YANMAR

SERVICE MANUAL

YANMAR Marine Gear

XY series

MODEL YX-Series

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1. General

1-1. Specifications

Type		Input shaft eccentric hydraulic type multi disc clutch. Forward 1 reverse 1 reduction reversing gear													
Model		YX-6				YX-10			YX-15			YX-20-1			
Clutch capacity	Torque (kgf-m)	4.4				13.6			14.9			27.5			
	PS/rpm	21/3400				60/3200			75/3600			115/3000			
Allowance speed for input shaft (rpm)		400–4400				400–4200			400–4200			400–4000			
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise													
	Output shaft	Clockwise at forward (std.) or counter-clockwise													
Reduction ratio	Forward	3.48	2.96	2.55	2.03	3.50	3.13	2.54	3.53	3.10	2.58	3.48	2.96	2.55	2.03
	Reverse	3.48	2.96	2.55	2.03	3.50	3.13	2.54	3.53	3.10	2.58	3.48	2.96	2.55	2.03
Safety valve opening pressure		—				—			—			—			
Hydraulic oil pressure (kgf/cm²)		9.5–10.5 (10)				17–19 (18)			17–19 (18)			20–22 (21)			
Lube oil pressure (kgf/cm²)		1.5–2.5 (2)				1.5–2.5 (2)			1.5–2.5 (2)			1.5–2.5 (2)			
Applicable oil		SAE#30				SAE#30 or the equivalent									
Maximum oil capacity (ℓ) (effective oil capacity)		1.5 (0.3)				2.3 (0.3)			2.4 (0.3)			3.0 (0.3)			
Max. speed for switching (rpm)		≦ 1/2 of engine continuous rating													
Trolling device (Note 1)		—				A-2 type									
Engine rpm tolerance when trolling		—				≦ 1/2 of engine continuous rating (excludes plummetand tugboat operation)									
Propeller shaft output (Note 2)	Lower limit	—				50 rpm at 1/3 of engine rpm continuous rating									
	Upper limit	—				Slip ratio 50% at 1/3 of engine rpm continuous rating									
Lever operating force (kgf)		≦5 (cable direction)													
Oil cooler	Cooling water temperature (℃)	≦45 (inlet side)				≦45 (inlet side)			≦45 (inlet side)			≦45 (inlet side)			
	Cooling water capacity(ℓ/h) (non-by-pass)	≦1500				≦4500			≦4500			≦6500			
Number of mounting flange		SAE#5				SAE#4			SAE#4			SAE#3			
Number. of coupling		—				—			—			—			
Dry weight (kg)	Main body	28				27.5			29.5			52.5			
	Input coupling (rubber block)	—				4.1			4.1			7			
	Damper disc	0.9				3			3			6			
	Mounting foot	—				—			—			—			
	Output coupling (stern side)	1.3				2.5			2.5			4			
	Trolling device	—				2.6 (A2)			2.6 (A2)			2.6 (A2)			
Applicable engine, standard model		2GMFYE 3GMFYE				4JHYE 4JH-TYE			4JH-HTYE 4JH-DTYE			4CHE			

(Note 1) From the applicable engine, trolling device is not attached for non-trolling type, otherwise attached for other Type.

