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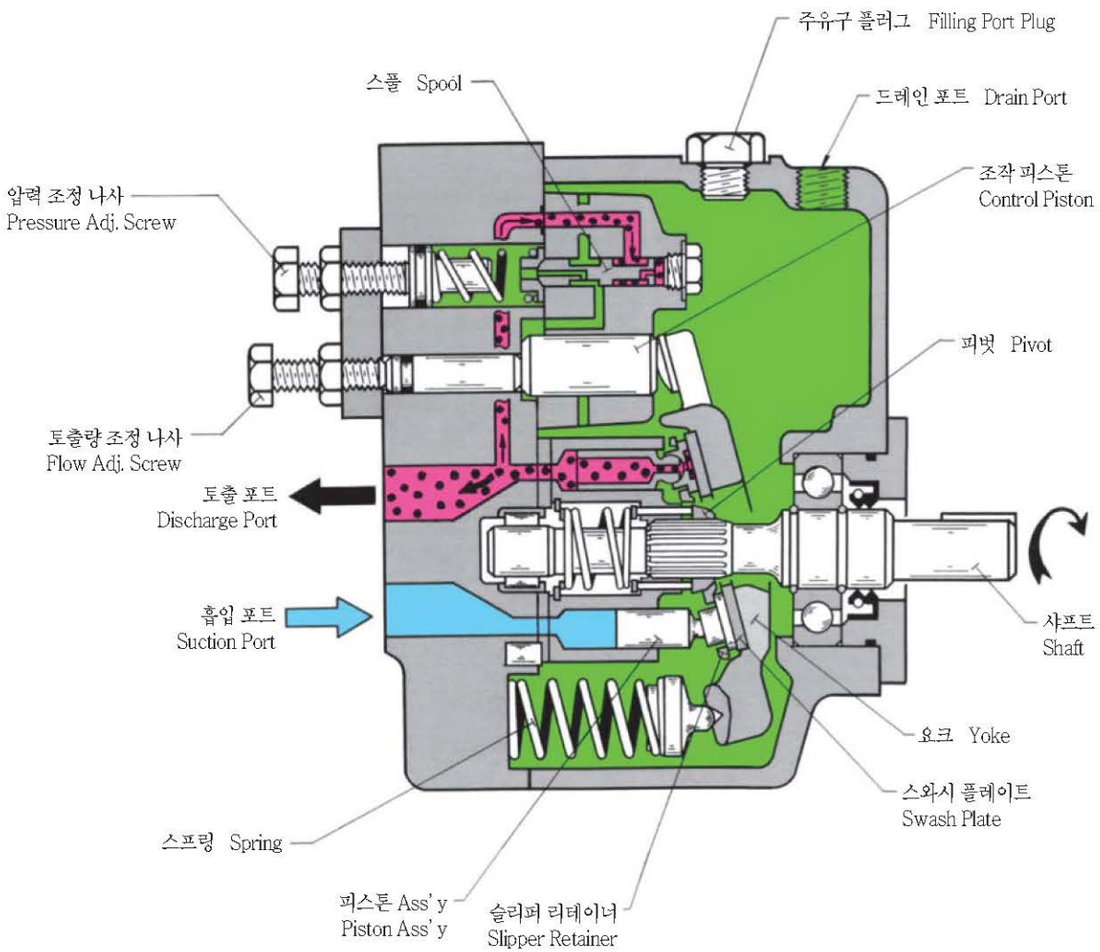
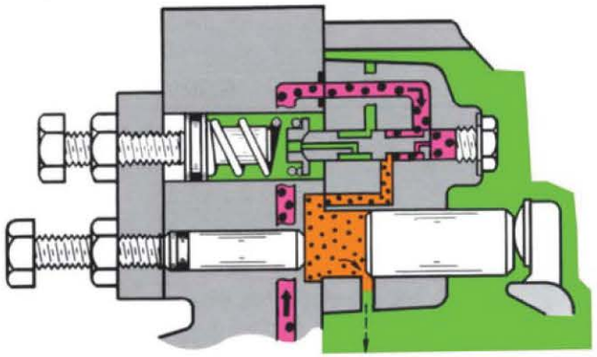
A시리즈 가변 피스톤 펌프 [압력 보상 제어형] (01제어)

"A" Series Variable Displacement Piston Pumps (Pressure Compensator Type)

● 최대 토출량 At Full Flow



● 풀컷 오프일 때 At Full Cut-off



KS 유압기호
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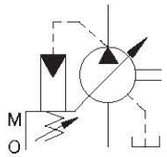
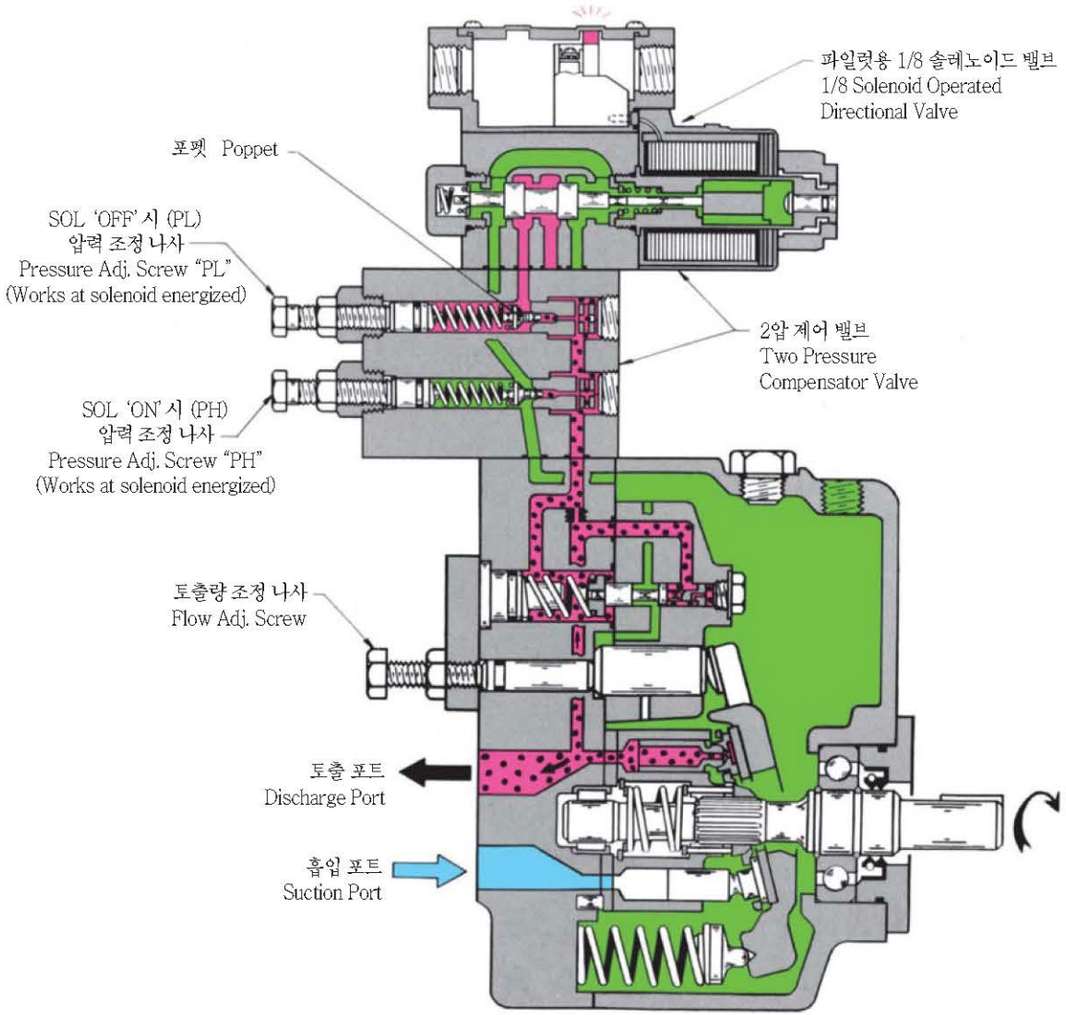


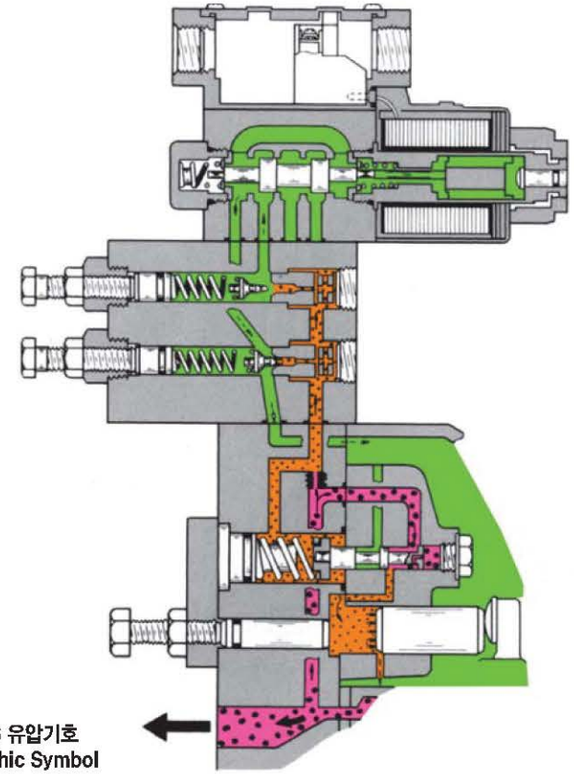
A시리즈 가변 피스톤 펌프 [2압 보상 제어형] (02제어)

"A" Series Variable Displacement Piston Pumps (Solenoid Two Pressure Control Type)

● 솔레노이드 'ON' 일 때 Solenoid Energized



● 솔레노이드 'OFF' 일 때 Solenoid De-energized



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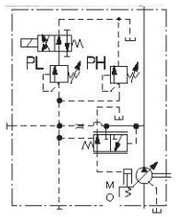
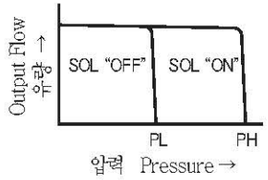
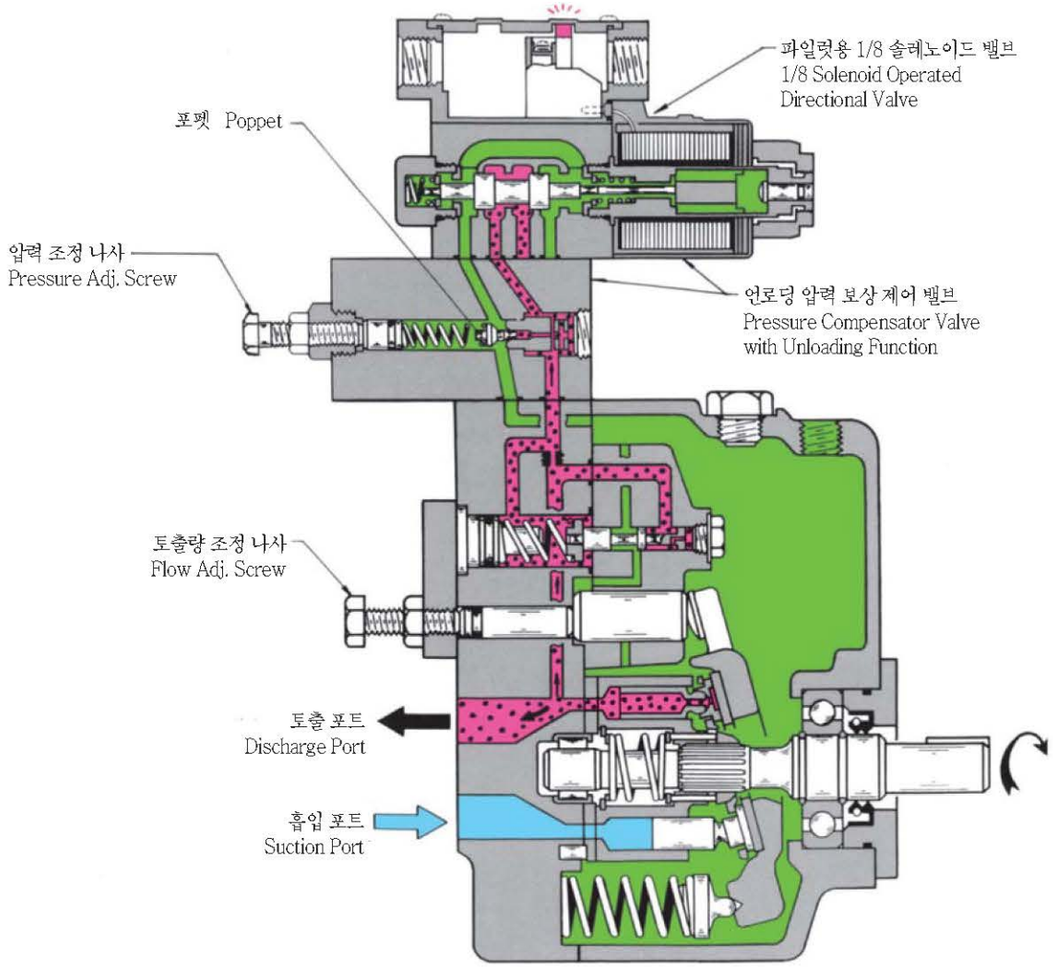


특성
Performance Characteristic

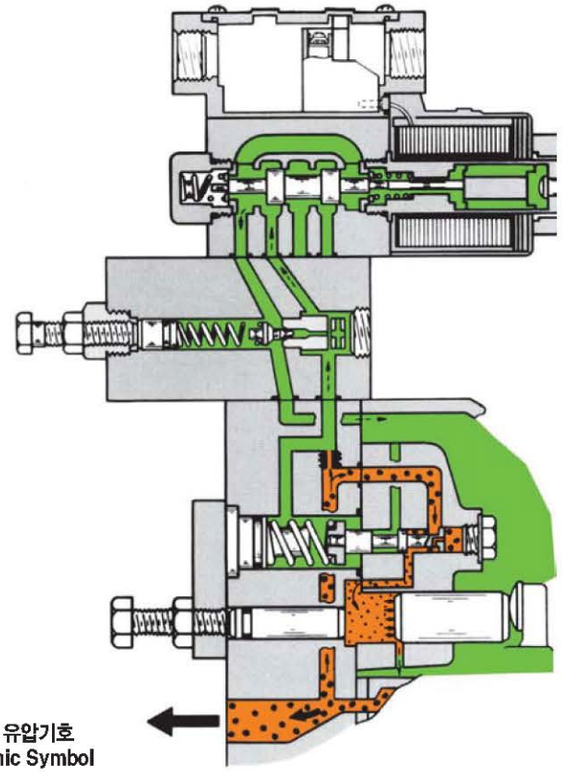


A시리즈 가변 피스톤 펌프 [언로딩 압력 보상 제어형] (03제어)

● 솔레노이드 "ON"일 때 Solenoid Energized



● 솔레노이드 "OFF"일 때 (언로딩시)
Solenoid De-energized (Unloading Condition)



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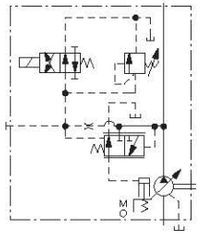

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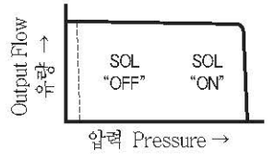
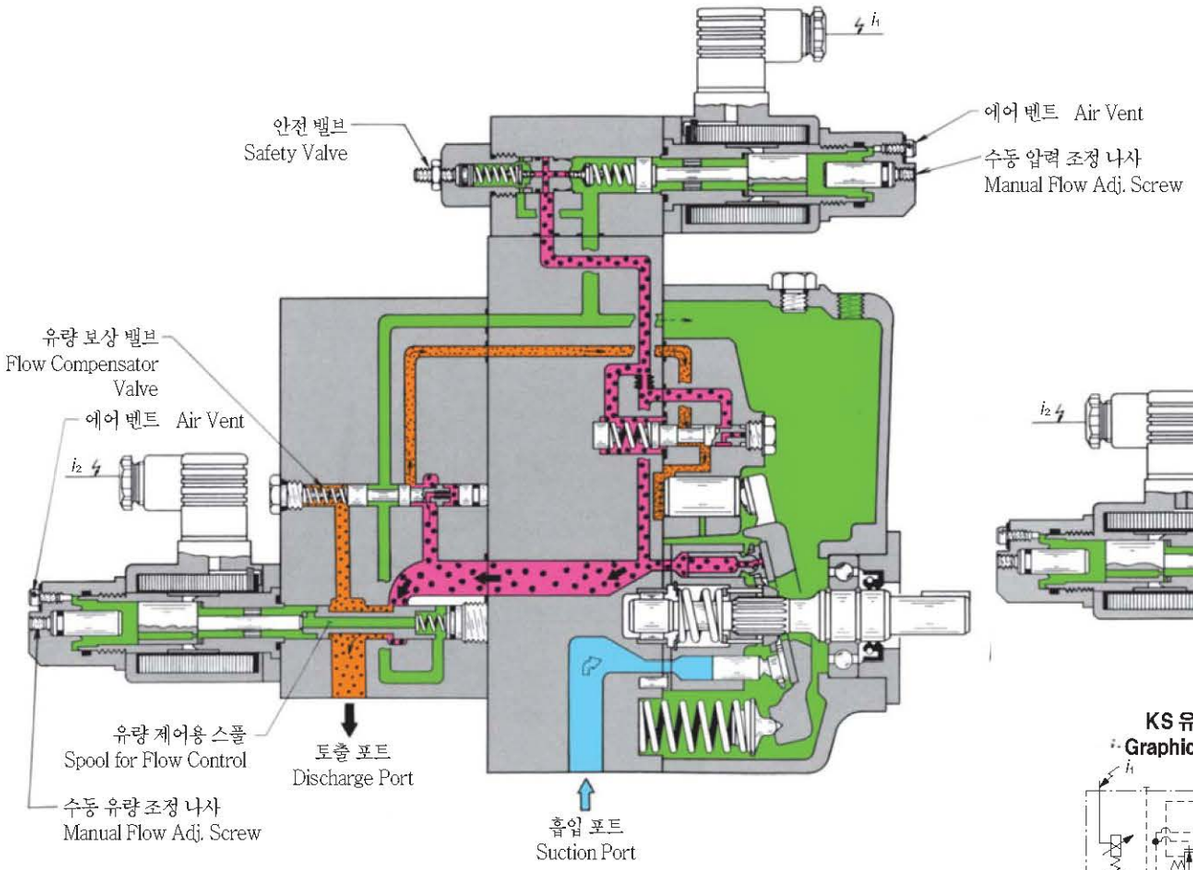
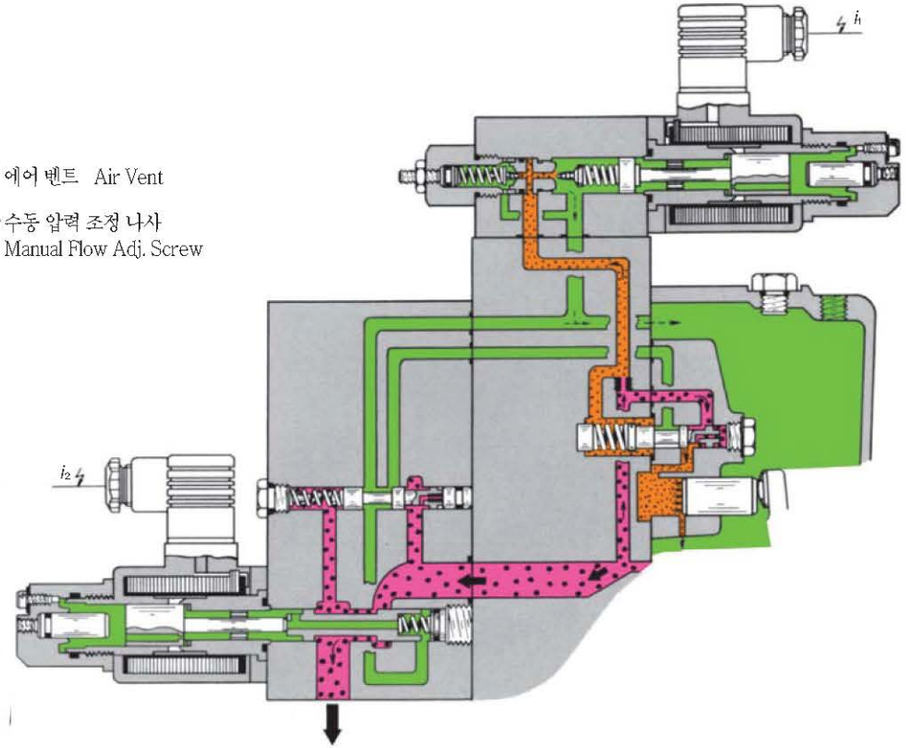


● 유량 제어일 때 At Flow Control



● 압력 제어일 때 At Pressure Control



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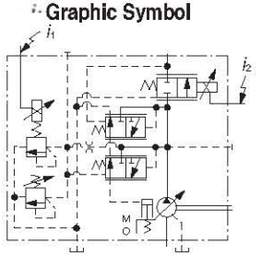

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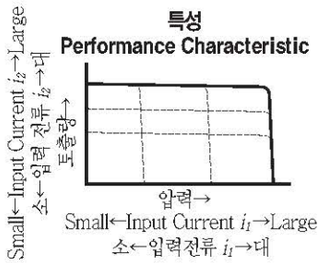
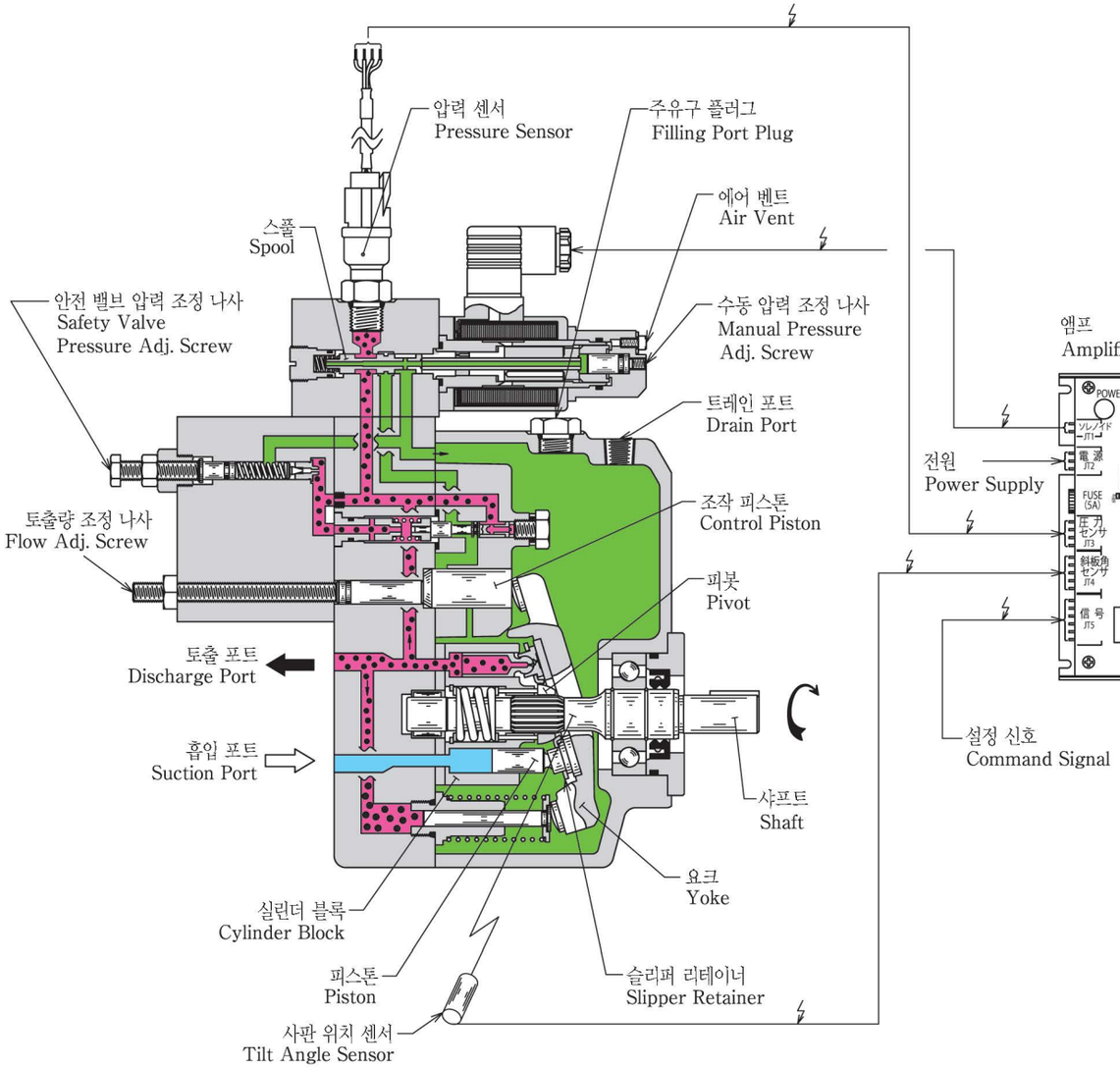
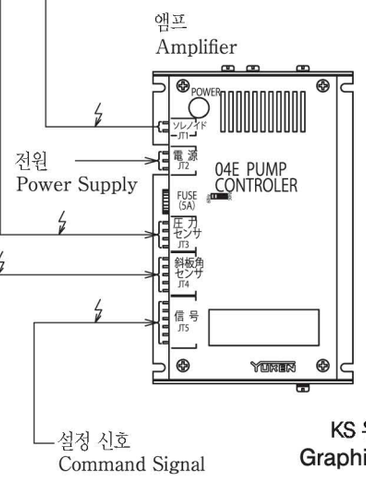


A시리즈 가변 피스톤 펌프 [앰프 별도 설치형 비례전자식 압력·유량 제어형] (04E제어)

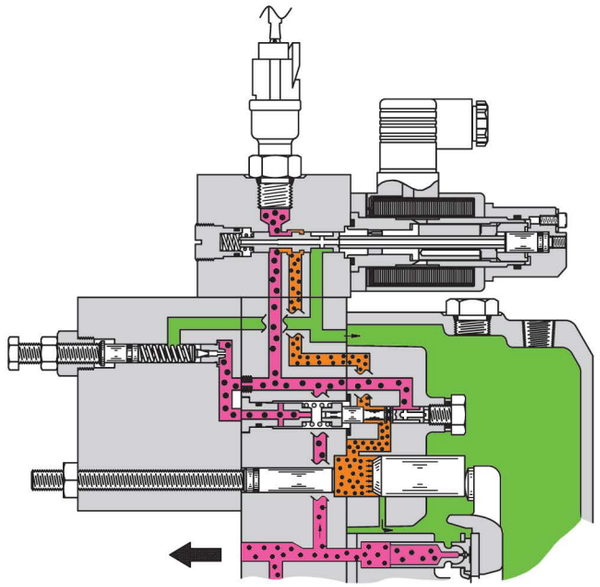
"A" Series Variable Displacement Piston Pumps
(Proportional Electro-Hydraulic Pressure & Flow Control Type)

● 최대 토출량일 때 At Full Flow

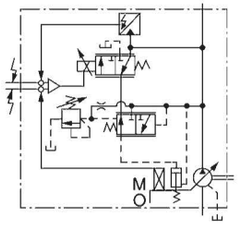




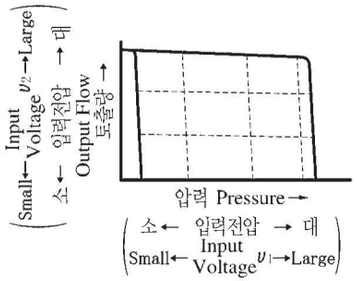
● 압력 제어시 At Pressure Control



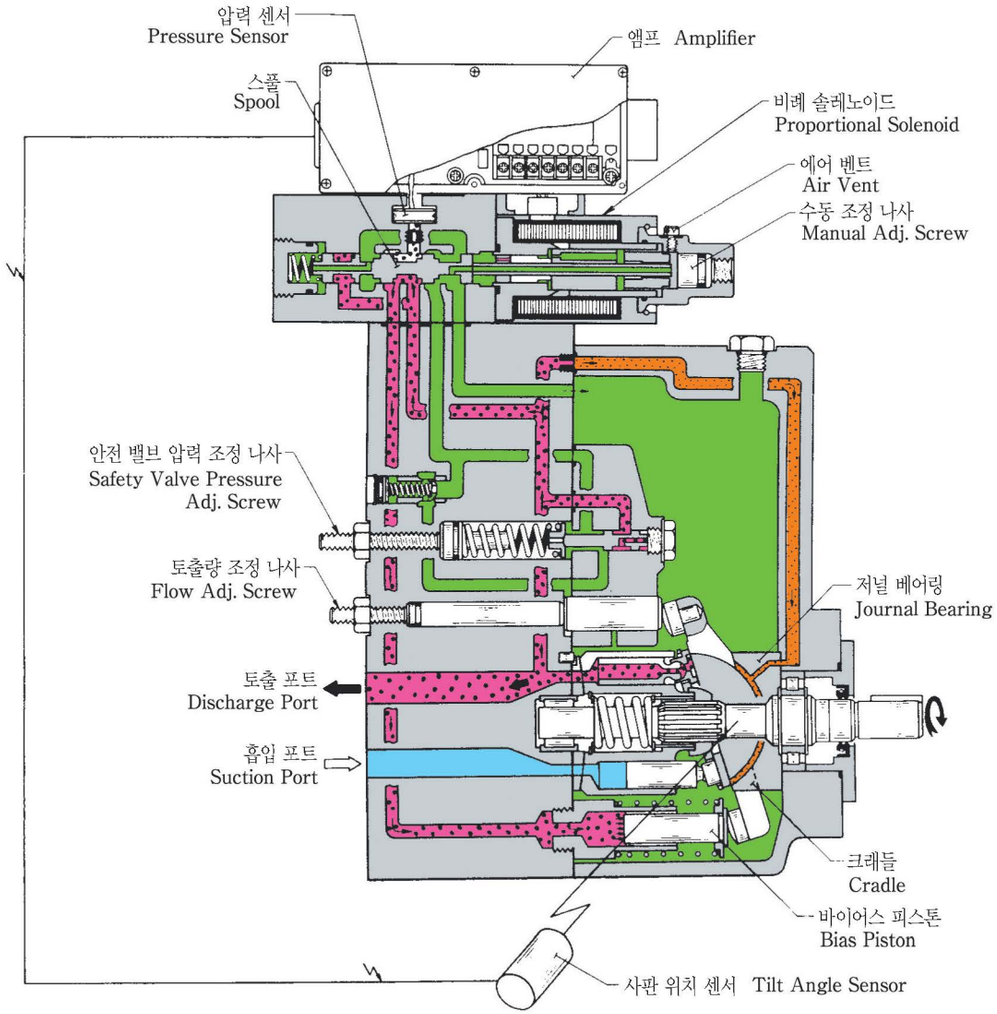
KS 유압기호
Graphic Symbol



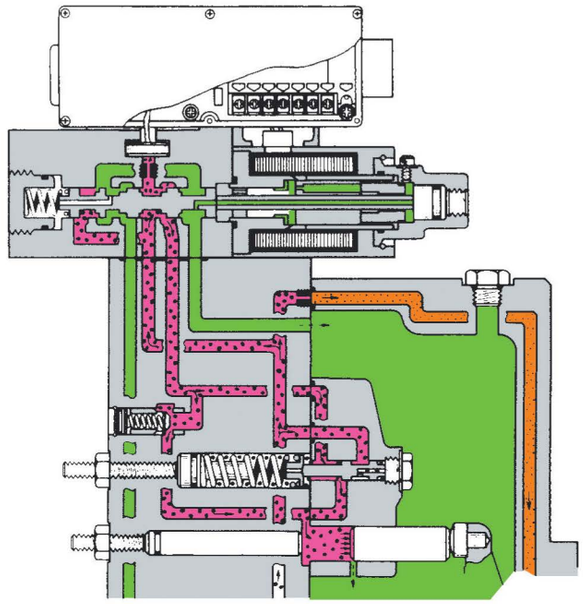
특성
Performance Characteristic



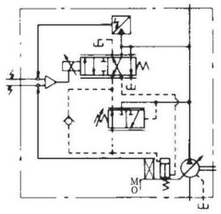
● 최대 유량일 때 At Full Flow



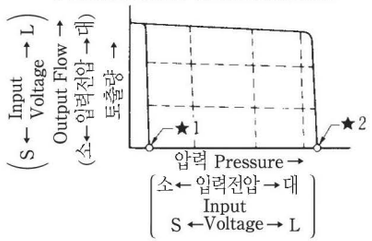
● 입력 신호 0V일 때 (언로딩시)
When Input Signal is 0V (Unloading Condition)



KS 유압기호
Graphic Symbol



특성
Performance Characteristic

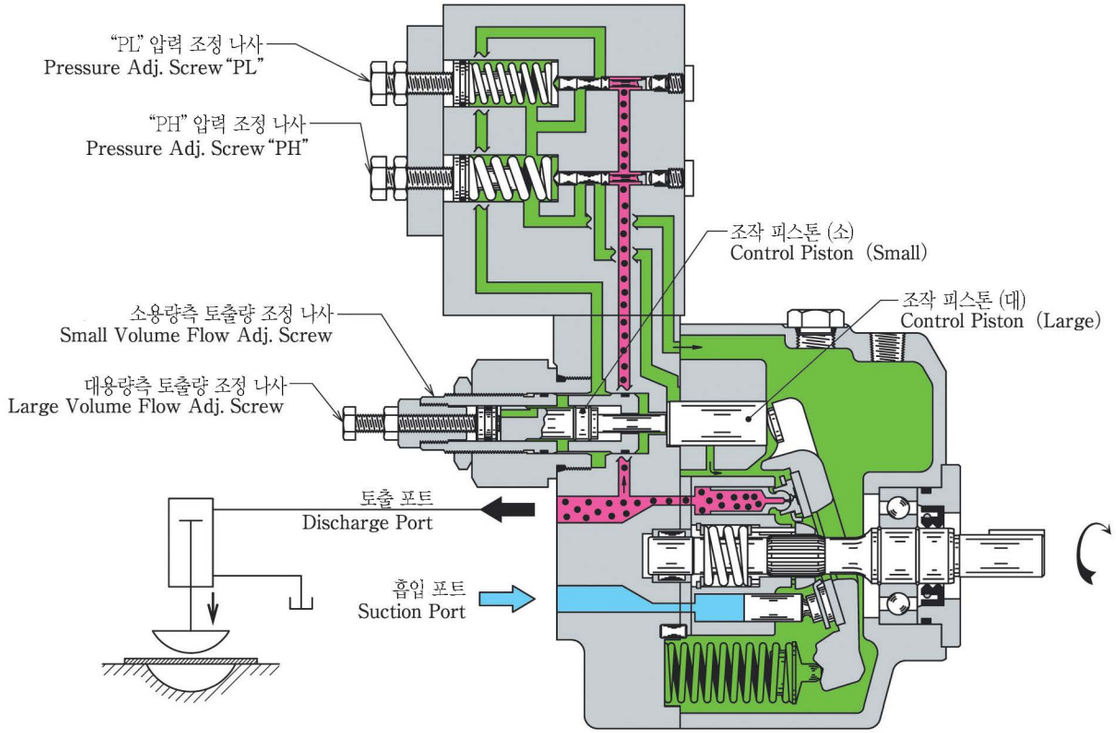


★1. 입력신호 0일 때 언로딩 압력
★2. 안전 밸브 설정 압력
★1. Unloading pressure when input signal is 0 V.
★2. Safety valve setting pressure

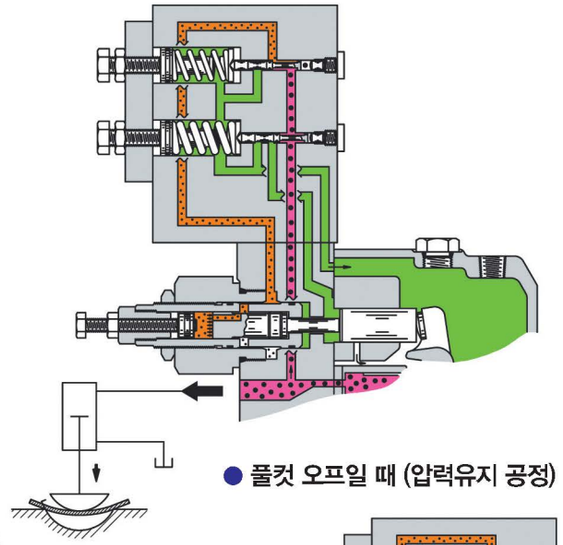
A시리즈 가변 피스톤 펌프 [자압식 2압 2용량 제어형] (05제어)

"A" Series Variable Displacement Piston Pumps
(Two-Pressure Two-Flow Control Type By System Pressure)

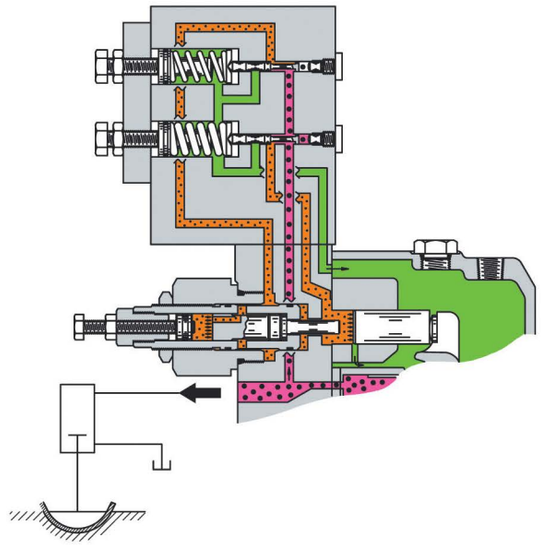
● 저압 대유량일 때 (빠른 공정) At Quick Feed



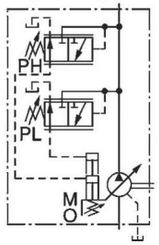
● 고압 소유량일 때 (가압성형 공정) At Pressure Forming



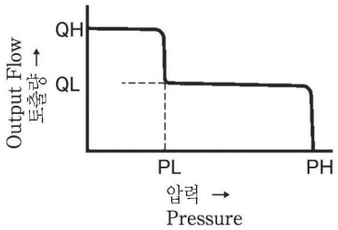
● 풀컷 오프일 때 (압력유지 공정) At Holding Pressure



KS 유압기호
Graphic Symbol



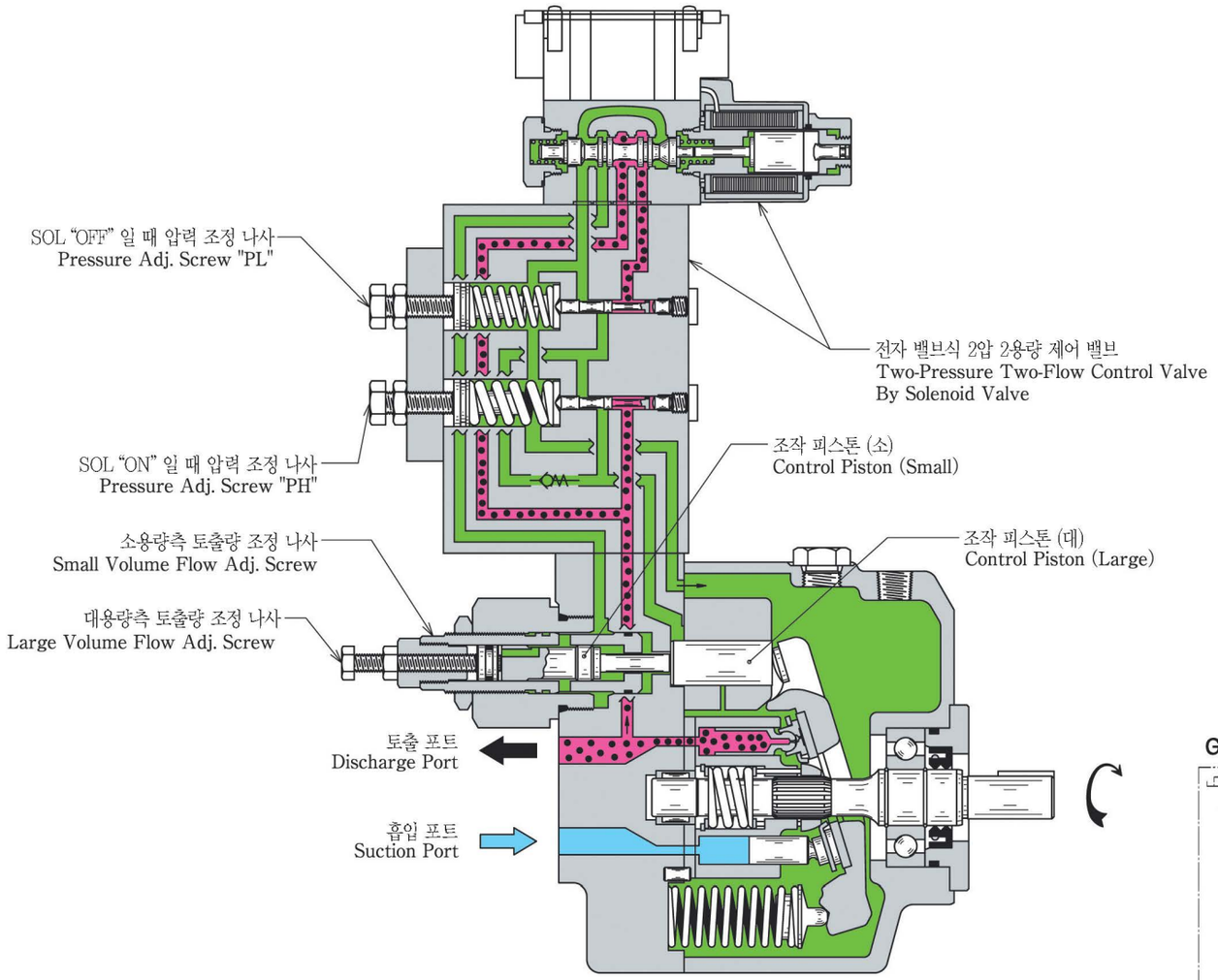
특성
Performance Characteristic



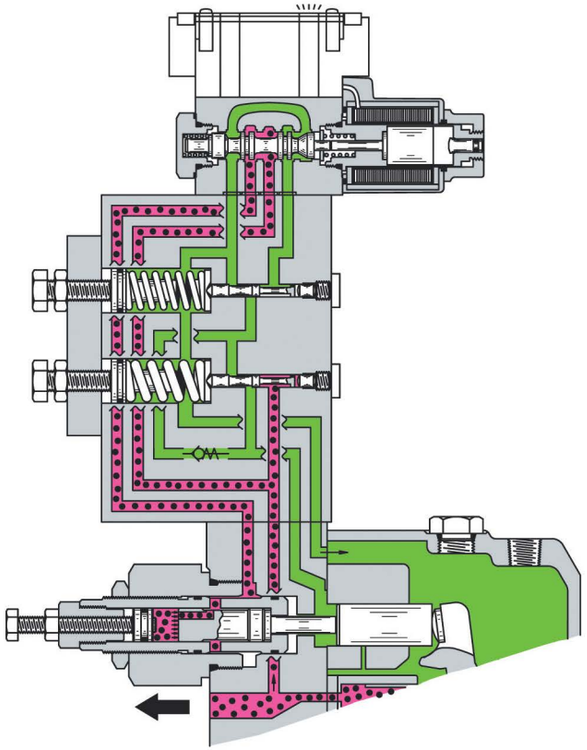
A시리즈 가변 피스톤 펌프 [솔레노이드 밸브 부착 2압 2용량 제어형] (06제어)

"A" Series Variable Displacement Piston Pumps
(Two-Pressure Two-Flow Control Type By Solenoid Valve)

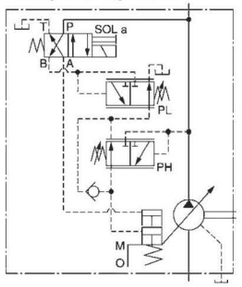
● 솔레노이드 "OFF"일 때 Solenoid De-energized
(저압 대유량일 때 At Low Pressure High Flow)



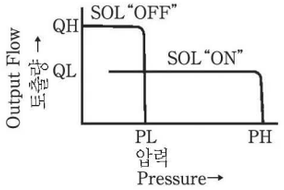
● 솔레노이드 "ON"일 때 Solenoid Energized
(고압 대소유량일 때 At High Pressure Low Flow)



