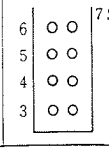
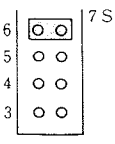
Table 16 Number of Bits for D/A Converter and Setting Width of Positioning Completion Signal

Lag Pulses in Error Counter: ε	No. of Bits for D/A Converter	Positioning Completion Signal Setting Width: $\pm\Delta\varepsilon$ (Target)
$\varepsilon < 512$ (pulse)	9 Bit	±2 pulses
$512 \leqq \varepsilon < 1024$	10 Bit	±3 pulses
$1024 \leqq \varepsilon < 2048$	11 Bit	±4 pulses
$2048 \leqq \varepsilon < 4096$	12 Bit	±5 pulses

Setting of Positioning Completion ($\overline{\text{COIN}}$) Signal Width

Set 7SW-3, 4, 5, 6 according to the positioning completion signal width determined by the number of bits of the D/A converter as follows.

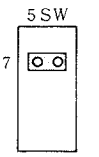
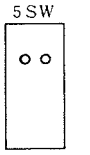
Table 17 Setting of Positioning Completion Signal Width

±1 Pulse	±2 Pulses	±3 Pulses	±4 Pulses
			
±5 Pulses	**±6 Pulses**	**±7 Pulses**	**±63 Pulses**
			

Selection of Indicating Counter Output Pulses

Select the indicating pulses for the indicating counter (optional) by setting 5SW-7, as follows.

Table 18 Setting of Pulses for Indicating Counter

For Indicating Accumulative Reference Pulses	For Indicating Accumulative FB Pulses
	

INSTALLATION PRECAUTIONS

LOCATION

(1) When installed in a panel:

Keep the temperature around Servopack at 50°C or below. Avoid blowing cooling air directly against the transistors on the printed circuit board.

(2) When installed near a heat source:

Keep the temperature around Servopack below 50°C.

(3) If subjected to vibration:

Mount the unit on shock absorbing material.

(4) If corrosive gases prevail:

Avoid the location where corrosive gases exist as it may cause extensive damage with long use, especially:

- Poor commutation of the motor commutator.
- Defective switching operation of contactors and relays.

(5) Where unfavourable atmospheric conditions considered:

Select a location with minimum exposure to oil, water, hot air, high humidity, excessive dust or metallic particles.

(6) Servopack unit Type CPCR-PF05B employs an externally fan-cooled method. To circulate the cooling air, locate cooling fan at the back of or below a heatsink. See Fig. 17.

(7) When more than three Servopack units Type CPCR-PF01B and 02B are located in parallel, heat cannot be dissipated effectively. Locate cooling fan at the back of or below the units to circulate the cooling air. See Fig. 8.1.

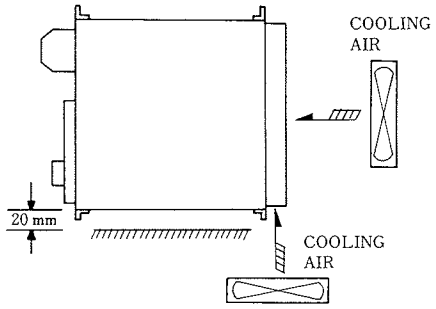
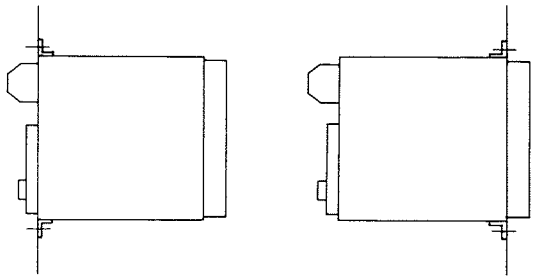


Fig. 17 Cooling Direction and Clearance

MOUNTING

To maintain effective cooling conditions, mount the unit vertically on the wall using the four mounting screws as shown in Fig. 18.



(a) Front Mounting (b) Rear Mounting

Fig. 18 Positioning

CABLE LENGTH

Cable length between Servopack and related units, or devices as follows. The cables should be separate from noise source to prevent erroneous operation caused by noise interference.

- 3 meters max between Servopack and signal generator or relay sequence circuit.
- 3 meters max between Servopack and indicating counter.
- 10 meters max between Servopack and optical encoder (PG: +12 V level).

NOTE

When PG of +5 V level is used, the cable length should be 3 meters max. with no noise influence.

- 10 meters max between Servopack and tachometer generator.

TEST OPERATION ADJUSTMENT

CHECKS BEFORE TEST OPERATION

Before turning on the power supply, carefully check the wiring for conformance with the connection examples given in Section 5.

(1) Connecting the output relay surge absorbing diode with the wrong polarity may burn out or damage electrical parts in the Servopack.