(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

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Type		Input shaft eccentric hydraulic type multi disc clutch. Forward 1 reverse 1 reduction reversing gear															
Model		YX-30				YX-51				YX-70S				YX-71			
Capacity	Torque (kgf-m)	35.8				71.6				107				110			
	PS/rpm	130/2600				280/2800				405/2700				430/2800			
Allowance speed for input shaft (rpm)		400–3300				400–3600				400–3600				400–3600			
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise															
	Output shaft	Clockwise at forward (std.) or counter-clockwise															
Reduction ratio	Forward	3.48	2.96	2.55	2.03	3.45	2.96	2.50	2.06	2.95	2.50	1.96	1.52	3.53	2.91	2.58	2.07
	Reverse	3.48	2.96	2.55	2.03	3.45	2.96	2.50	2.06	2.95	2.50	1.96	1.52	3.53	2.91	2.58	2.07
Safety valve opening pressure (kgf/cm²)		—				≧40				≧40				≧40			
Hydraulic oil pressure (kgf/cm²) (static pressure)		20–22 (21)				22–24.5 (24)				24–26.5 (26)				24–26.5 (26)			
Lube oil pressure (kgf/cm²) (static pressure)		1.5–2.5 (2)				2.0–3.0 (2.5)				2.0–3.0 (2.5)				2.0–3.0 (2.5)			
Applicable oil		SAE#30 or the equivalent															
Maximum oil capacity (ℓ) (effective oil capacity)		3.2 (0.4)				4.7 (0.7)				4.0 (0.5)				5.5 (0.5)			
Max. speed for switching (rpm)		Max. speed for switching (rpm)															
Trolling device (Note 1)		A-2 type															
Engine rpm tolerance when trolling		≦ 1/2 of engine continuous rating (excludes plummetand tugboat operation)															
Propeller shaft output (Note 2)	Lower limit	50 rpm at 1/3 of engine rpm continuous rating															
	Upper limit	Slip ratio 50% at 1/3 of engine rpm continuous rating															
Lever operating force (kgf)		≦5 (cable direction)															
Oil cooler	Cooling water temperature (℃)	≦45 (inlet side)				≦45 (inlet side)				45 (inlet side)				45 (inlet side)			
	Cooling water capacity(ℓ /h) (non-by-pass)	≦7700				≦10200				16000				16000			
Number of mounting flange		SAE#3				SAE#3		SAE#1		SAE#3				SAE#3		SAE#1	
Number of coupling		—				SAE#11½		SAE#14		SAE#11½				SAE#11½		SAE#14	
Dry weight (kg)	Main body	54.5				147		159		146				192		204	
	Input coupling (rubber block)	7				10		16		10				10		16	
	Damper disc	6				—				—				—			
	Mounting foot	—				5.3		10.6		10.4				5.3		9.6	
	Output coupling (stern side)	4				6				10				10			
	Trolling device	2.6 (A2)				2.6 (A2)				2.6 (A2)				2.6 (A2)			
Applicable engine, standard model		6CHE				6HAE 6CH-HTE				6CX-ETE				6CH-UTE 6CH-DTE 6CH-ETYE			

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Type		Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear									
Model		YX-90				YX-120				YX-120L	
Capacity	Torque (kgf-m)	110				125				125	
	PS/rpm	430/2800				400/2300				400/2300	
Allowance speed for input shaft (rpm)		400–3600				400–2300				400–2300	
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise									
	Output shaft	Clockwise at forward (std.) or counter-clockwise									
Reduction ratio	Forward	2.06	2.52	2.96	3.52	2.03	2.57	3.04	3.55	4.00	4.59
	Reverse	2.06	2.52	2.96	3.52	2.03	2.57	3.04	3.55	4.00	4.59
Safety valve opening pressure(kgf/cm²)		23–27				26.5–39.5				26.5–39.5	
Hydraulic oil pressure (kgf/cm²)		21.5–22.5				21.5–22.5				21.5–22.5	
Lube oil pressure (kgf/cm²)		2–3				2–3				2–3	
Applicable oil		API service grade CD class (common with engine system oil)									
Maximum oil capacity (ℓ) (effective oil capacity)		9 (0.7)				11 (1.5)				11 (0.5)	
Max. speed for switching (rpm)		≤1/2 of engine continuous rating									
Trolling device (Note 1)		A-2 type									
Engine rpm tolerance when trolling		≤1/2 of engine continuous rating (excludes plummetand tugboat operation)									
Propeller shaft output (Note 2)	Lower limit	50rpm at 1/3 of engine rpm continuous rating									
	Upper limit	Slip ratiof 50% at 1/3 of engine rpm continuous rating									
Lever operating force (kgf)		5 (cable direction)									
Oil cooler	Cooling water temperature (℃)	≤45 (inlet side)				≤35				≤35	
	Cooling water capacity(ℓ /h) (non-by-pass)	≤16000				8000–9000				8000–9000	
Number of mounting flange		#3		#1		#2		#1		#2	#1
Number of coupling		#11½		#14		#11½		#14		#11½	#14
Dry weight (kg)	Main body	230		242		305				390	
	Input coupling (rubber block)	10		16		—				—	
	Damper disc	—		—		—				—	
	Mounting foot	5.3		8.4		—				—	
	Output coupling (stern side)	11.5				—				—	
	Trolling device	2.6 (A2)				—				—	
Applicable engine, standard model		6HA-HTE				6GH-UTE 6HA-HTE 6HA-DTE 6GHA-STE					

(Note 1) From the applicable engine, trolling device is not attached for non-trolling type, otherwise attached for other Type.