KS 유압기호
Graphic Symbol



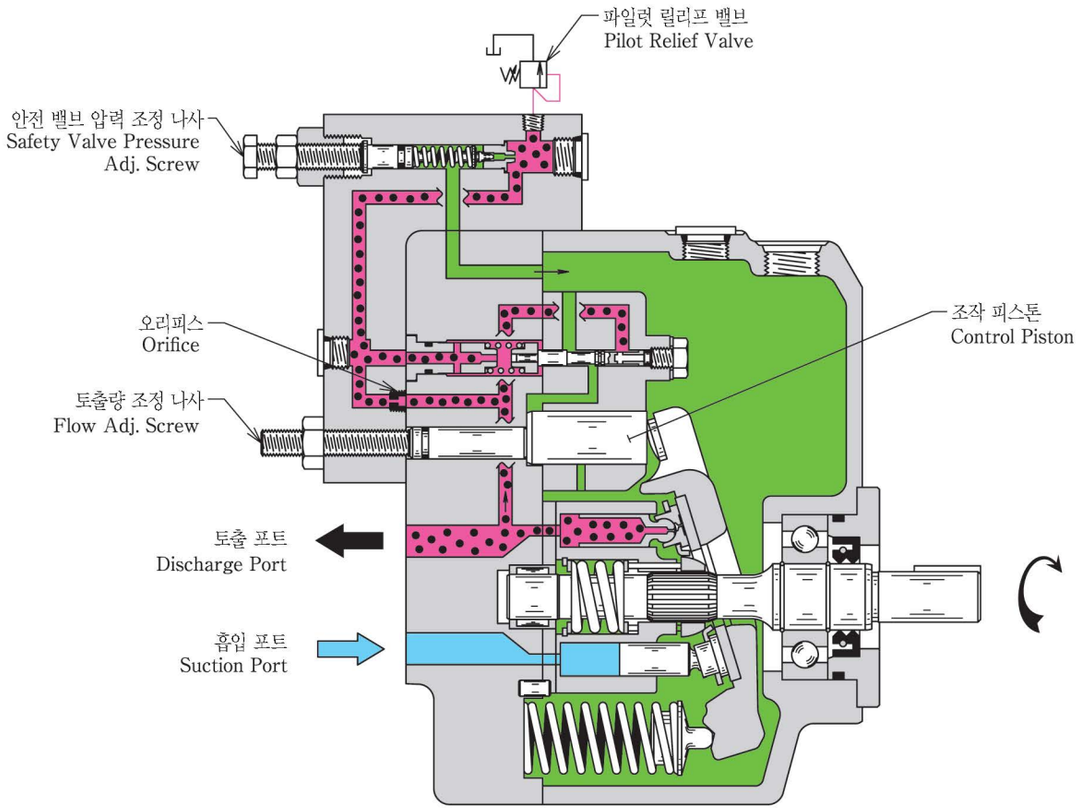
특성
Performance Characteristic



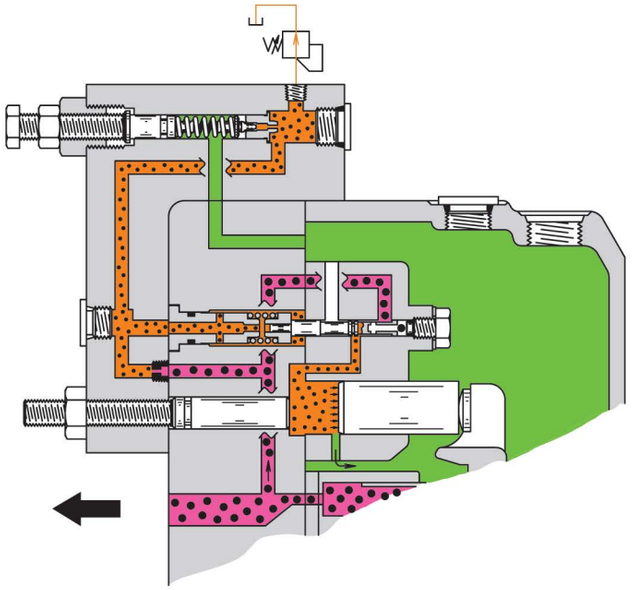
A시리즈 가변 피스톤 펌프 [외부 파일럿 방식 압력 보상 제어형] (07제어)

"A" Series Variable Displacement Piston Pumps
(Pilot Pressure Control Type Pressure Compensator)

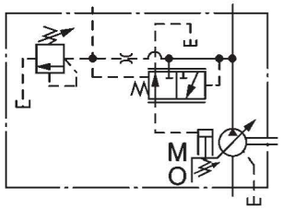
● 최대 토출량일 때 At Full Flow



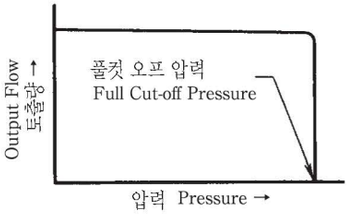
● 풀컷 오프일 때 At Full Cut-off



KS 유압기호
Graphic Symbol

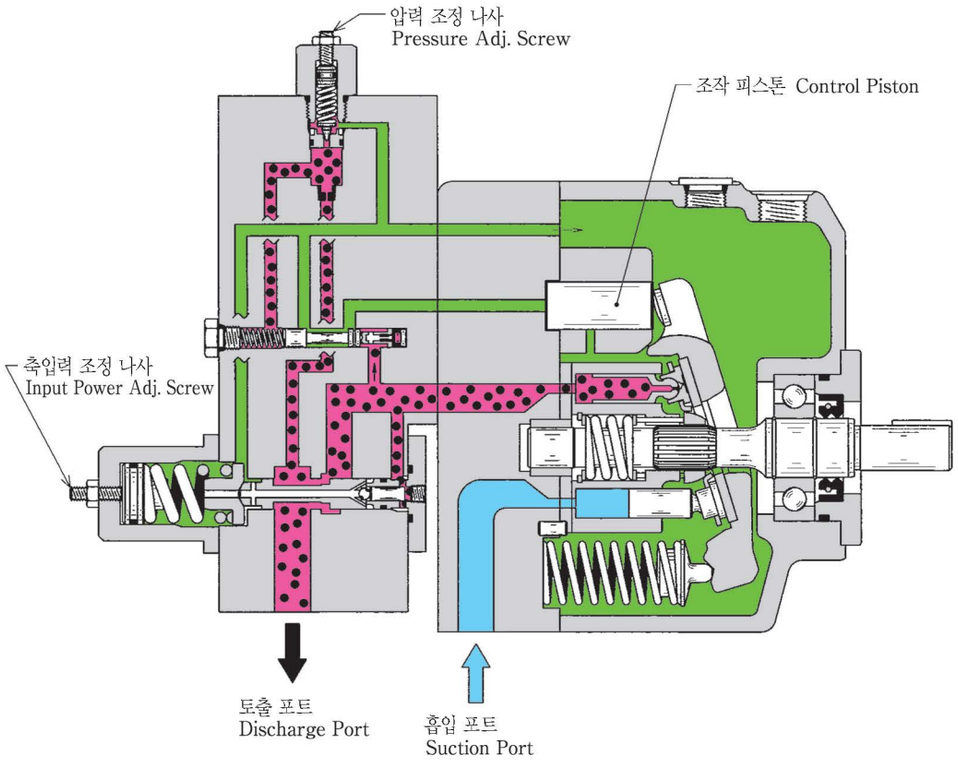


특성
Performance Characteristic

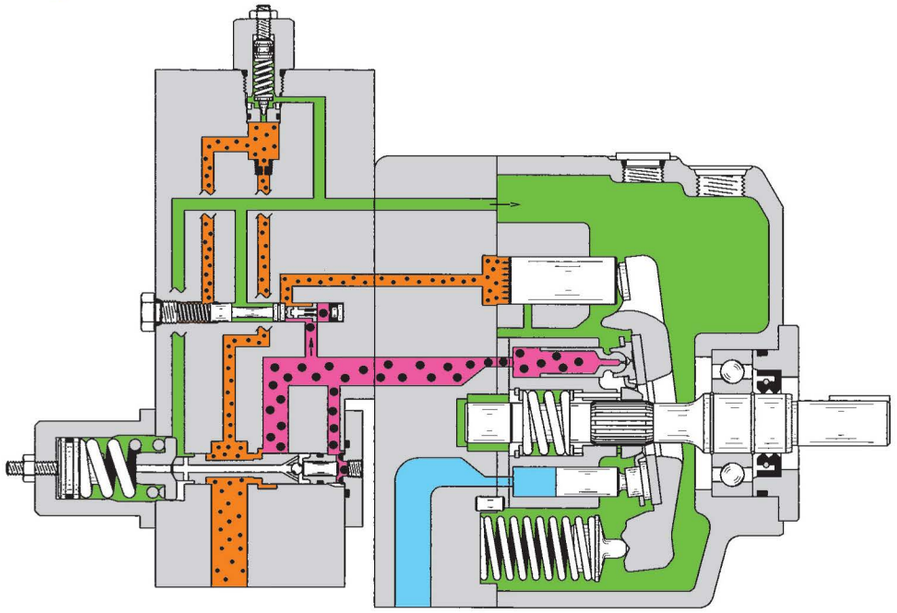


A시리즈 가변 피스톤 펌프 [정마력 제어형] (09제어)

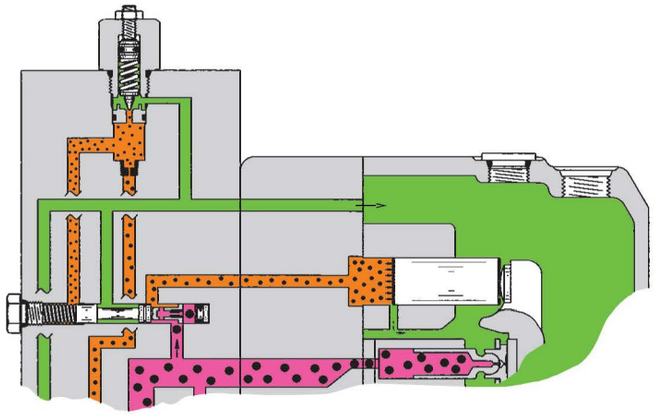
● 최대 토출량일 때 At Full Flow ①



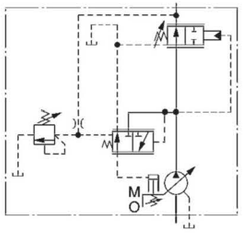
● 유량 제어시 At Flow Control ②



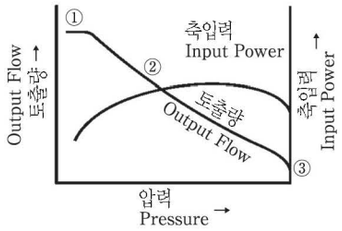
● 풀컷 오프일 때 At Full Cut-off ③



KS 유압기호
Graphic Symbol

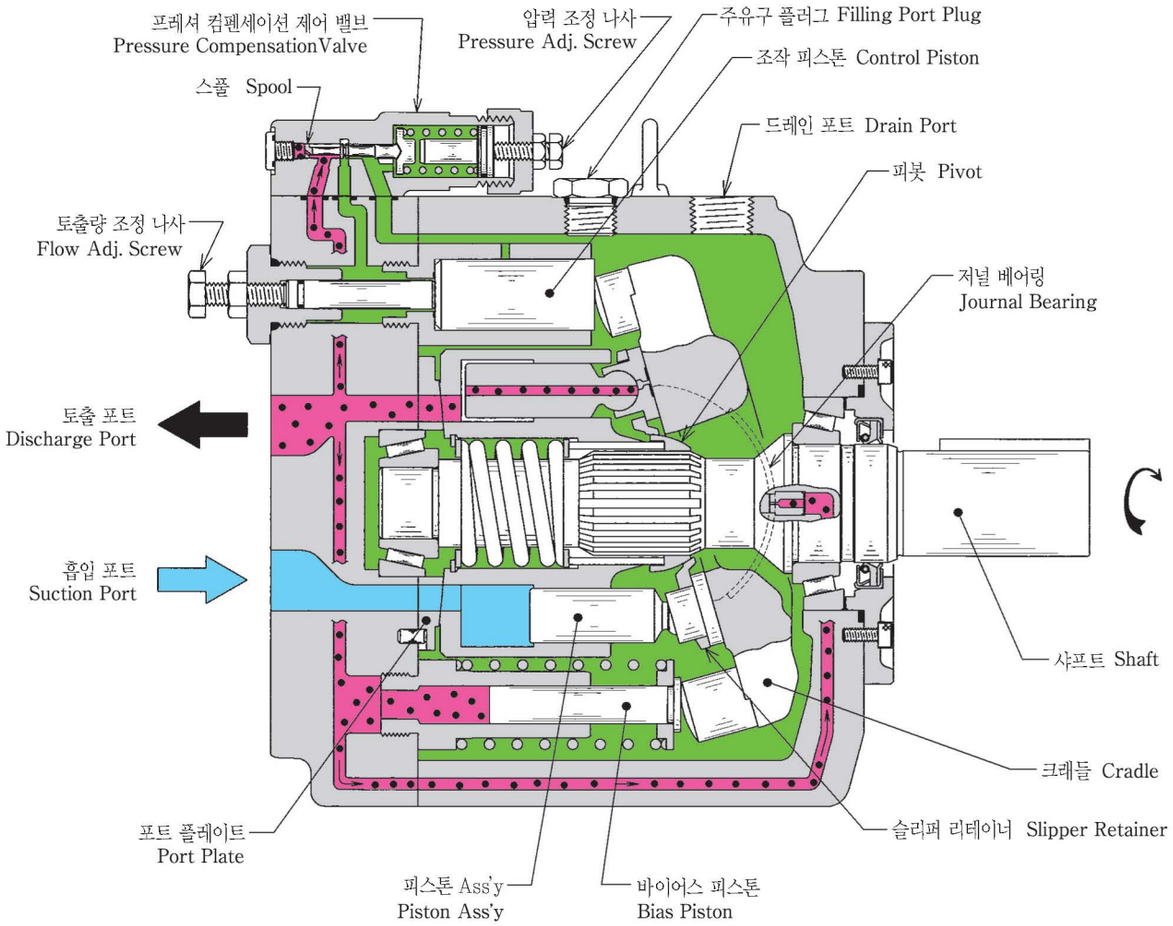


특성
Performance Characteristic

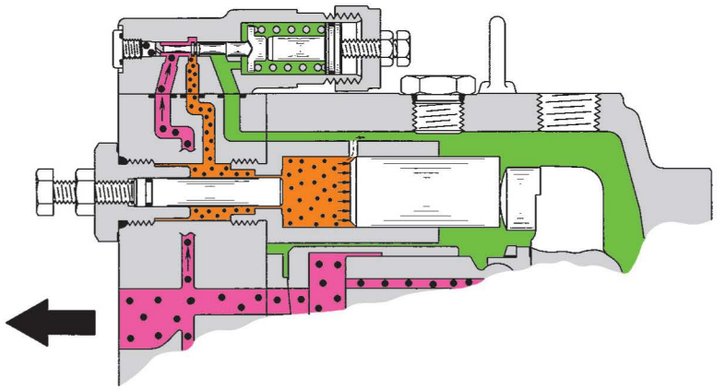


A3H시리즈 고압가변 피스톤 펌프 [압력 보상 제어형] (01제어)

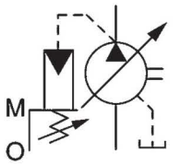
● 최대 토출량일 때 At Full Flow



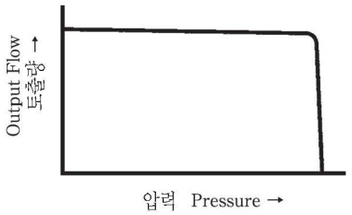
● 풀컷 오프일 때 At Full Cut-off



KS 유압기호
Graphic Symbol



특성
Performance Characteristic

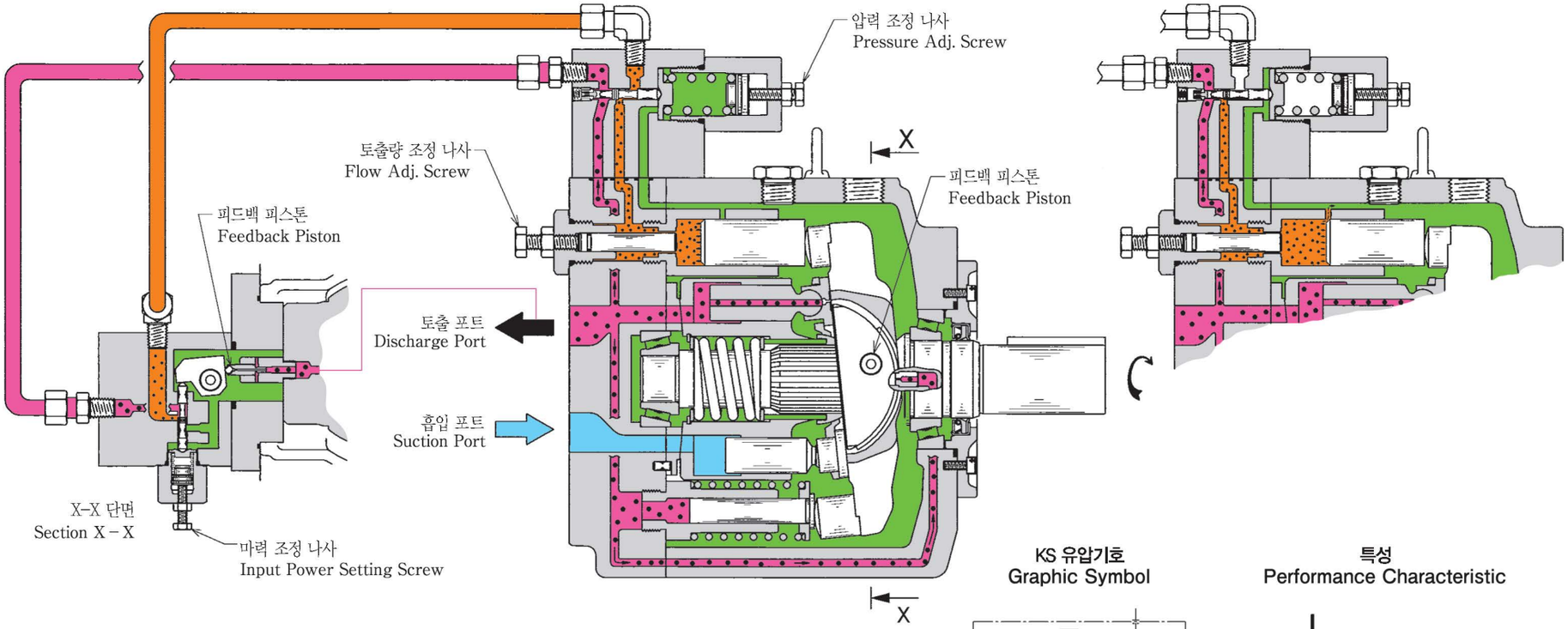


A3H시리즈 고압가변 피스톤 펌프 [정마력 (토크) 제어형] (09제어)

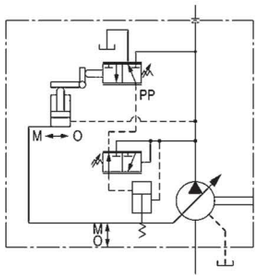
"A3H" Series Variable Displacement Piston Pumps
(Constant Power (Torque) Control Type)

● 마력 (유량) 제어시 At Power (Flow) Control

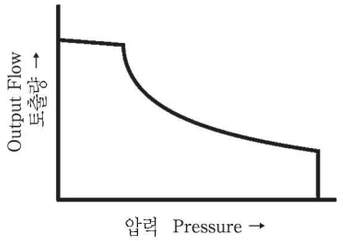
● 압력 제어시 At Pressure Control



KS 유압기호
Graphic Symbol



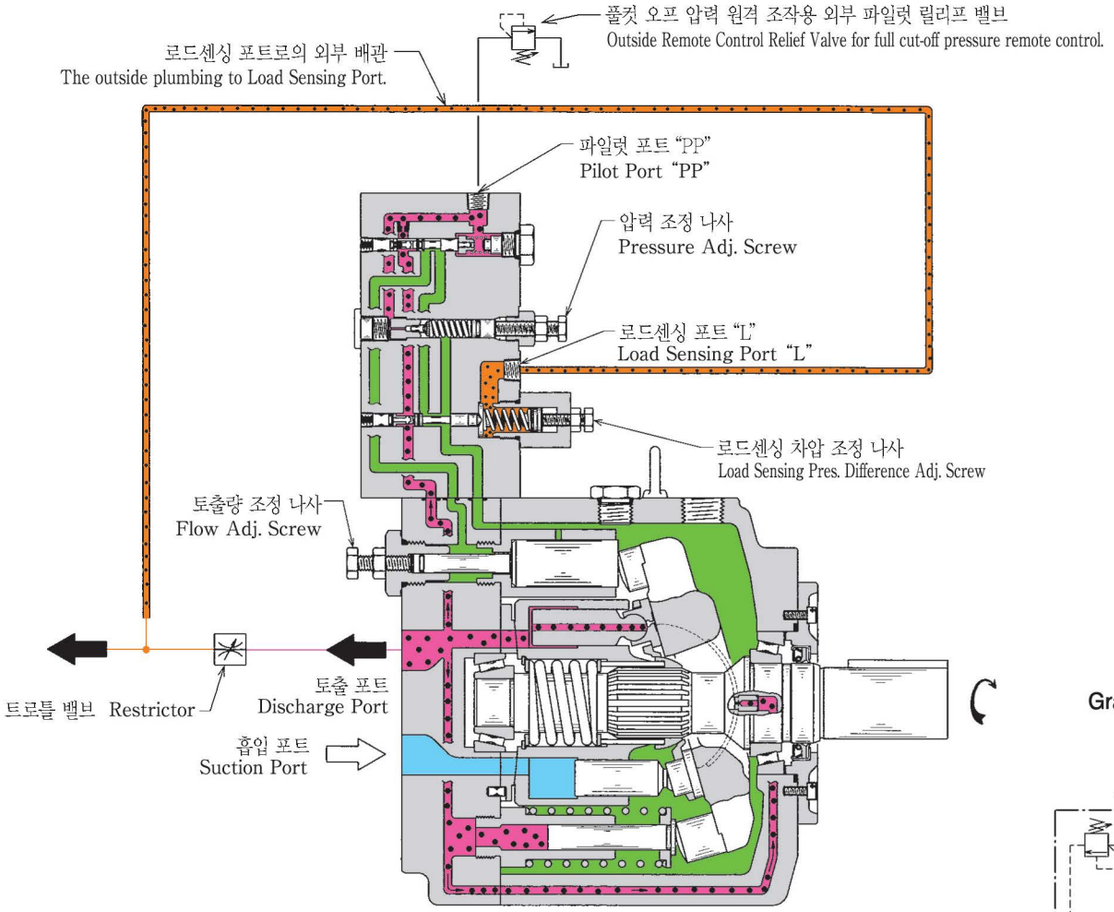
특성
Performance Characteristic



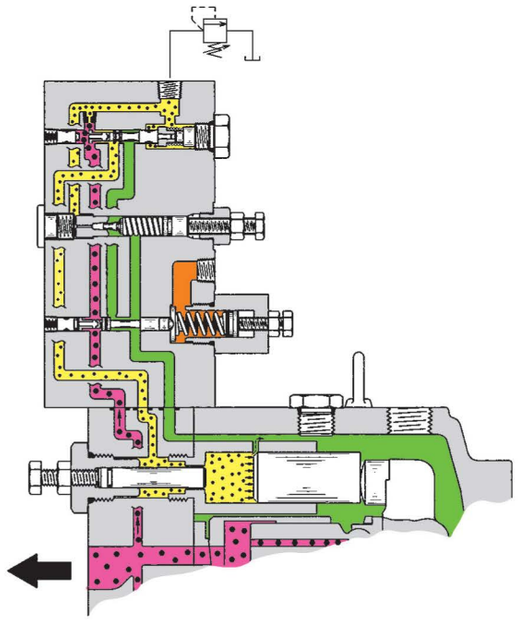
A3H시리즈 고압가변 피스톤 펌프 [로드센싱 제어형] (14제어)

"A3H" Series Variable Displacement Piston Pumps (Load Sensing Type)

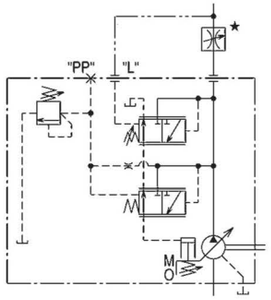
● 최대 토출량일 때 At Full Flow



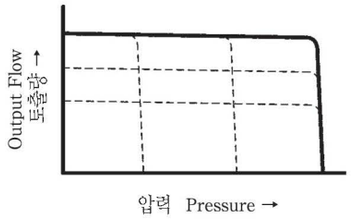
● 압력 제어시 At Pressure Control



KS 유압기호
Graphic Symbol

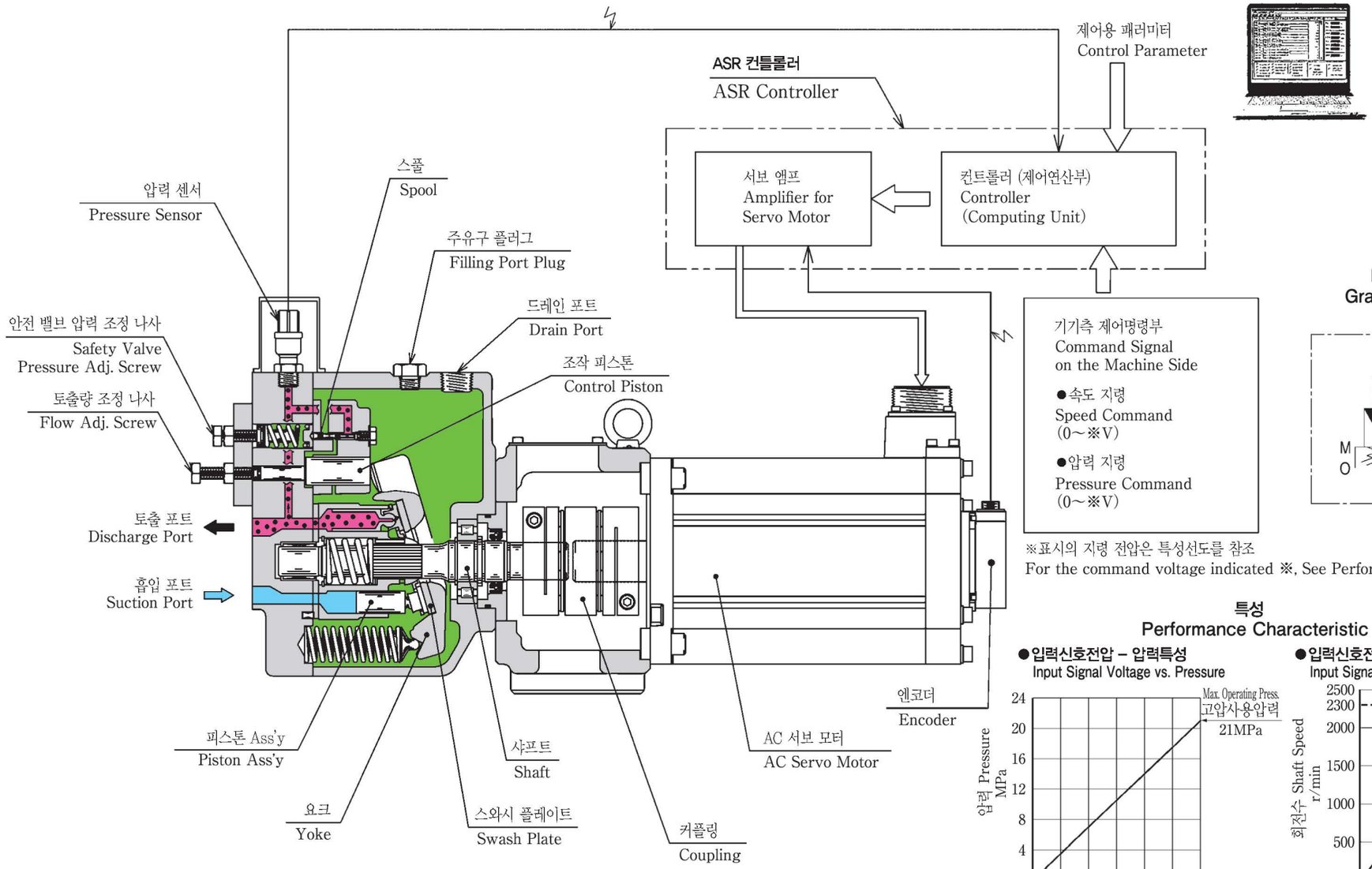


특성
Performance Characteristic



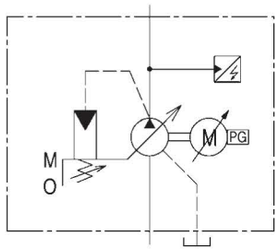
ASR시리즈 AC 서보 모터 구동 펌프

"ASR" Series AC Servo Motor Driven Pumps



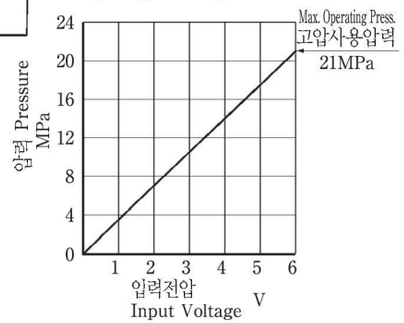
※표시의 지령 전압은 특성선도를 참조
For the command voltage indicated ※, See Performance characteristics.

KS 유압기호
Graphic Symbol

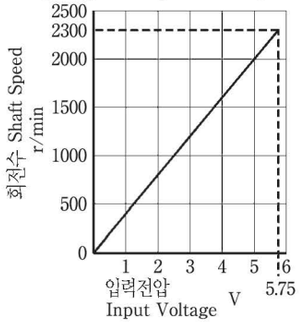


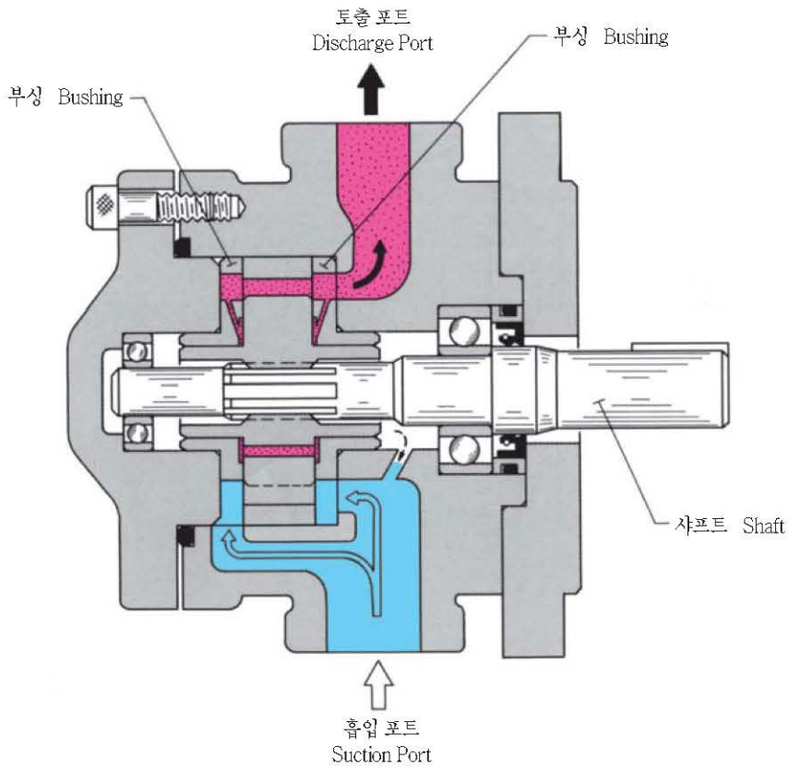
특성
Performance Characteristic

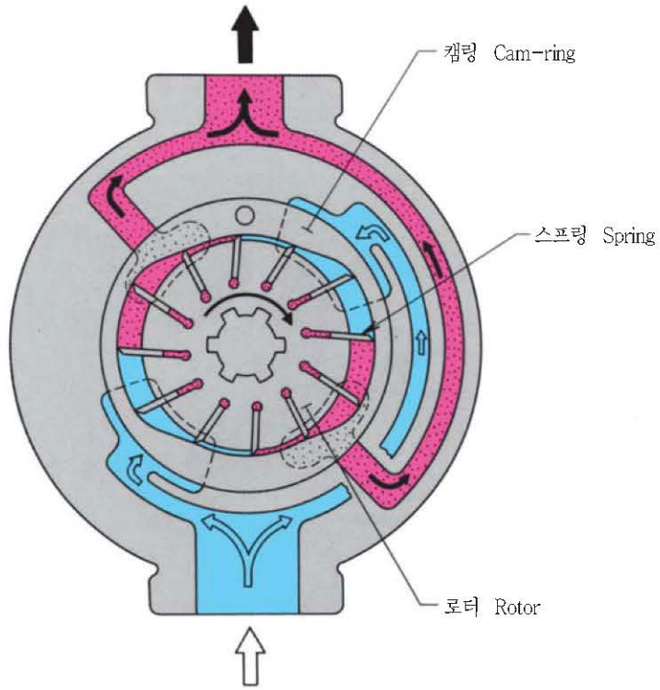
●입력신호전압 – 압력특성
Input Signal Voltage vs. Pressure



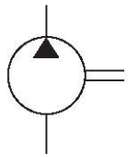
●입력신호전압 – 회전수특성
Input Signal Voltage vs. Shaft Speed