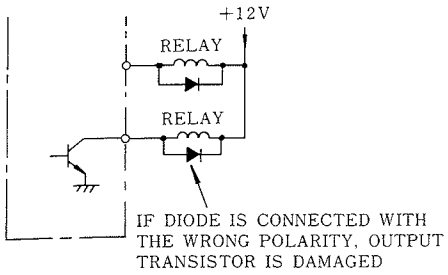


Fig. 19 Output Relay Circuit

(2) If the wires are connected in reverse polarity to the motor, TG and PG, the motor runs out of control. Make sure that the feedback loops for TG and PG are constructed in the negative feedback mode.

[Connection when Motor and PG (YASKAWA) are in one unit.]

Fig. 20 shows correct connections to various units for forward running (CCW as viewed from load side). With the PG output pulses, phase A is 90° behind phase B. If any one of the connections is reversed, the motor runs out of control or hunts.

[Connection When Motor and PG are installed Separately.]

Fig. 21 shows correct connections for forward running (CCW as viewed from load side). Make connection so that lag pulses of A-and B-phase (output pulse) for the separately installed PG are as shown in Fig. 21.

To reverse the reference direction and motor running direction, reverse the polarity of the servomotor, TG, and A- and B-phase of the PG.

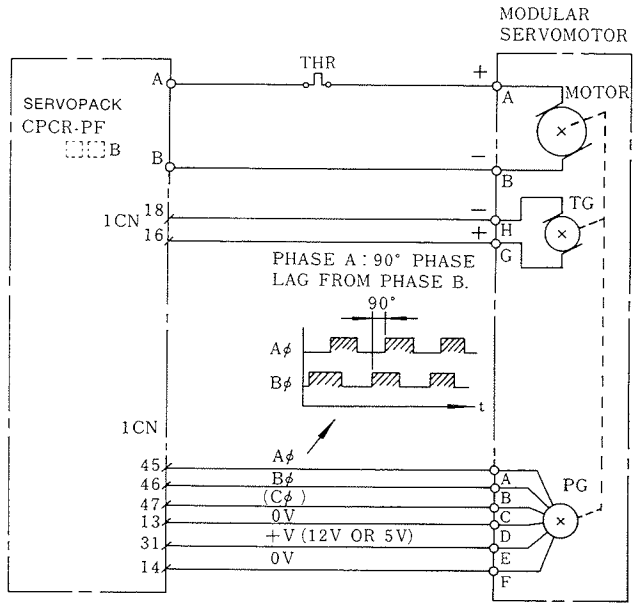


Fig. 20 Polarity at Correct Running of Motor

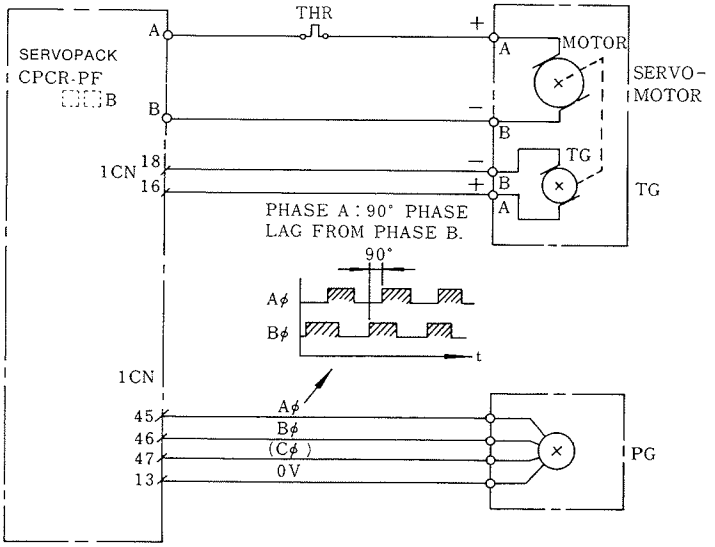


Fig. 21 Polarity at Correct Running of Motor (Separately Installed PG)

TURNING ON POWER SUPPLY

When starting the test operation with modular servomotor, first run the servomotor without a load, to avoid unexpected mishaps.
Where the test operation must be started with the motor coupled to the driven machine, start the motor after preparing for an immediate emergency stop.

(1) After the Servopack setting and the wiring check have been completed, turn on the power supply. If the sequence has been made correctly (see Fig. 7 Connection Diagram), the power is supplied to the control power circuit and, after the timer counts (0.5 s min.), the Servopack is energized. In this condition, the Servopack is reset to the initial state, and the error counter is 0, so that the motor is in standstill.

(2) The following LED lights to indicate the correctly energized state.

· Servopack : [DRIVE]

(3) Run the motor by giving reference pulses of a low frequency.