(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

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Type		Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear												
Model		YX-150				YX-150L		YX-151				YX-151L		
Capacity	Torque (kgf-m)	158				158		175				175		
	PS/rpm	450/2050				450/2050		500/2050				500/2050		
Allowance speed for input shaft (rpm)		2100				2100		2100				2100		
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise												
	Output shaft	Clockwise at forward (std.) or counter-clockwise												
Reduction ratio	Forward	2.08	2.55	3.03	3.50	4.03	4.59	17.2	2.08	2.55	3.03	3.55	4.03	4.59
	Reverse	2.08	2.55	3.03	3.50	4.03	4.59	17.2	2.08	2.55	3.03	3.55	4.03	4.59
Safety valve opening pressure(kgf/cm²)		21.5–32.5				21.5–32.5		≧24				≧24		
Hydraulic oil pressure (kgf/cm²) (static pressure)		17.5–18.5				17.5–18.5		19.5–20.5				19.5–20.5		
Lube oil pressure (kgf/cm²) (static pressure)		2–3				2–3		2–3				2–3		
Applicable oil		SAE#30 or equivalent (lube oil use for engine)												
Maximum oil capacity (ℓ) (effective oil capacity)		8.5 (1.5)				20.0 (1.5)		8.5 (1.5)				20.0 (1.5)		
Max. speed for switching (rpm)		≦1/2 of engine continuous rating												
Trolling device (Note 1)		A-2 type												
Engine rpm tolerance when trolling		≦1/2 of engine continuous rating (excludes plummetand tugboat operation)												
Propeller shaft output (Note 2)	Lower limit	50rpm at 1/3 of engine rpm continuous rating												
	Upper limit	Slip ratio 50% at 1/3 of engine rpm continuous rating												
Lever operating force (kgf)		5 (cable direction)												
Oil cooler	Cooling water temperature (℃)	≦35				≦35		≦35				≦35		
	Cooling water capacity(ℓ /h) (non-by-pass)	8000–9000				8000–9000		8000–9000				8000–9000		
Number of mounting flange		#1				#1		#1				#1		
Number of coupling		#14				#14		#14				#14		
Dry weight (kg)		370				460		390				480		
Applicable engine, standard model		6KH-UTE				6KH-UTE		6KH-STE				6KH-STE		

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Type		Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear												
Model		YX-180					YX-181			YX-180L		YX-180N		
Capacity	Torque (kgf-m)	189					234			234		206		
	PS/rpm	500/1900					620/1900			620/1900		530/1850		
Allowance speed for input shaft (rpm)		1800					1800			1900		1900		
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise												
	Output shaft	Clockwise at forward (std.) or counter-clockwise												
Reduction ratio	Forward	2.08	2.55	3.03	3.50	※4.09	2.08	2.55	3.03	4.00	4.54	5.10	5.65	※6.02
	Reverse	2.08	2.55	3.03	3.50	※4.09	2.08	2.55	3.03	4.00	4.54	5.10	5.65	※6.02
Safety valve opening pressure(kgf/cm²)		24					28.8			≧28.8		≧28.8		
Hydraulic oil pressure (kgf/cm²) (static pressure)		19.5–20.5					23.5–24.5			23.5–24.5		23.5–24.5		
Lube oil pressure (kgf/cm²) (static pressure)		2–3					2–3			2–3		2–3		
Applicable oil		SAE#30 or equivalent (lube oil use for engine)												
Maximum oil capacity (ℓ) (effective oil capacity)		20 (2.0)					21 (2.0)			24.0 (4)		20 (2.0)		
Max. speed for switching (rpm)		≦1/2 of engine continuous rating												
Trolling device (Note 1)		A-2 type												
Engine rpm tolerance when trolling		≦1/2 of engine continuous rating (excludes plummetand tugboat operation)												
Propeller shaft output (Note 2)	Lower limit	50rpm at 1/3 of engine rpm continuous rating												
	Upper limit	Slip ratio 50% at 1/3 of engine rpm continuous rating												
Lever operating force (kgf)		5 (cable direction)												
Oil cooler	Cooling water temperature (℃)	≦45					≦45			≦45		≦45		
	Cooling water capacity(ℓ /h) (non-by-pass)	8000–9000					8000–9000			8000–9000		8000–9000		
Number of mounting flange		#0					#0			—		—		
Number of coupling		#18					#18			—		—		
Dry weight (kg)		500					515			—		—		
Applicable engine, standard model		6LA-DTE 6LA-UTE					6LAH-STE			6LA-DTE 6LAA-UTE 6LAH-STE		6LA-DTE 6LAA-UTE 6LAH-STE		