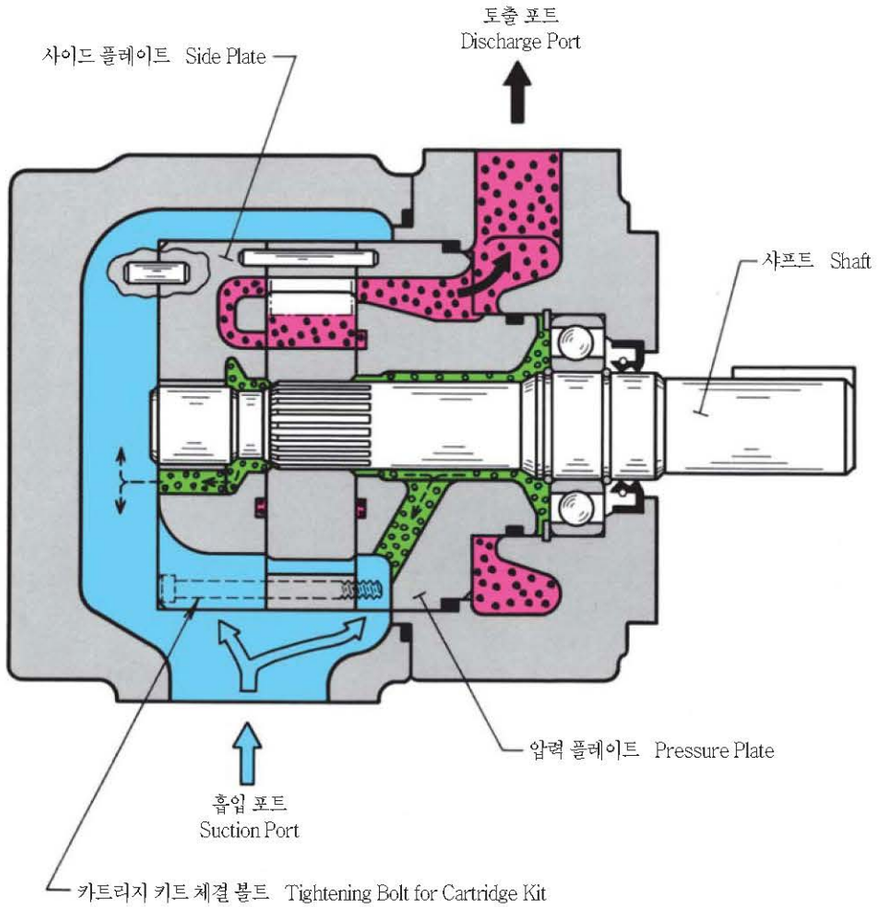


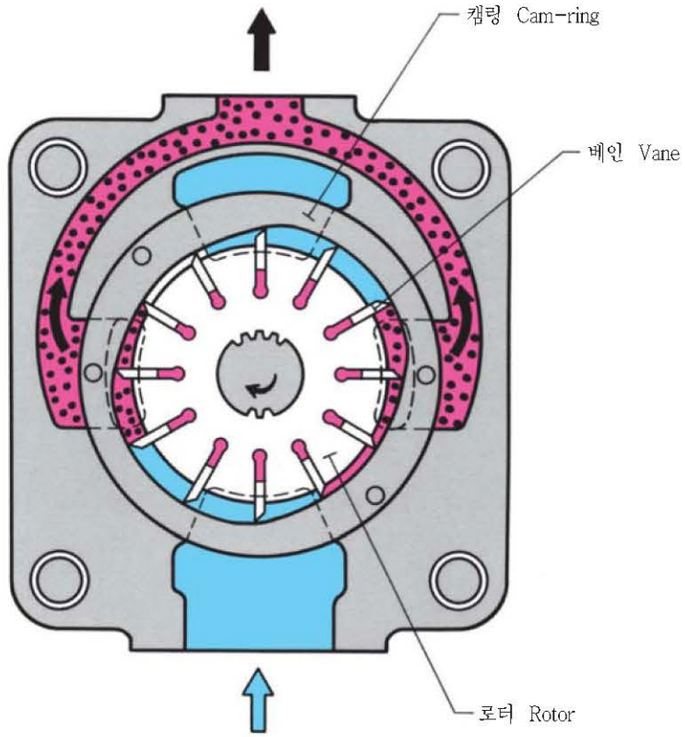




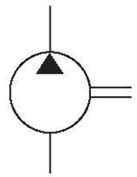
KS 유압기호
Graphic Symbol

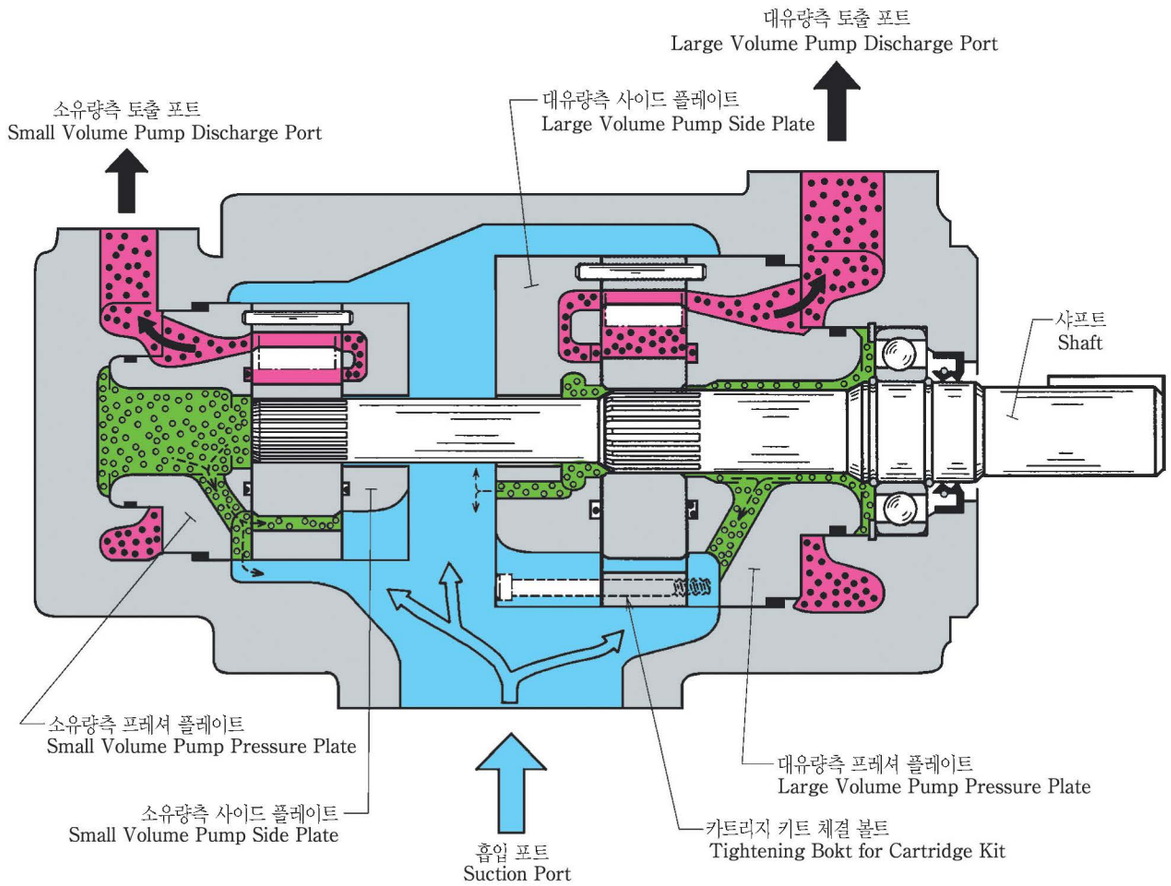


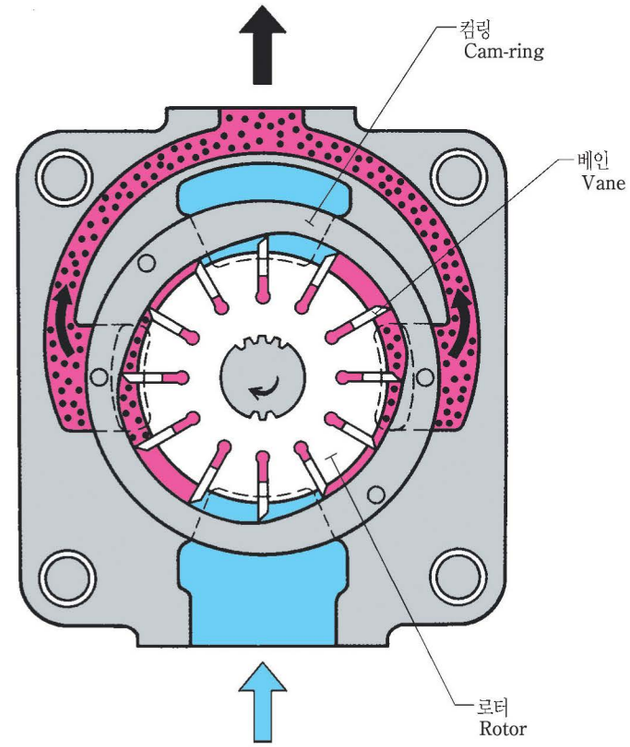




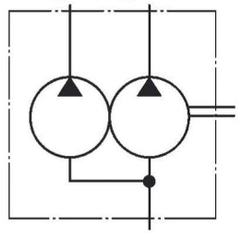
KS 유압기호
Graphic Symbol

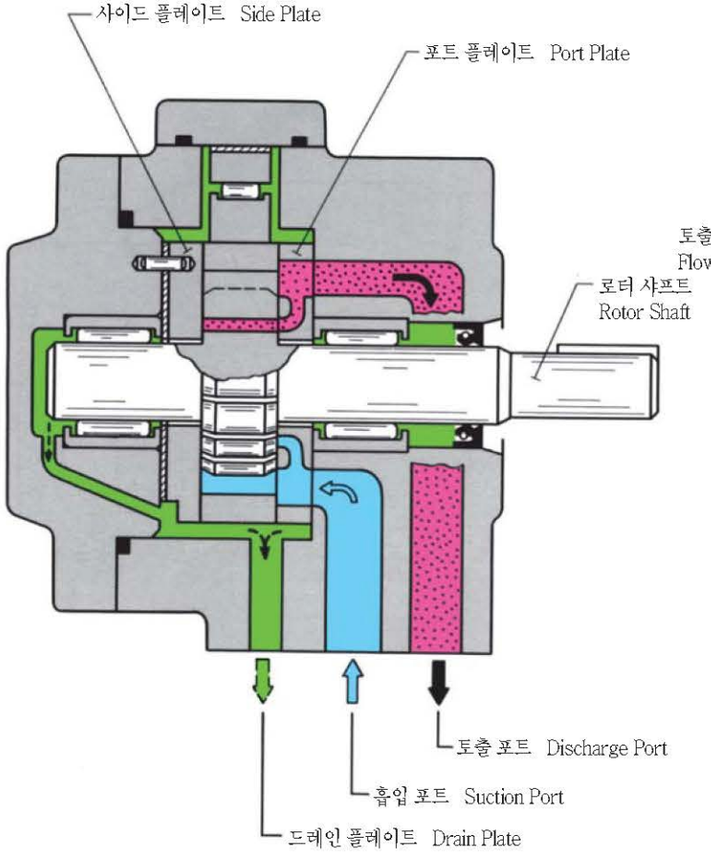


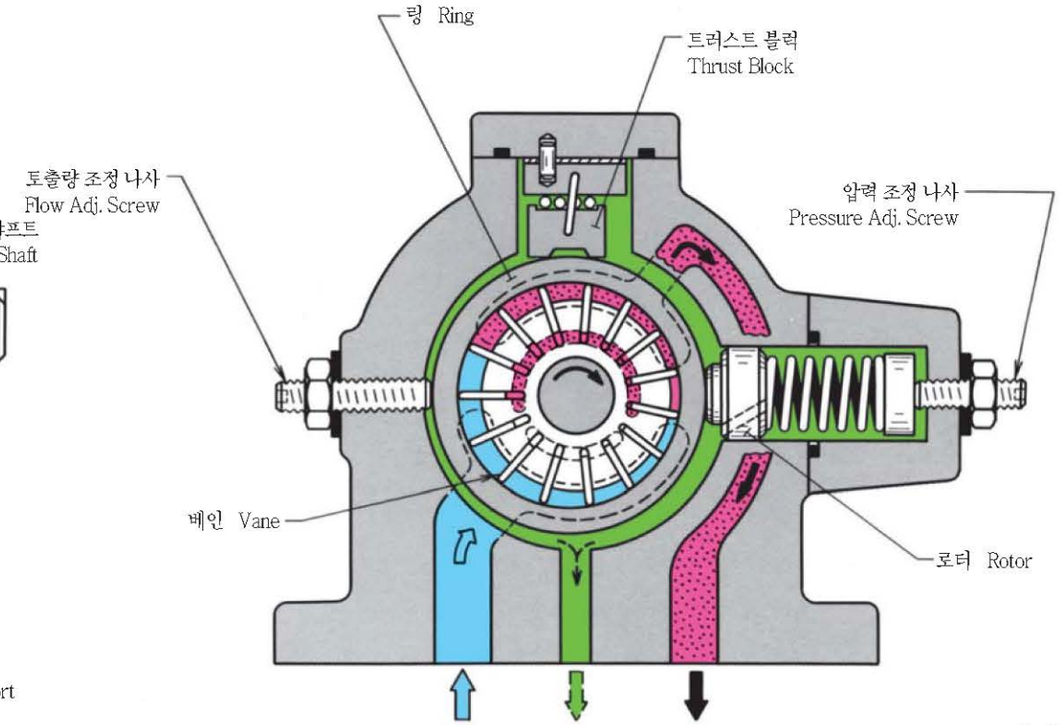




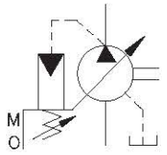
KS 유압기호
Graphic Symbol

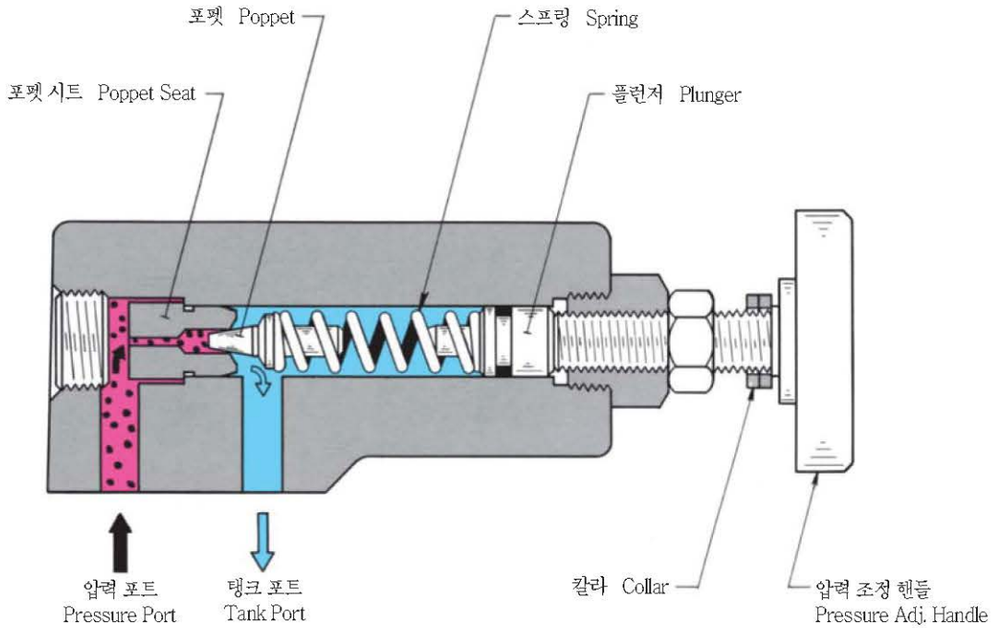


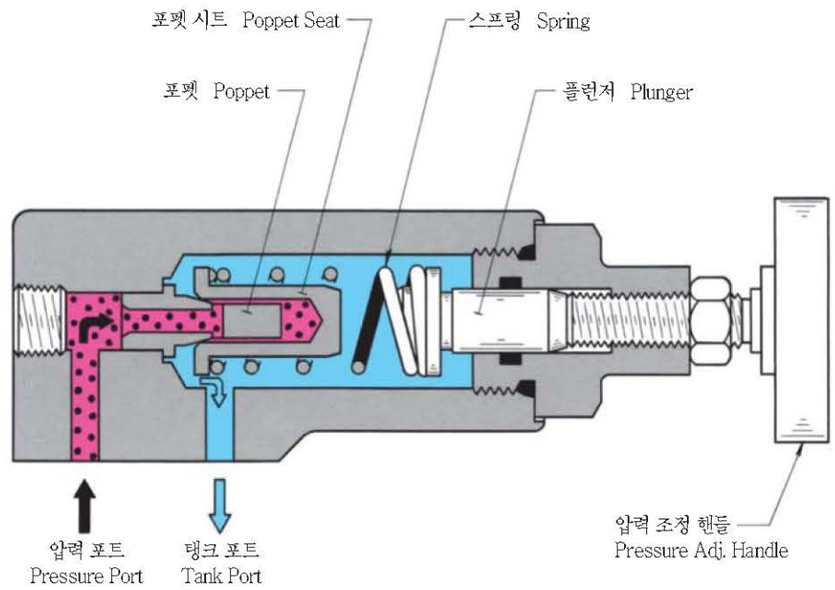




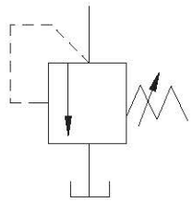
KS 유압기호
Graphic Symbol





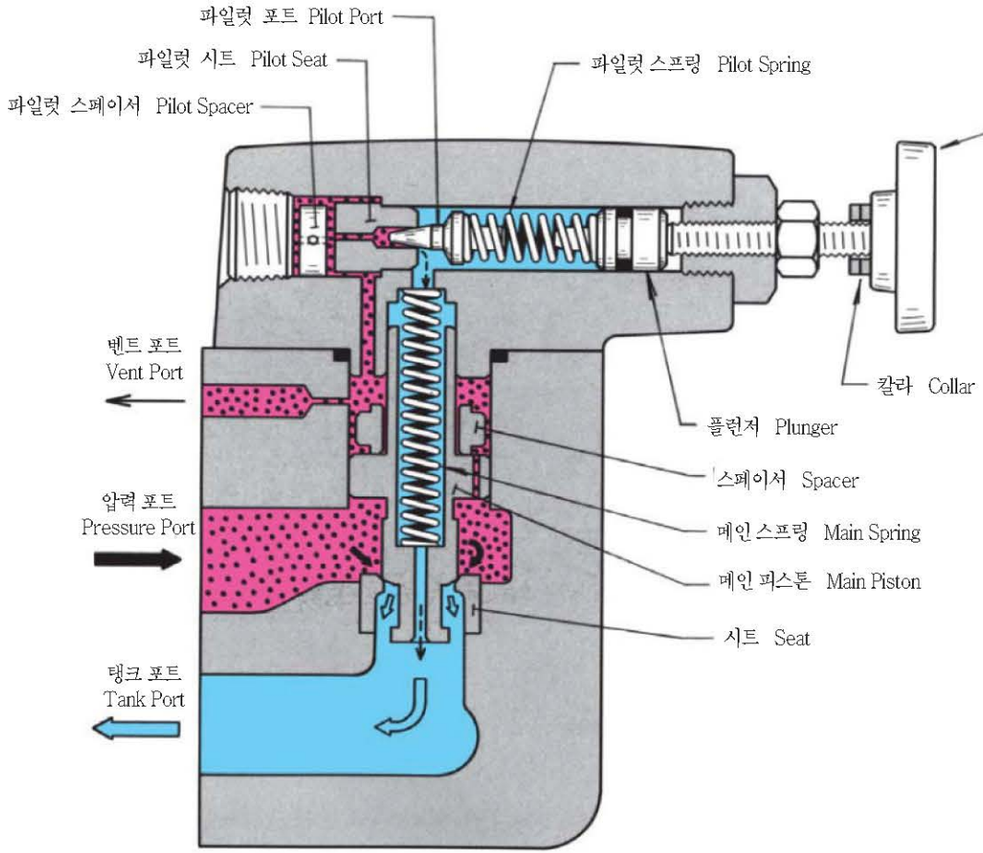


KS 유압기호
Graphic Symbol

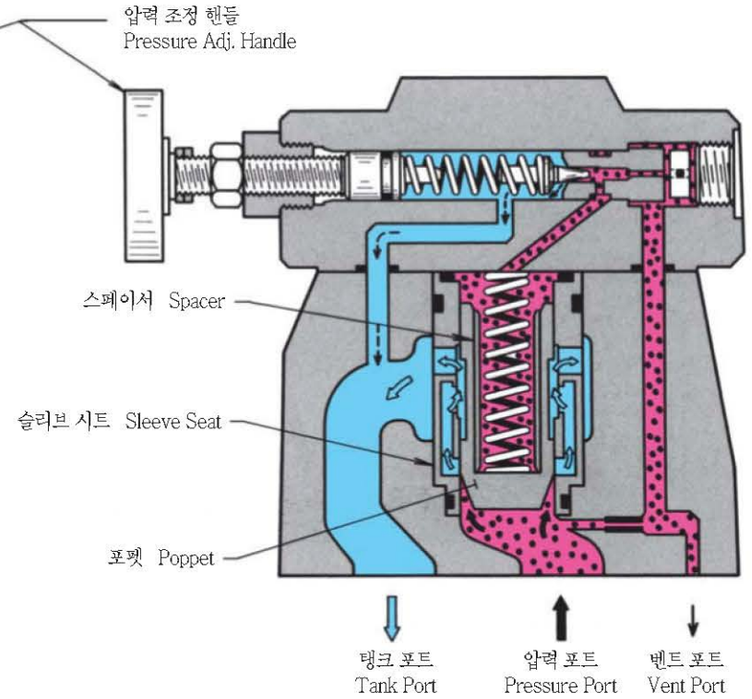


파일럿 작동형 릴리프 밸브

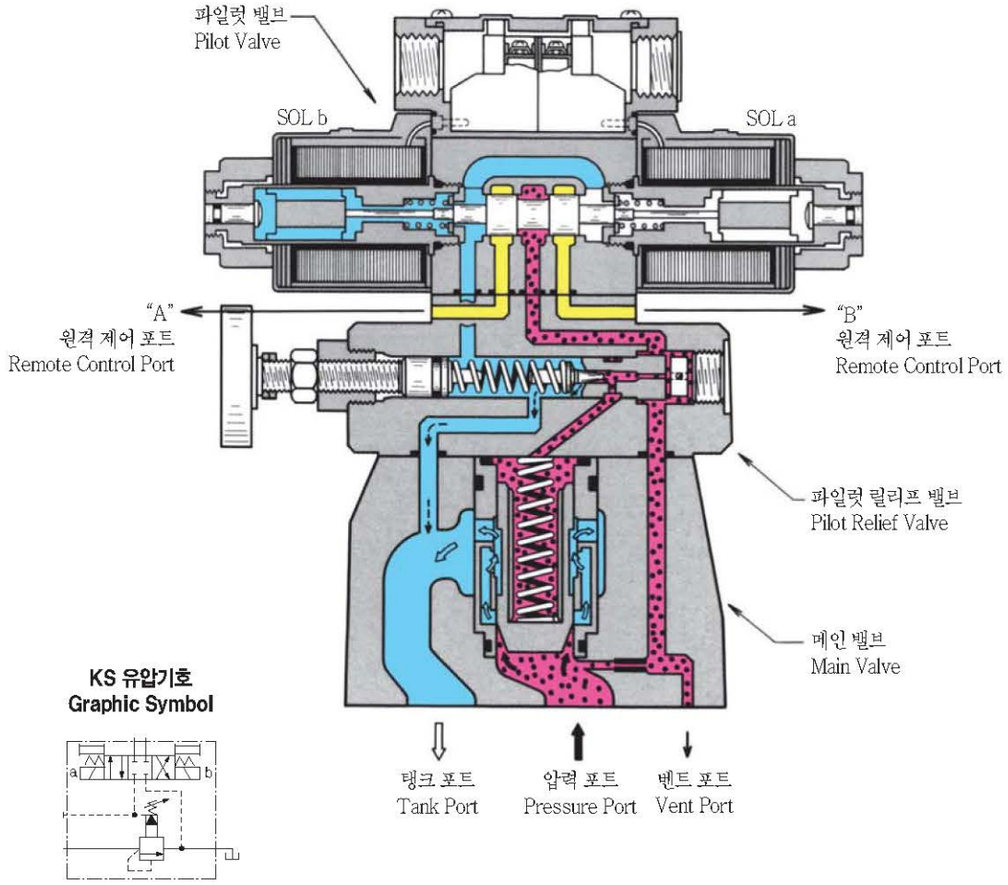
● 표준형 Standard Type



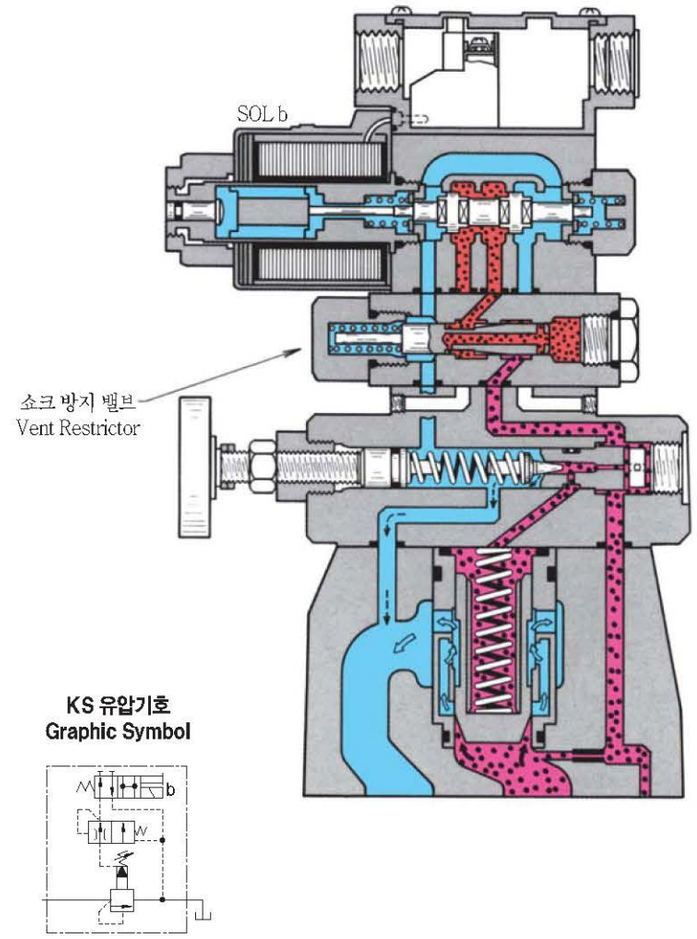
● 저소음형 Low Noise Type



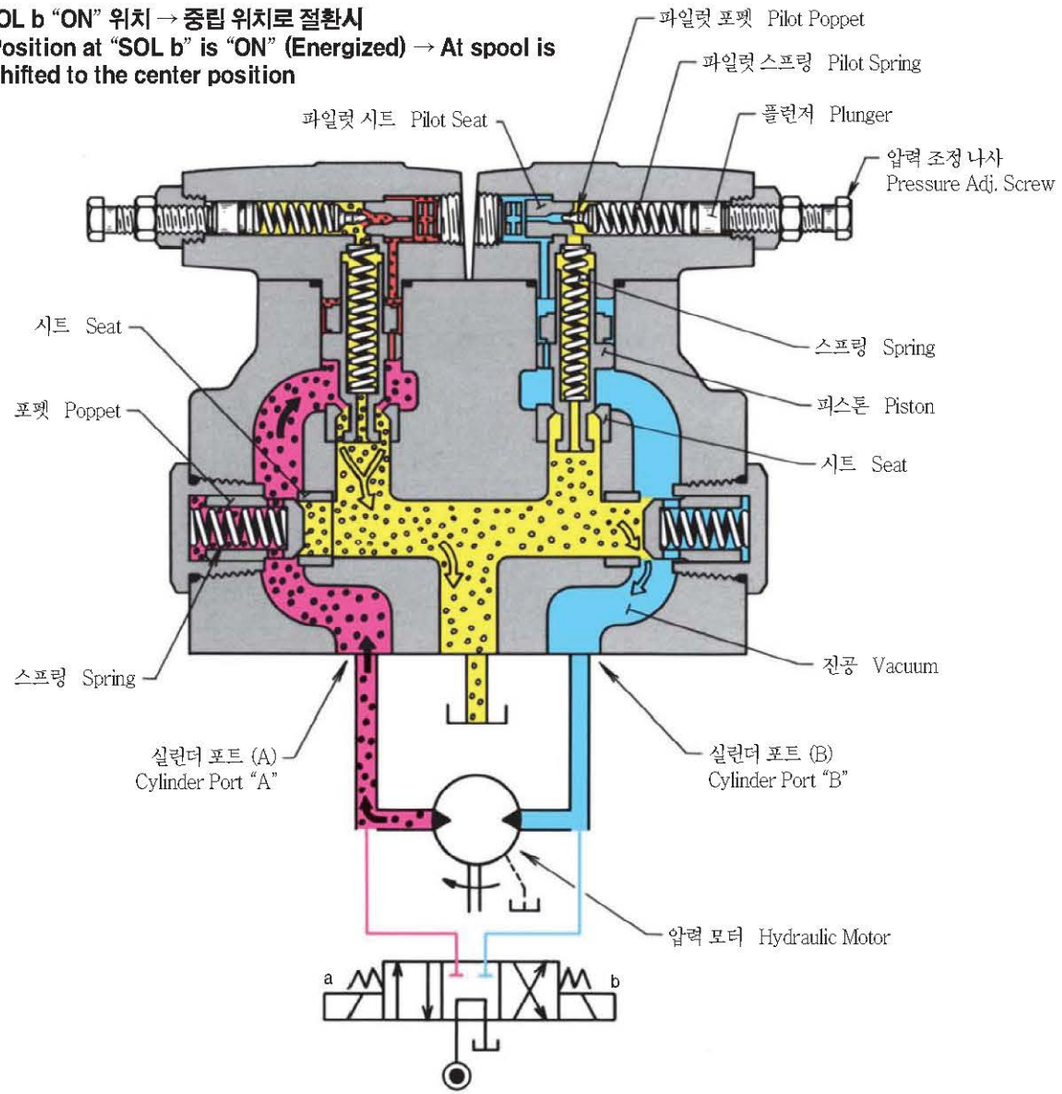
KS 유압기호
Graphic Symbol



● 쇼크 방지 밸브 부착 Models with Vent Restrictor

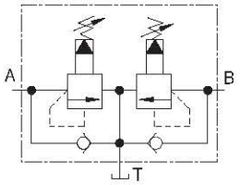


● **SOL b "ON" 위치 → 중립 위치로 절환시**
Position at "SOL b" is "ON" (Energized) → At spool is shifted to the center position

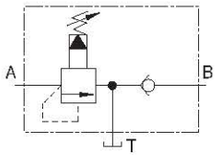


KS 유압기호
Graphic Symbol

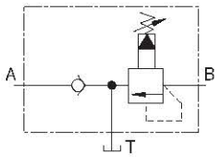
A-B 라인용
For "A & B-Lines"



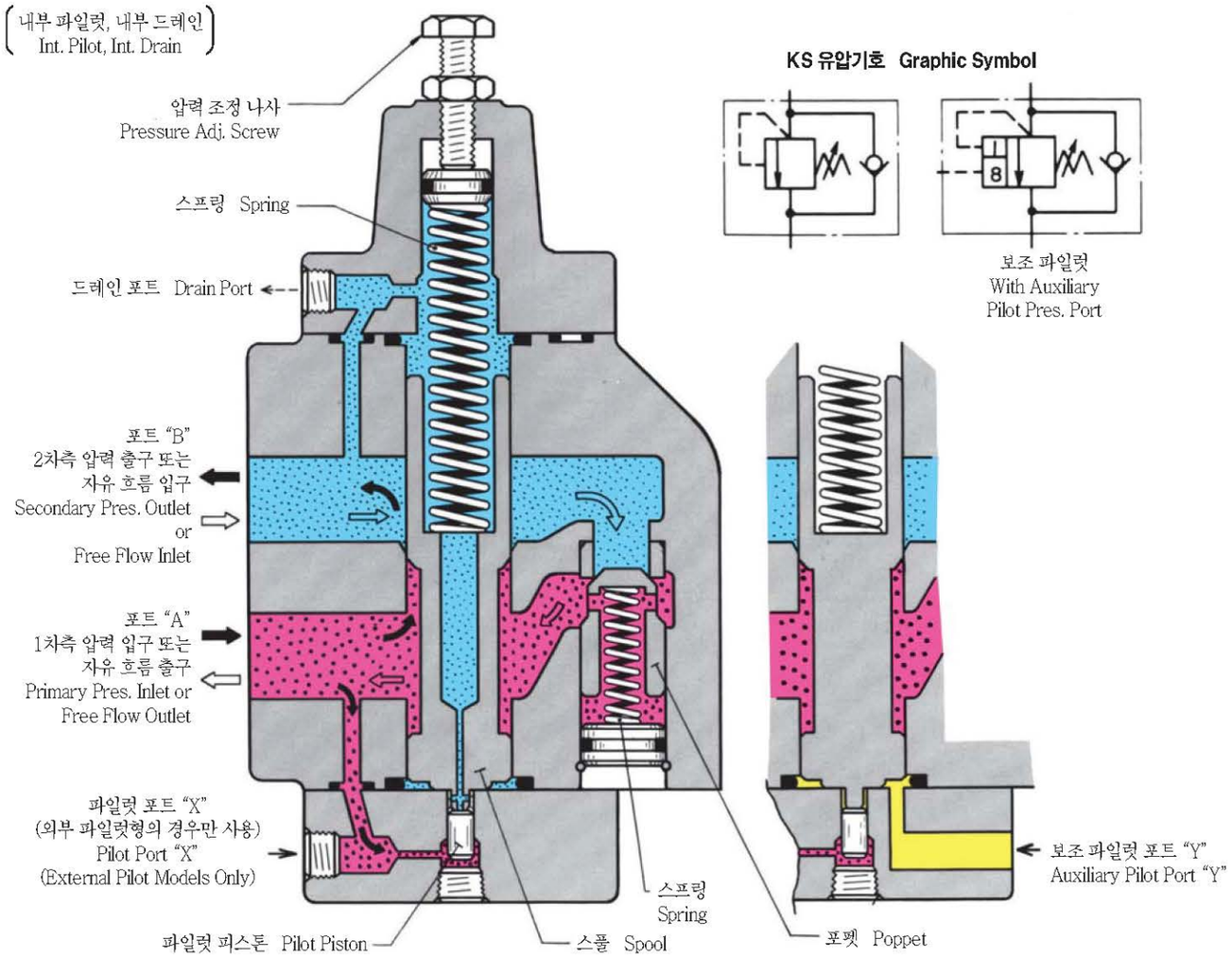
A 라인용
For "A-Line"



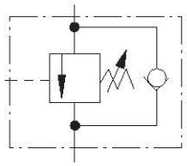
B 라인용
For "B-Line"



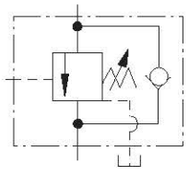
● 카운터 밸런스 밸브 Counterbalance Valve



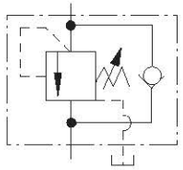
● 카운터 밸런스 밸브
Counterbalance Valve
외부 파일럿, 내부 드레인
(Ext. Pilot, Int. Drain)

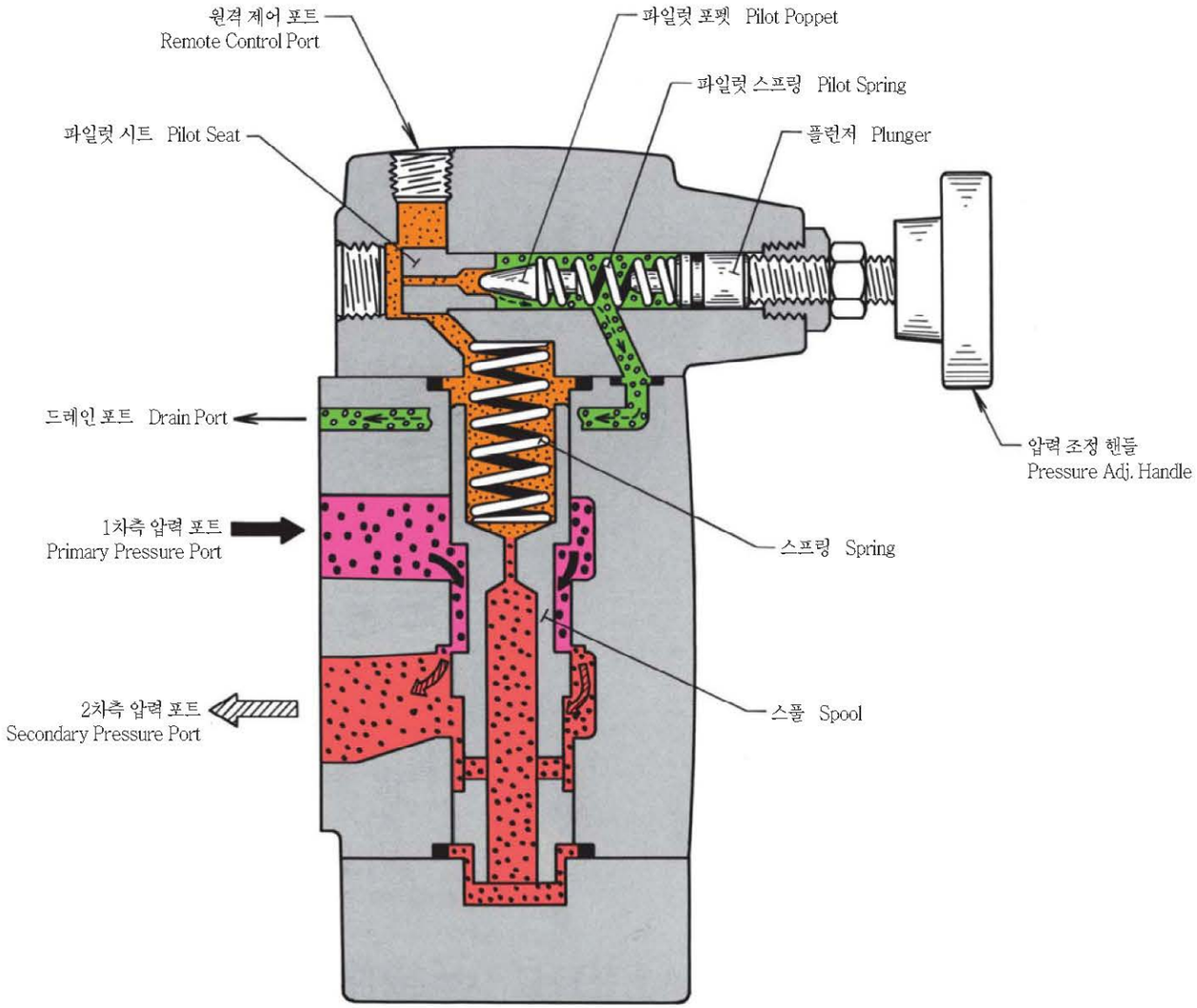


● 체크 밸브 부착 시퀀스 밸브
Sequence and Check Valve
외부 파일럿, 외부 드레인
(Ext. Pilot, Ext. Drain)



● 체크 밸브 부착 시퀀스 밸브
Sequence and Check Valve
내부 파일럿, 외부 드레인
(Int. Pilot, Ext. Drain)