· When FB pulse Aϕ(PH-A input) is input correctly, [A] blinks, and when Bϕ is input correctly, [B] blinks.
(The above LEDs light continuously when the signal line is broken, and if it is shortcircuited to 0 V, the LEDs go off.)

· Check the motor running direction for conformance with the commanded running direction.
With the reference for forward running, the motor runs CCW as viewed from the load side.

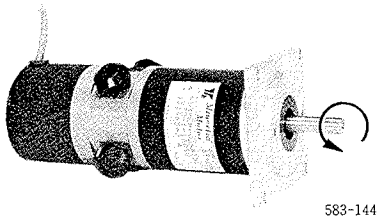


Fig. 22 Direction of Rotation of Motor at Forward Running Command

· Check that the motor stops when the reference pulse is discontinued.

ADJUSTMENT

Adjust the system with the servomotor coupled to the driven machine.

(1) Connect an oscilloscope (memory scope is preferable) to the check terminals [FFV] - 0 V on the Servopack.

(2) Input the maximum frequency reference pulse for the specifications of the system being used, and observe the TG waveform. The TG voltage should be 7 V/1000 rpm within ± 10%.

An example of TG waveform for forward running is shown below.

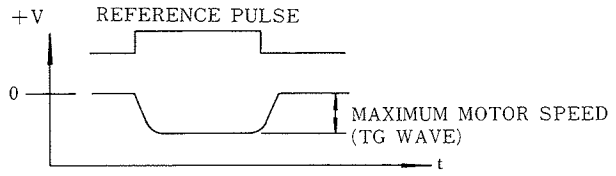


Fig. 23 Example of TG Waveform at Forward Running of Motor

(3) When the TG waveform overshoots or undershoots at the leading or trailing edges, turn the [IN-B] potentiometer on the Servopack counterclockwise until the overshoot or undershoot just begins to damp out, and leave the potentiometer at this position.

If the overshoot or undershoot remains, even with the [IN-B] fully-turned counterclockwise, the D/A gain is too high. Readjust after setting the D/A gain of the Servopack to the next lower bit, for example, from 9 bits to 10 bits. Potentiometer [IN-B] is used for position loop gain (kp) adjustment.

(4) An Example of optimum setting from the TG waveform is shown below.

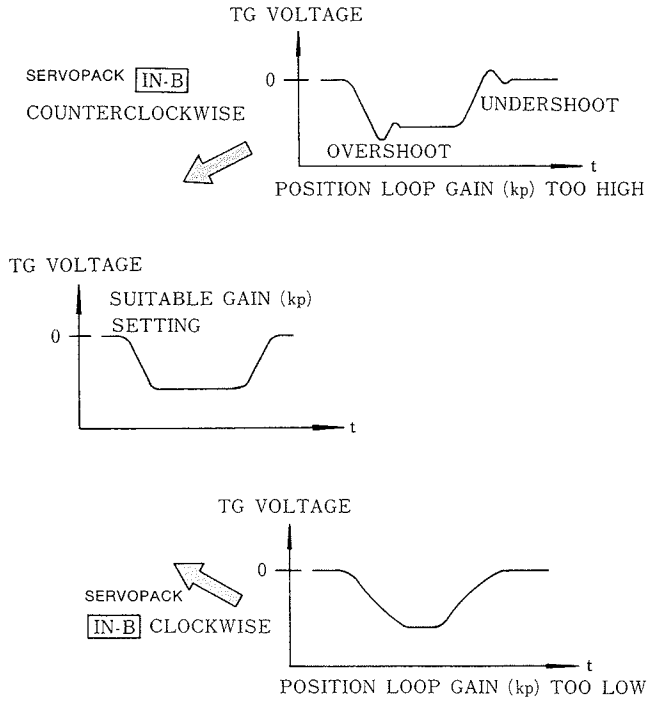


Fig. 24 Adjustment by TG Waveform

Corrective Action when Adjustment is impossible

With D/A gain set to 12 bits, when overshoot or undershoot cannot be eliminated by turning the potentiometer IN-B on the Servopack fully CCW, no further adjustment is possible with Servopack. Proceed as follows:

(1) Use acceleration/deceleration control on the reference pulse input to make it a ramp input.

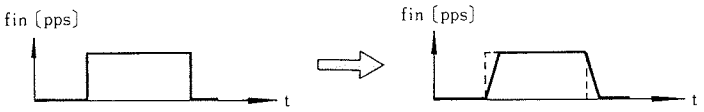


Fig. 25 Corrective Action I at Impossible Adjustment

(2) When the ramp input is already used, extend the acceleration and deceleration time further.