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※ *Apply for 6LA-DTE*

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Type		Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear													
Model		YX-350E				YX-350L			YX-351				YX-351L		
Capacity	Torque (kgf-m)	377				377			426				426		
	PS/rpm	1000/1850				1000/1850			1100/1850				1100/1850		
Allowance speed for input shaft (rpm)		1900				1900			1900				1900		
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise													
	Output shaft	Clockwise at forward (std.) or counter-clockwise													
Reduction ratio	Forward	2.25	2.67	3.11	3.51	4.08	4.52	4.82	2.25	2.67	3.11	3.51	3.53	4.08	4.52
	Reverse	2.25	2.67	3.11	3.51	4.08	4.52	4.82	2.25	2.67	3.11	3.51	3.53	4.08	4.52
Safety valve opening pressure(kgf/cm²)		≧24				≧24			≧31.5				≧31.5		
Hydraulic oil pressure (kgf/cm²) (static pressure)		17.5–18.5				17.5–18.5			20.5–21.5				20.5–21.5		
Lube oil pressure (kgf/cm²) (static pressure)		2–3				2–3			2–3				2–3		
Applicable oil		SAE#30 or equivalent (lube oil use for engine)													
Maximum oil capacity (ℓ) (effective oil capacity)		35 (3.0)				38.5 (2.5)			35 (3.0)				38.5 (2.5)		
Max. speed for switching (rpm)		≦1/2 of engine continuous rating													
Trolling device (Note 1)		—													
Engine rpm tolerance when trolling		—													
Propeller shaft output (Note 2)	Lower limit	—													
	Upper limit	—													
Lever operating force (kgf)		5 (cable direction)													
Oil cooler	Cooling water temperature (℃)	≦45				≦45			≦45				≦45		
	Cooling water capacity(ℓ /h) (non-by-pass)	8000–9000				8000–9000			8000–9000				8000–9000		
Dry weight (kg)		900				1200			1050				1400		
Applicable engine, standard model		8LAA-UTE 12LAA-UTE				12LAA-UTE			12LAA-UTE				12LAK-STE2		

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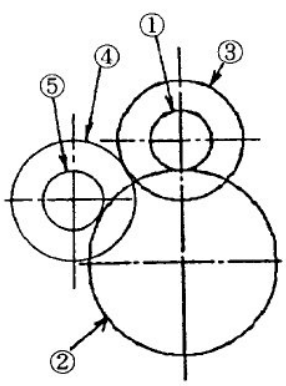
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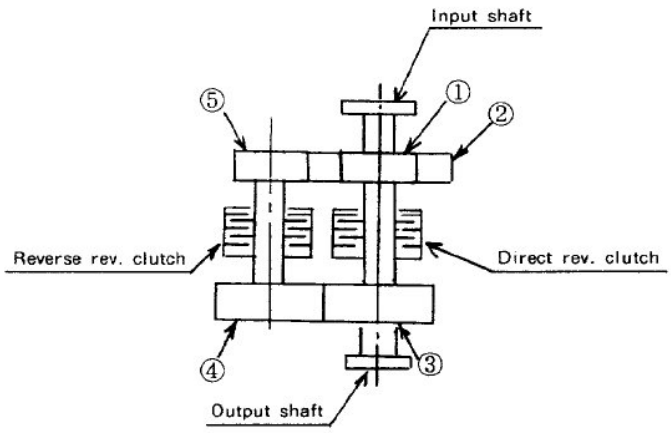
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1-2. Power Transmission Circuit