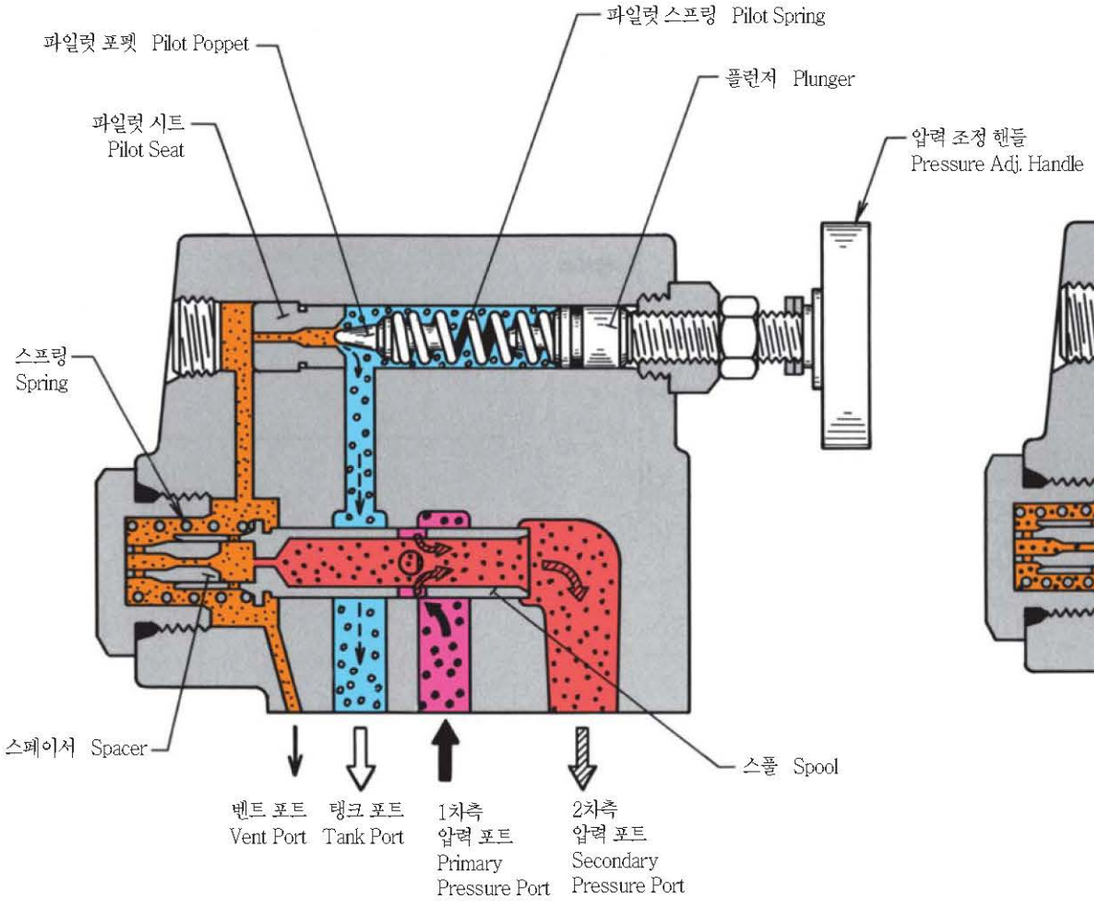




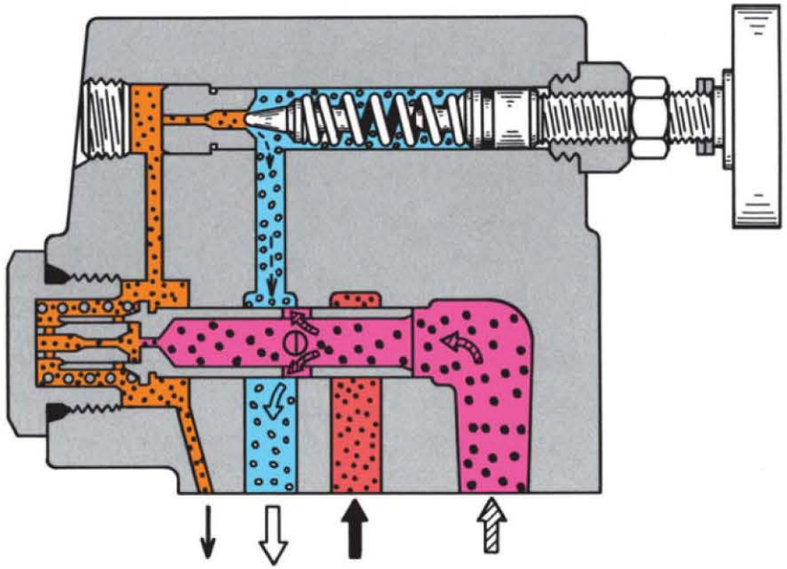
KS 유압기호
Graphic Symbol

원격 제어 포트
접속의 경우
Using Remote
Control Port

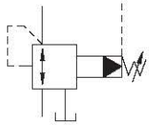
● 감압 작동시 Reducing Operation



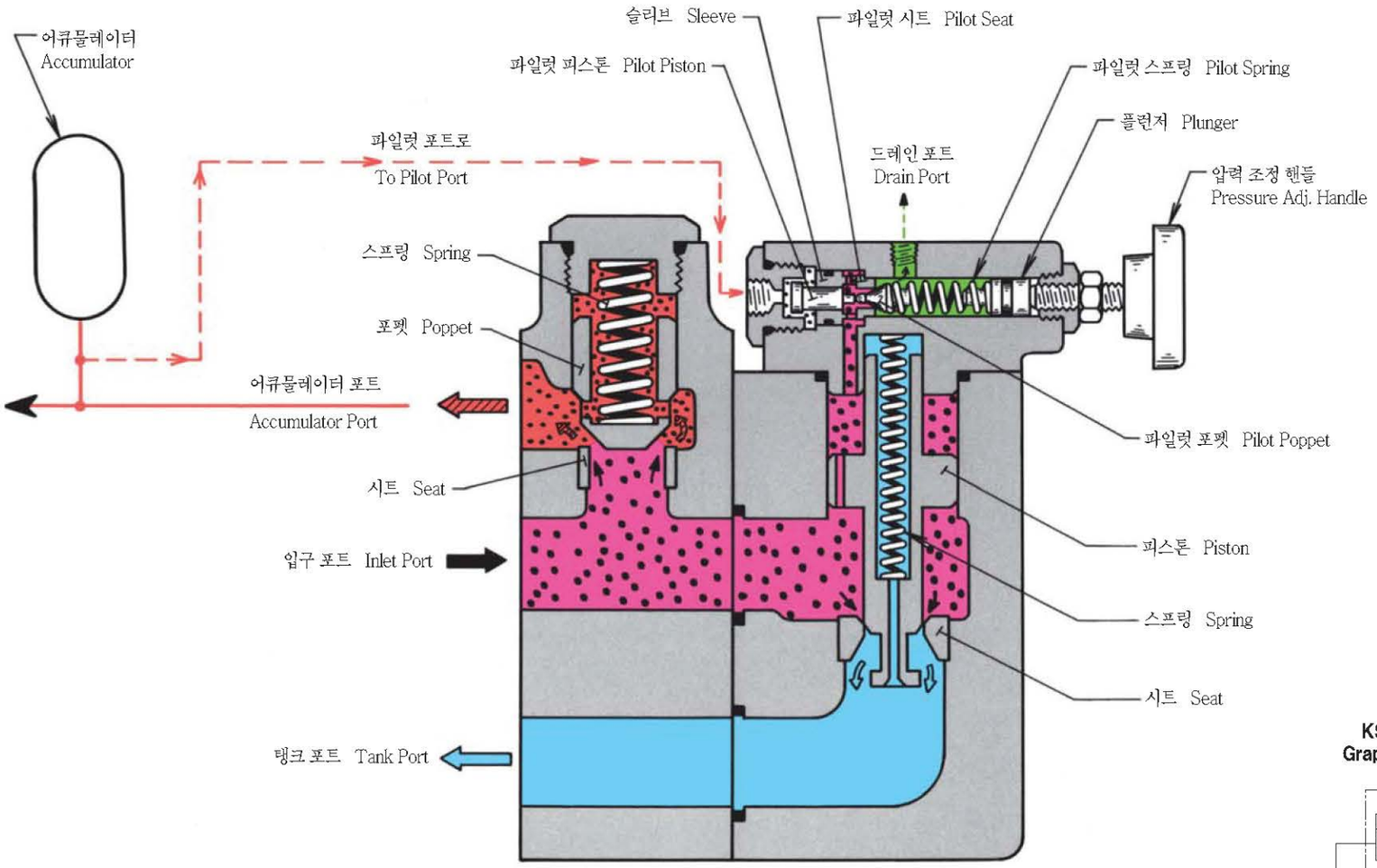
● 릴리프 작동시 Relieving Operation



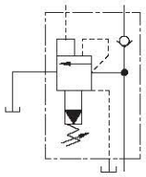
KS 유압기호
Graphic Symbol

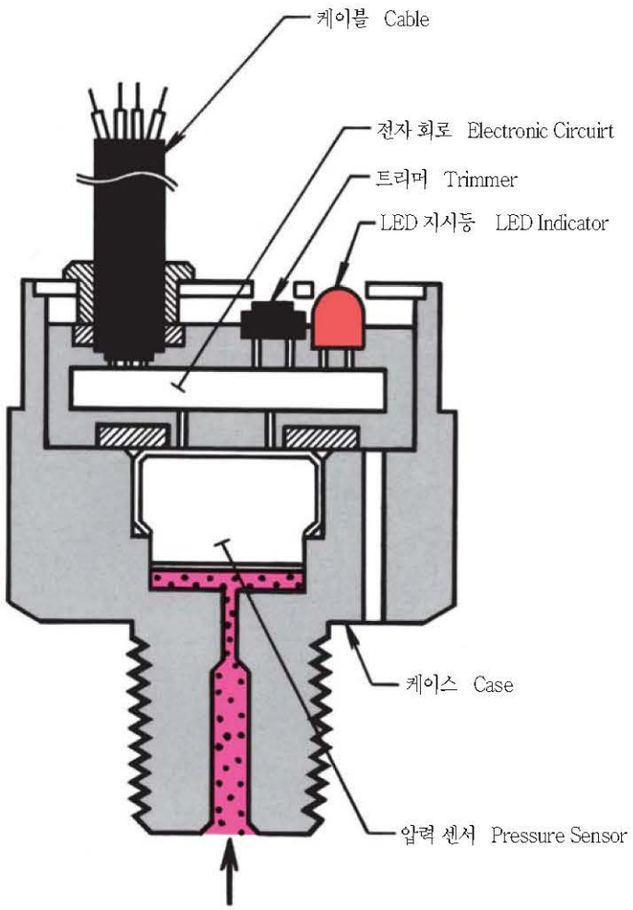


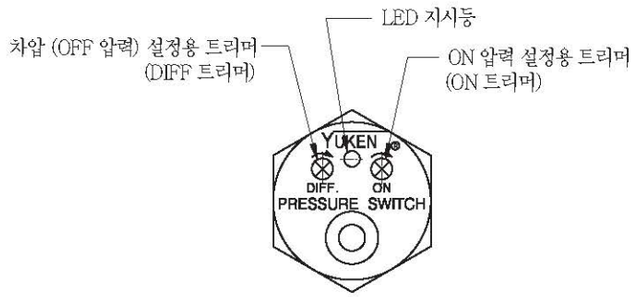
언로딩 릴리프 밸브

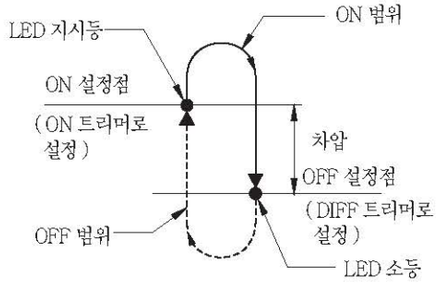


KS 유압기호
Graphic Symbol

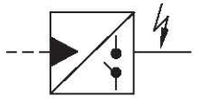


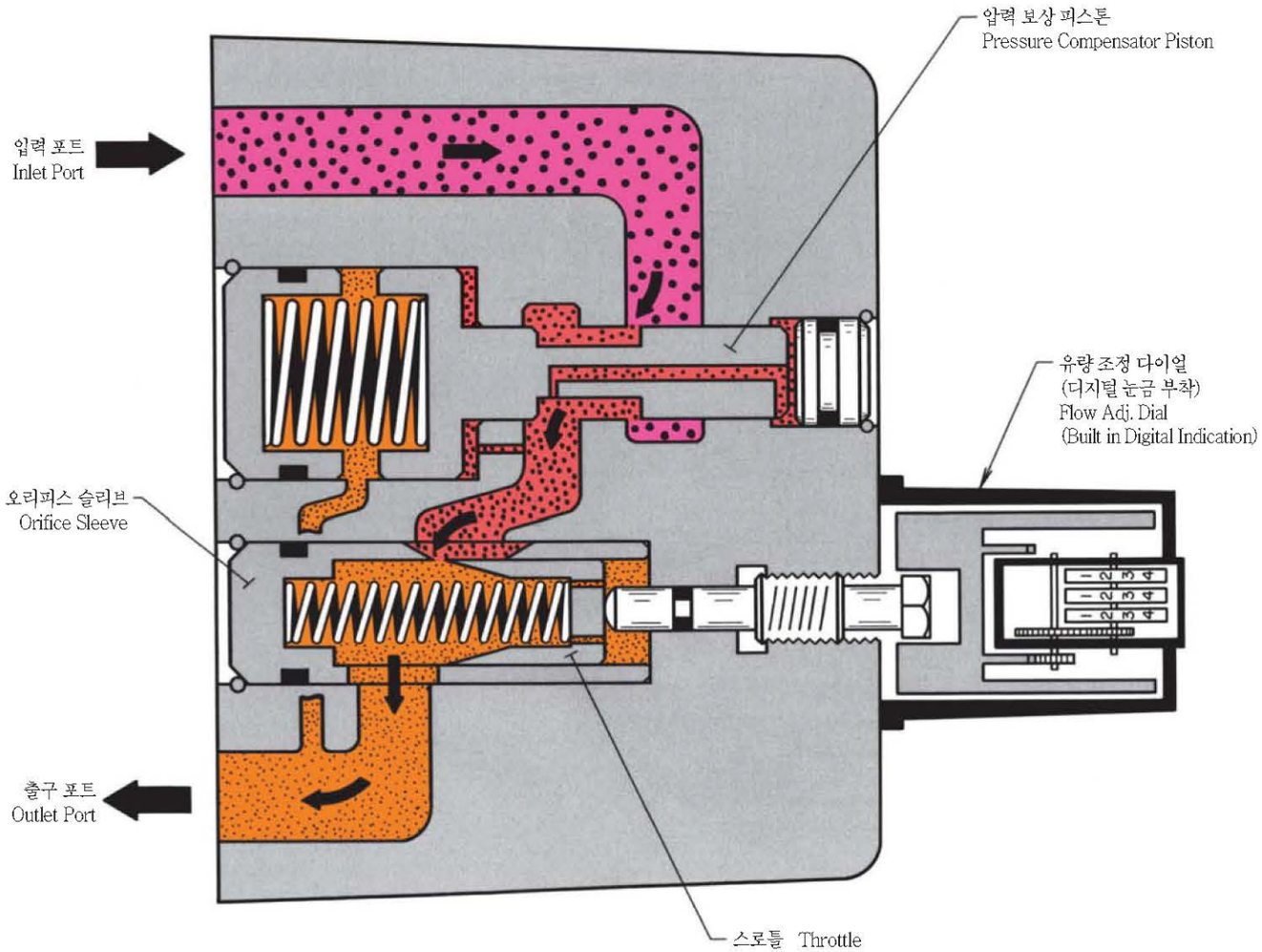




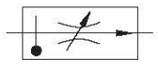


KS 유압기호
Graphic Symbol

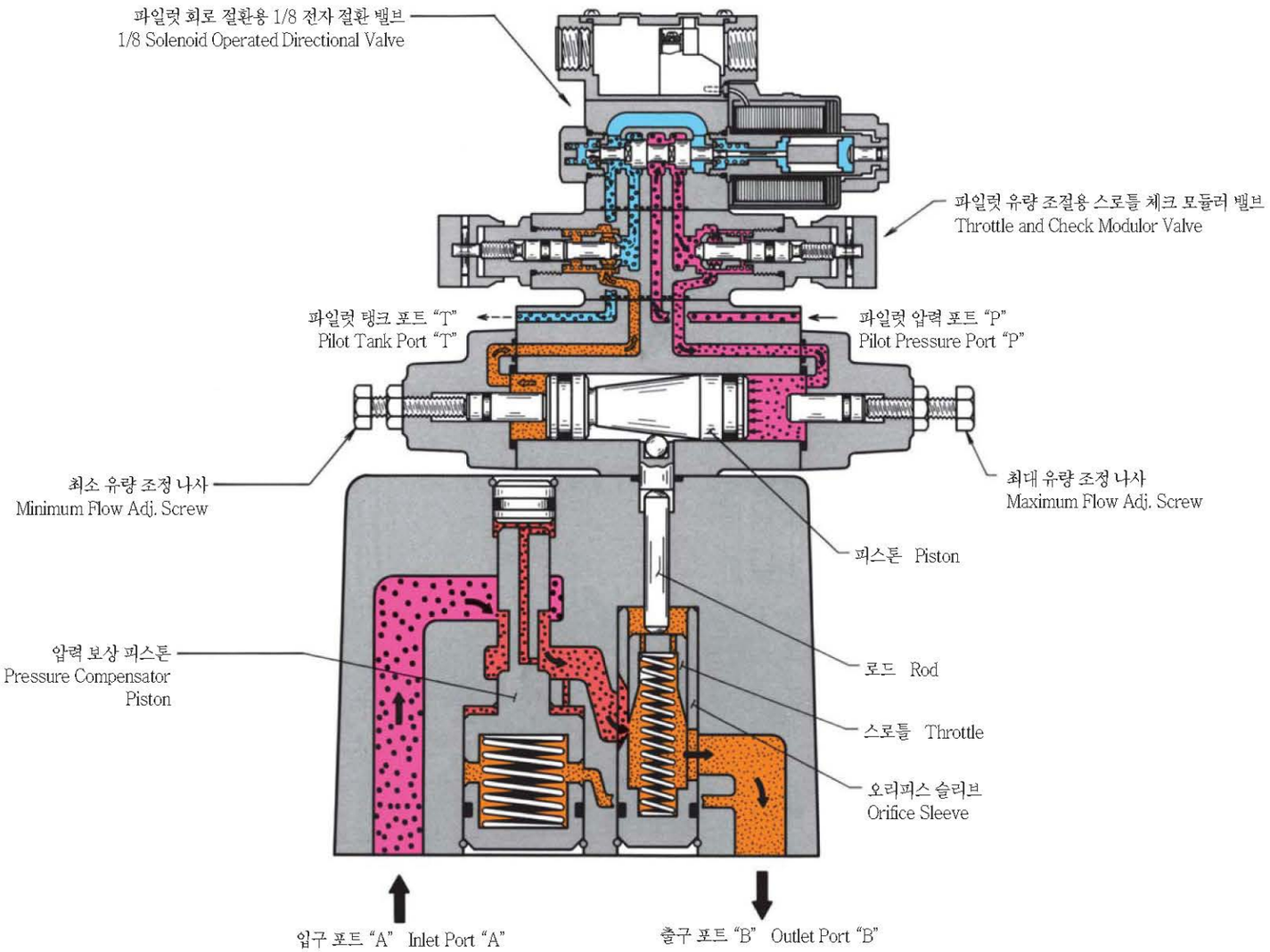




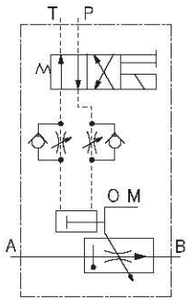
KS 유압기호
Graphic Symbol



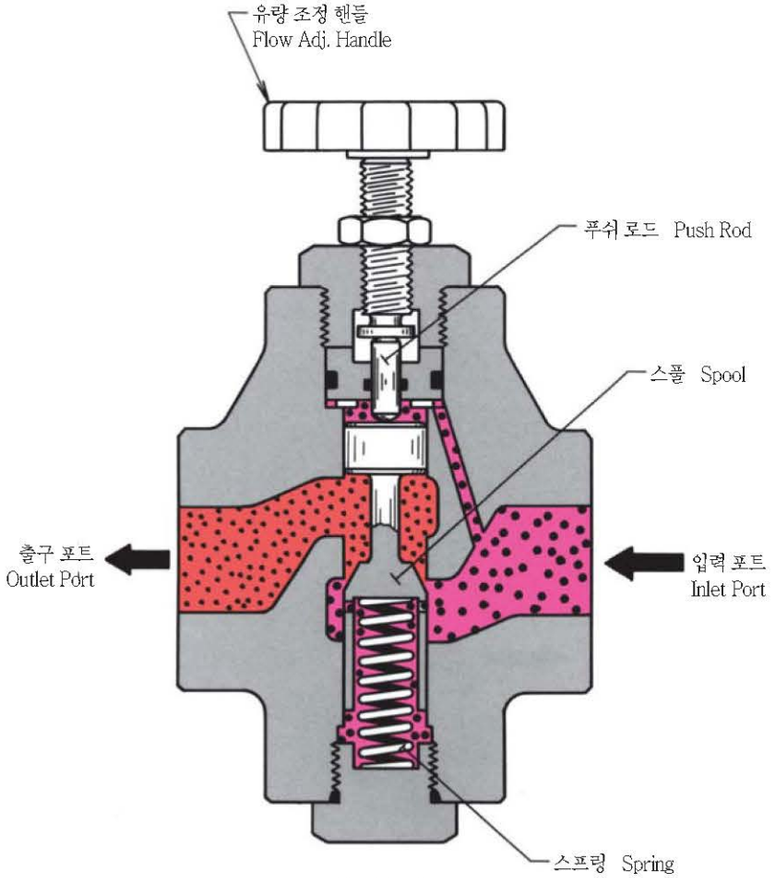
파일럿 조작 유량 조정 밸브



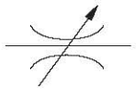
KS 유압기호
Graphic Symbol

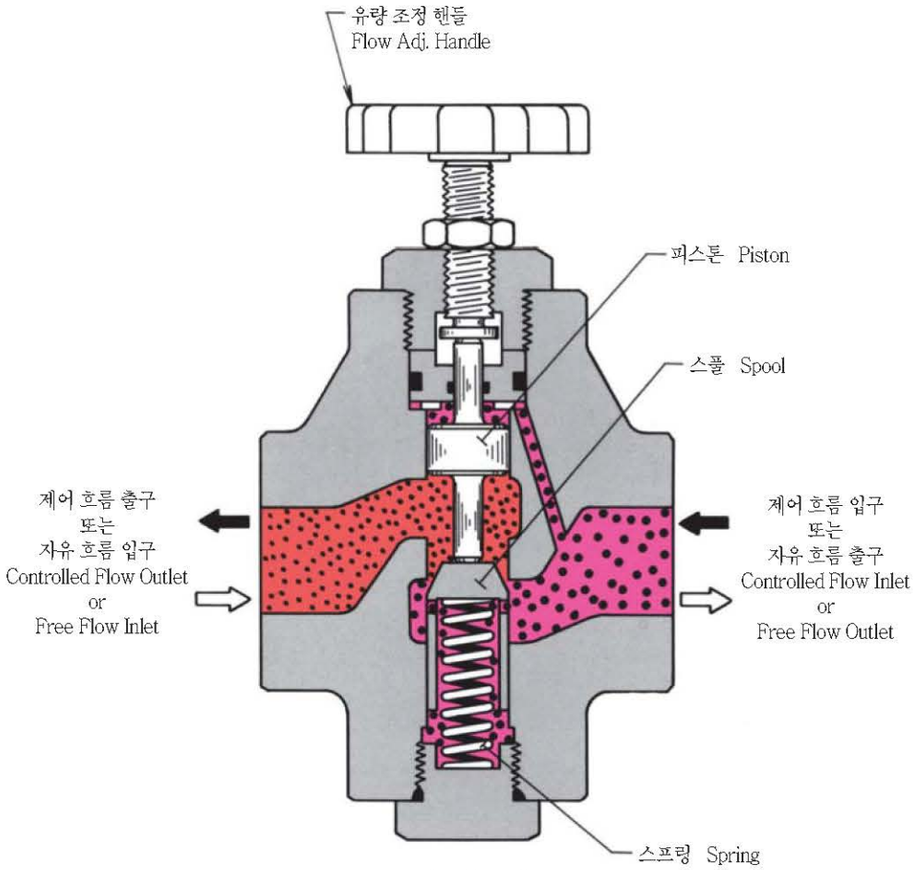


한 방향 스로틀 밸브 One Way Restrictors

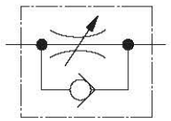


KS 유압기호
Graphic Symbol

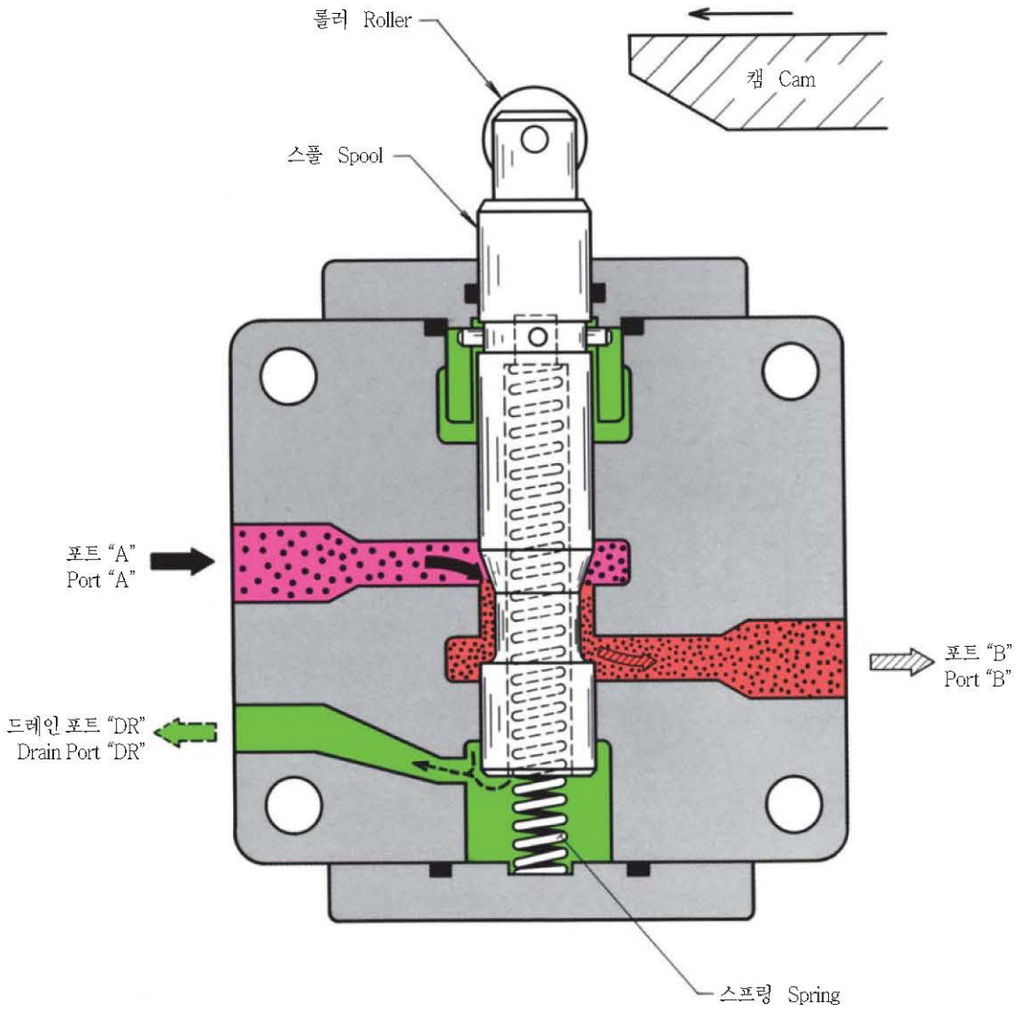




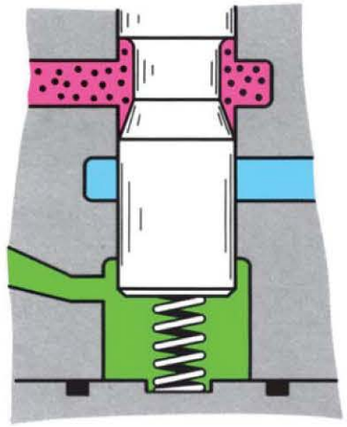
KS 유압기호
Graphic Symbol



● 노멀 오픈형 Normally Open Type

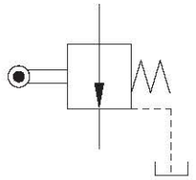


노멀 크로즈형
Normally Closed Type

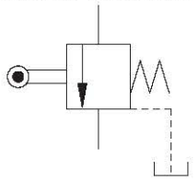


KS 유압기호
Graphic Symbol

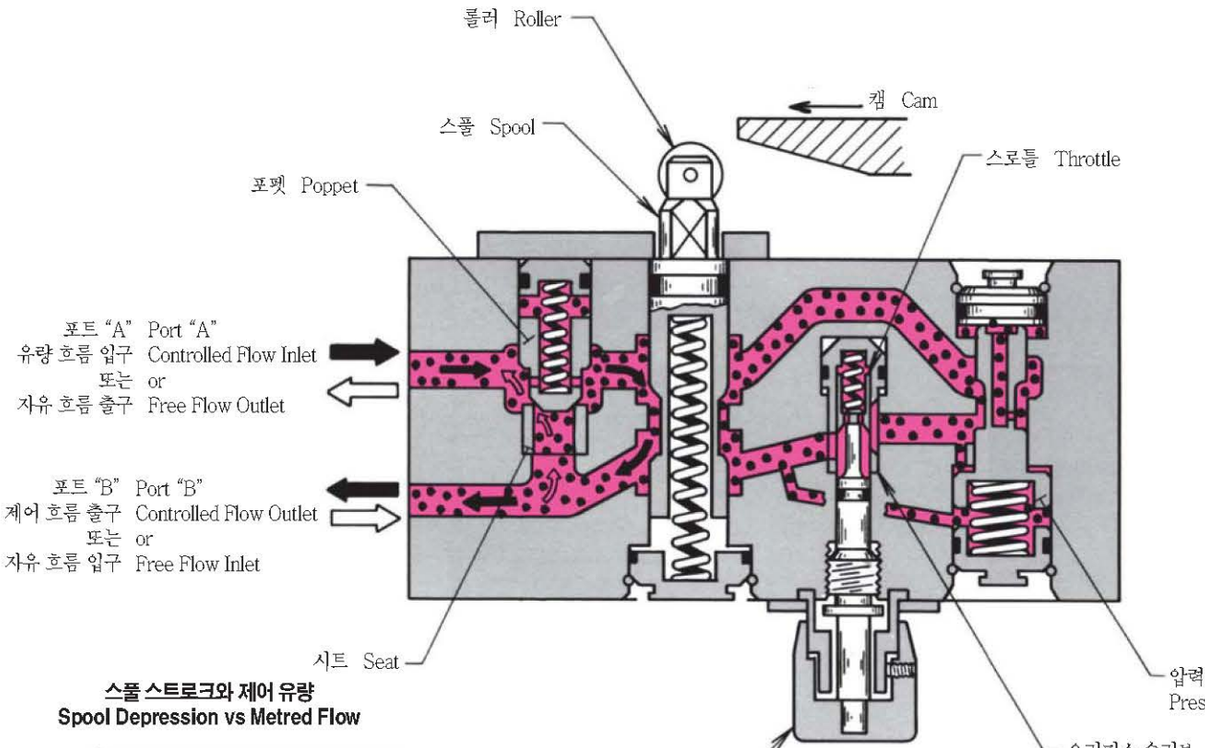
노멀 오픈형
Normally Open Type



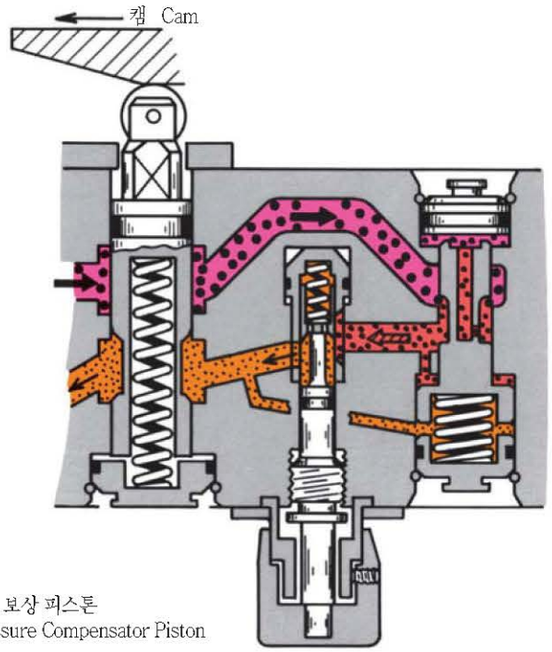
노멀 크로즈형
Normally Closed Type



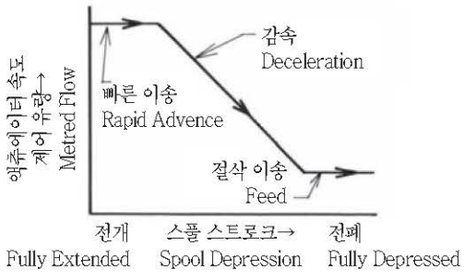
● 빠른 이송일 때 At Rapid Advance



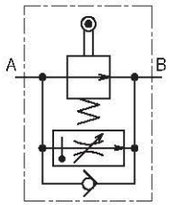
● 절삭 이송일 때 At Feed Control



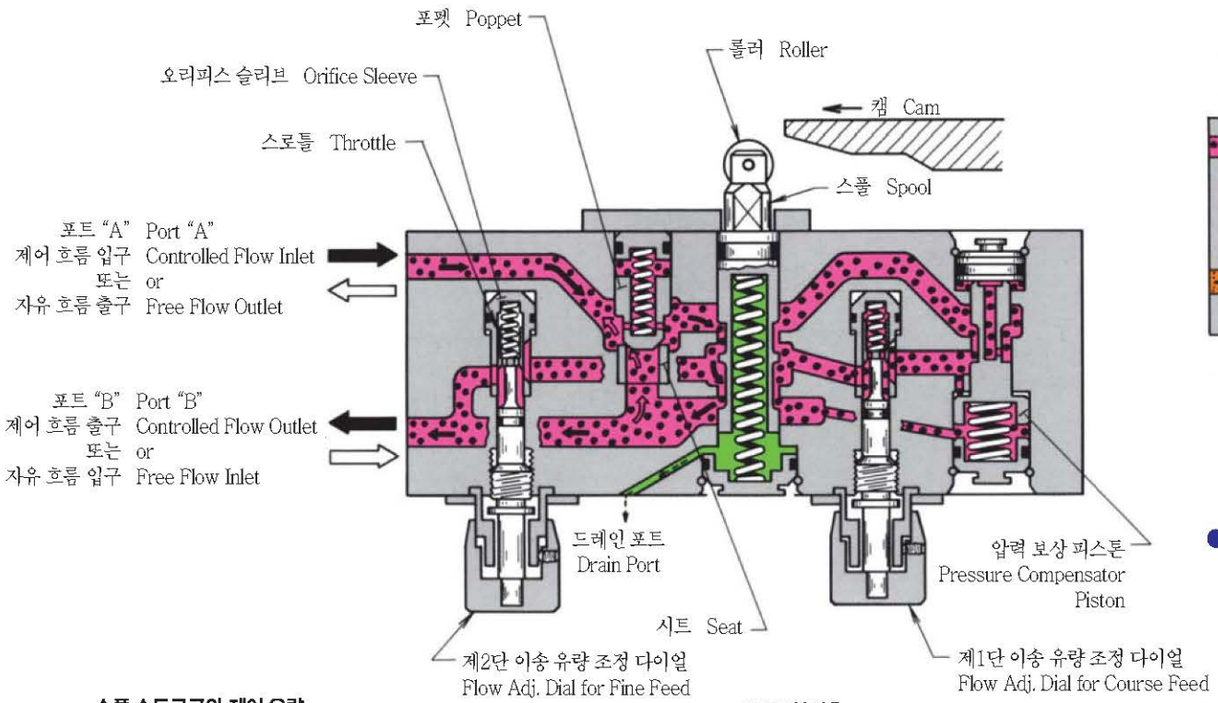
스풀 스트로크와 제어 유량
Spool Depression vs Metred Flow



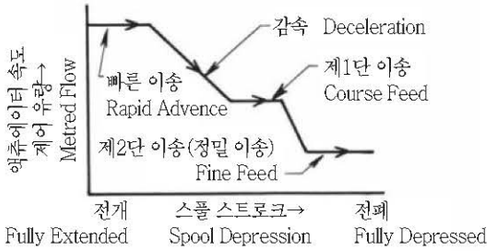
KS 유압기호
Graphic Symbol



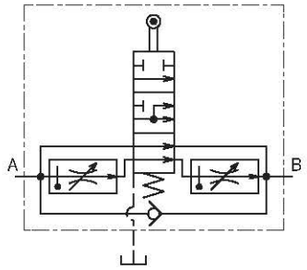
● 빠른 이송일 때 At Rapid Advance



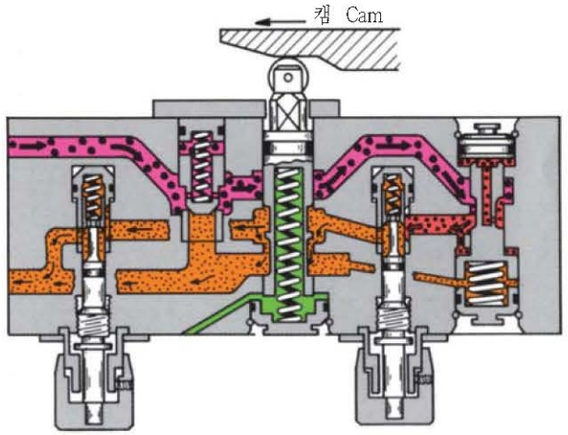
스풀 스트로크와 제어 유량
Spool Depression vs Metred Flow



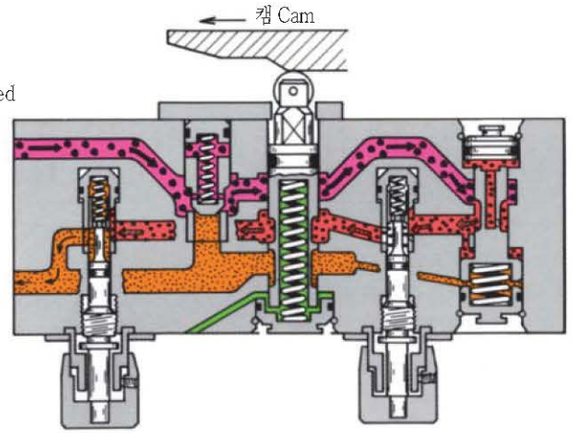
KS 유압기호
Graphic Symbol



● 제1단 이송일 때 At Course Feed

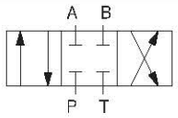
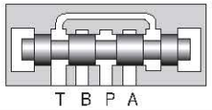
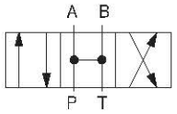
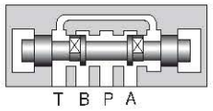
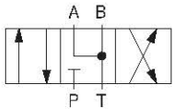
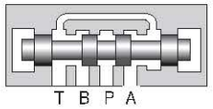
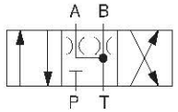
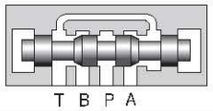
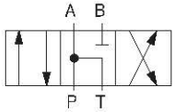
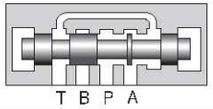
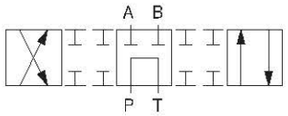
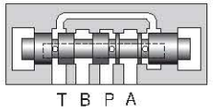
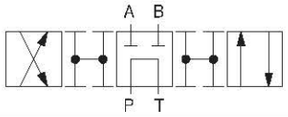
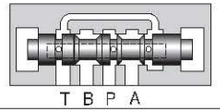


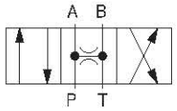
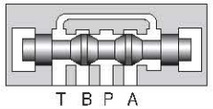
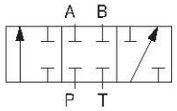
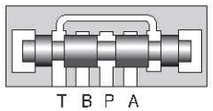
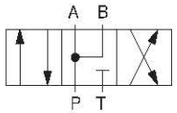
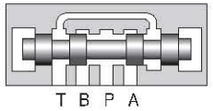
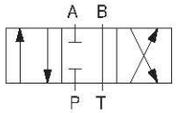
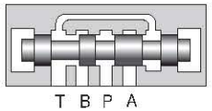
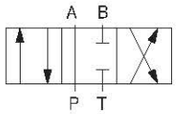
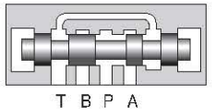
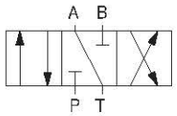
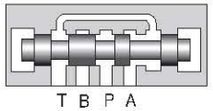
● 제2단 이송일 때 At Find Feed



방향 절환 밸브 스풀 형식 일람표

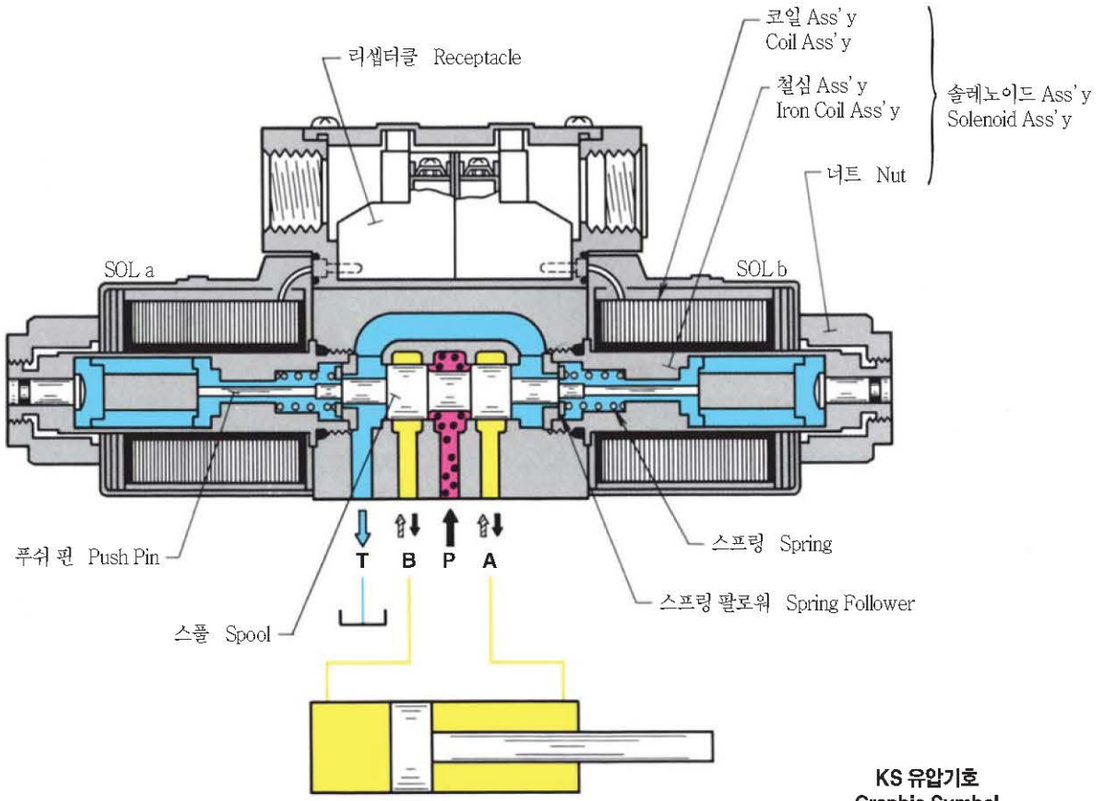
● 스풀 형식은, 중립 위치에 있는 밸브 내의 흐름 상태에 따라 하기표와 같이 분류됩니다.
According to the condition of flow in the center position, spool types are classified as per the table below.

스풀 형식 Spool Type	유압기호 Graphic Symbols	스풀 관계도 (중립 위치) Schematic Drawing (Center Position)
2 클로즈 센터 Closed Center All Ports		
3 오픈 센터 Open Center All Ports		
4 A · B · T 접속 Open Center A · B & T		
40 교축 A · B · T 접속 Open Center A · B & T Restricted Flow		
5 P · A · T 접속 Open Center P · B & T		
6 P · T 접속 Open Center P & T Close Crossover		
60 P · T 접속 Open Center P & T Open Crossover		

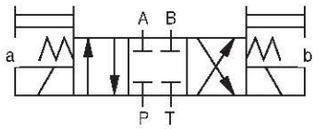
스풀 형식 Spool Type	유압기호 Graphic Symbols	스풀 관계도 (중립 위치) Schematic Drawing (Center Position)
7 오픈 센터 Open Center All Ports Restricted Flow		
8 2방향 2 Way		
9 P · A · B 접속 Open Center P · A & B		
10 B · T 접속 Open Center B & T		
11 P · A 접속 Open Center P & A		
12 A · T 접속 Open Center A & T		

DSG-01 솔레노이드 밸브

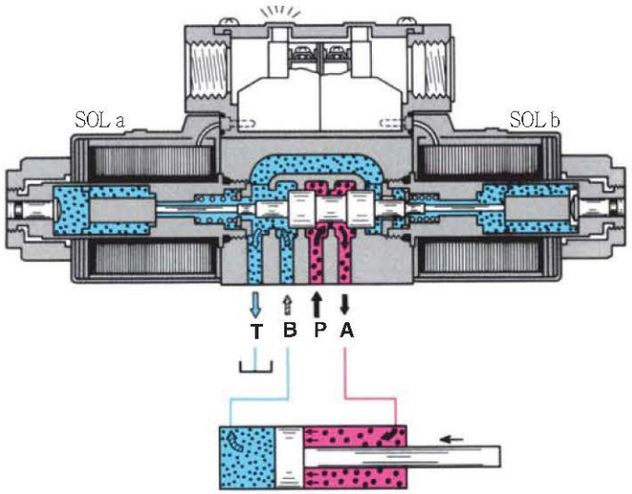
● 중립시 At Center Position



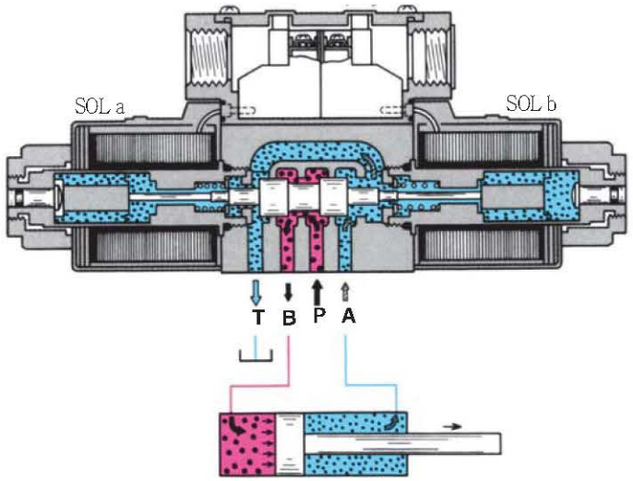
KS 유압기호
Graphic Symbol



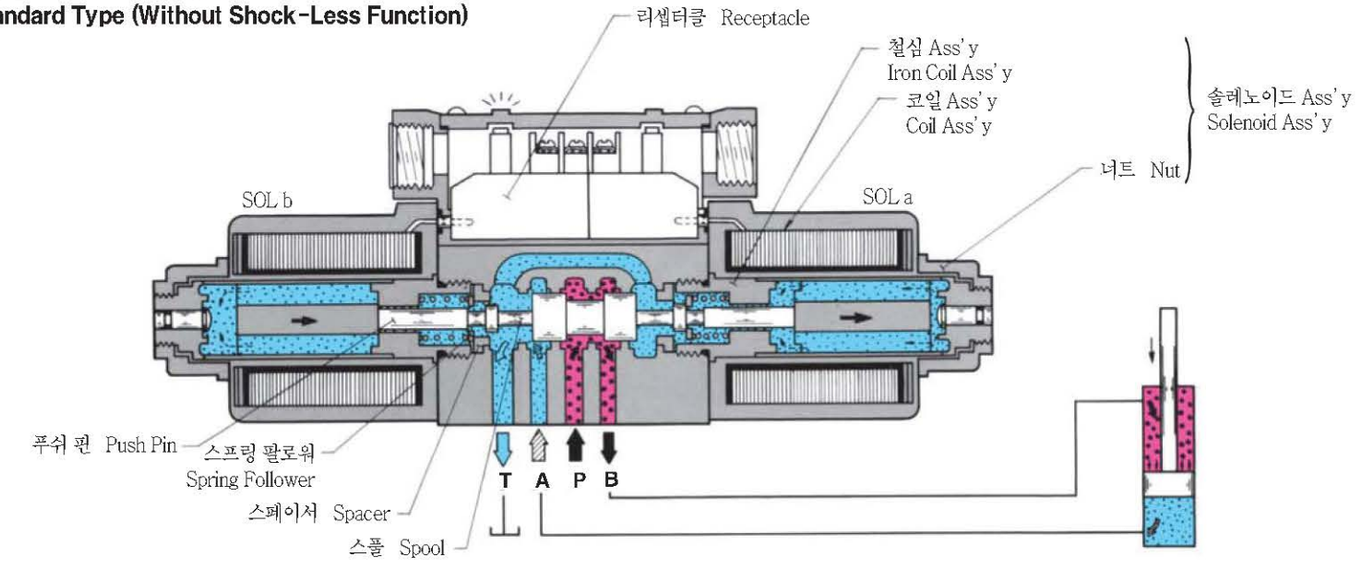
● SOL a ON일 때 SOL a is Energized



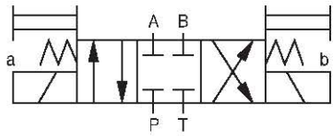
● SOL b ON일 때 SOL b is Energized



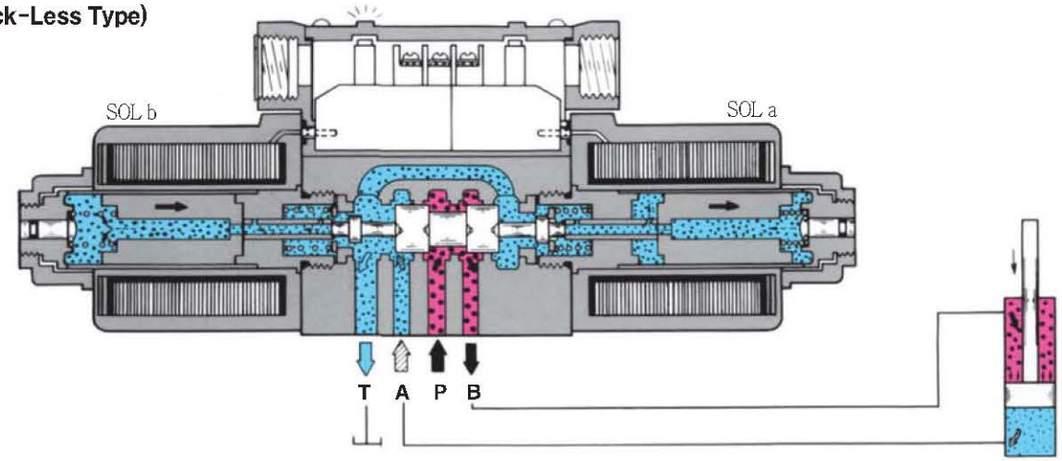
● 범용형 (쇼크레스 기능 없음)
Standard Type (Without Shock-Less Function)

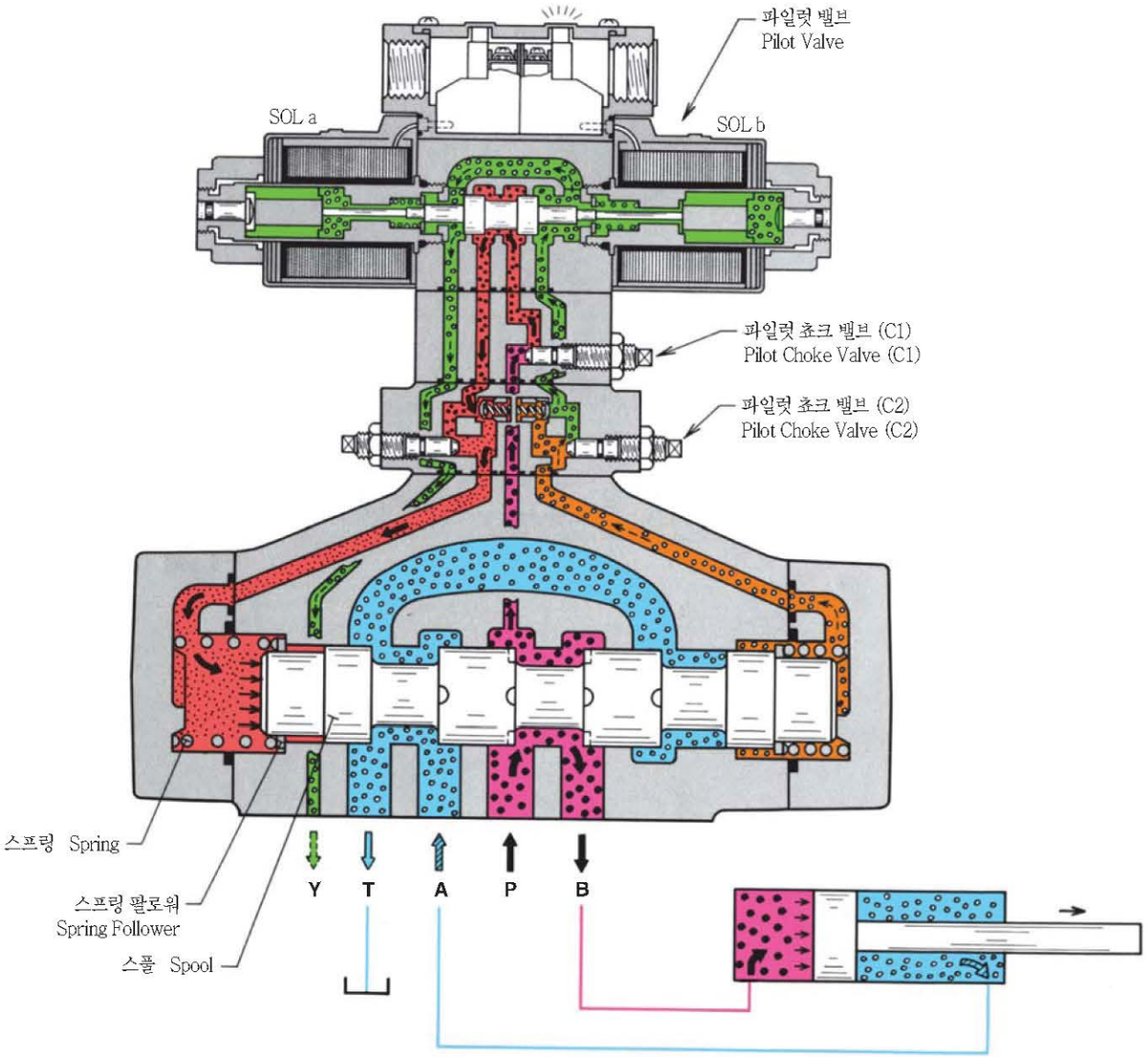


KS 유압기호
Graphic Symbol



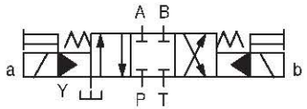
● 쇼크레스형 (Shock-Less Type)



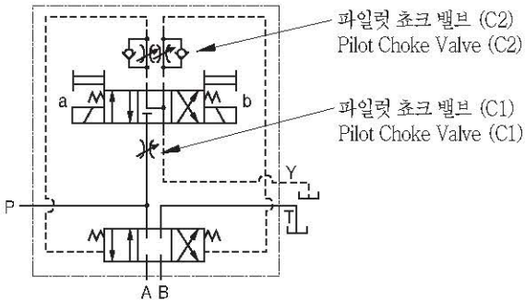


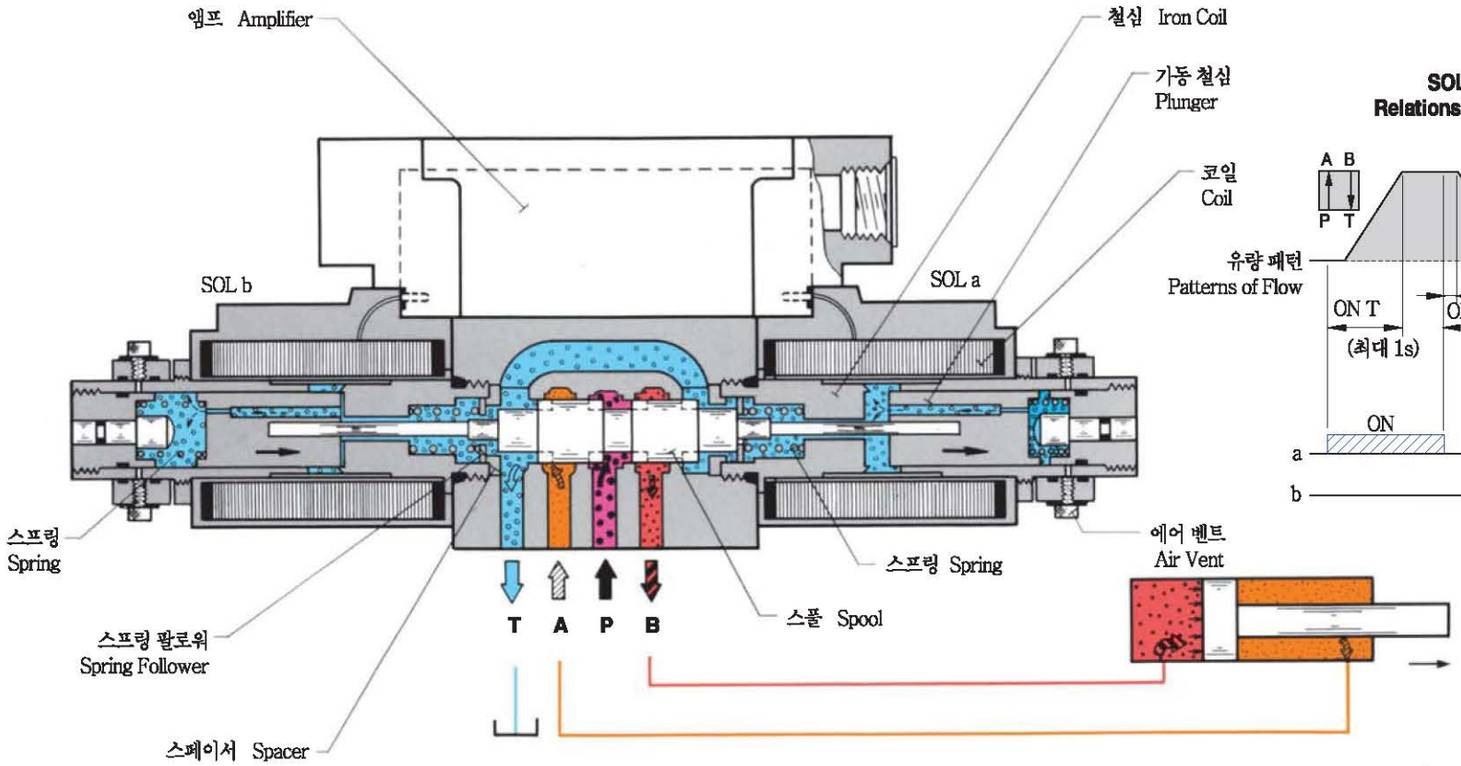
KS 유압기호
Graphic Symbol

● **간략 기호 Simplified**

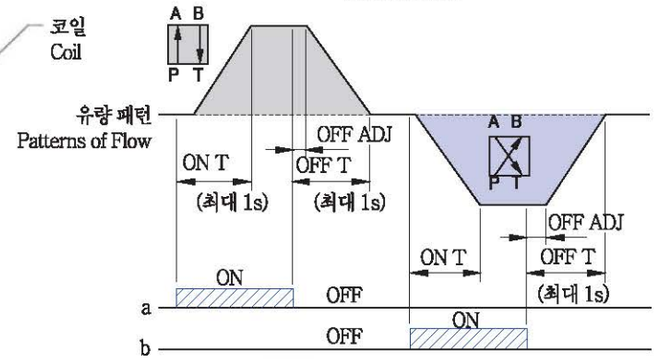


● **상세 기호 Detailed**

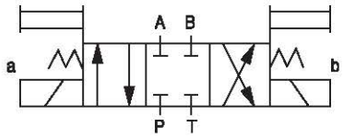




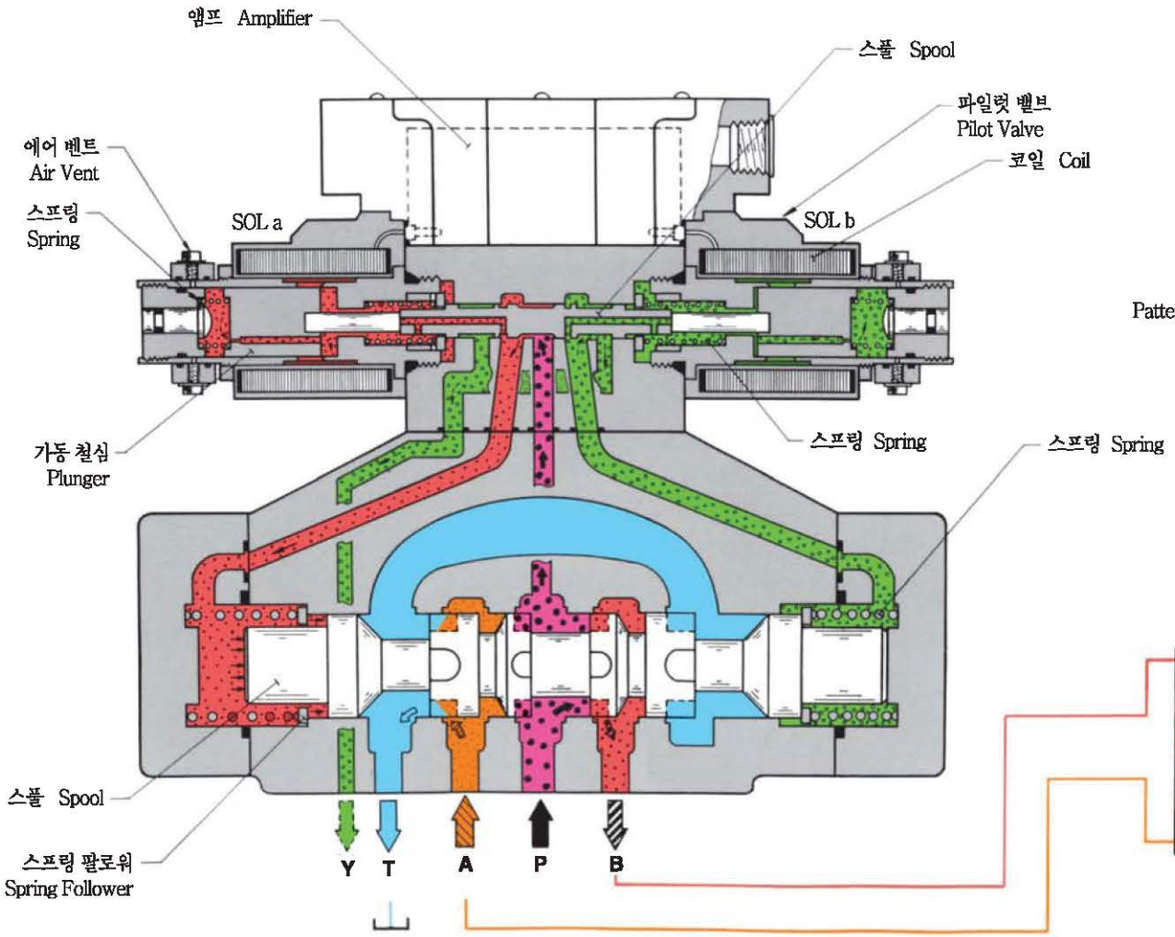
SOL 신호와 유량 패턴의 관계도
Relationships between SOL signals and flow patterns