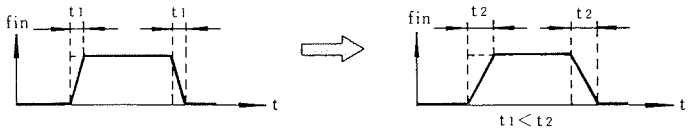


Fig. 26 Corrective Action II at Impossible Adjustment

TROUBLESHOOTING

If a malfunction occurs, checking must be started with the assumption that the failure was caused by either erroneous operation or faulty equipment. Condition of the digital control unit is easily checked using LED provided on the check panel and input/output terminals. The following charts show typical examples for troubleshooting.

POWER SUPPLY

Faulty, or fluctuation of, control power supply voltage exceeding the following limits may cause overrunning of the motor or inaccurate control.

- 100/110 VAC or 200/220 VAC ±10% for main circuit voltage (primary side of power transformer)
- 100 VAC for control power supply voltage lead size should be 2 mm^2 or more.

ALARM BY POWER ON

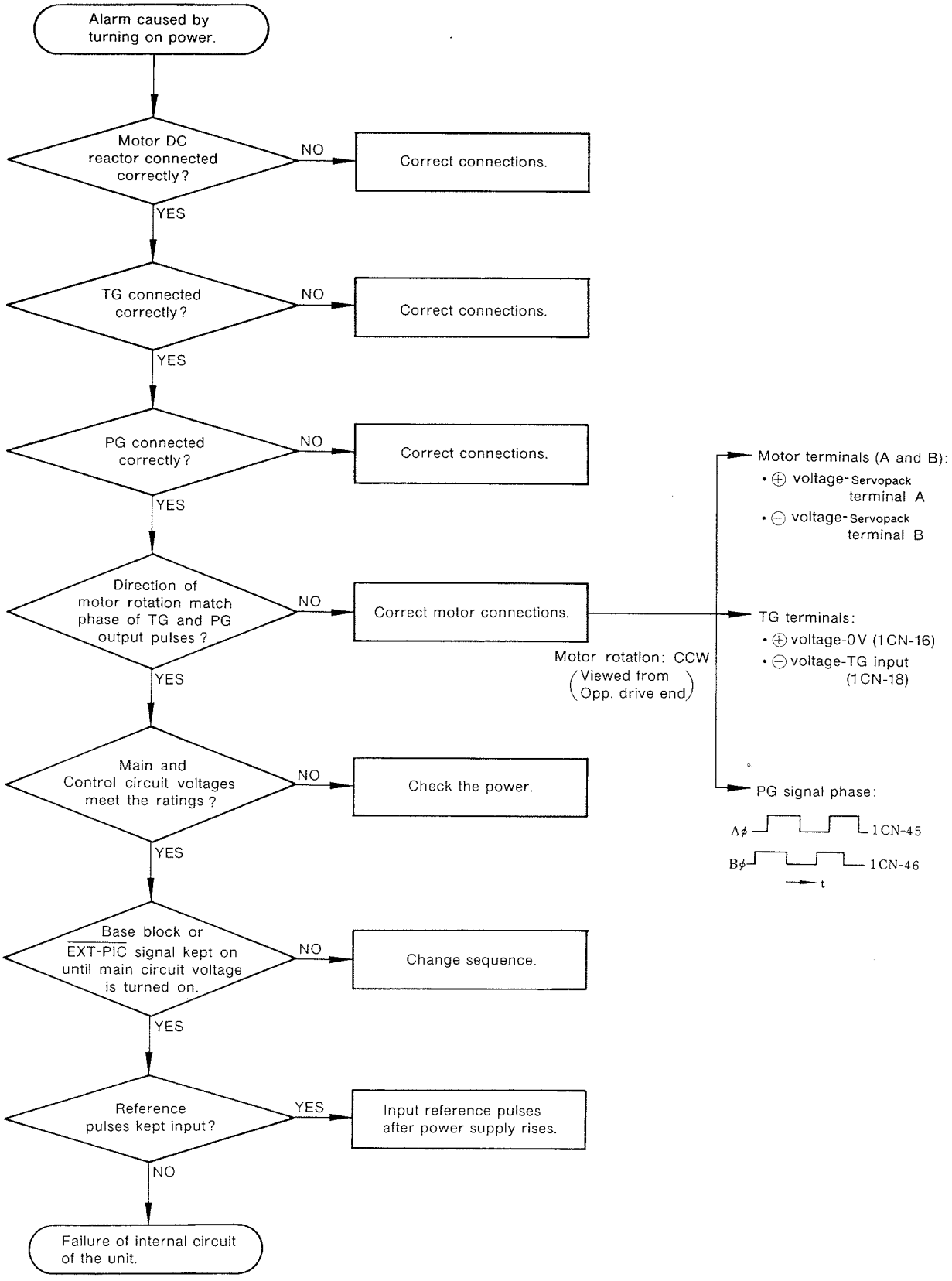


Fig. 27

MOTOR WILL NOT RUN BY REFERENCE PULSE INPUT

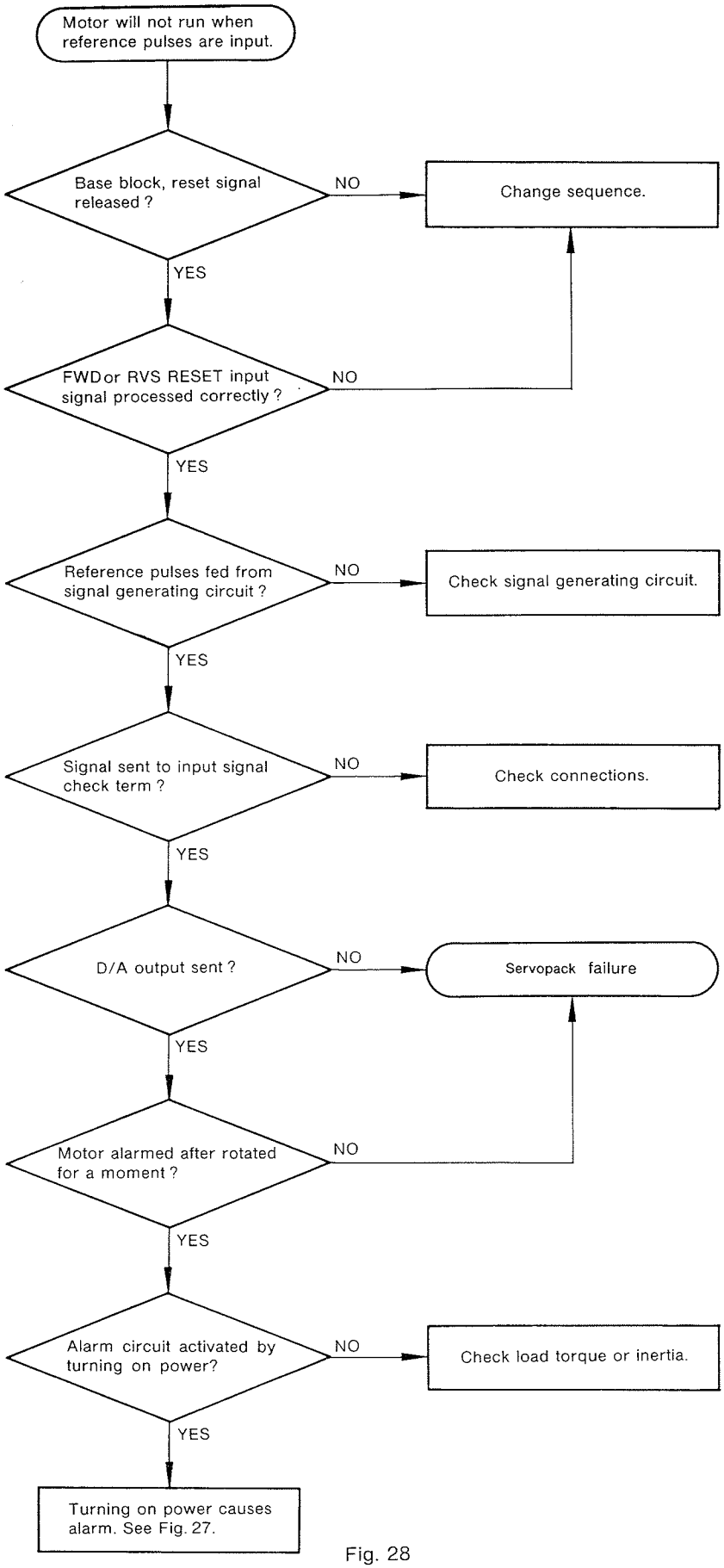


Fig. 28

INACCURATE POSITIONING

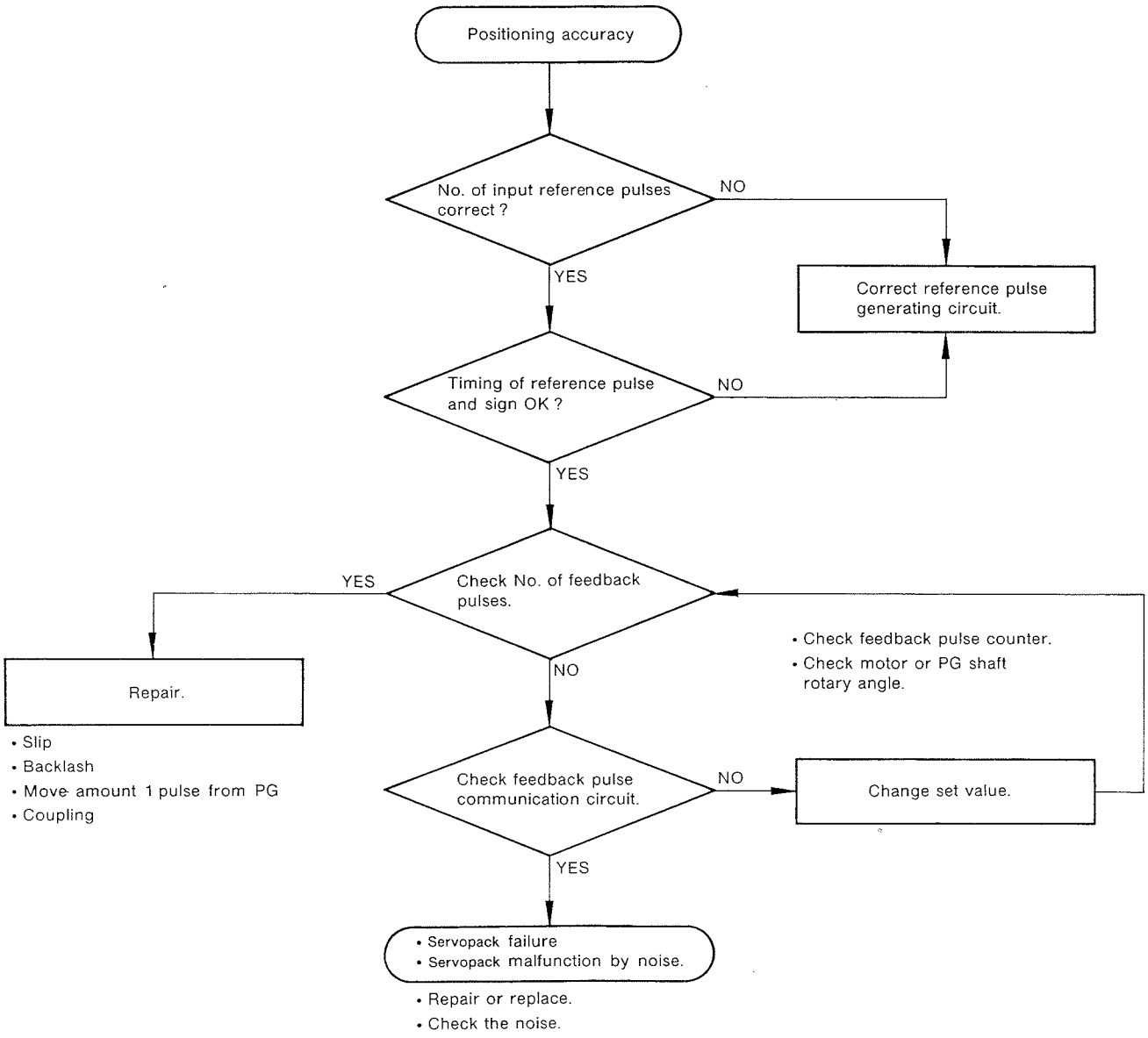


Fig. 29

ALARM DETECTIVE CIRCUIT ACTIVATION

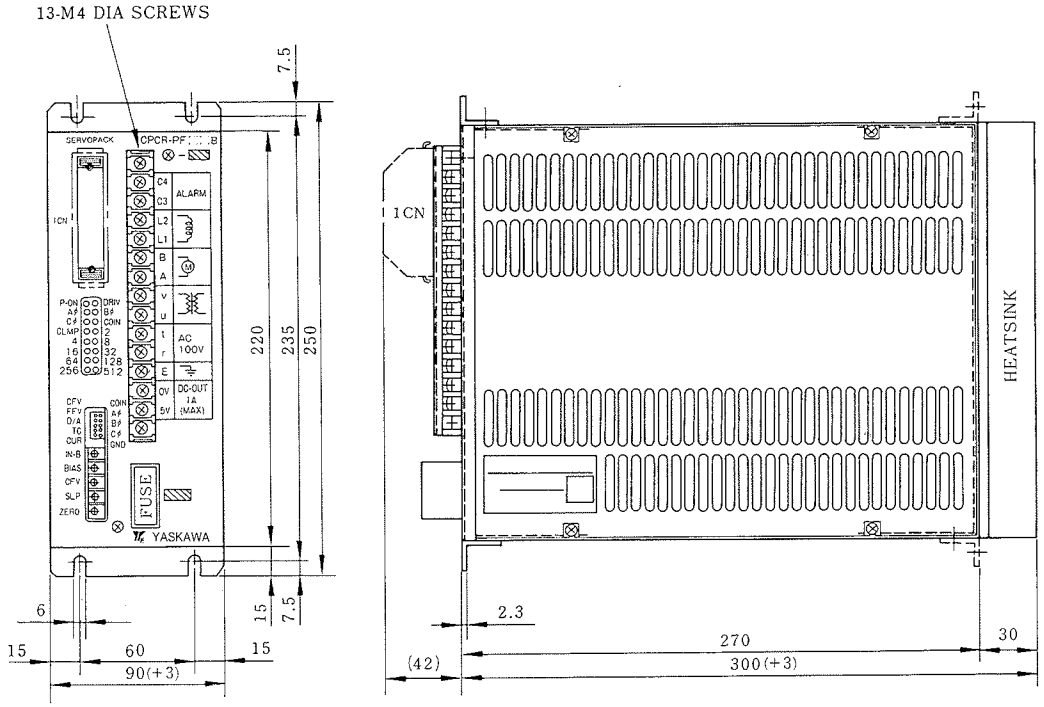
Detected Alarm	Possible Cause
Error Counter Overflow	(1) Feedback pulse not returned after reference pulse input • Motor locked • Incorrect PG signal pulses (Disconnection, short-circuit, power not applied, defective PG unit) • No motor drive output due to Servopack failure (2) Motor coasting • Incorrect wiring (Incorrect phases between PG, TG, and motors) • Servopack unit failure (3) Operation distance (operation correct) • Incorrect servo adjustment... Low servo gain • Incorrect calculation of load capacity... Overload, too excessive load inertia • Too high frequency of reference pulses