<1>. YX−6, YX−10, YX−15, YX−20−1, YX−30, YX−51,
YX−70S, YX−71, YX−90, YX−120, YX−120L

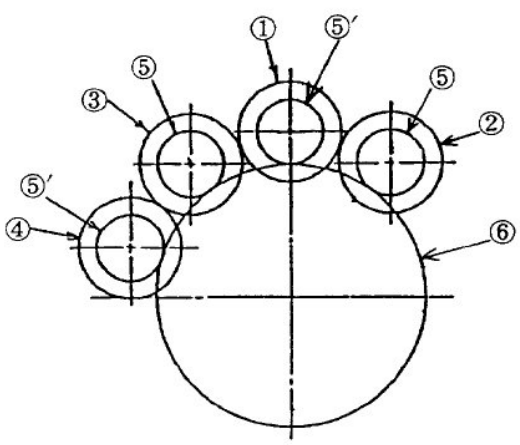
Direct revolution : Engine→①→②
Reverse revolution : Engine→③→④→⑤→②

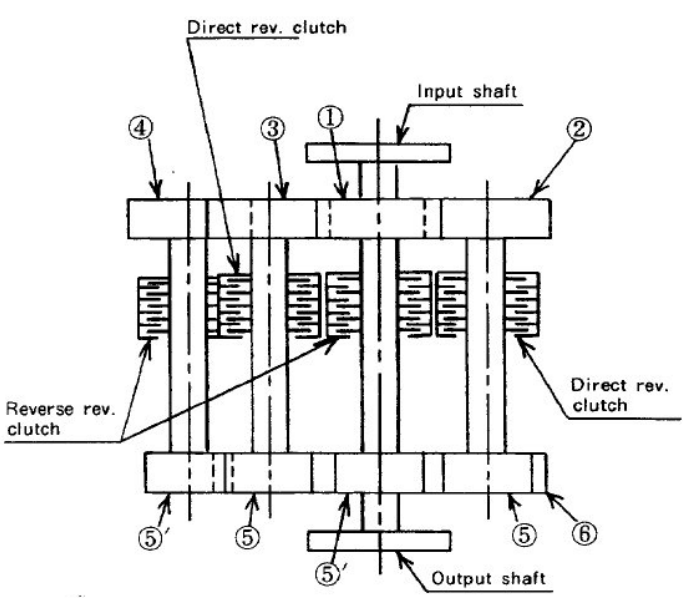




<2>. YX−150, YX−151, YX−150L, YX−151L, YX−180, YX−181, YX−180L

Direct revolution : Engine→①→②→⑤→⑥
①→③→⑤→⑥
Reverse revolution : Engine→①→③→④→⑤′→⑥
→①→⑤′→⑥