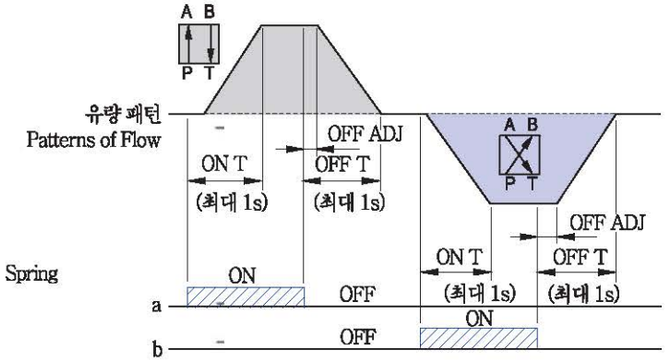
KS 유압기호
Graphic Symbol



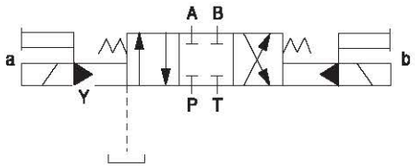
G시리즈 가변 쇼크레스형 전자 파일럿 절환 밸브



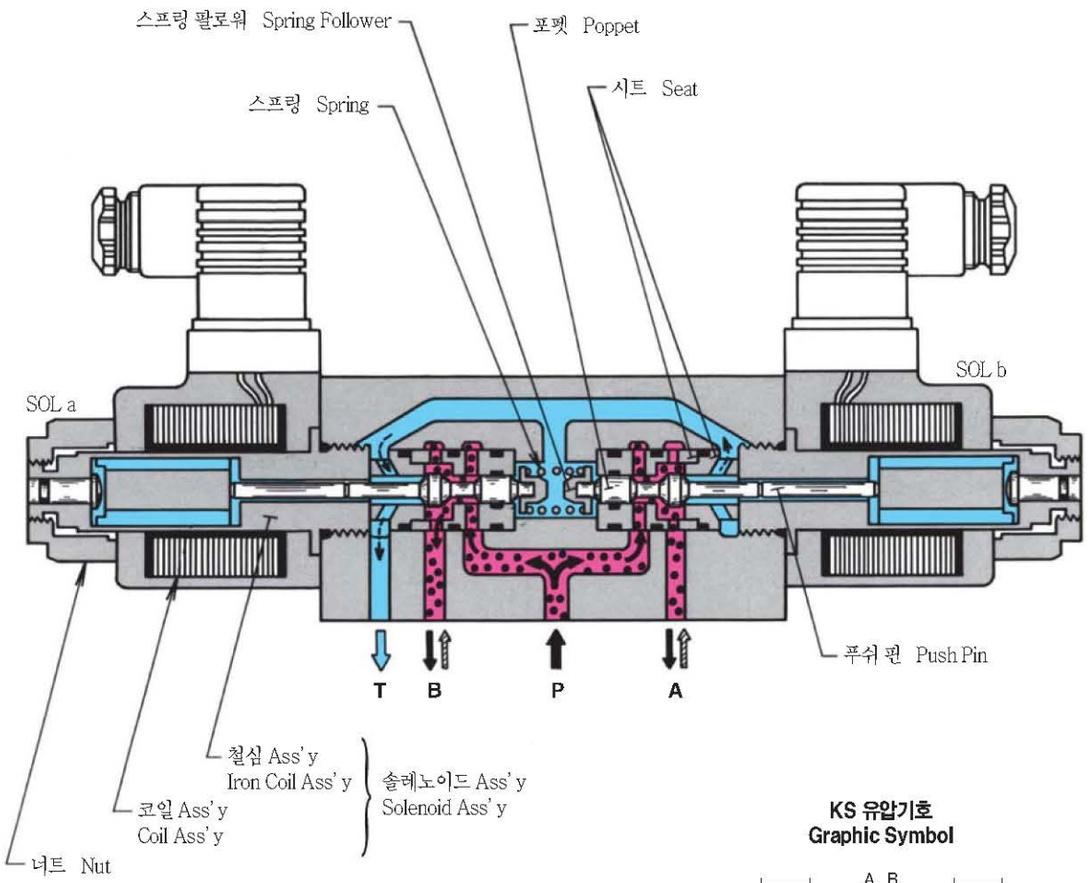
SOL 신호와 유량 패턴의 관계도
Relationships between SOL signals and flow patterns



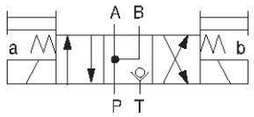
KS 유압기호
Graphic Symbol



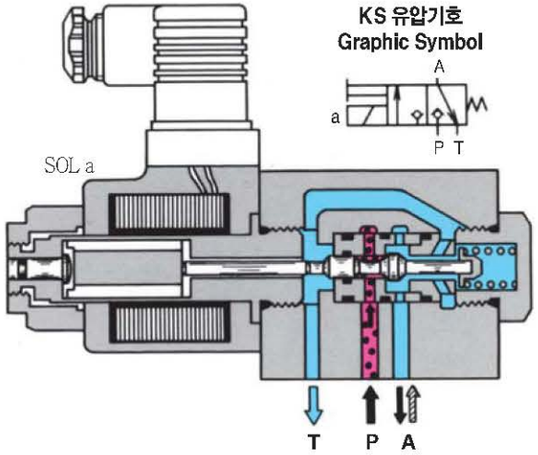
● 4포트 밸브, 노멀 오픈형
4Port Valve, Normally Open Type



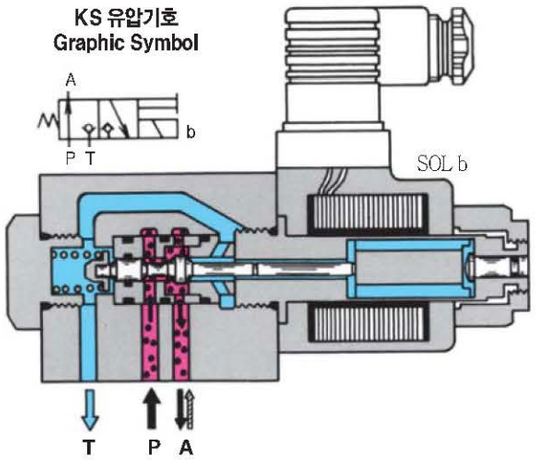
KS 유압기호
Graphic Symbol



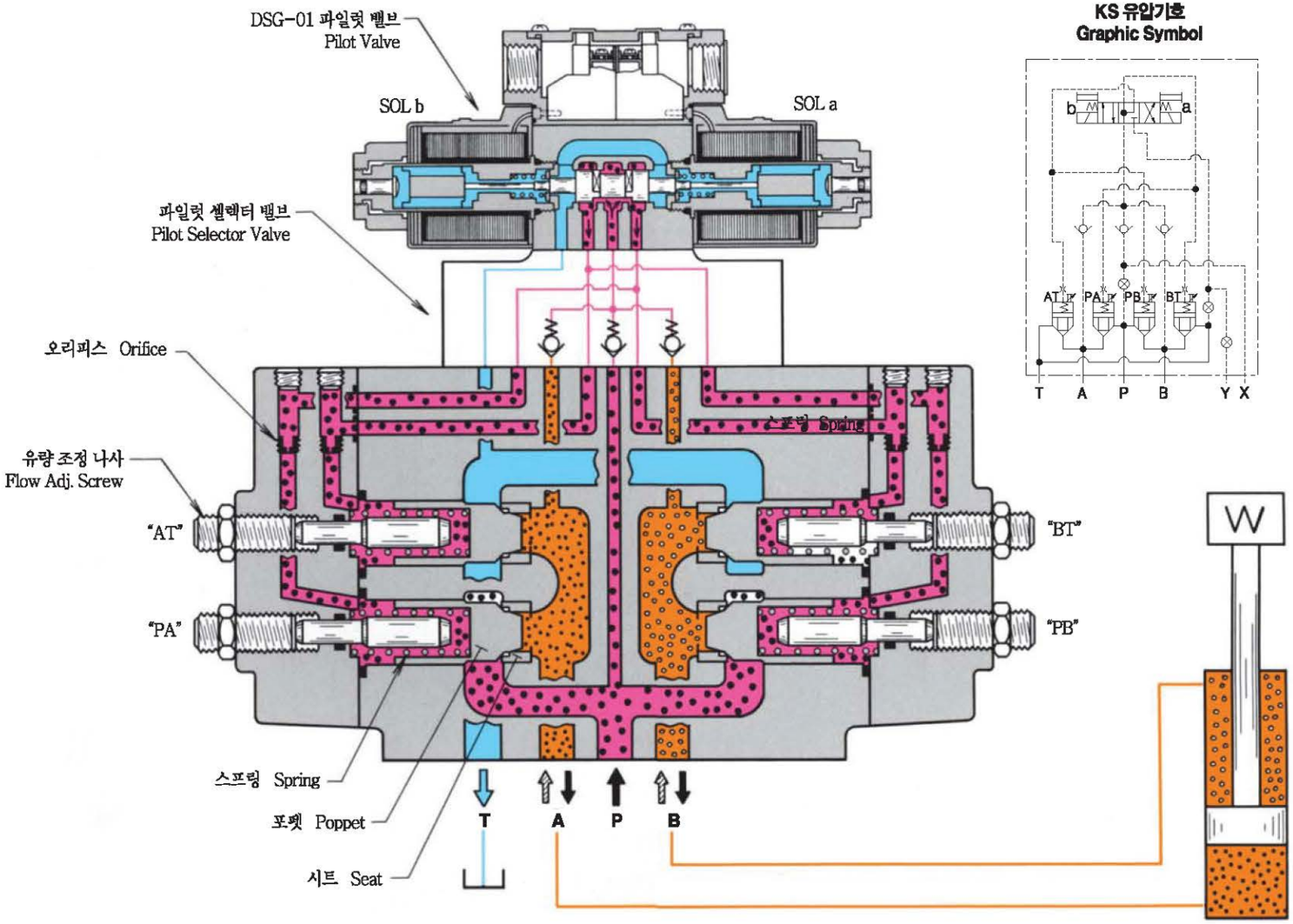
● 3포트 밸브, 노멀 클로즈형
3Port Valve, Normally Closed Type



● 3포트 밸브, 노멀 오픈형
3Port Valve, Normally Open Type

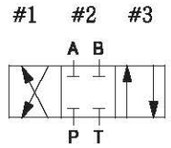


포펫형 전자 파일럿 절환 밸브

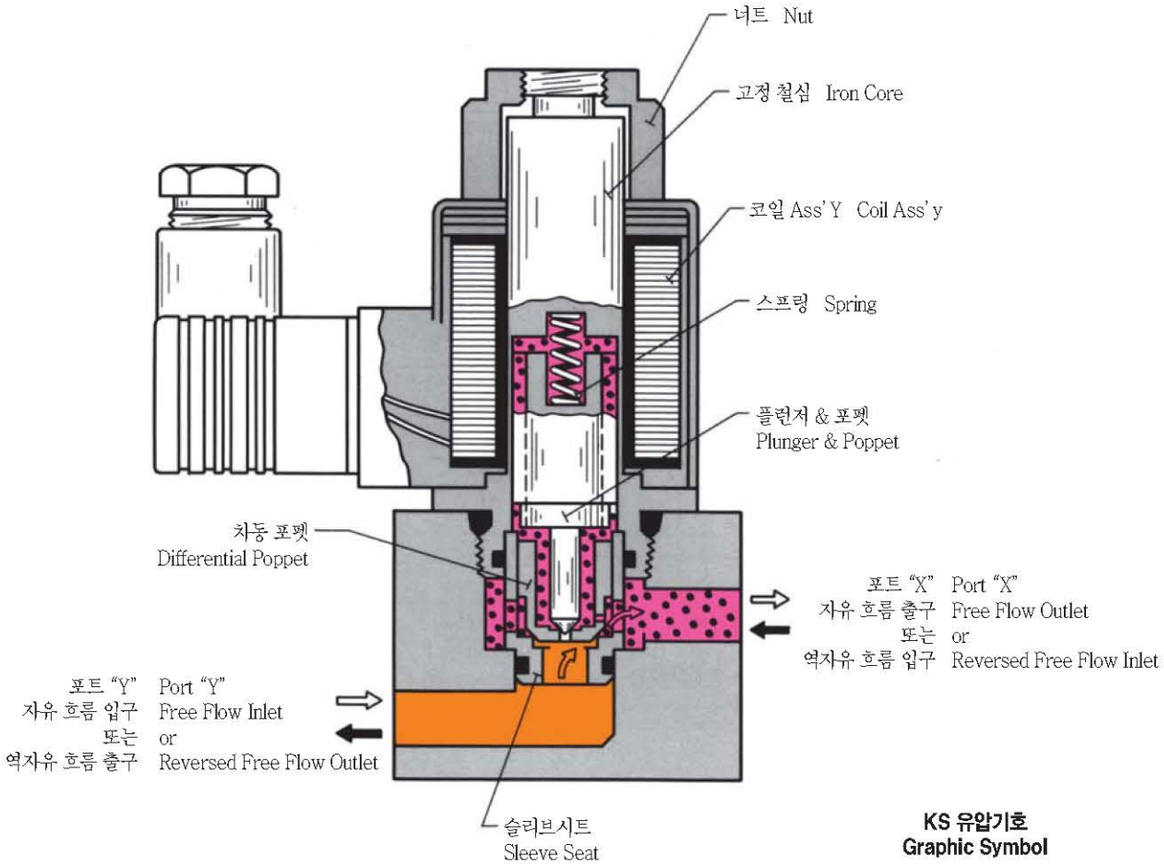


KS 유압기호
Graphic Symbol

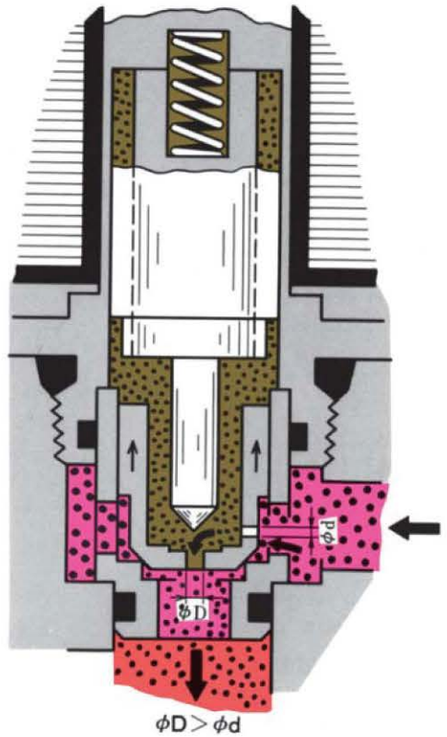
솔레노이드와 절환 위치
Solenoid Energizing and Chang Over Position



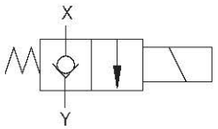
위치	#1	#2	#3
SOL a	ON	OFF	OFF
SOL b	OFF	OFF	ON



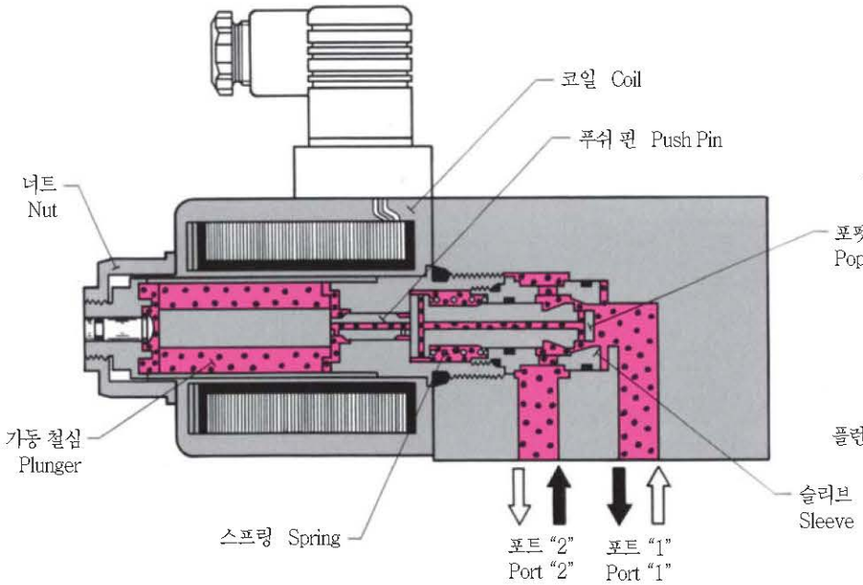
통전시 상태도 (절환 도중)
Picture of the condition when solenoid is energized
(When spool is shifting)



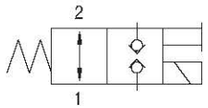
KS 유압기호
Graphic Symbol



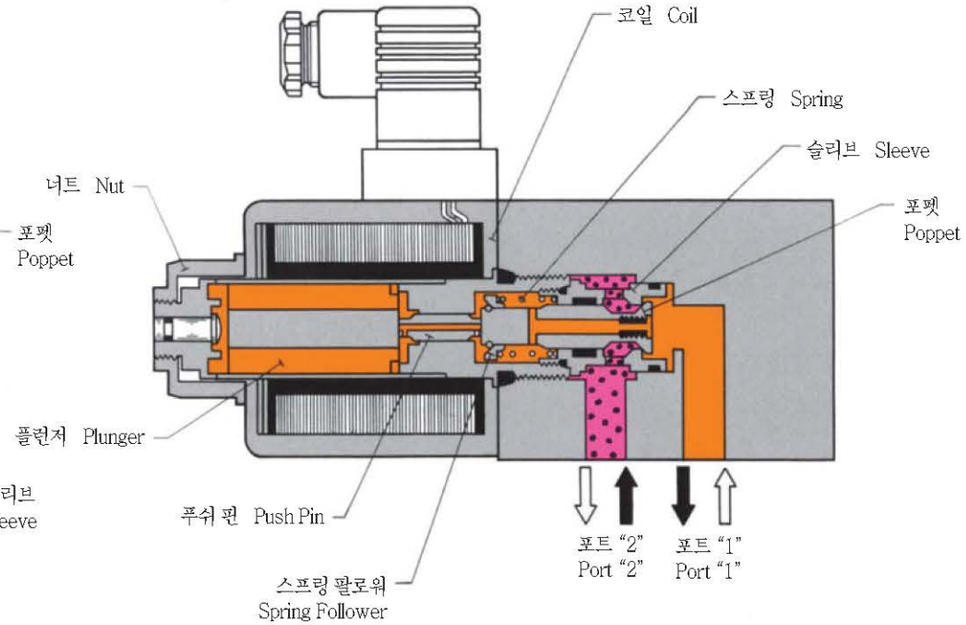
● 노멀 오픈형 (솔레노이드 "OFF"일 때)
Normally Open Type (Solenoid De-energized)



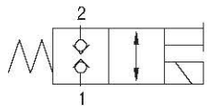
KS 유압기호
Graphic Symbol



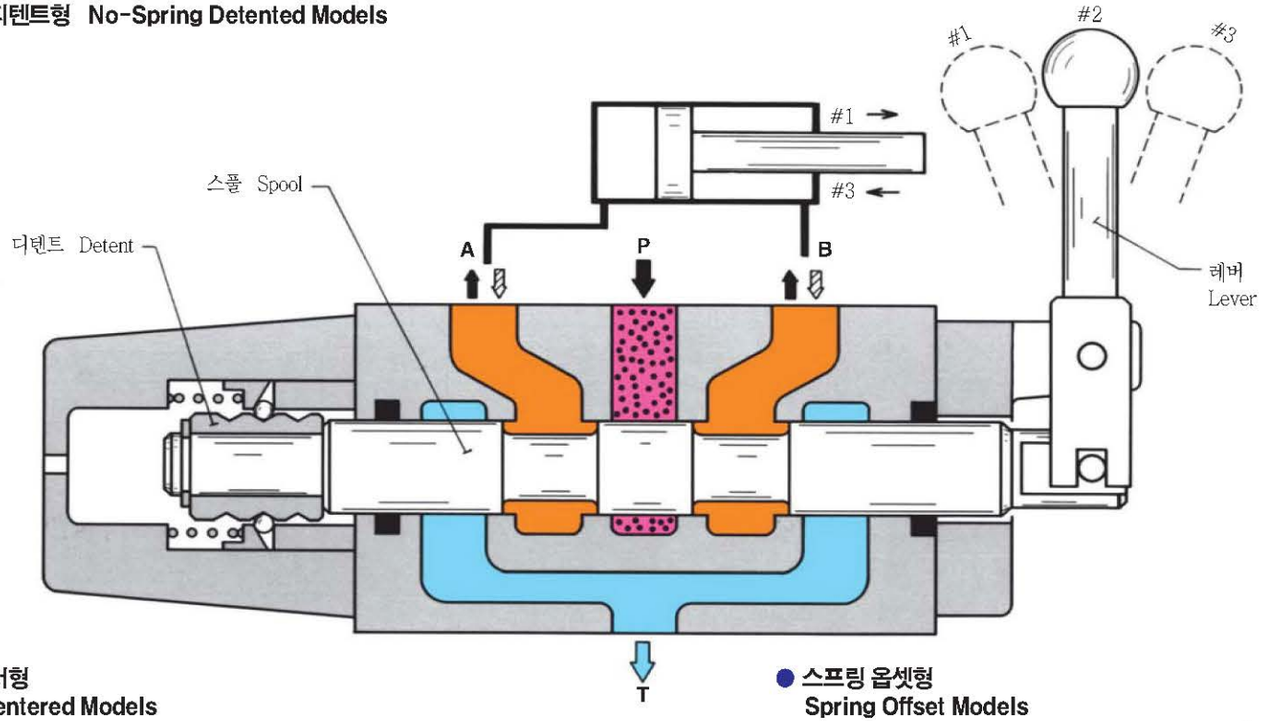
● 노멀 크로즈형 (솔레노이드 "OFF"일 때)
Normally Close Type (Solenoid De-energized)



KS 유압기호
Graphic Symbol

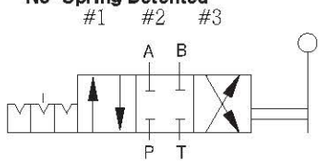


● 노스프링 디텐트형 No-Spring Detented Models

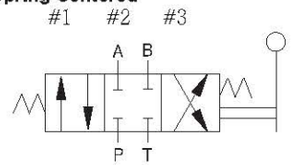


KS 유압기호
Graphic Symbol

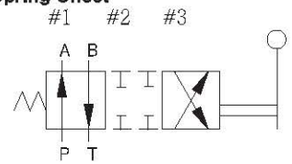
● 노스프링 디텐트
No-Spring Detented



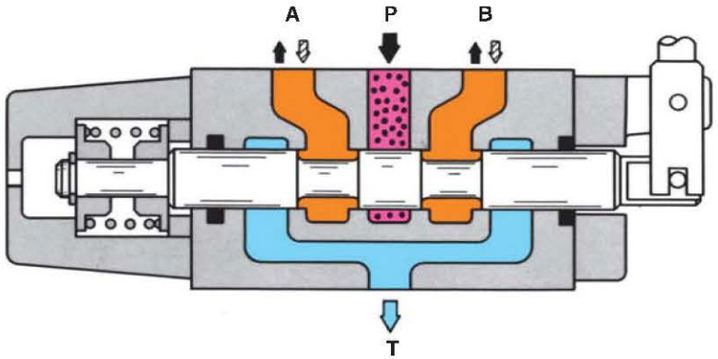
● 스프링 센터
Spring Centered



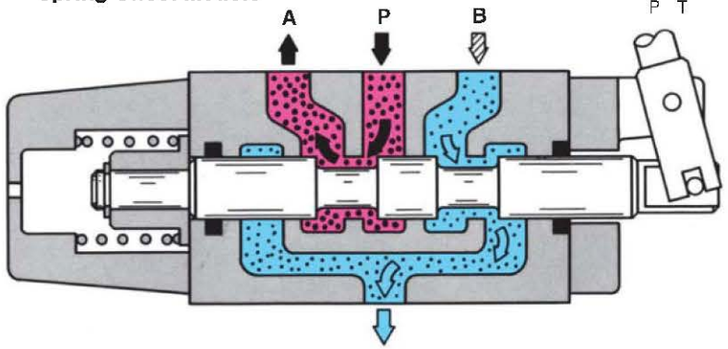
● 스프링 옵셋
Spring Offset



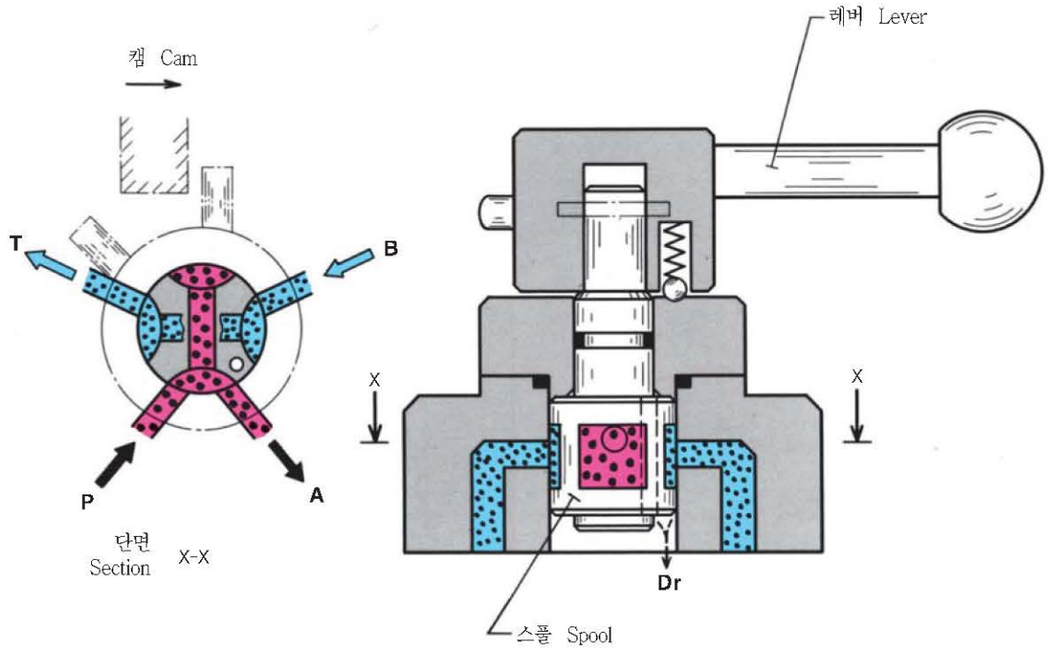
● 스프링 센터형
Spring Centered Models



● 스프링 옵셋형
Spring Offset Models

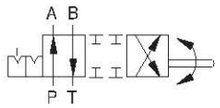


● 로터리형 Rotary Type

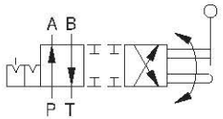


KS 유압기호
Graphic Symbol

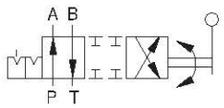
도그 절환형
Revershing Dog Operation



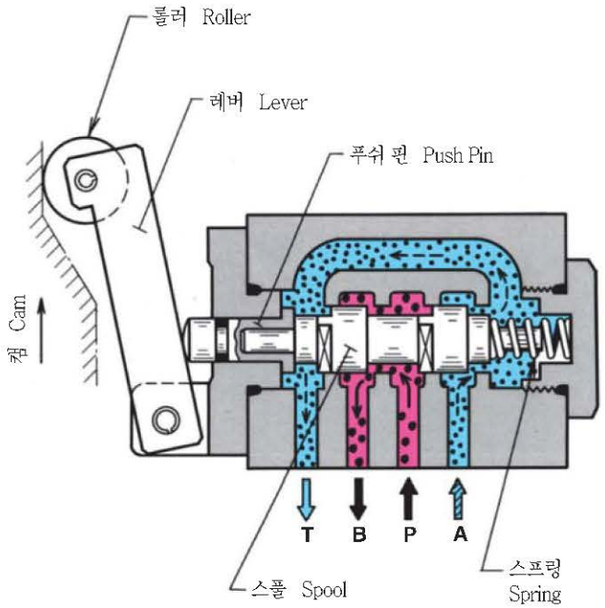
도그 레버 절환형
Revershing Dog & Manual Operation



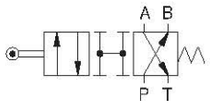
레버 절환형
Manual Operation



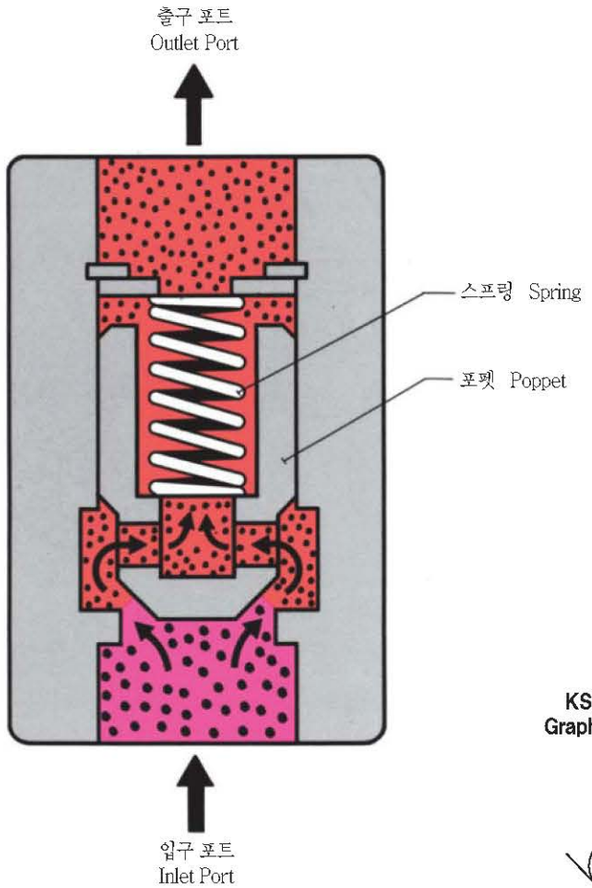
● 캠조작형 Cam Operated Type



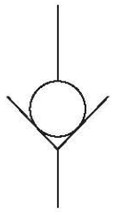
KS 유압기호
Graphic Symbol



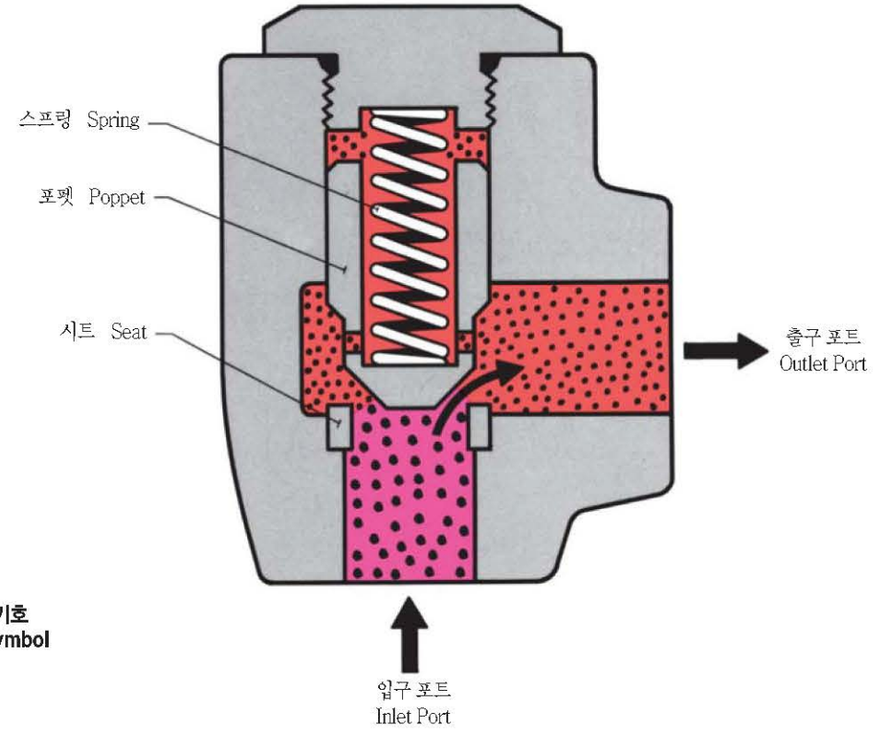
● 인라인형 In-Line Type



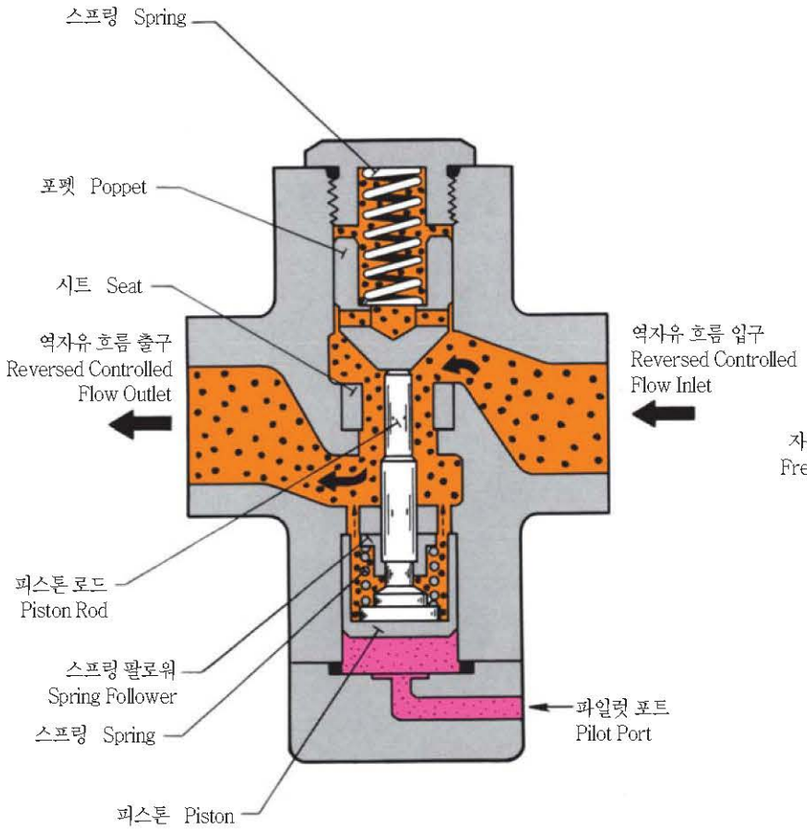
KS 유압기호
Graphic Symbol



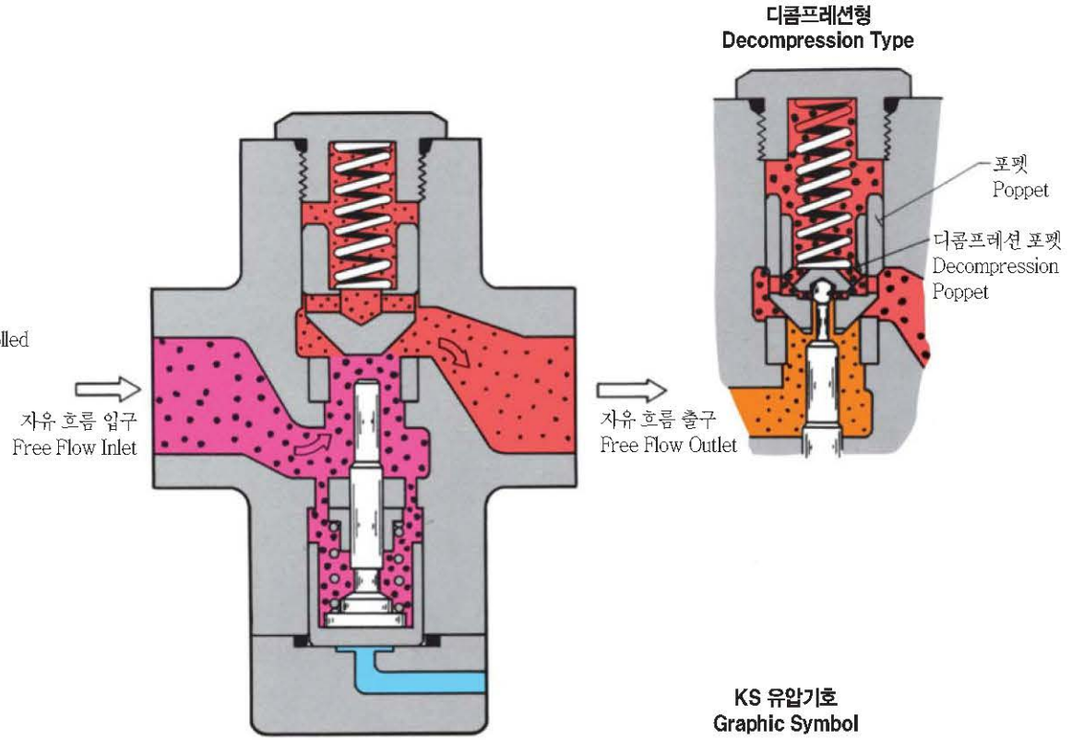
● 앵글형 Right Angle Type



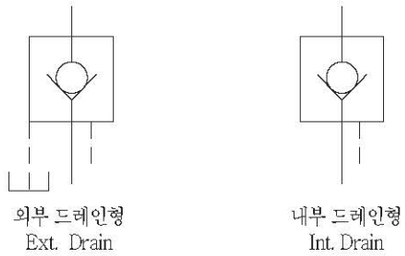
● 역자유 흐름일 때 At Reversed Controlled Flow



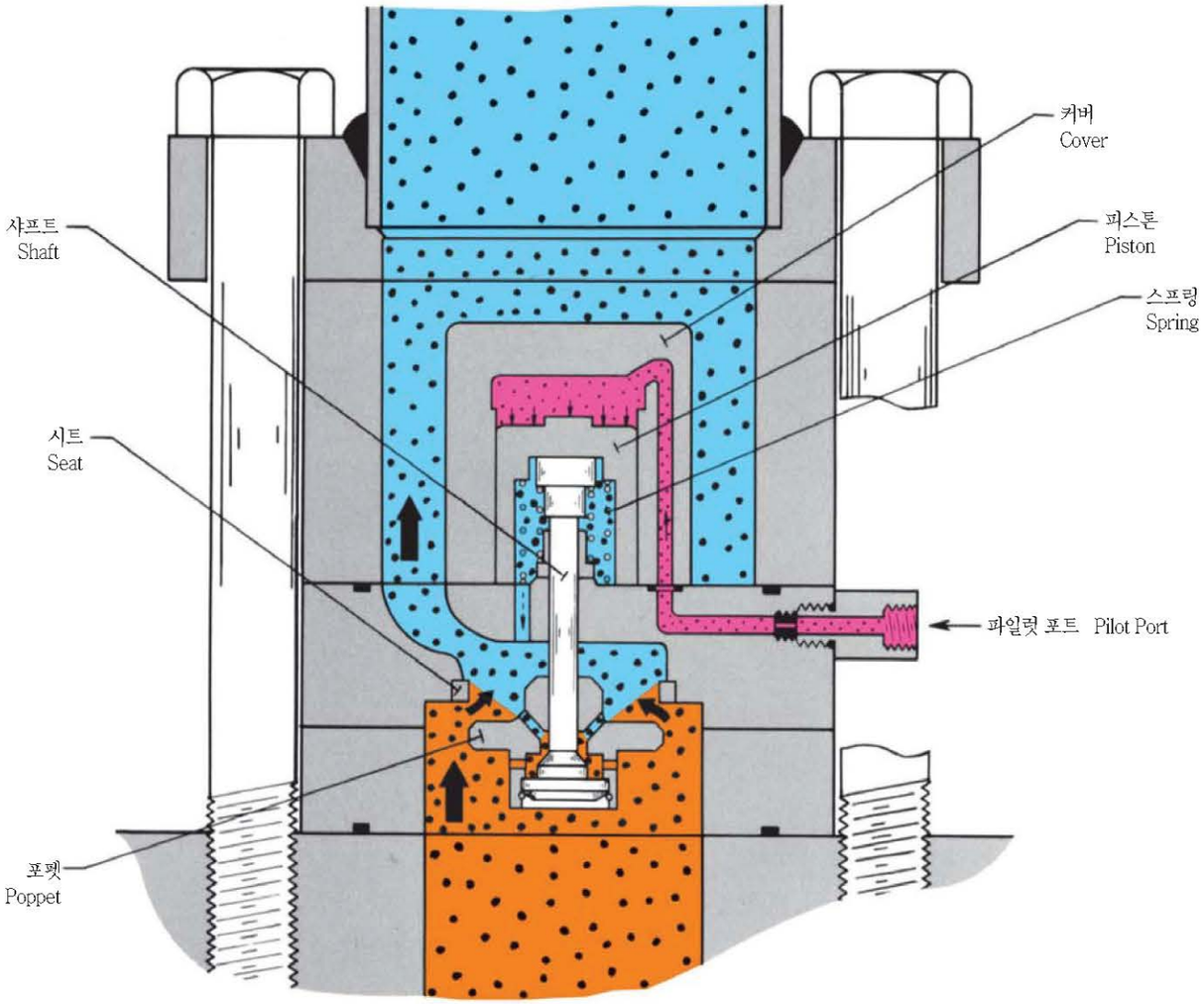
● 자유 흐름일 때 At Free Flow



KS 유압기호
Graphic Symbol

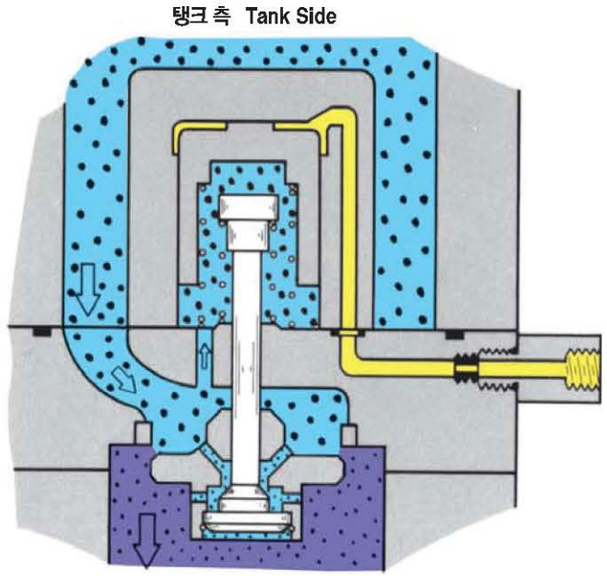


● 역자유 흐름일 때 At Reversed Controlled Flow

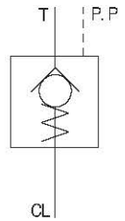


실린더 측 Cylinder Side

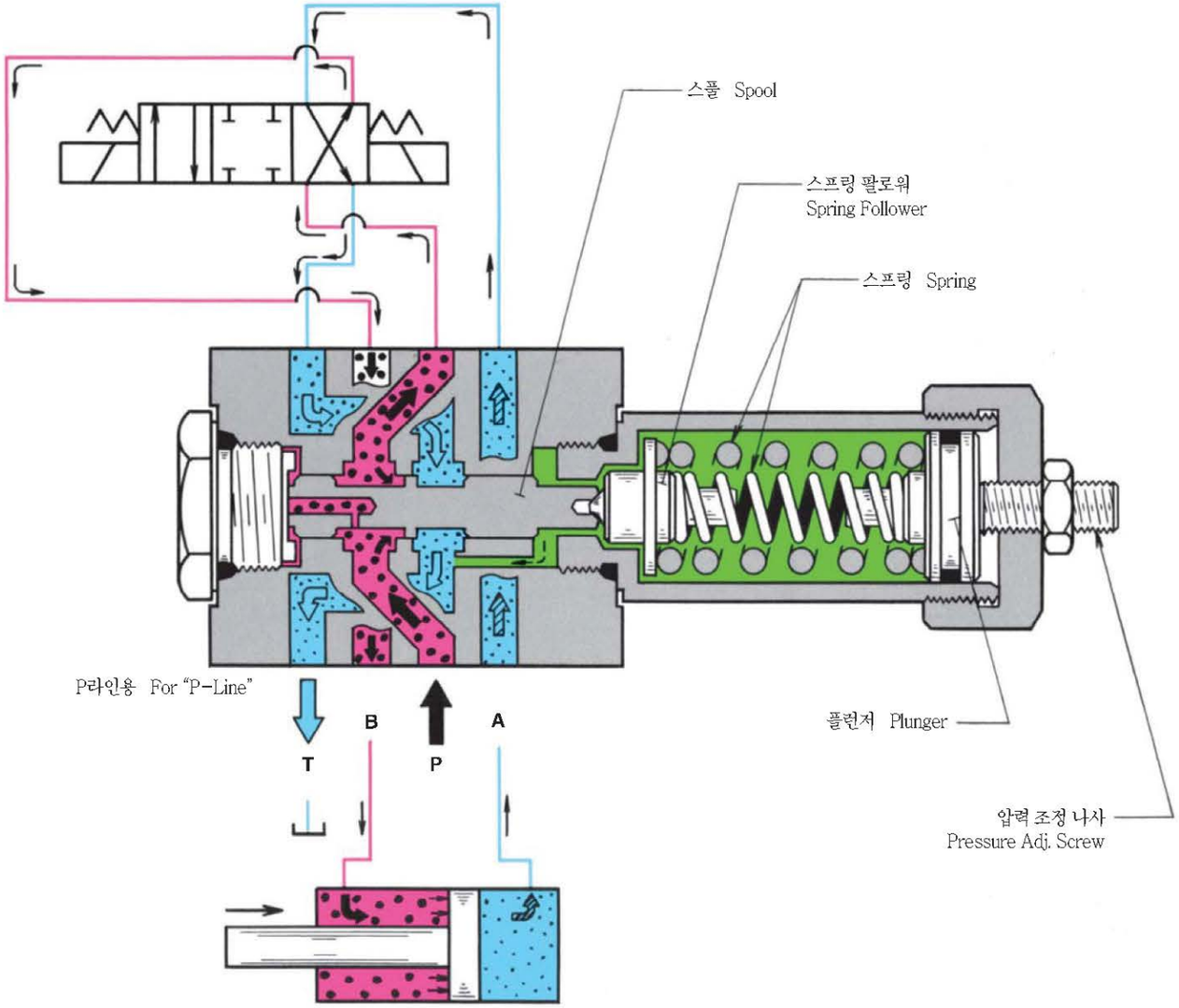
● 자유 흐름일 때 At Free Flow



KS 유압기호
Graphic Symbol

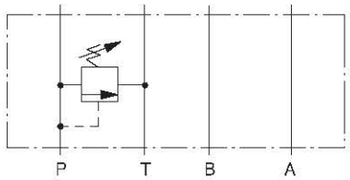


1/8 릴리프 모듈러 밸브

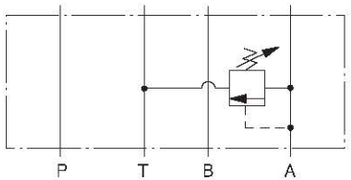


KS 유압기호
Graphic Symbol

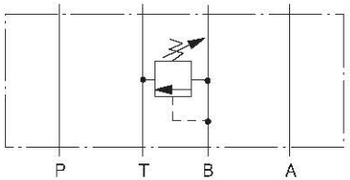
P라인용 For "P-Line"