Current Flow Exceeding the Rated Current at Overload for more than 2 seconds	(1) Motor shaft locked by brake... Incorrect operational sequence (2) Heavy load exceeding the calculation or large inertia... Incorrect selection of motor capacity (3) Frequent start and stop (RMS value of torque) (4) Overload detecting level low... Incorrect Servopack adjustment
Overcurrent Flow (Current Exceeding the Rated Value of Power Transistor)	(1) Incorrect wiring for load (2) Motor failure (Internally shortcircuit) (3) Reactor failure (Layer shortcircuit) (4) Main circuit power shortcircuit due to defective inside components (5) Power transistor trigger due to noise ... Power shortcircuit by power transistor
Overvoltage (Main Circuit Voltage too High)	(1) Supply voltage too high (2) Incorrect connection of power transformer (3) Motor speed too high (4) Large inertia of machine (5) Minus load
Open Phase of PG Signals	(1) Open phase of feedback pulse from PG... Disconnection, short-circuit, defective PG unit or Servopack component) (2) Long starting time due to overload or high load inertia... Incorrect adjustment
+5V, ±12V Shut-off	(1) Load shortcircuit (2) Load shortcircuit due to defective components (3) Defective control power

DIMENSIONS in mm

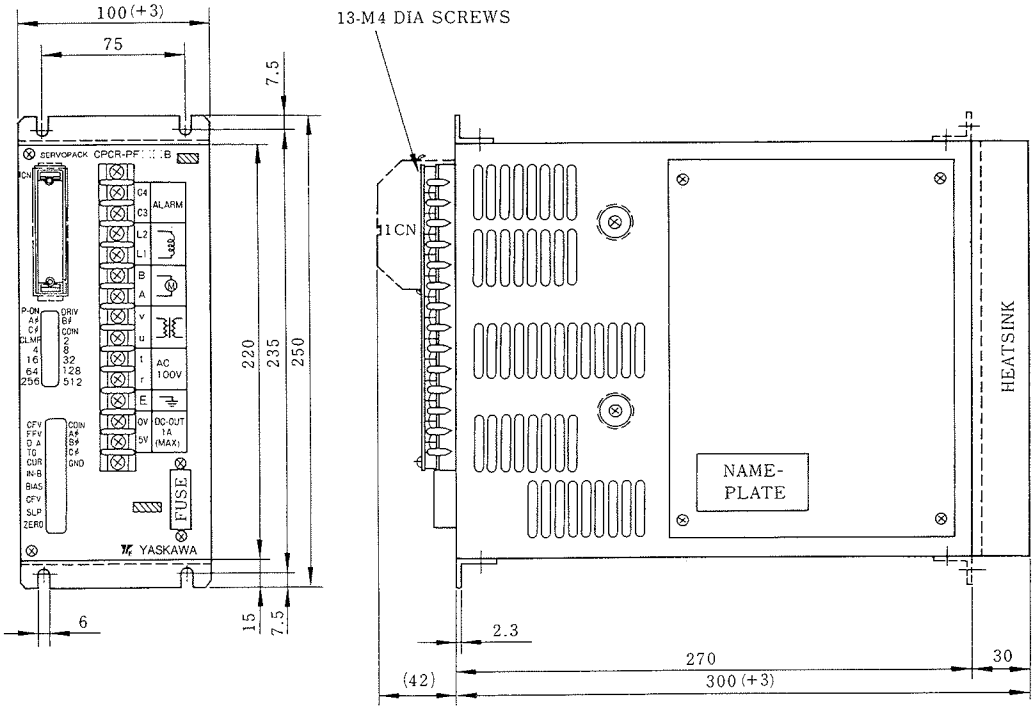
SERVOPACK

	Servopack Connector	Cable Connector	Remarks
1CN (For Input Signals)	MR-50RMA	Servopack accessories • Housing: MR-50F (soldering type) • Food: MR-50L	Made by Honda Tsushin Co.,Ltd.
2CN (For Indicating Counter)	PS-20PA-D4LT1-LN1	Optional	Japan Aviation Electronics Industry, Ltd.