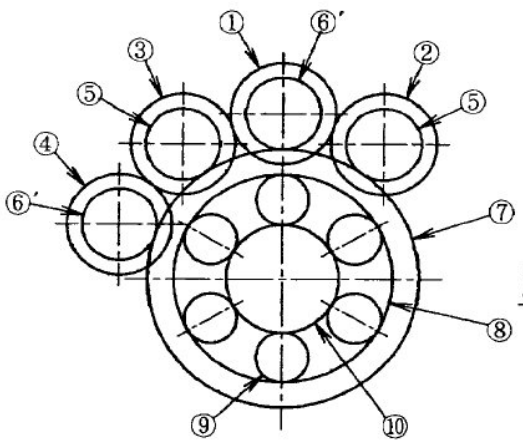


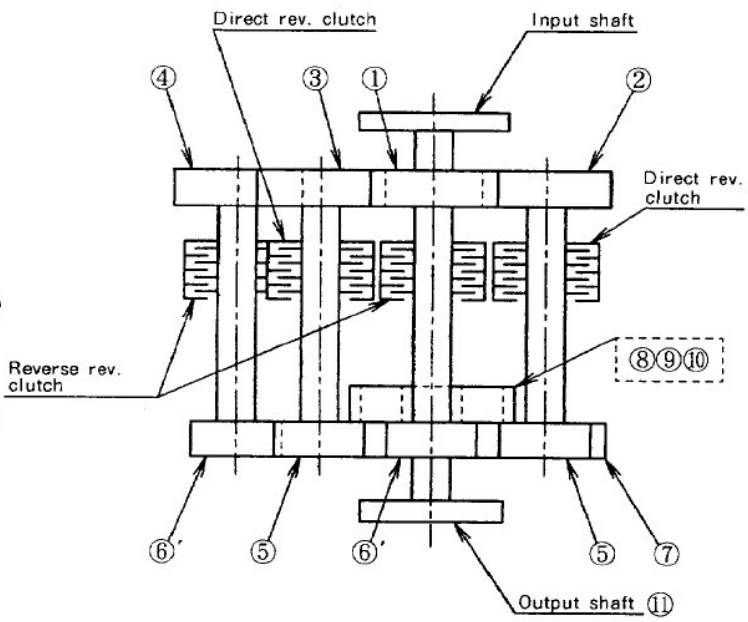


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<3>. YX−180N

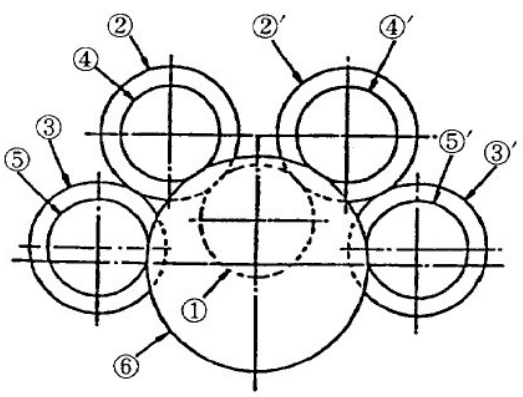
Direct revolution : Engine→①→②→⑤→⑦→ ⑧⑨⑩ →⑪
①→③→⑤→⑦→ ⑧⑨⑩ →⑪
Reverse revolution : Engine→①→③→④→⑥'→⑦→ ⑧⑨⑩ →⑪
①→⑥'→⑦→ ⑧⑨⑩ →⑪

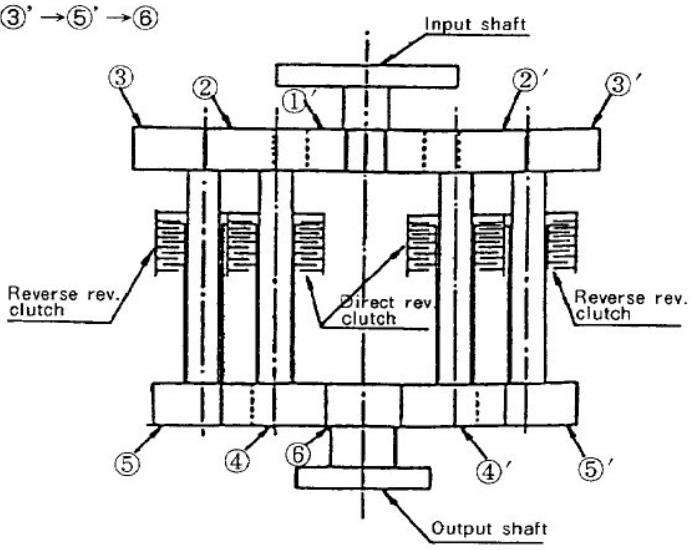




<4>. YX−350E, YX−350L, YX−351, YX−351L

Direct revolution : Engine→①→②→④→⑥
①→②'→④'→⑥
Reverse revolution : Engine→①→②→③→⑤→⑥
①→②'→③'→⑤'→⑥





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