A라인용 For "A-Line"

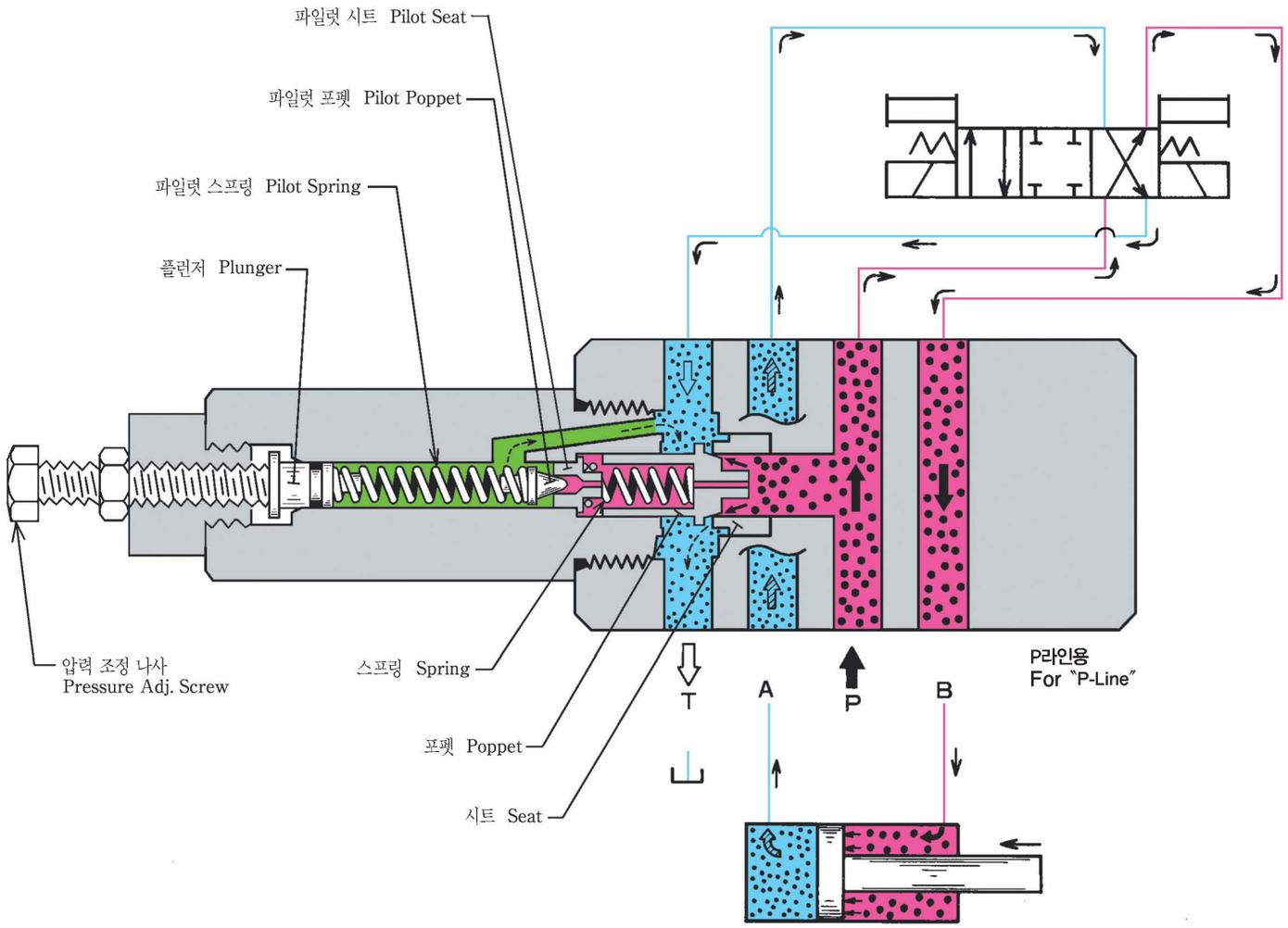


B라인용 For "B-Line"



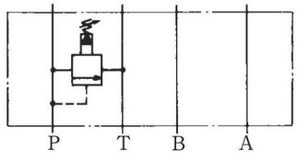
3/8 릴리프 모듈러 밸브

3/8 Relief Modular Valves

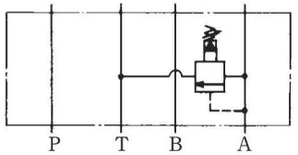


KS 유압기호
Graphic Symbols

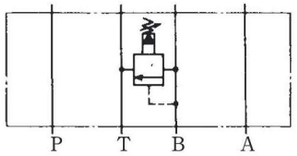
P라인용 For "P-Line"



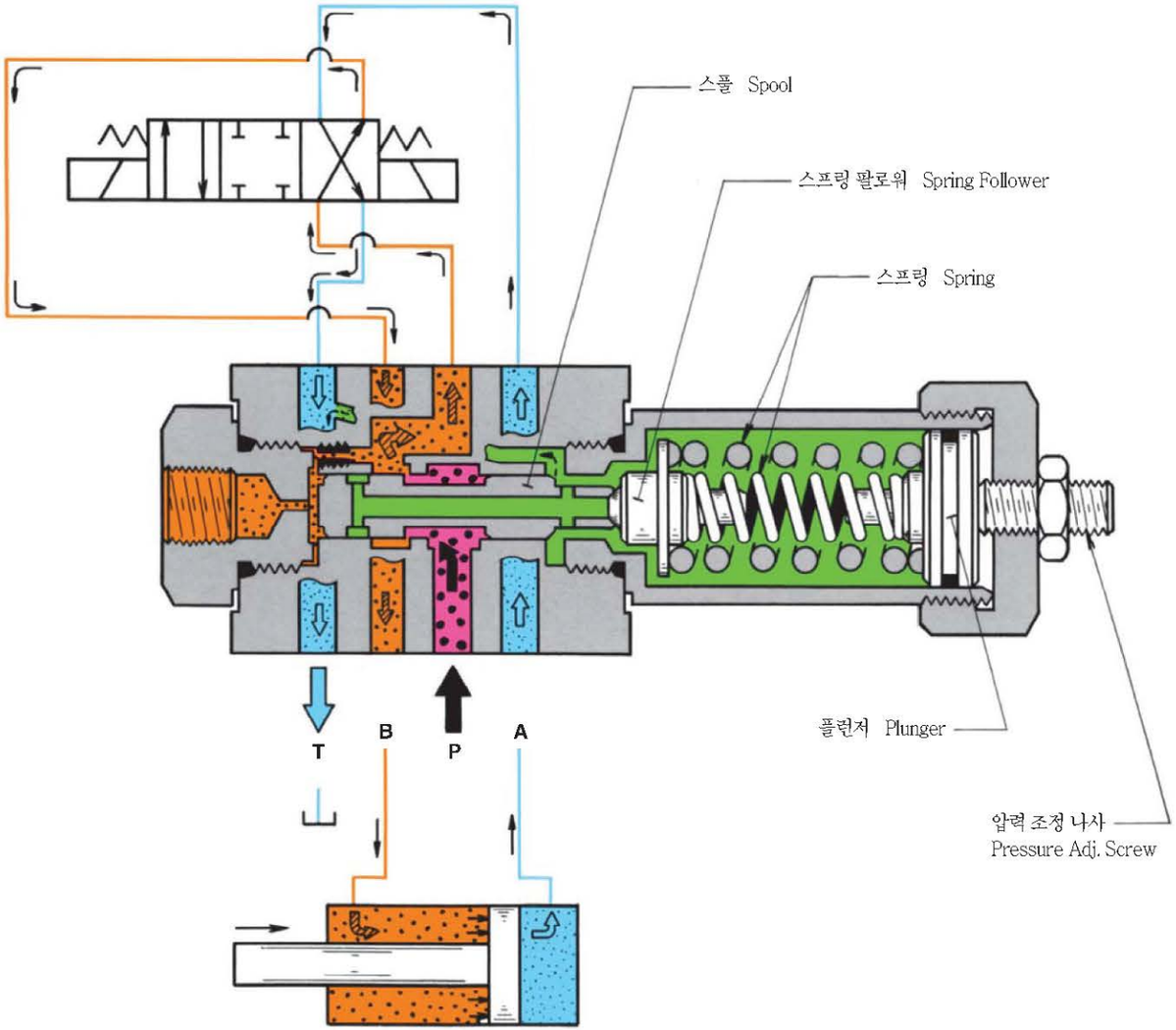
A라인용 For "A-Line"



B라인용 For "B-Line"

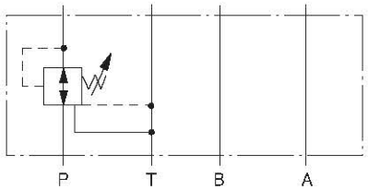


1/8 리듀싱 모듈러 밸브

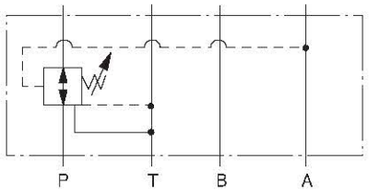


KS 유압기호
Graphic Symbol

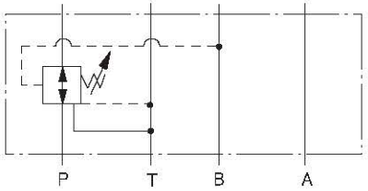
P라인용 For "P-Line"



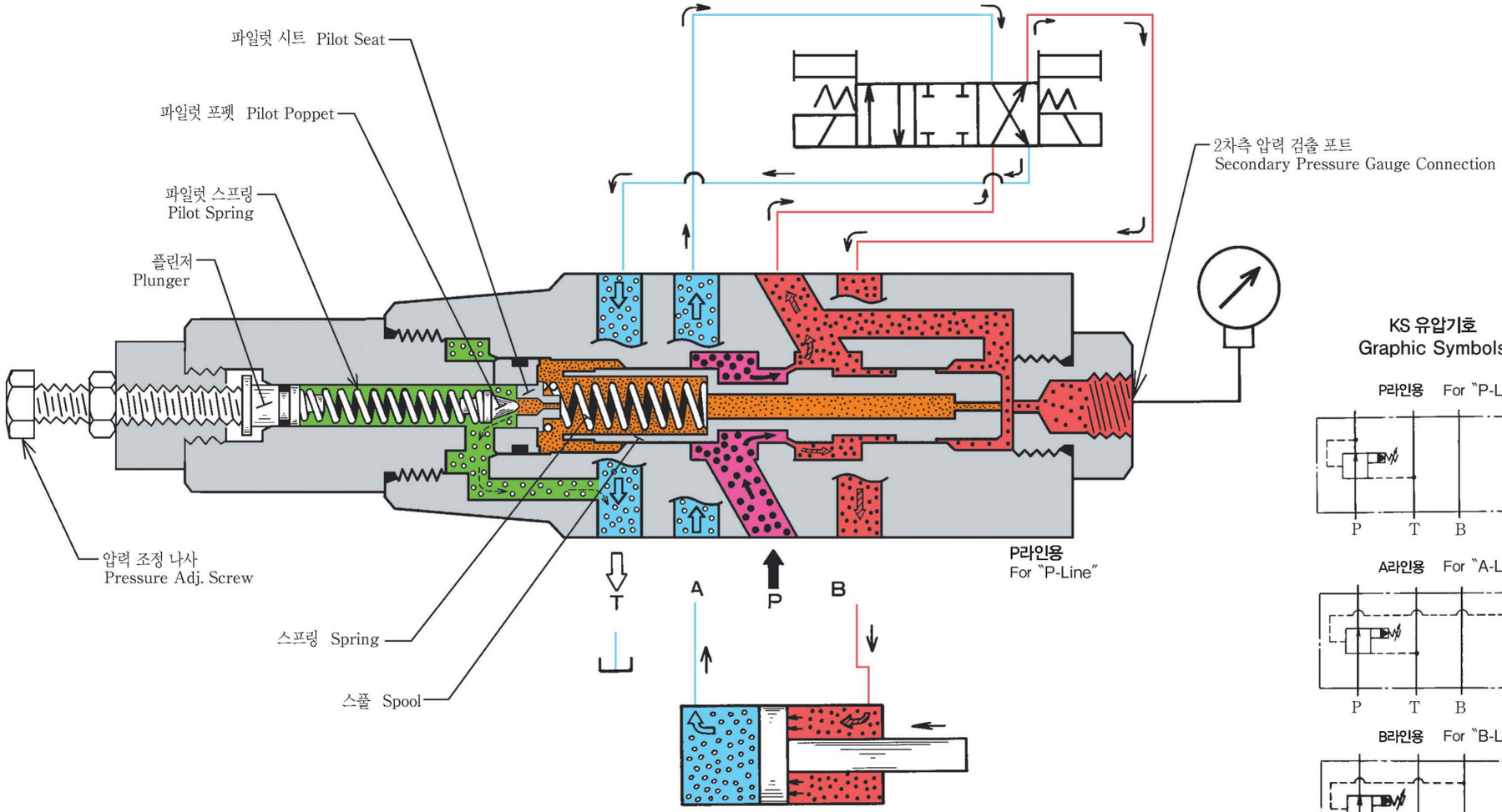
A라인용 For "A-Line"



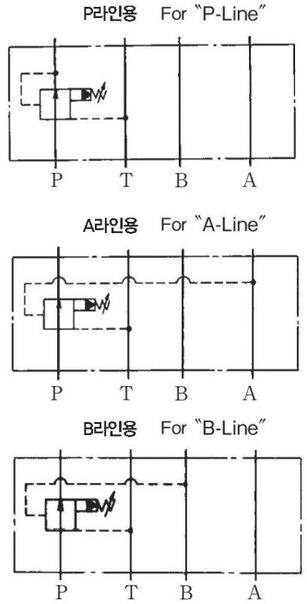
B라인용 For "B-Line"



3/8 리듀싱 모듈러 밸브



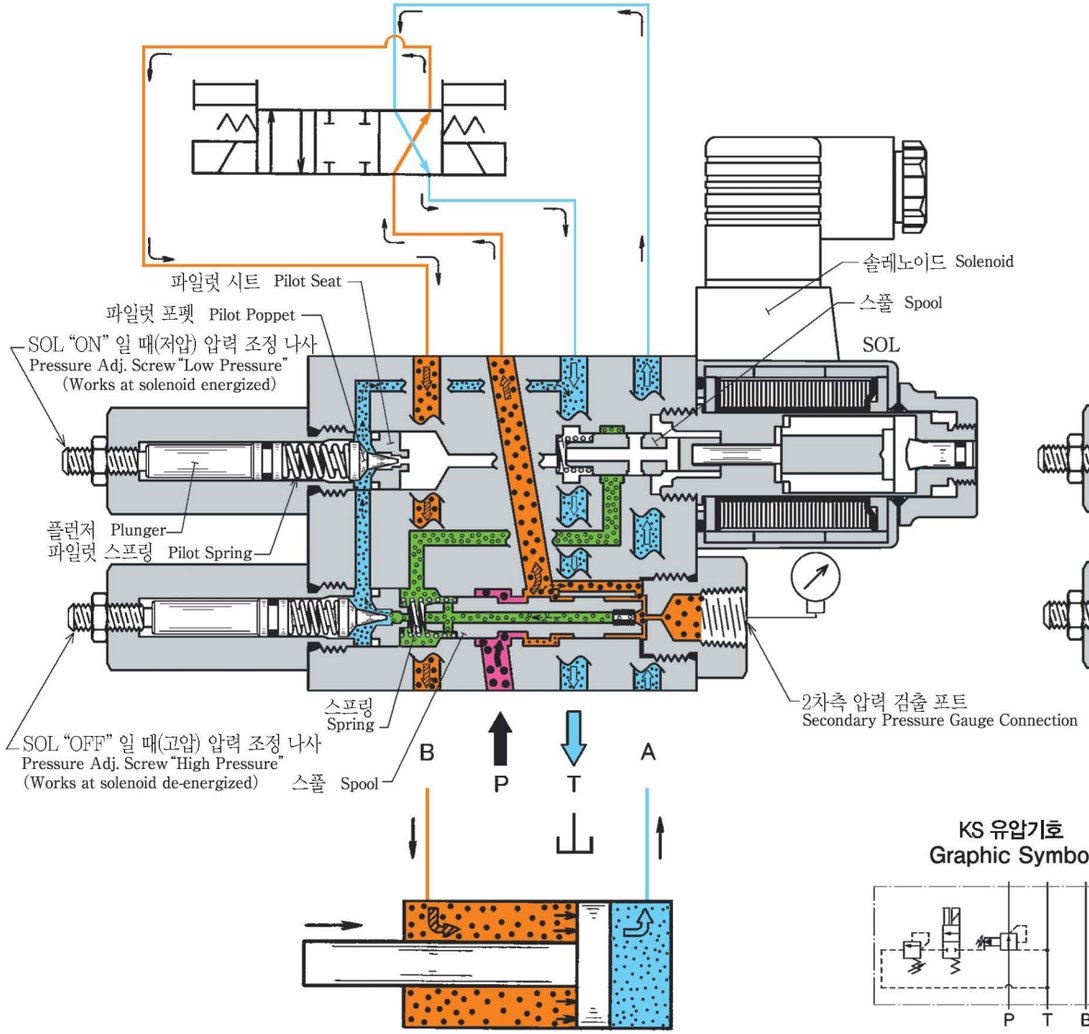
KS 유압기호
Graphic Symbols



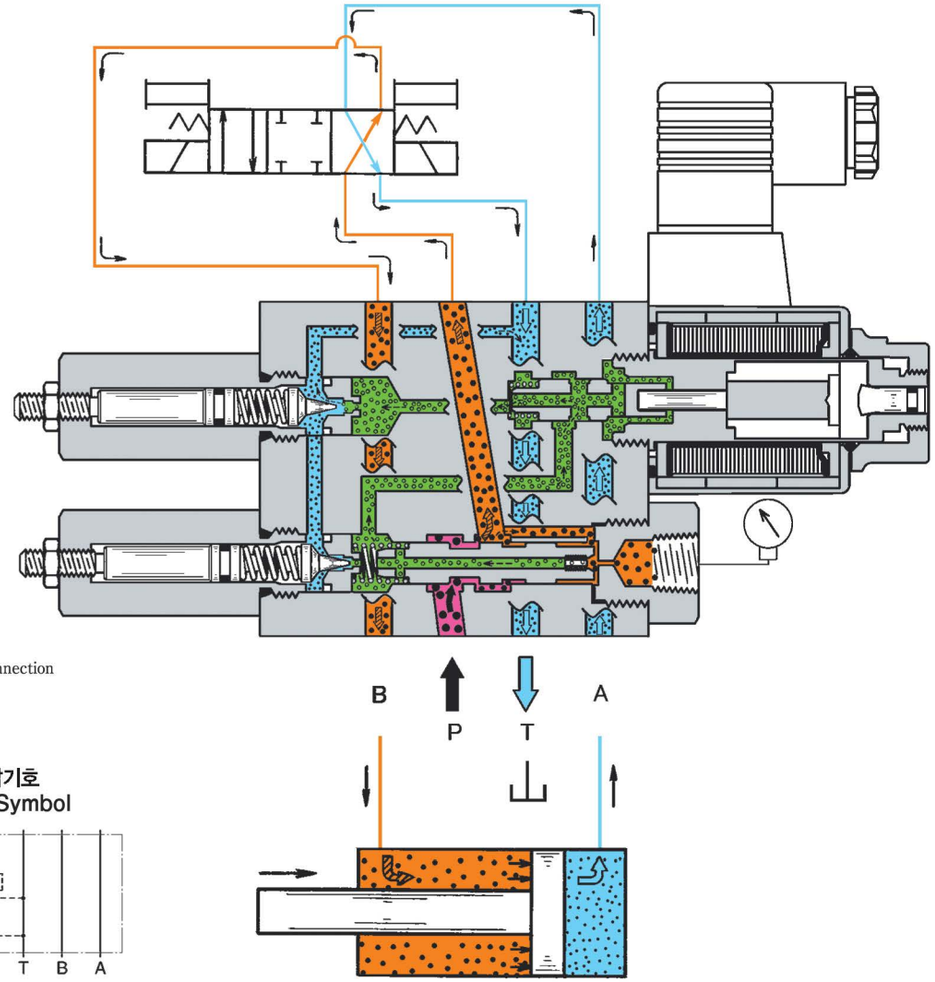
1/8 2압 리듀싱 모듈러 밸브

1/8 Two Pressure Reducing Modular Valves

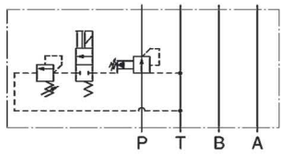
● 고압설정 High Pressure Setting
(솔레노이드 "OFF"일 때 Solenoid De-energized)

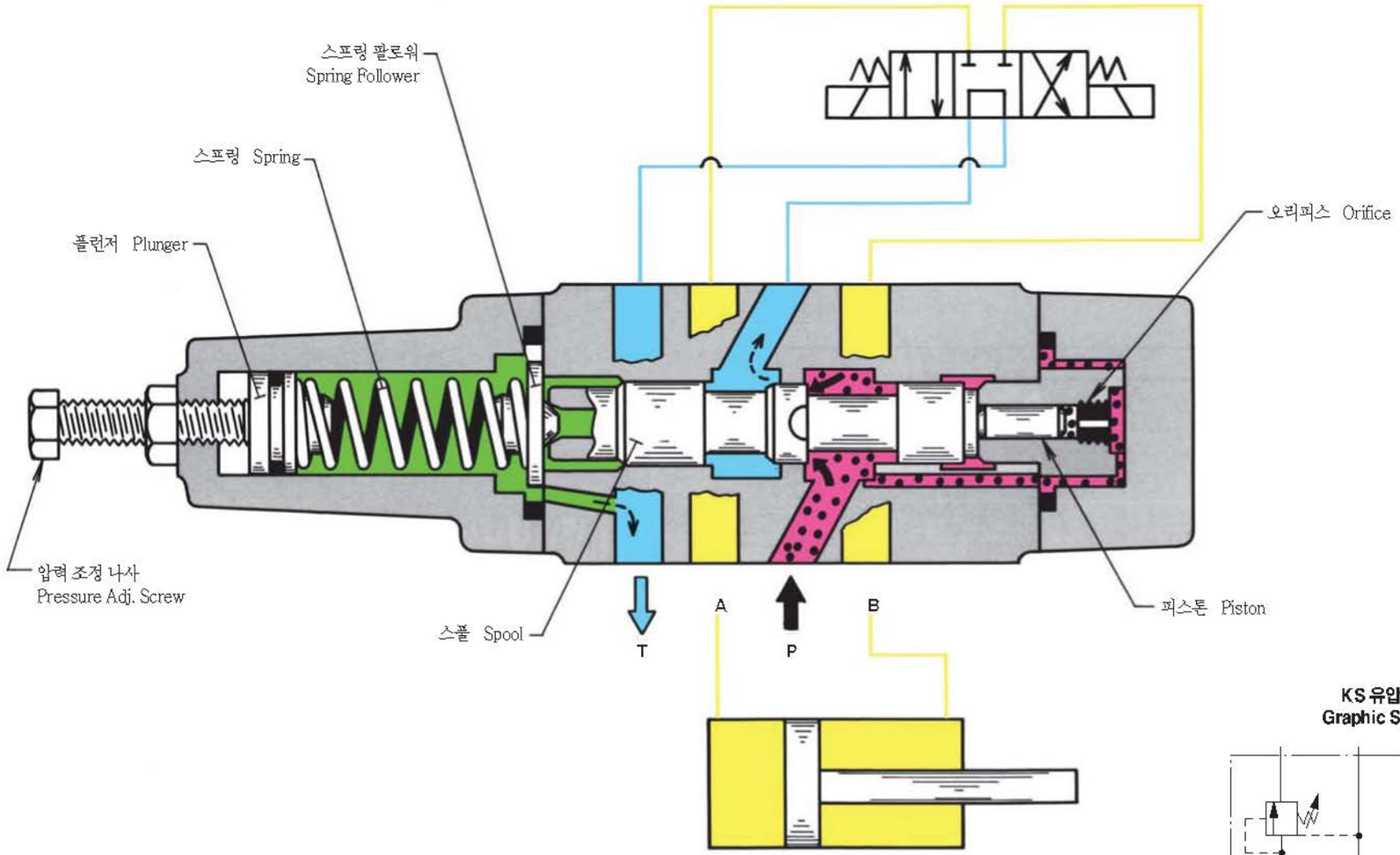


● 저압설정 Low Pressure Setting
(솔레노이드 "ON"일 때 Solenoid Energized)

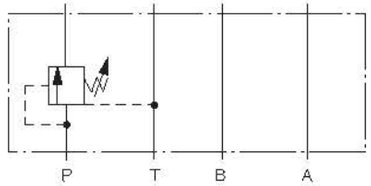


KS 유압기호
Graphic Symbol

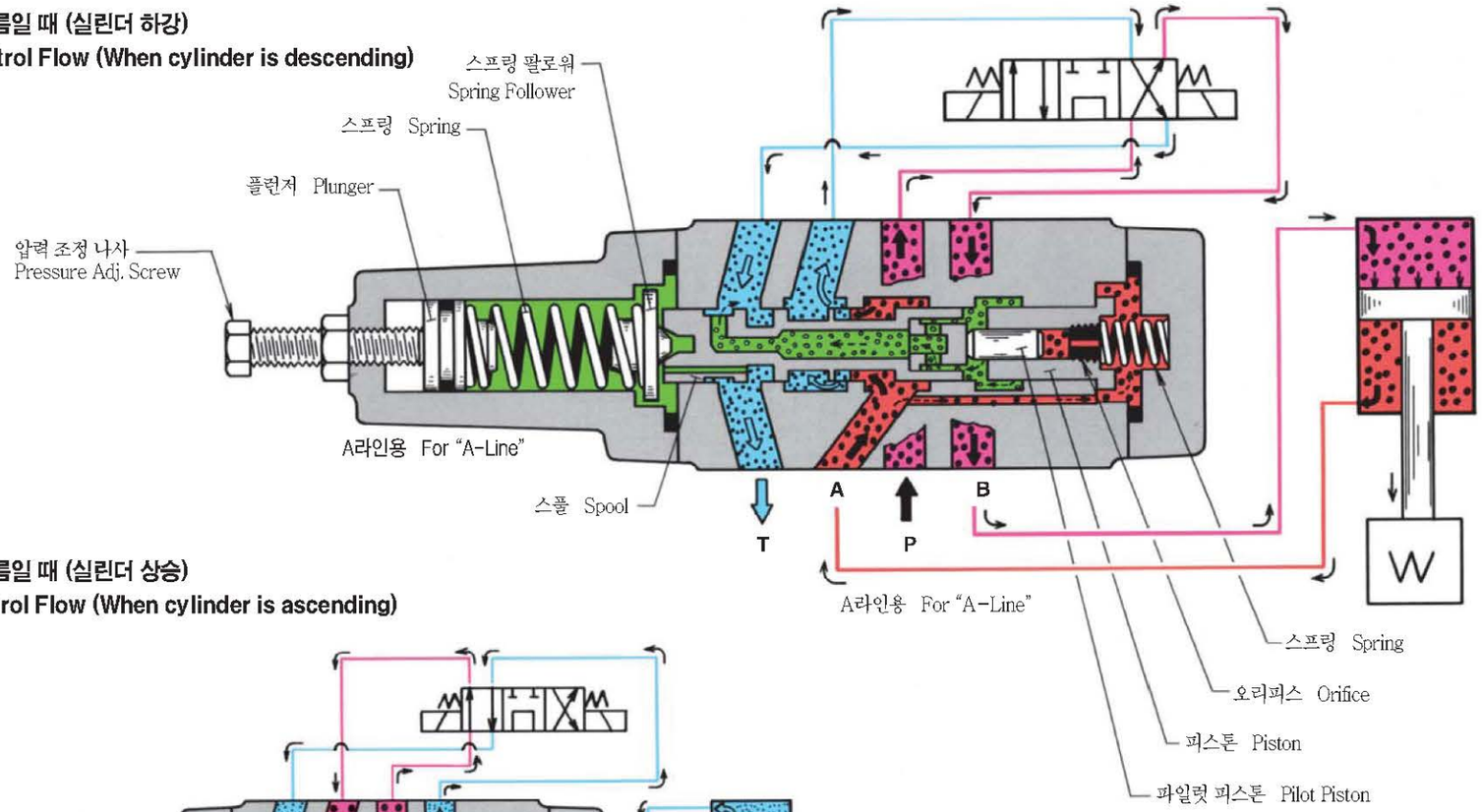




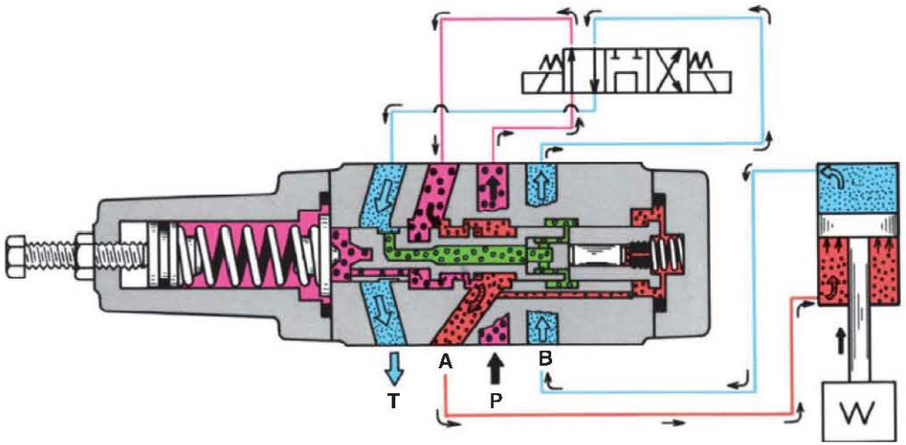
KS 유압기호
Graphic Symbol



● 제어 흐름일 때 (실린더 하강)
At Control Flow (When cylinder is descending)

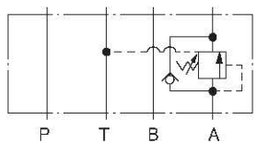


● 자유 흐름일 때 (실린더 상승)
At Control Flow (When cylinder is ascending)

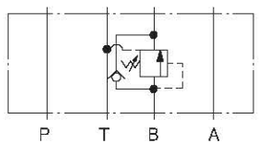


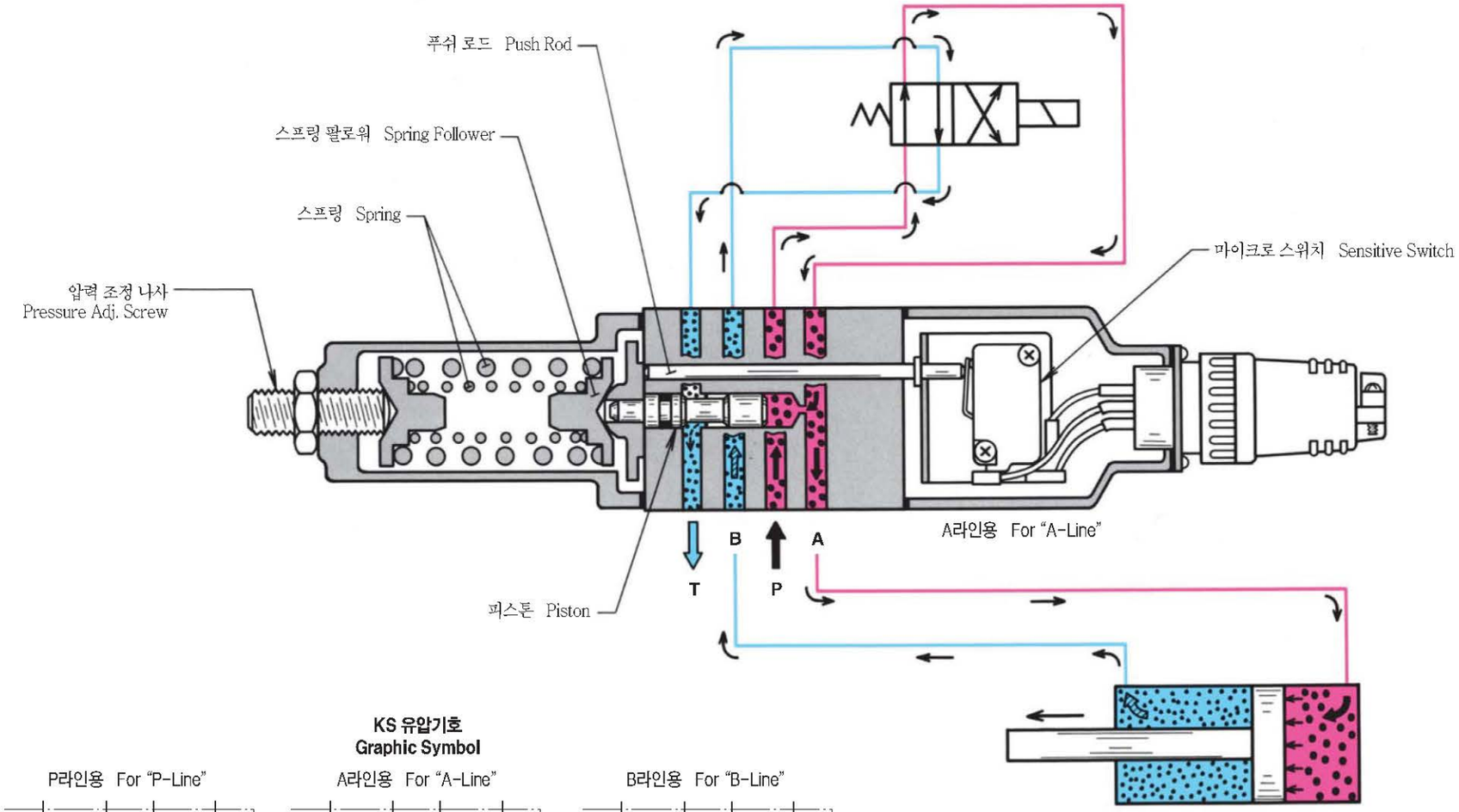
KS 유압기호
Graphic Symbol

A라인용 For "A-Line"



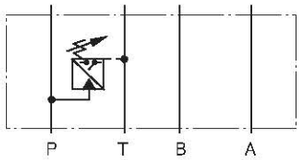
B라인용 For "B-Line"



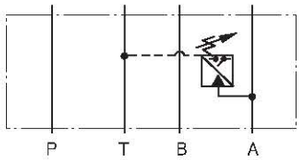


KS 유압기호
Graphic Symbol

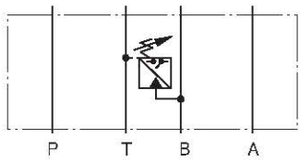
P라인용 For "P-Line"



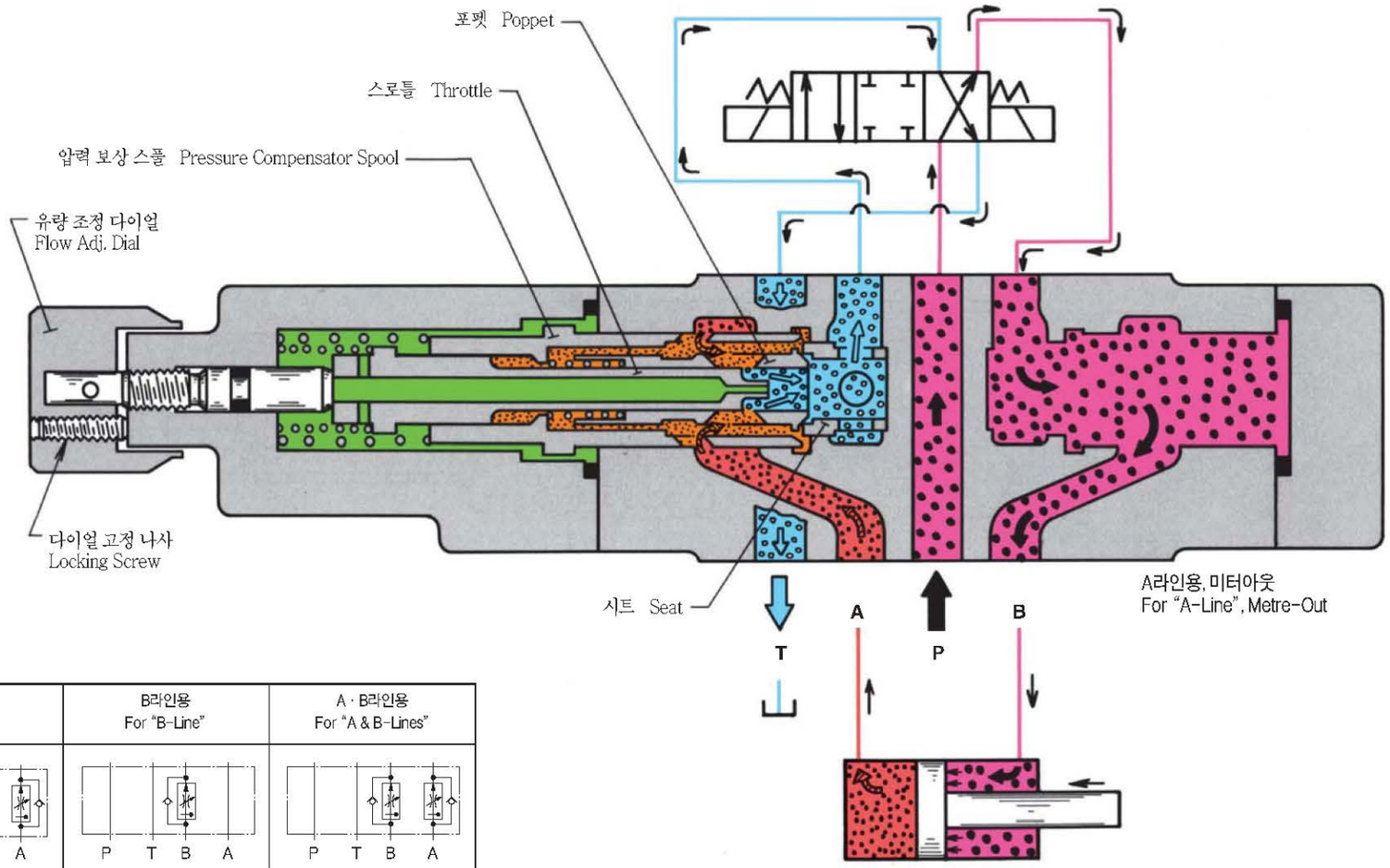
A라인용 For "A-Line"



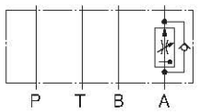
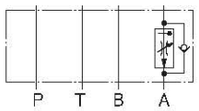
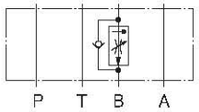
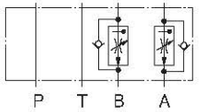
B라인용 For "B-Line"



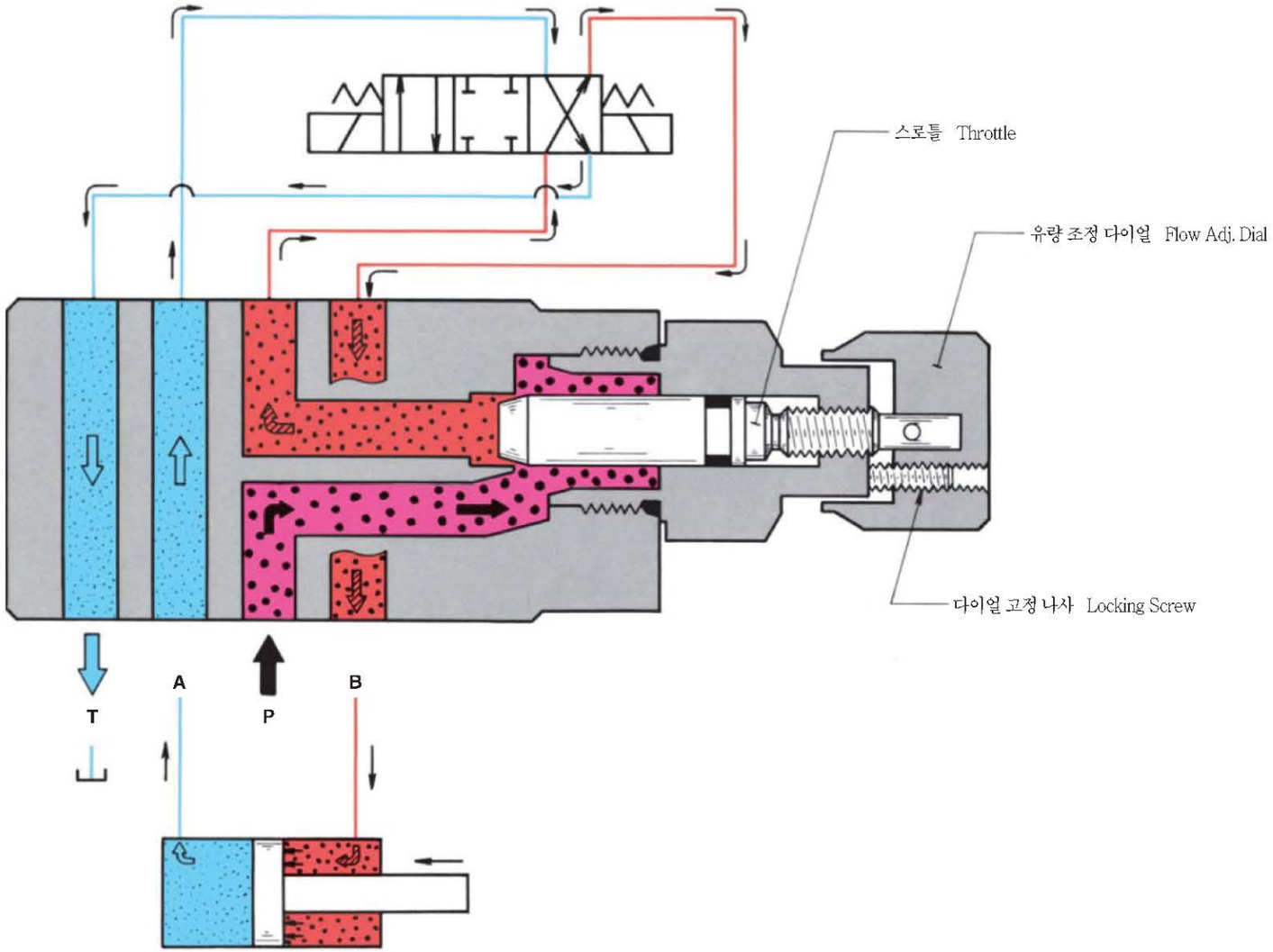
플로우 컨트롤 체크 모듈러 밸브 (압력·온도 보상형)