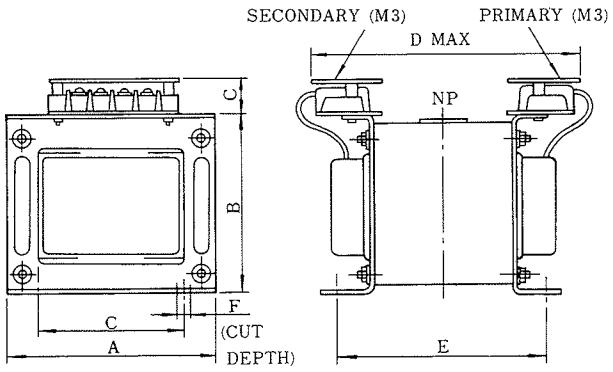
(1) Type CPCR-PF01B-□, -PF02B-□



(2) Type CPCR-PF05B-□



POWER TRANSFORMER

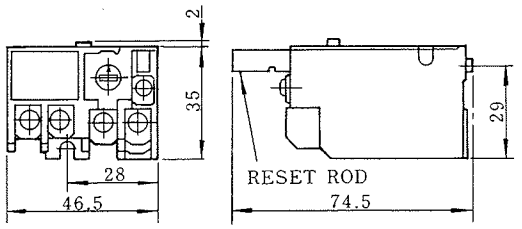


Type (Capacity)	A	B	C	D	E	F	G	Approx Mass kg	Servopack Combined
CPT10094 (200VA)	115	104	81	135	90	7	30	5.2	CPCR-PF01B
CPT10096 (300VA)	130	117	90	140	95	7	30	6.2	CPCR-PF01B -PF02B
CPT10097 (500VA)	130	117	90	165	120	7	30	9.5	CPCR-PF02B
CPT10117 (1kVA)	150	160	104	170	125	7	30	16	CPCR-PF05B

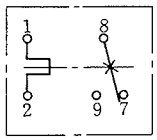
Note: Dimensions of the transformers for multi Servopack units are not indicated in the table above.

THERMAL RELAY

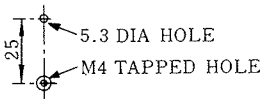
Type RHP-15, -15/□F



TERMINAL SYMBOL



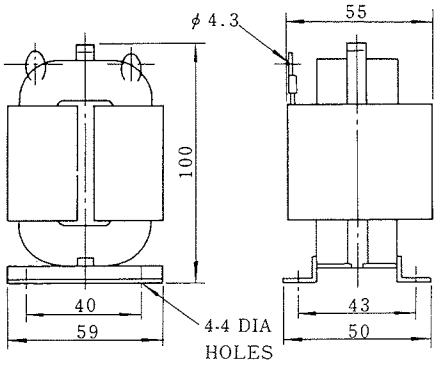
DRILLING PLAN



APPROX MASS: 0.3kg

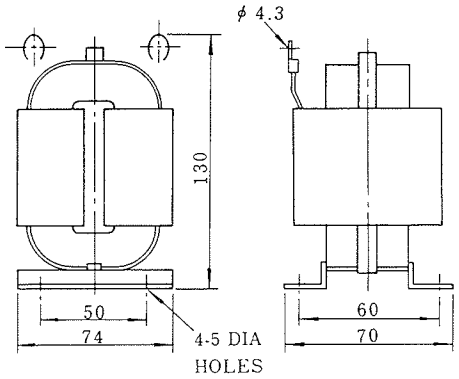
DC REACTOR

(1) Type X3064



APPROX MASS: 1 kg

(2) Type X5006



APPROX MASS: 1.3 kg

SERVOPACK

DC SERVOMOTOR CONTROLLER FOR POSITIONING CONTROL

TYPE CPCR-PF□□B

TOKYO OFFICE Ohtemachi Bldg, 1-6-1 Ohtemachi, Chiyoda-ku, Tokyo, 100 Japan
Phone (03) 3284-9111, -9145 Telex YASKAWA J33530 Fax (03) 3284-9034
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Phone (02) 776-7844 Fax (02) 753-2639
TAIPEI OFFICE Union Commercial Bldg, 14F, 137, Nanking East Road, Sec 2, Taipei, Taiwan
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YASKAWA ELECTRIC CORPORATION

Due to ongoing product modification/improvement, data subject to change without notice.

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