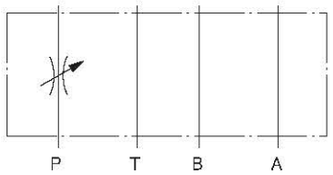
KS 유압기호 Graphic Symbol

제어 방향 Direction of Flow	A라인용 For "A-Line"	B라인용 For "B-Line"	A · B라인용 For "A & B-Lines"
미터아웃 Metre-Out			
미터인 Metre-In			

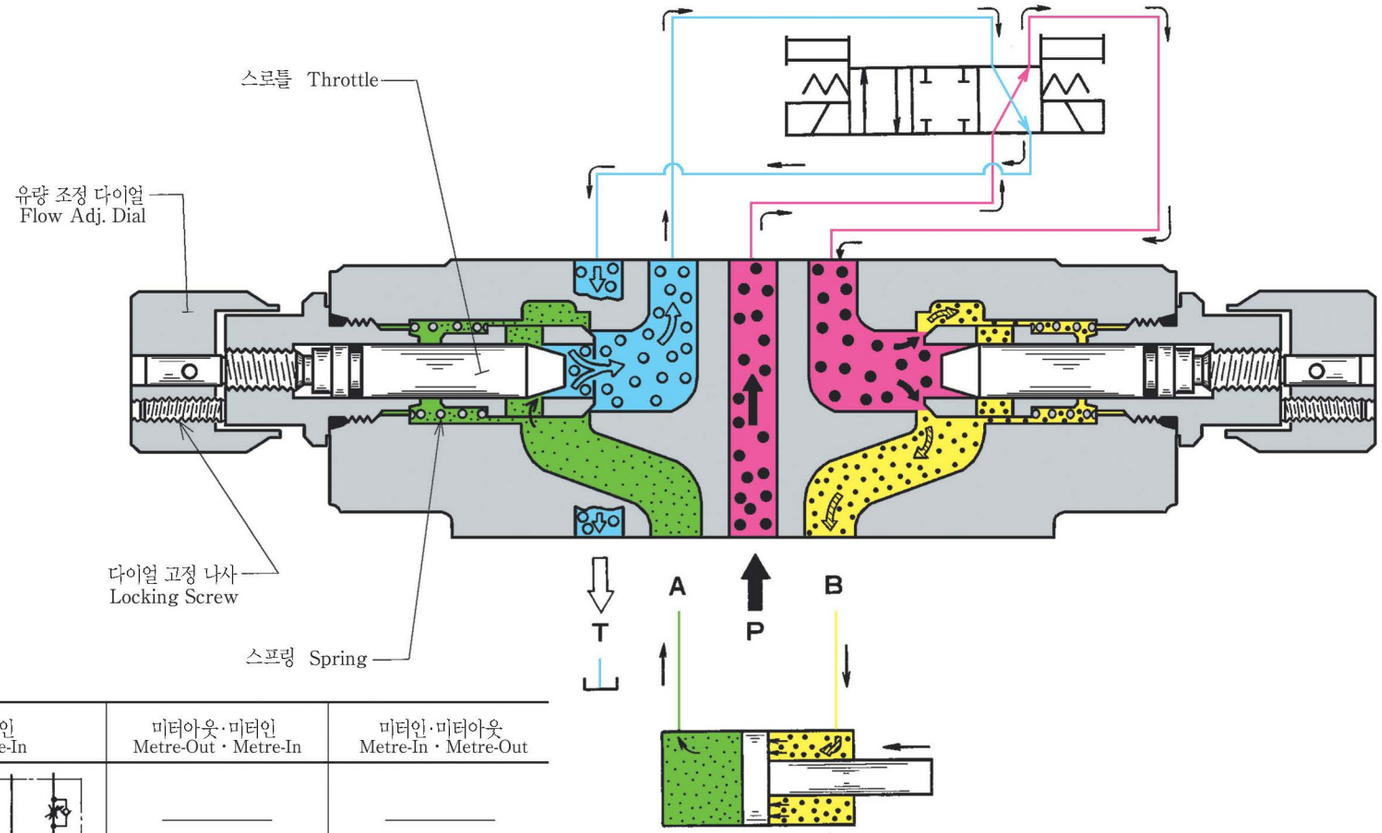
스로틀 모듈러 밸브



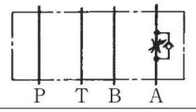
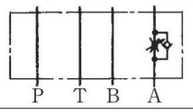
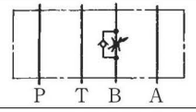
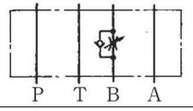
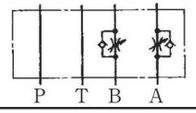
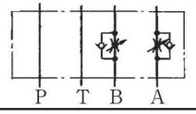
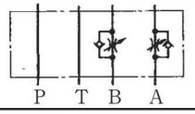
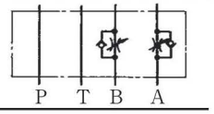
KS 유압기호
Graphic Symbol



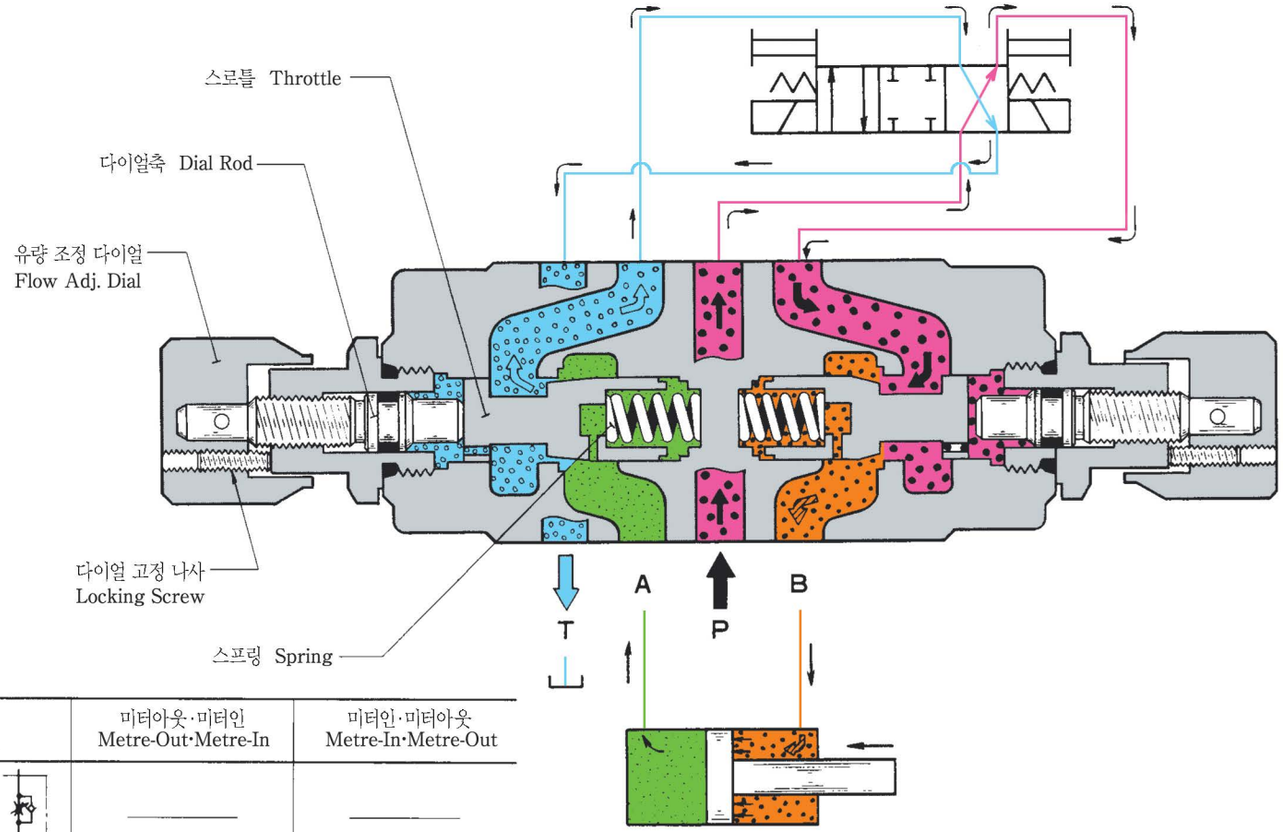
1/8 스로틀 체크 모듈러 밸브



KS 유압기호 Graphic Symbols

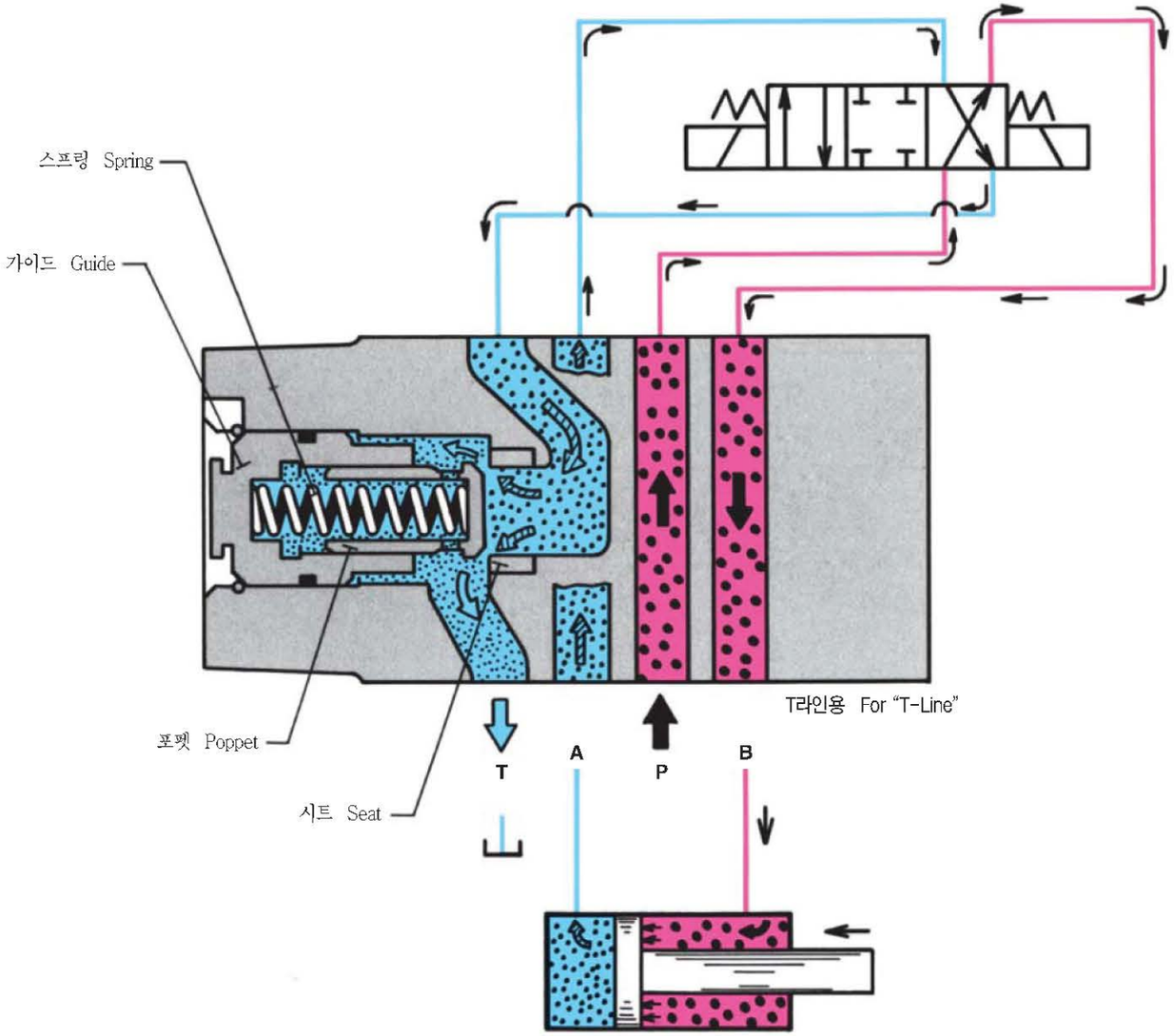
제어방식 Direction of Flow	미터아웃 Metre-Out	미터인 Metre-In	미터아웃·미터인 Metre-Out · Metre-In	미터인·미터아웃 Metre-In · Metre-Out
A라인용 For "A-Line"			———	———
B라인용 For "B-Line"			———	———
A · B라인용 For "A & B-Lines"				

3/8 스로틀 체크 모듈러 밸브



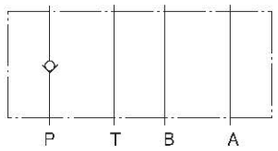
KS 유압기호 Graphic Symbols

제어방식 Direction of Flow	미터아웃 Metre-Out	미터인 Metre-In	미터아웃·미터인 Metre-Out·Metre-In	미터인·미터아웃 Metre-In·Metre-Out
A라인용 For"A-Line"	P T B A	P T B A	———	———
B라인용 For"B-Line"	P T B A	P T B A	———	———
A·B라인용 For"A&B-Lines"	P T B A	P T B A	P T B A	P T B A

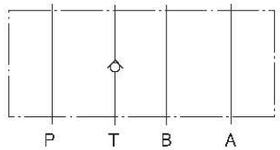


KS 유압기호
Graphic Symbol

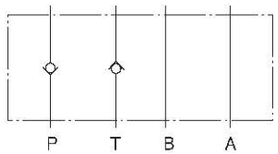
P라인용 For "P-Line"



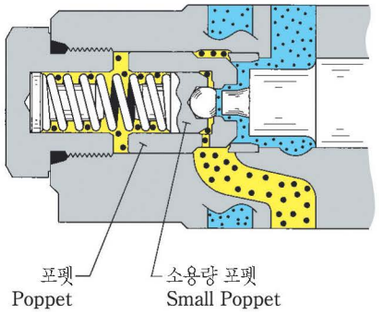
T라인용 For "T-Line"



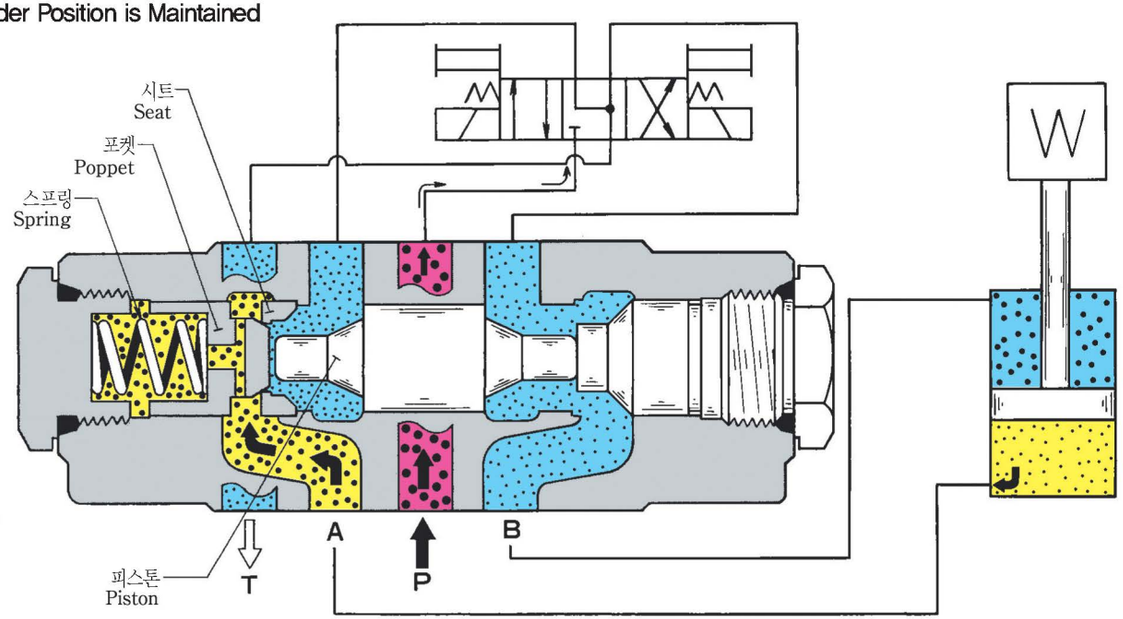
P · T라인용 For "P & T-Lines"



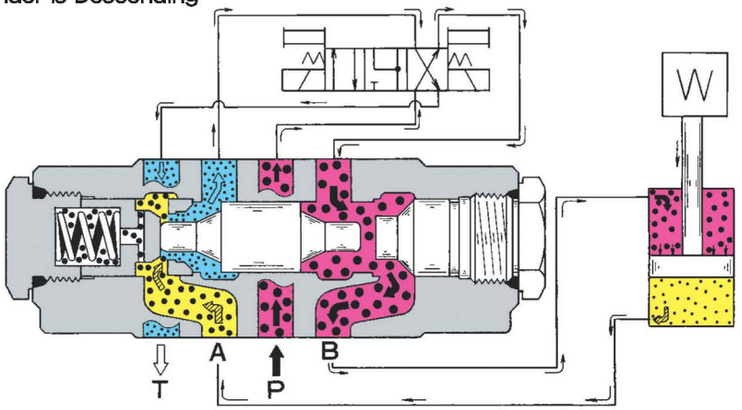
저파일럿조작형
Low Pilot Pressure Control Type



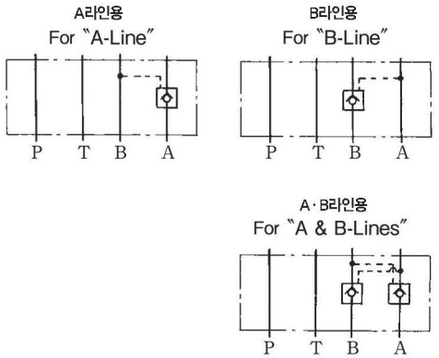
● 실린더 위치 고정시
When Cylinder Position is Maintained



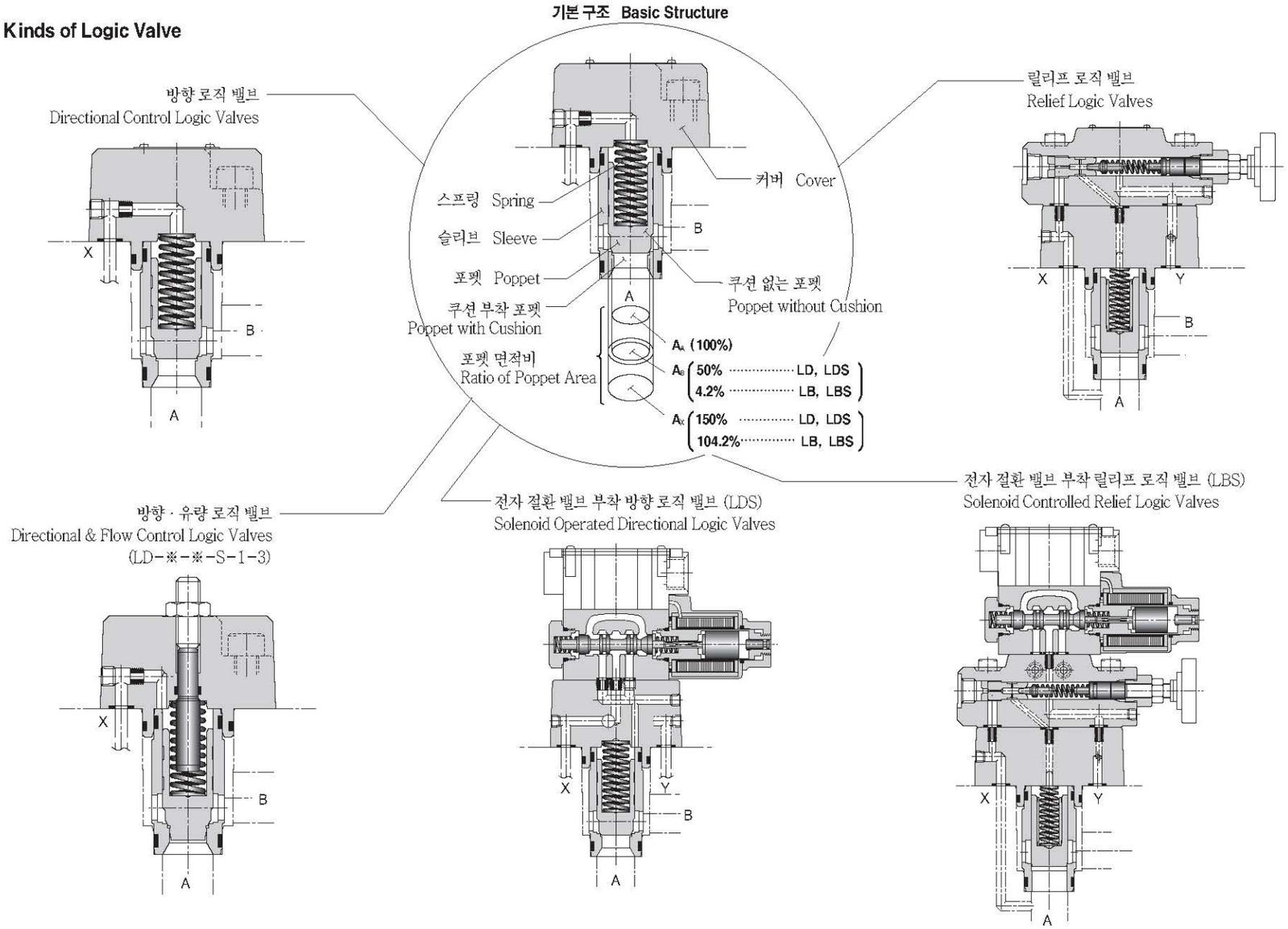
● 실린더 하강시
When Cylinder is Descending



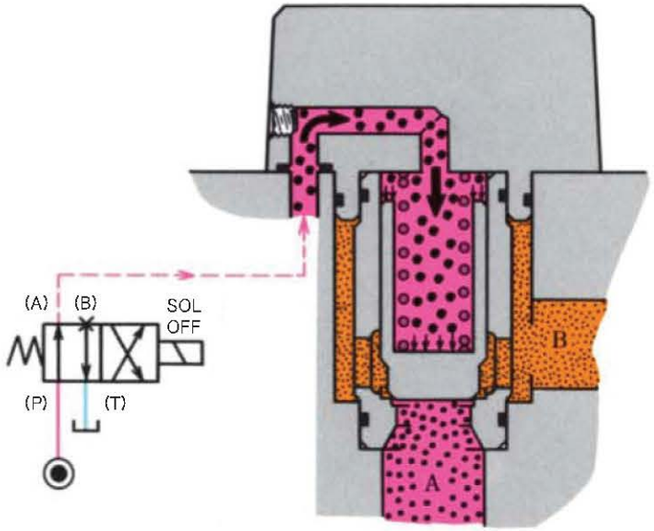
KS 유압기호
Graphic Symbols

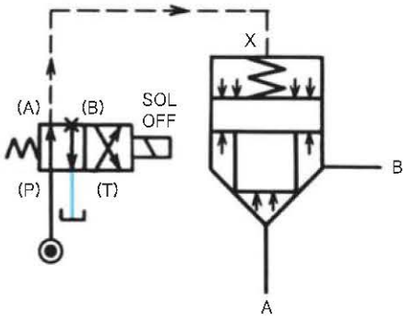


● 기종 Kinds of Logic Valve

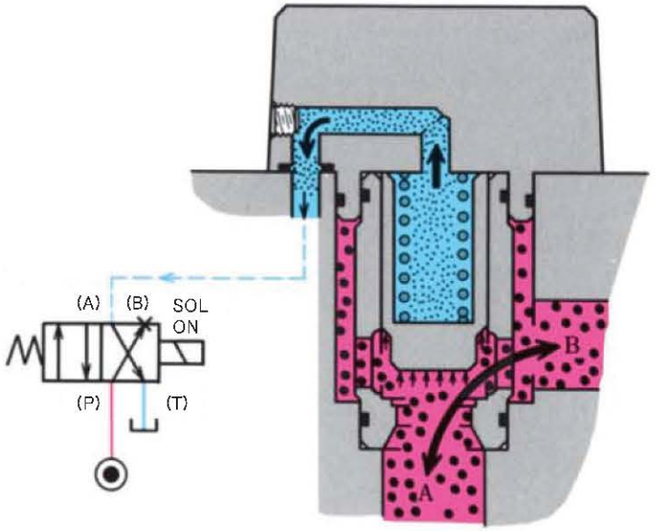


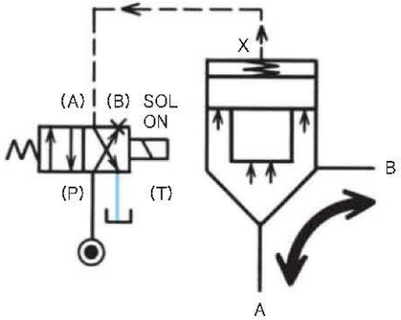
● 폐작동 Closed Operation





● 개작동 Open Operation

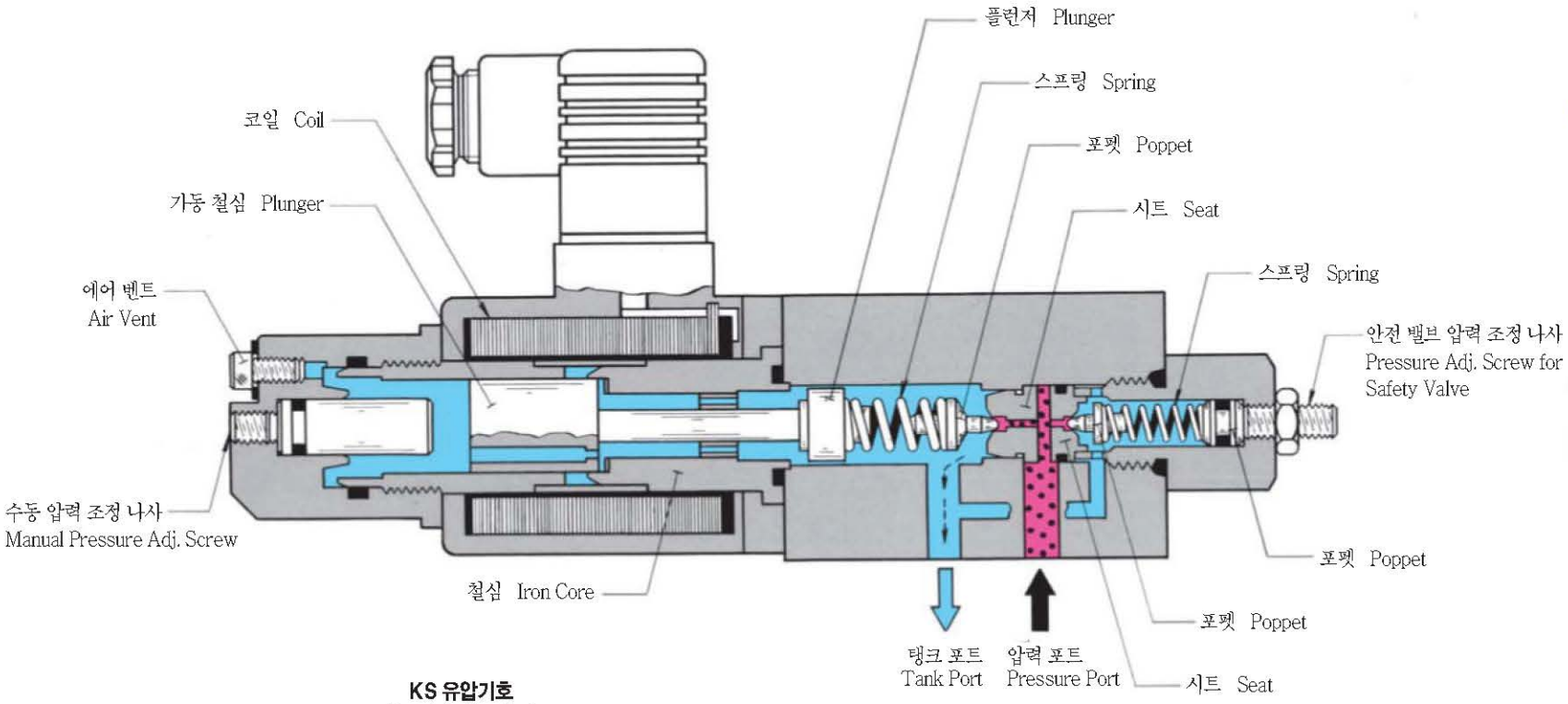




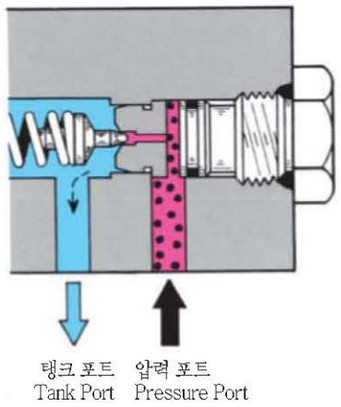
E시리즈 비례전자식 파일럿 릴리프 밸브

"E" Series Proportional Electro-Hydraulic Pilot Relief Valves

● 안전 밸브 부착 With Safety Valve

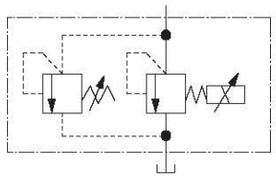


● 안전 밸브 없음
Without Safety Valve

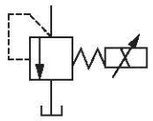


KS 유압기호
Graphic Symbol

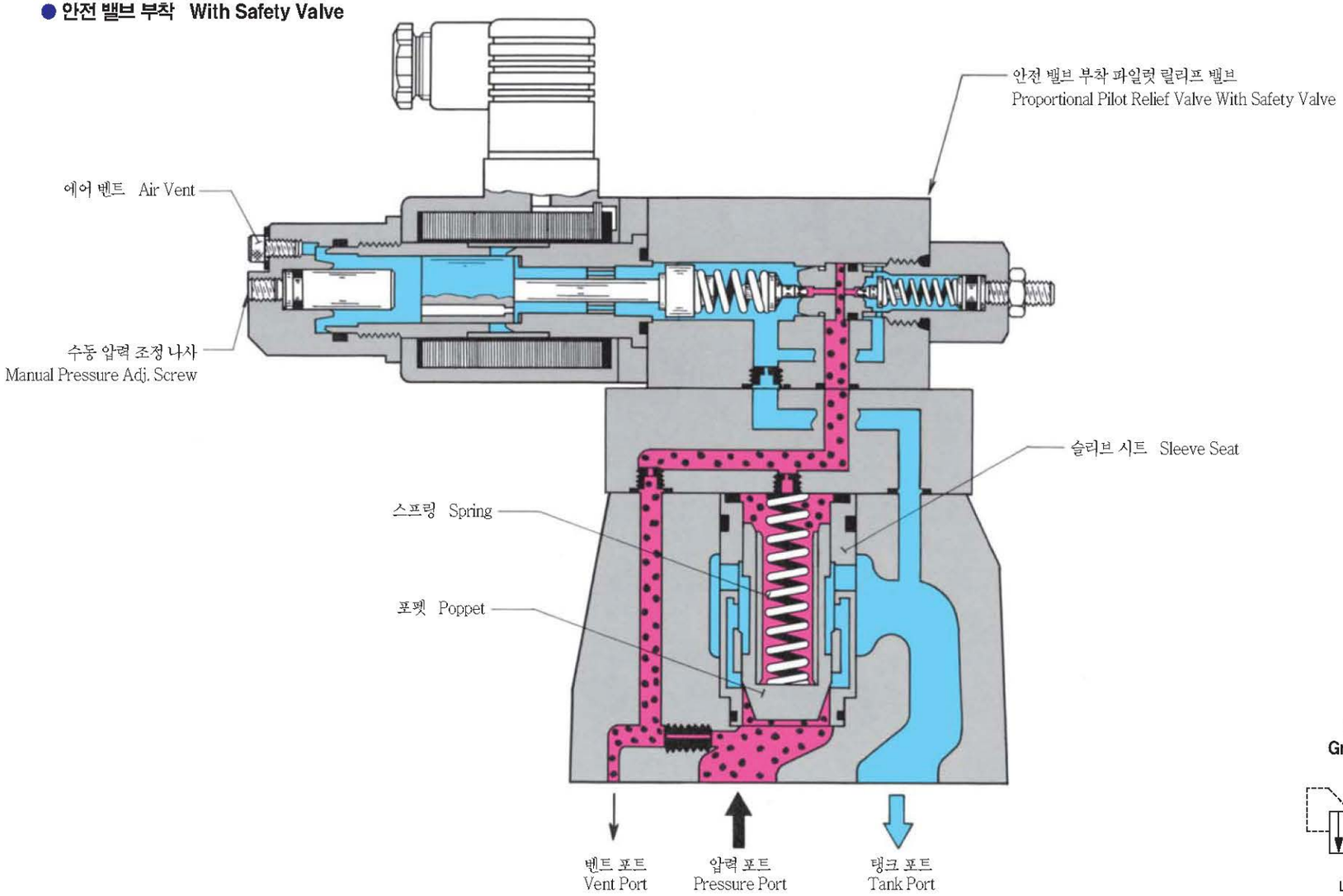
● 안전 밸브 부착 With Safety Valve



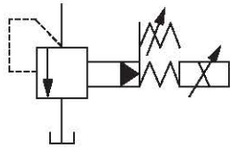
● 안전 밸브 없음 Without Safety Valve



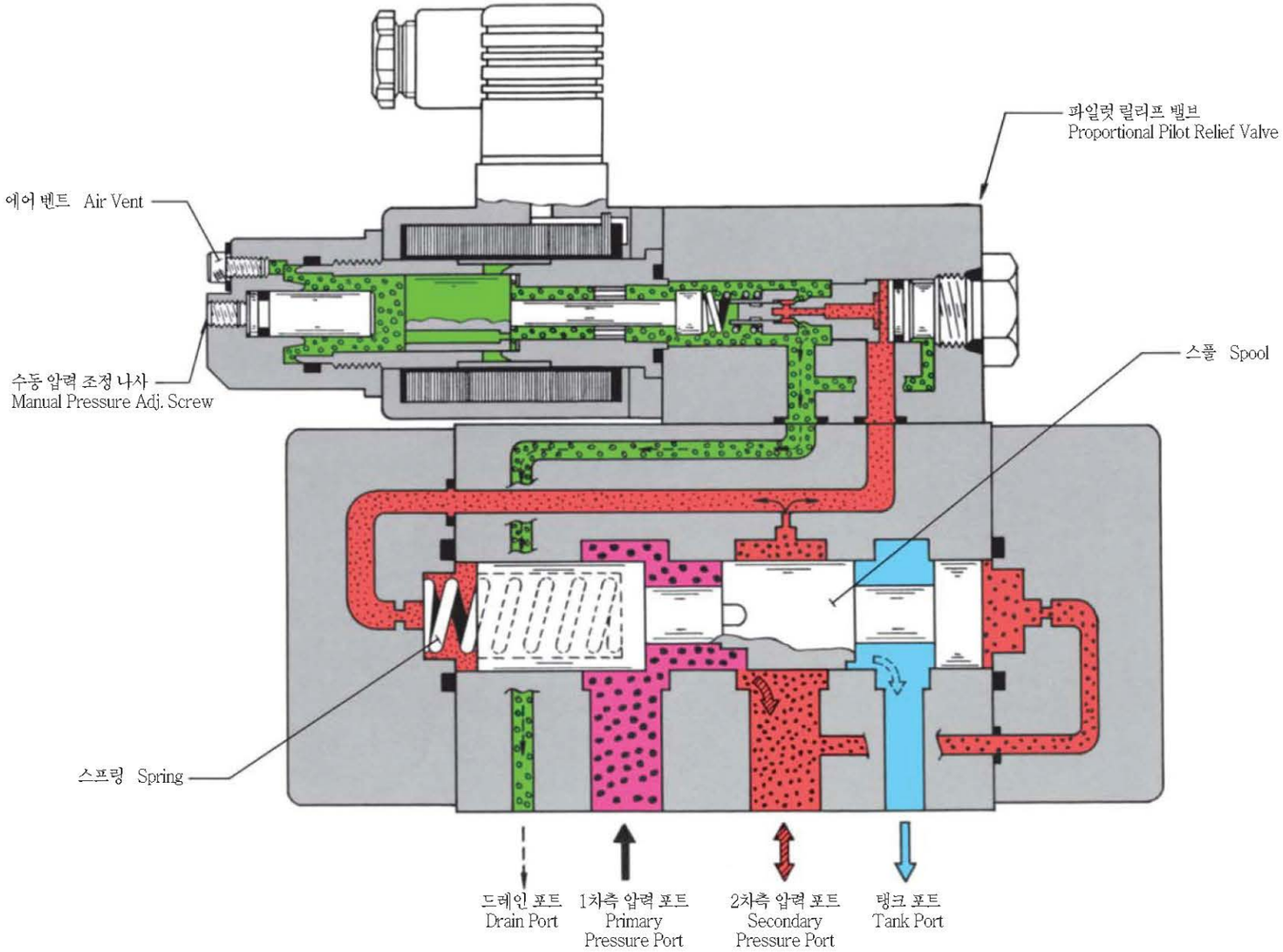
● 안전 밸브 부착 With Safety Valve



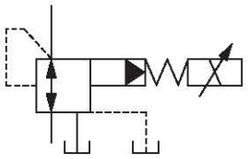
KS 유압기호
Graphic Symbol



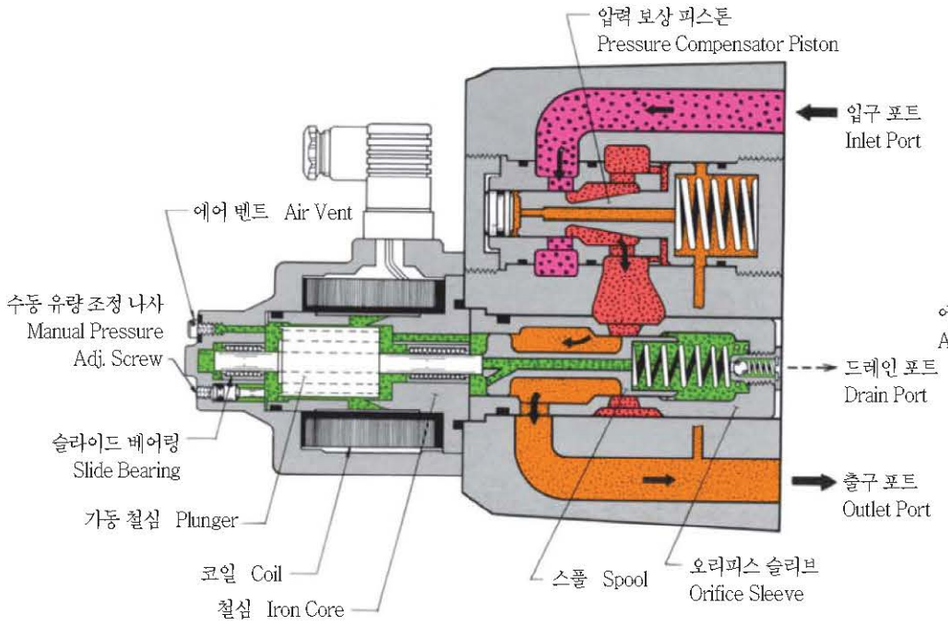
E시리즈 비례전자식 릴리프 부착 감압 밸브



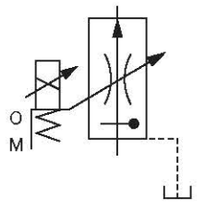
KS 유압기호
Graphic Symbol



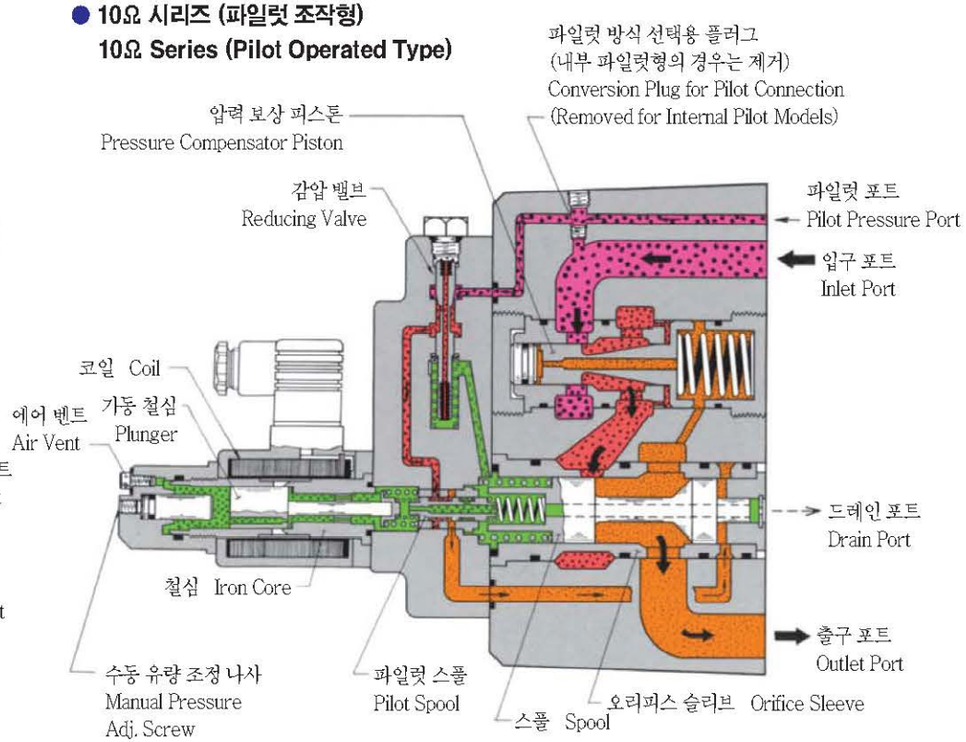
● 40Ω 시리즈 (직동형)
40Ω Series (Direct Type)



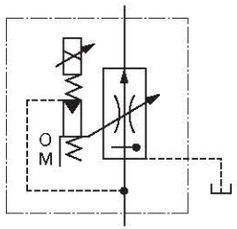
KS 유압기호
Graphic Symbol



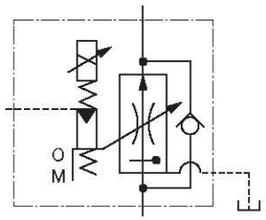
● 10Ω 시리즈 (파일럿 조작형)
10Ω Series (Pilot Operated Type)



KS 유압기호
Graphic Symbol



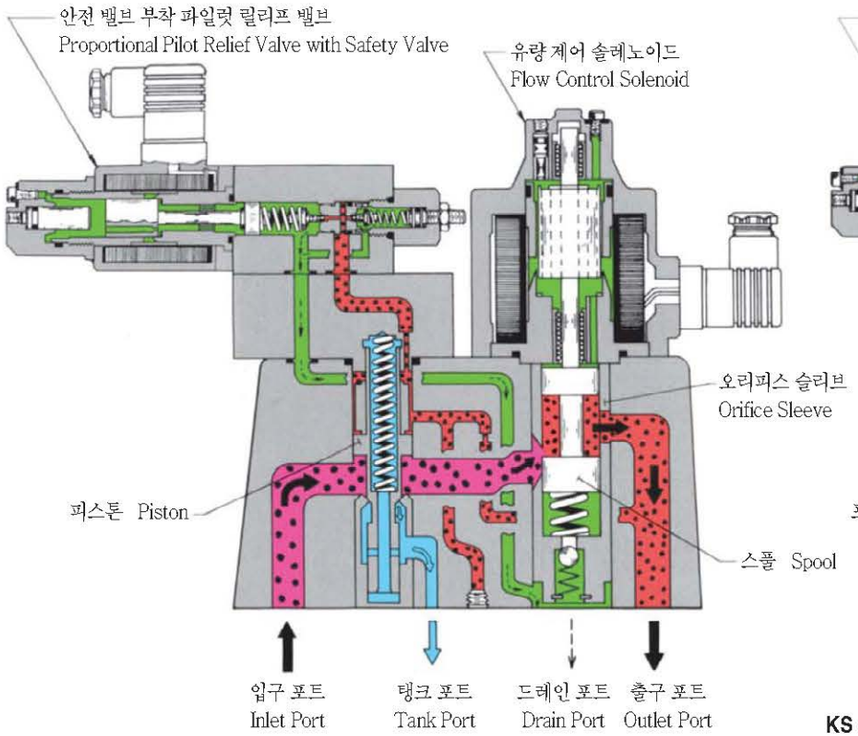
내부 파일럿 Int. Pilot



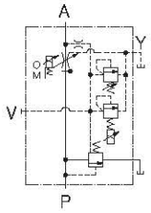
외부 파일럿 Ext. Pilot

E시리즈 비례전자식 파워세이빙 밸브 (릴리프 밸브 부착 유량 조정 밸브)

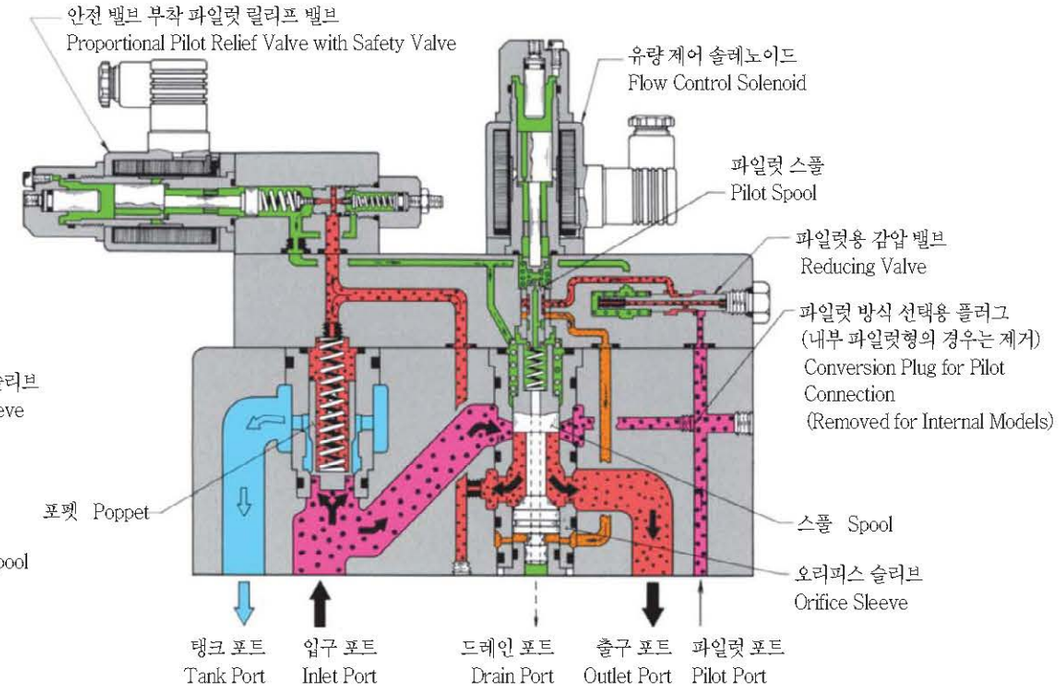
● **40Ω~10Ω 시리즈**
40Ω~10Ω Series



KS 유압기호
Graphic Symbol

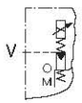


● **10Ω~10Ω 시리즈**
10Ω~10Ω Series

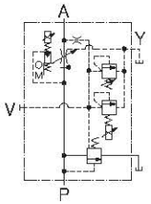


KS 유압기호
Graphic Symbol

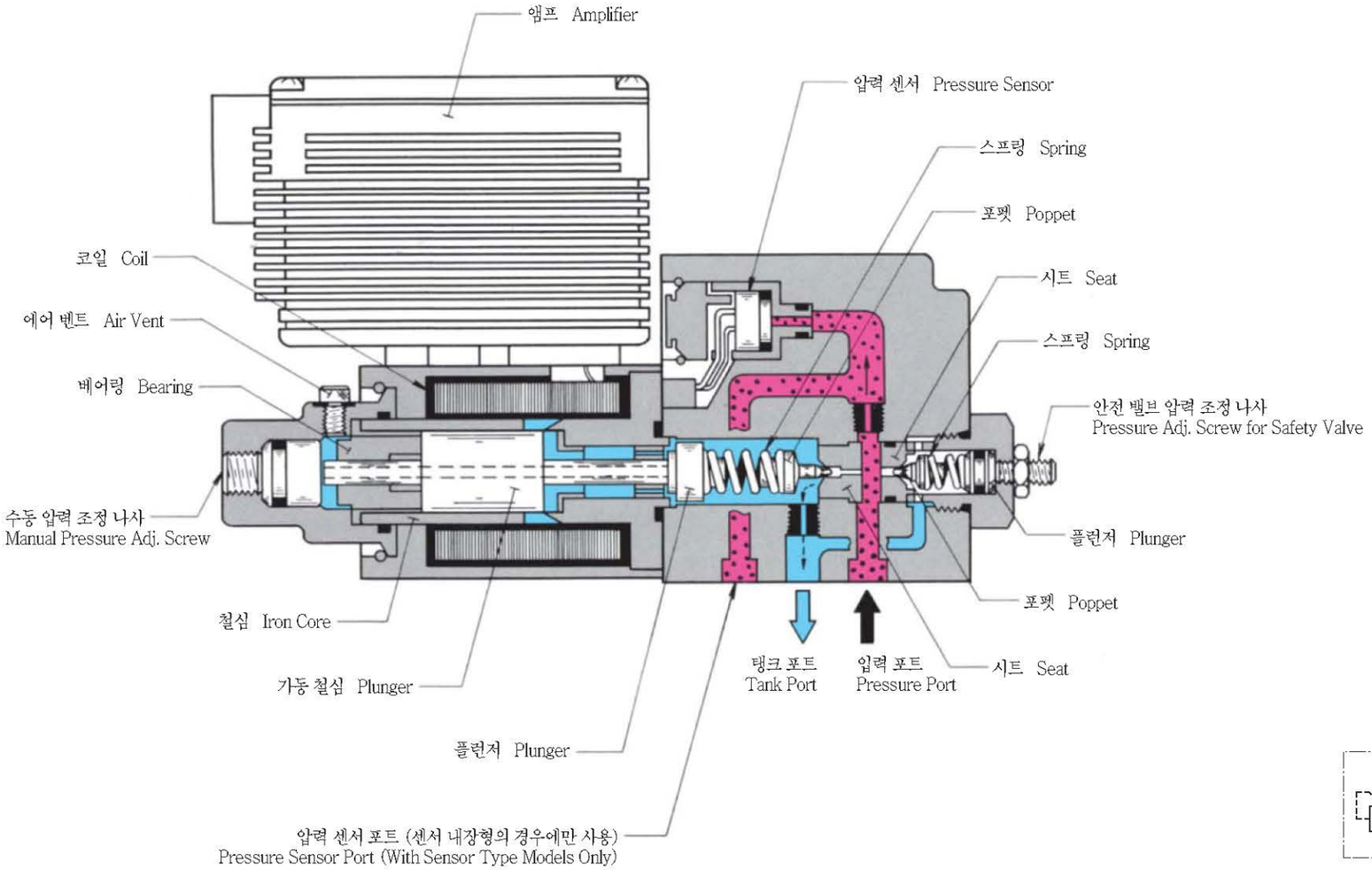
외부 파일럿 Ext. Pilot



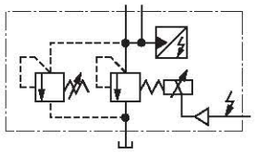
내부 파일럿 Int. Pilot



● 안전 밸브 부착 · 센서 내장형
With Safety Valve & Sensor



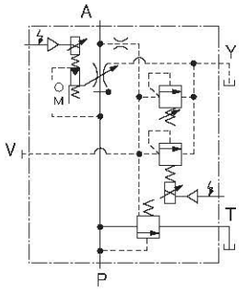
KS 유압기호
Graphic Symbol



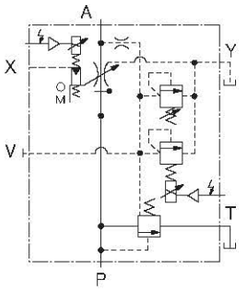
EH시리즈 비례전자식 파워세이빙 밸브 (릴리프 밸브 부착 유량 조정 밸브)

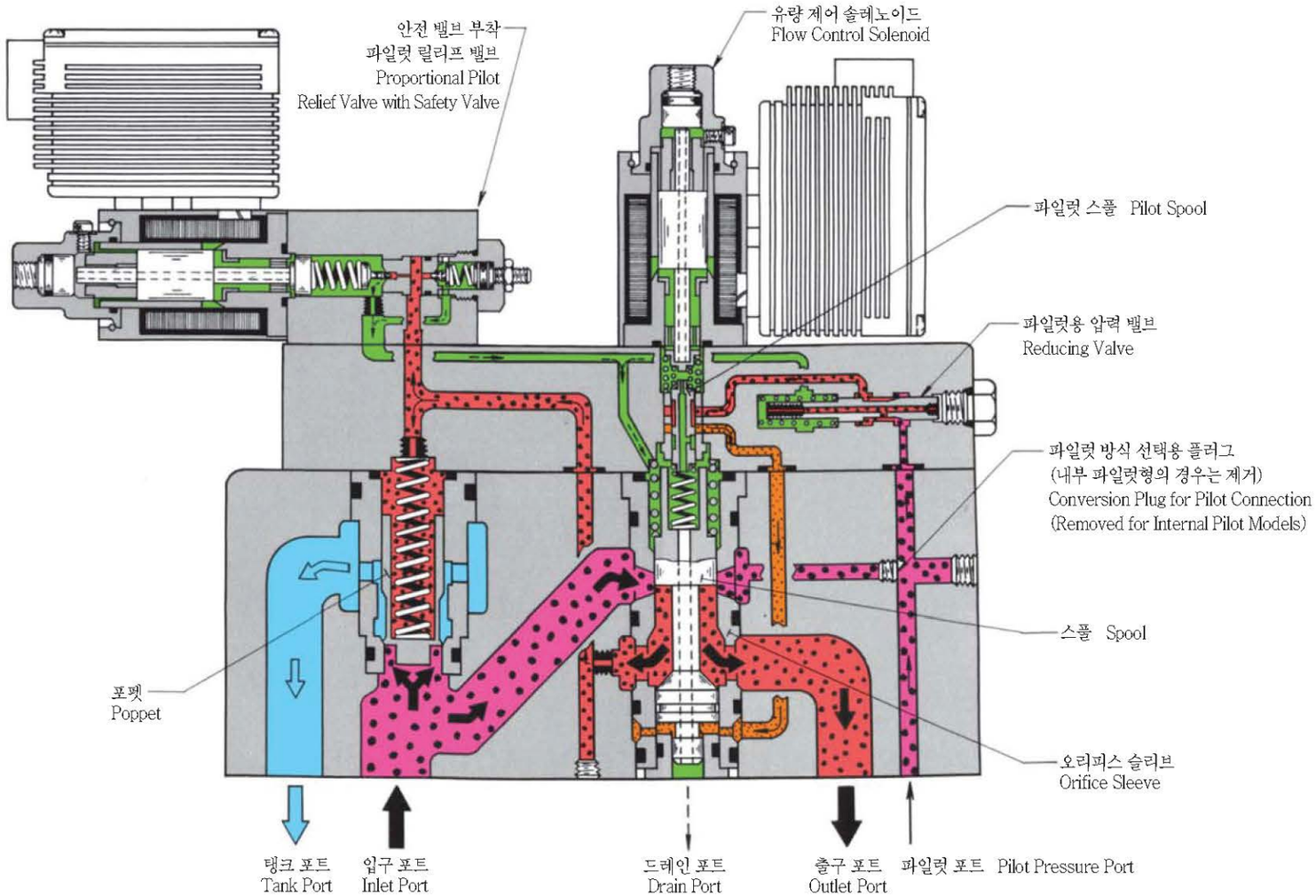
KS 유압기호
Graphic Symbol

내부 파일럿 Int. Pilot



외부 파일럿 Ext. Pilot

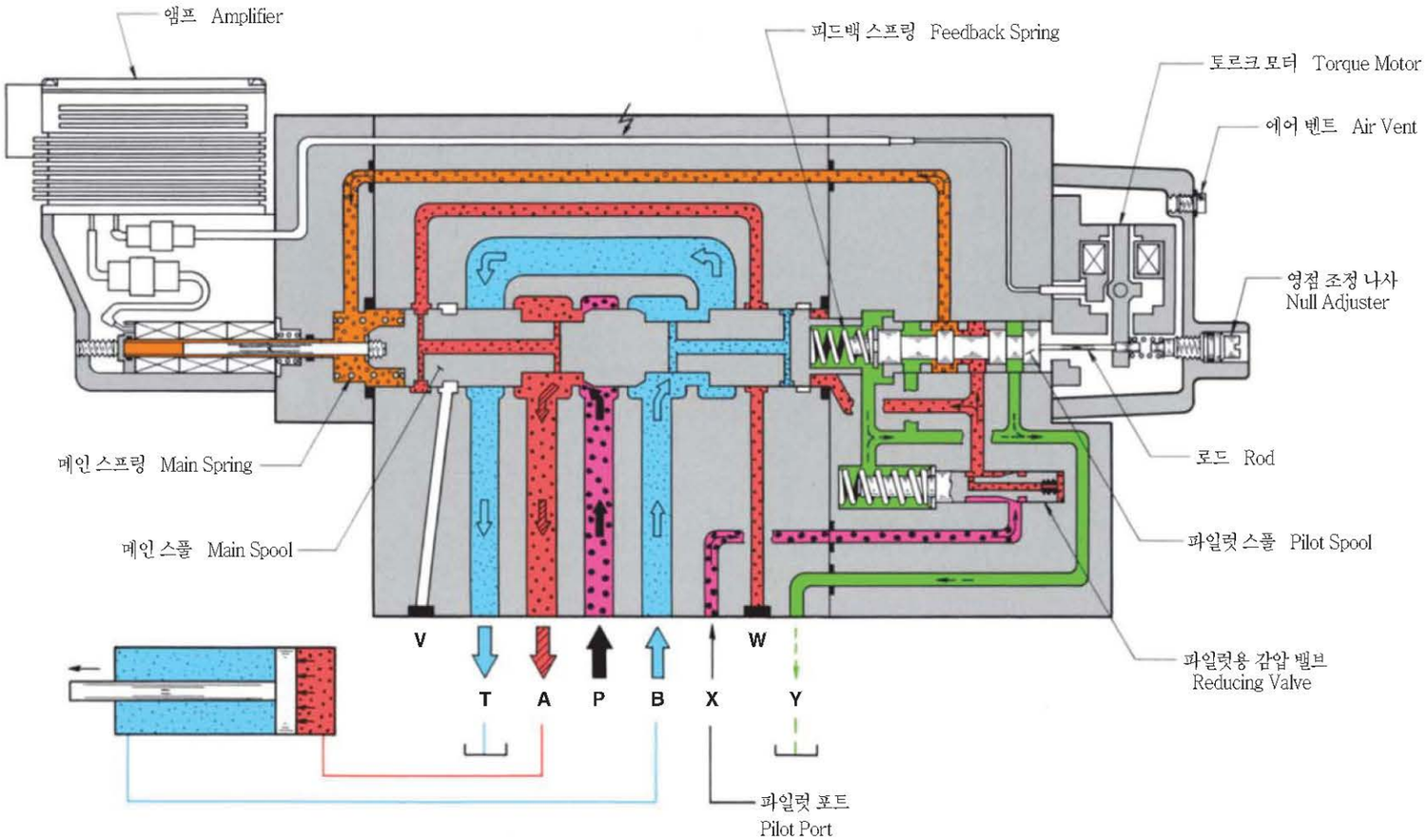




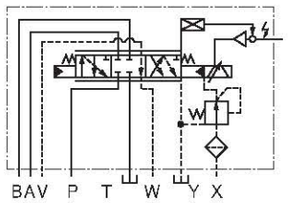
EH시리즈 고응답형 비례전자식 방향 · 유량 제어 밸브

"EH" Series High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

● **압력 보상 밸브 없음**
Without Pressure Compensator Valve

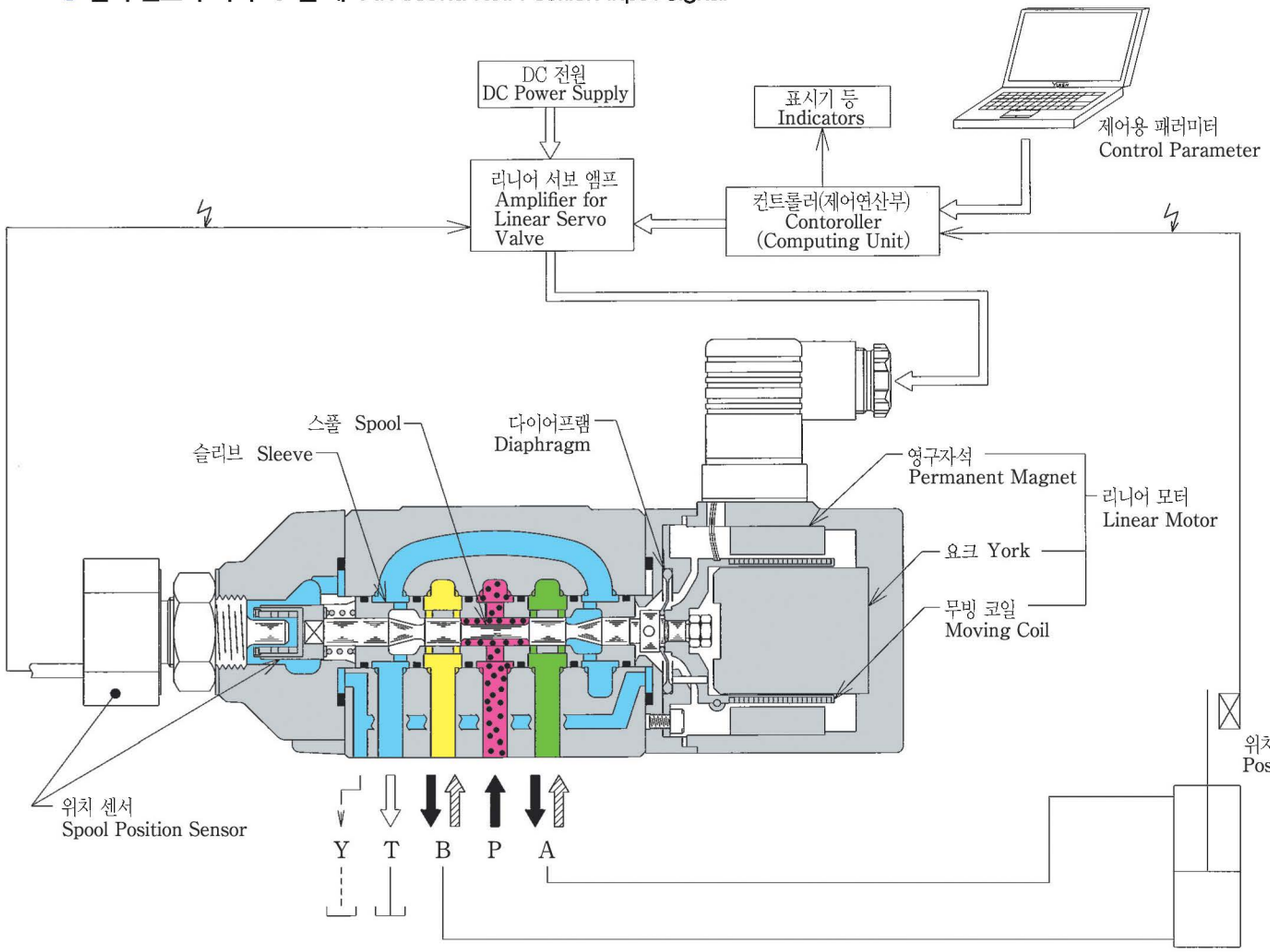


KS 유압기호
Graphic Symbol



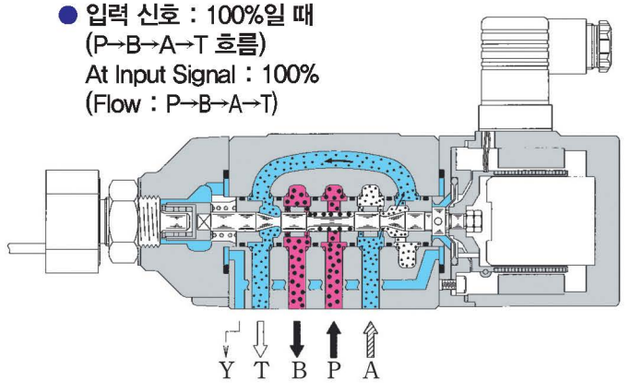
● **압력 보상 밸브 없는 경우는 V, W 포트를 사용하지 않음**

● 입력 신호가 거의 "0"일 때 At Around Null Position Input Signal

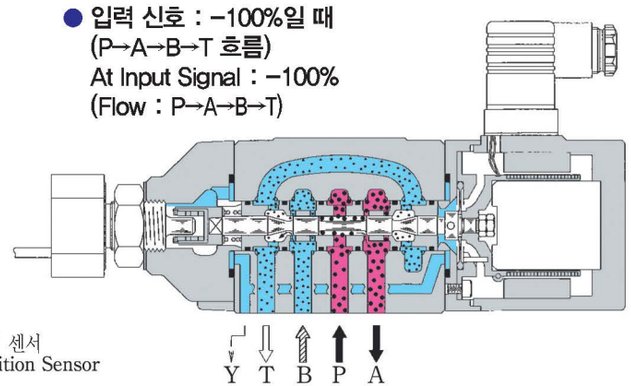


위치 제어시 구성도
Figure of constitution in case of the positioning

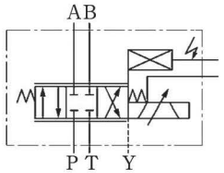
● 입력 신호 : 100%일 때
(P→B→A→T 흐름)
At Input Signal : 100%
(Flow : P→B→A→T)



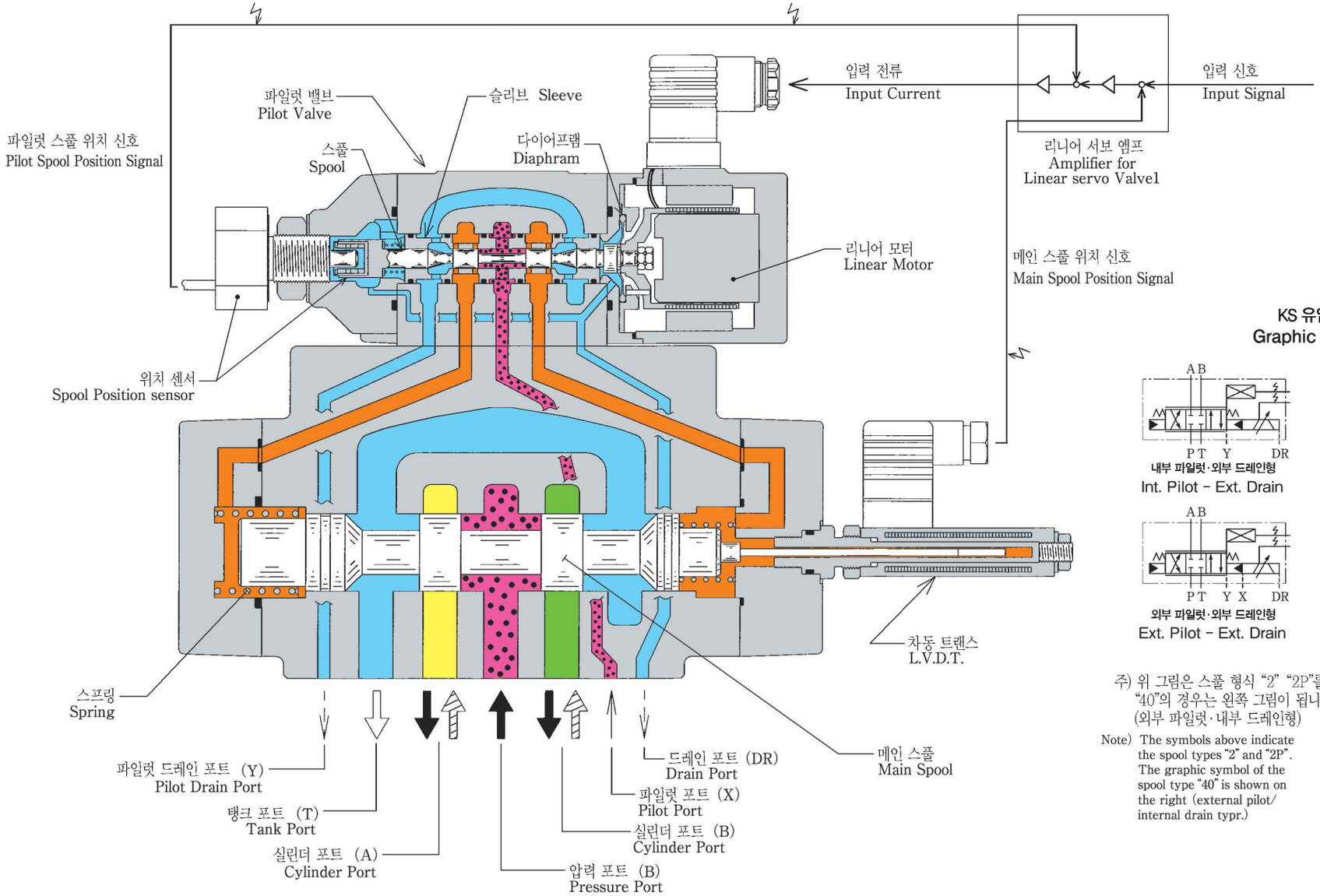
● 입력 신호 : −100%일 때
(P→A→B→T 흐름)
At Input Signal : −100%
(Flow : P→A→B→T)



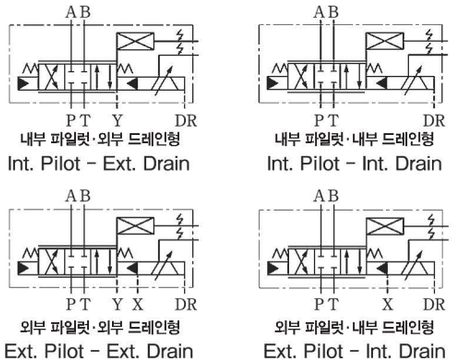
KS 유압기호
Graphic Symbol



2단형 고속 리니어 서보 밸브 (앰프 설치형)

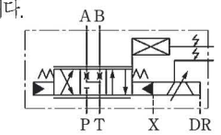


KS 유압기호
Graphic Symbol



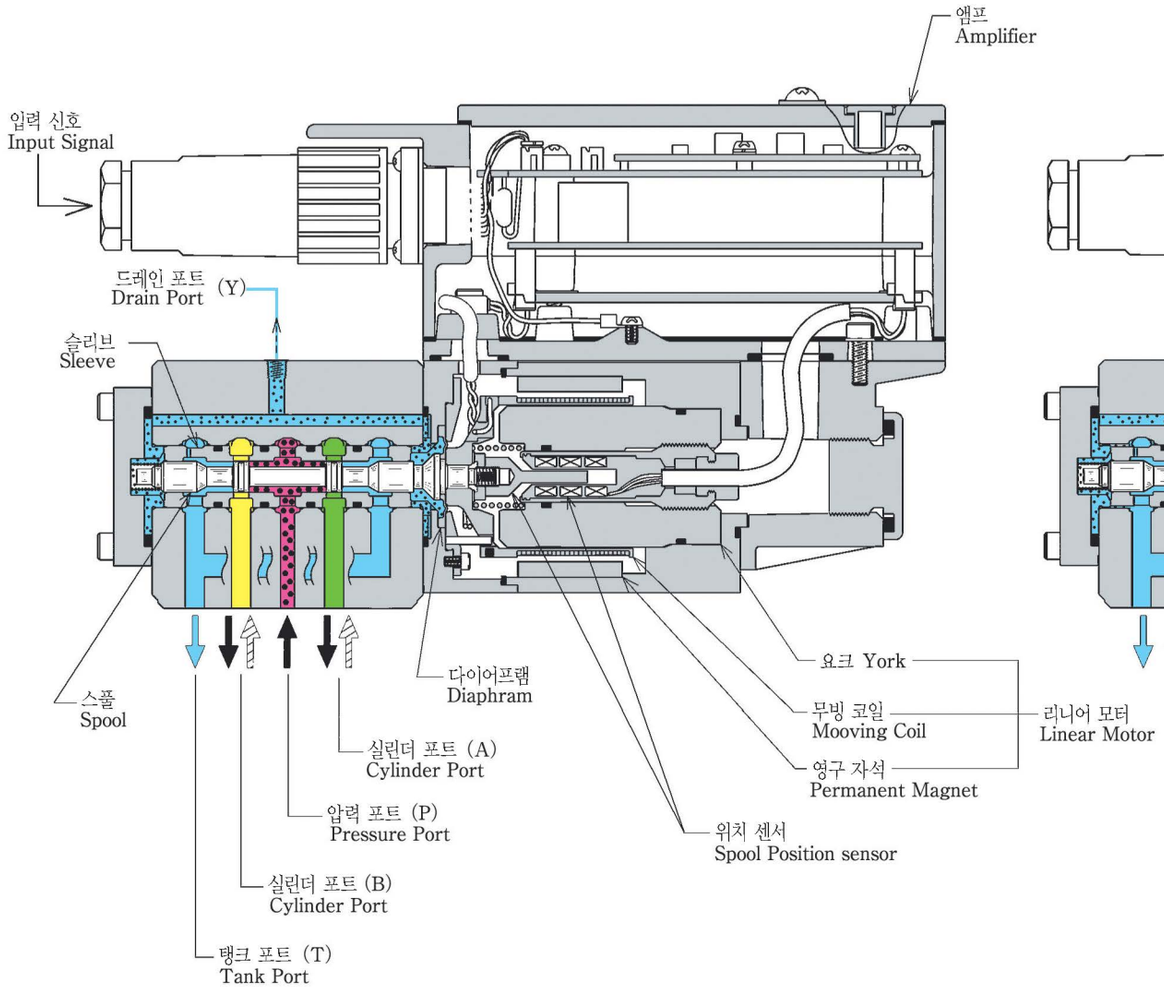
주) 위 그림은 스풀 형식 "2" "2P"를 나타냅니다.
"40"의 경우는 왼쪽 그림이 됩니다.
(외부 파일럿·내부 드레인형)

Note) The symbols above indicate the spool types "2" and "2P". The graphic symbol of the spool type "40" is shown on the right (external pilot/ internal drain typr.)

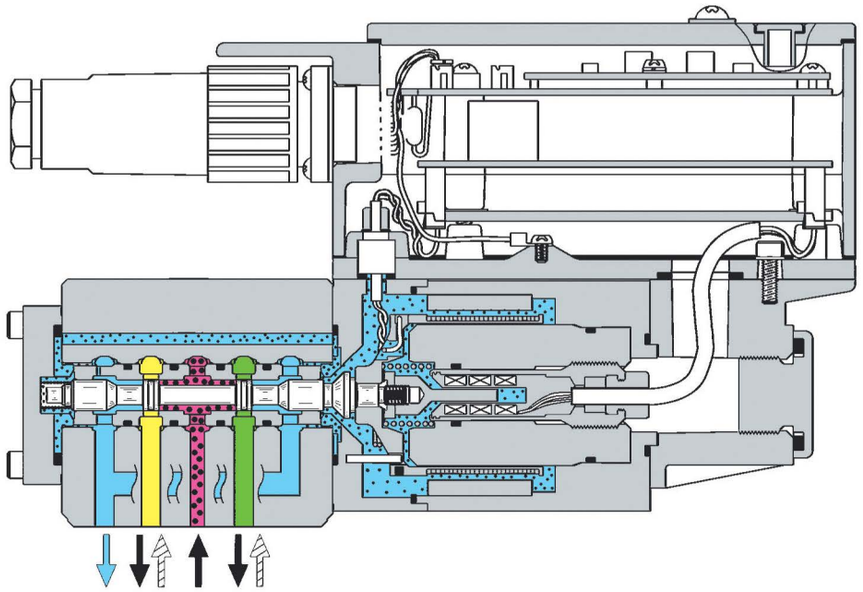


앰프 탑재형 직동 리니어 서보 밸브

● 건식형 Dry Type

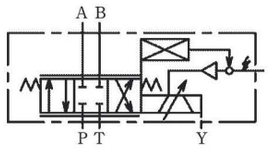


● 습식형 Wet Type

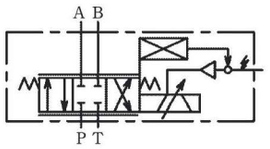


KS 유압기호
Graphic Symbols

Y포트 있음 (건식형)
With Y Port (Dry Type)

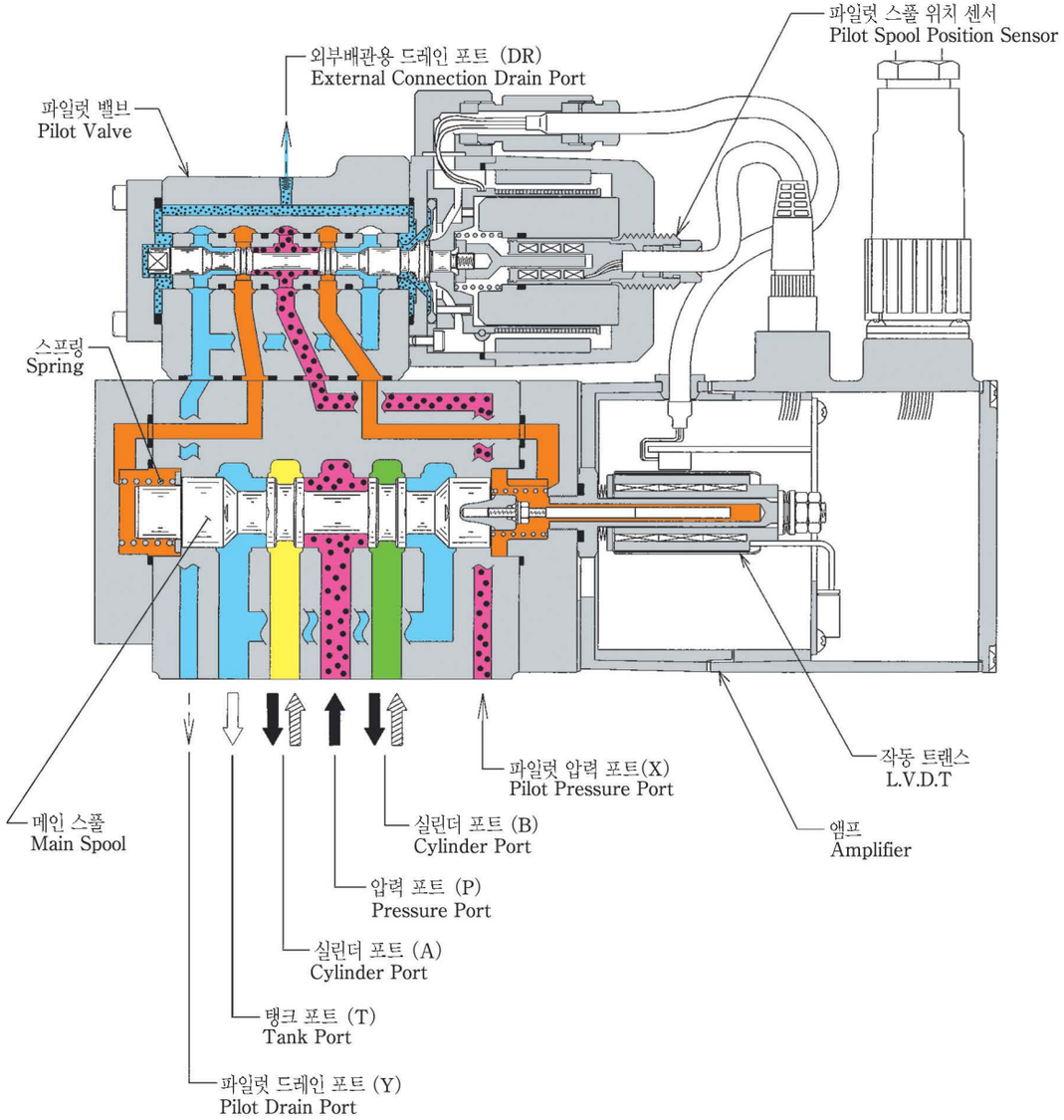


Y포트 없음 (습식형)
Without Y Port (Wet Type)

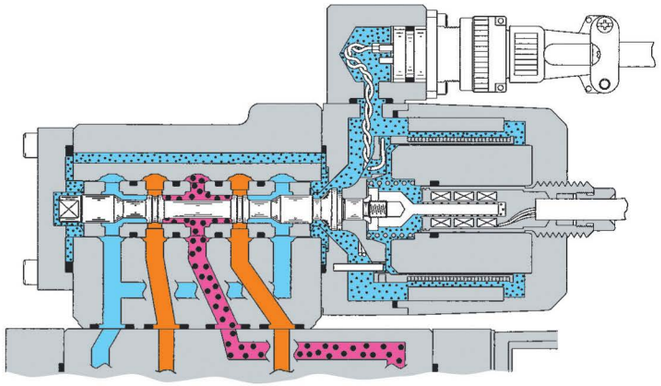


앰프 탑재 2단형 리니어 서보 밸브 (범용형)

● 파일럿 밸브 건식형 Pilot Valve : Dry Type

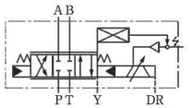


● 파일럿 밸브 습식형 Pilot Valve : Wet Type

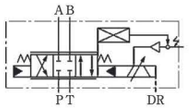


KS 유압기호
Graphic Symbols

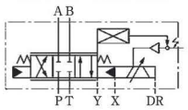
파일럿 밸브 건식형
Pilot Valve : Dry Type



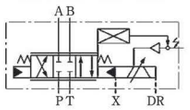
내부 파일럿·외부 드레인형
Int. Pilot – Ext. Drain



내부 파일럿·내부 드레인형
Int. Pilot – Int. Drain

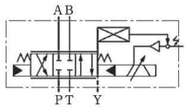


외부 파일럿·외부 드레인형
Ext. Pilot – Ext. Drain

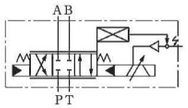


외부 파일럿·내부 드레인형
Ext. Pilot – Int. Drain

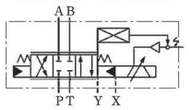
파일럿 밸브 습식형
Pilot Valve : Wet Type



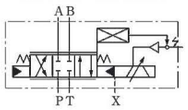
내부 파일럿·외부 드레인형
Int. Pilot – Ext. Drain



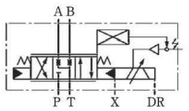
내부 파일럿·내부 드레인형
Int. Pilot – Int. Drain



외부 파일럿·외부 드레인형
Ext. Pilot – Ext. Drain



외부 파일럿·내부 드레인형
Ext. Pilot – Int. Drain



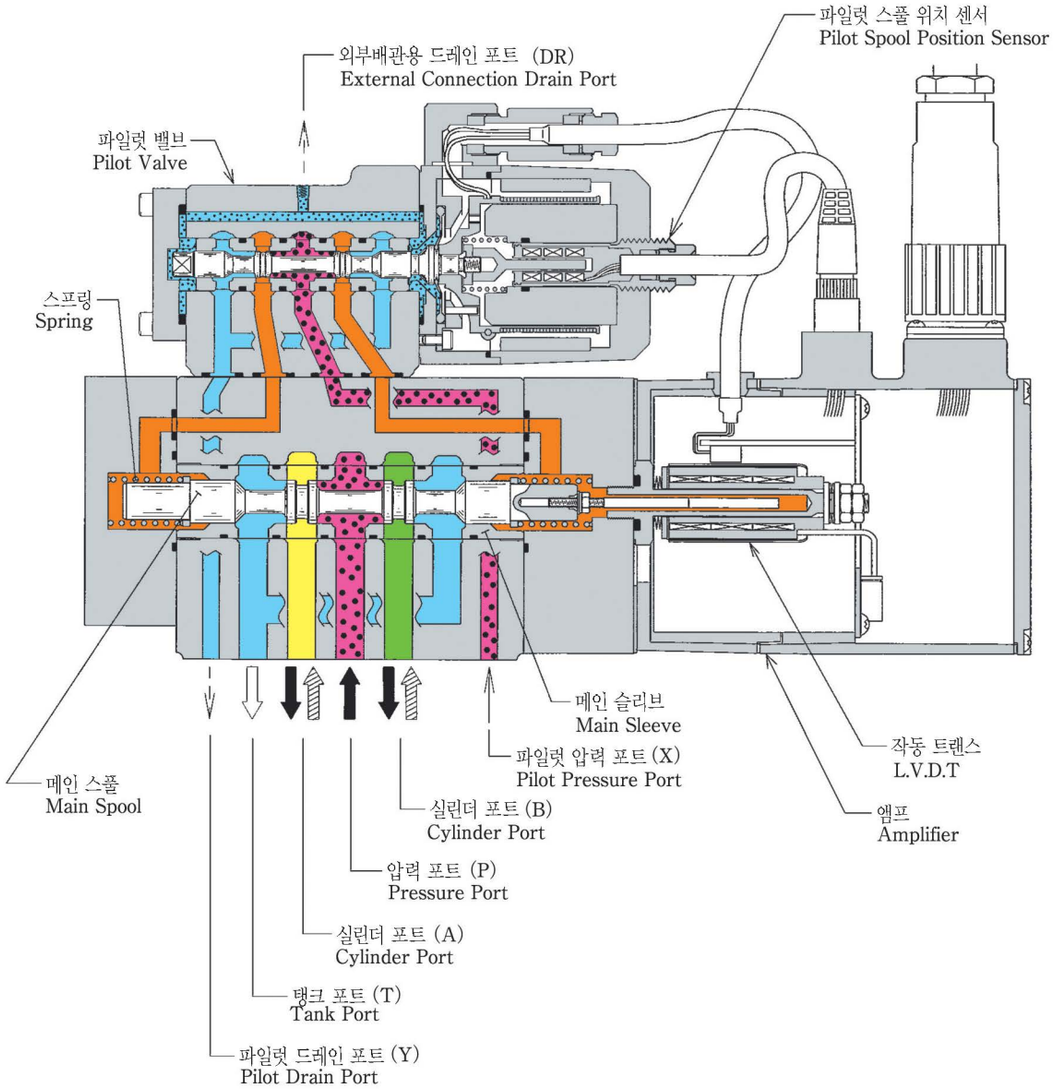
주) 위 그림은 스풀 형식 "2L" "2" "2P"를 나타냅니다.
"40"의 경우는 왼쪽 그림이 됩니다.
(파일럿 밸브 건식형·외부 파일럿·내부 드레인형)

Note) The symbols above indicate the spool types "2" and "2P".
The graphic symbol of the spool type "40" is shown on
the left (Pilot Valve:Dry Type/external pilot/internal drain type).

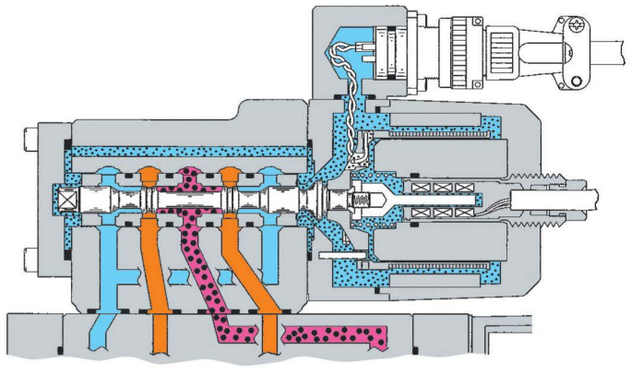
앰프 탑재 2단형 리니어 서보 밸브 (고성능형)

OBE Type Linear Servo Valves (Two Stage Type, High Performance Type)

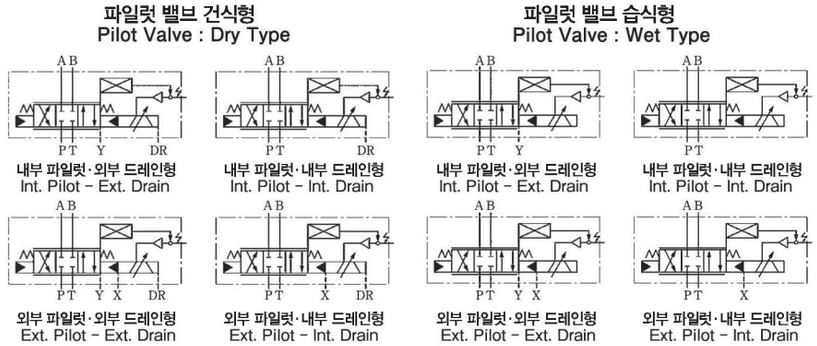
● 파일럿 밸브 건식형 Pilot Valve : Dry Type

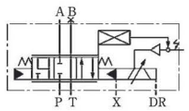


● 파일럿 밸브 습식형 Pilot Valve : Wet Type



KS 유압기호
Graphic Symbols

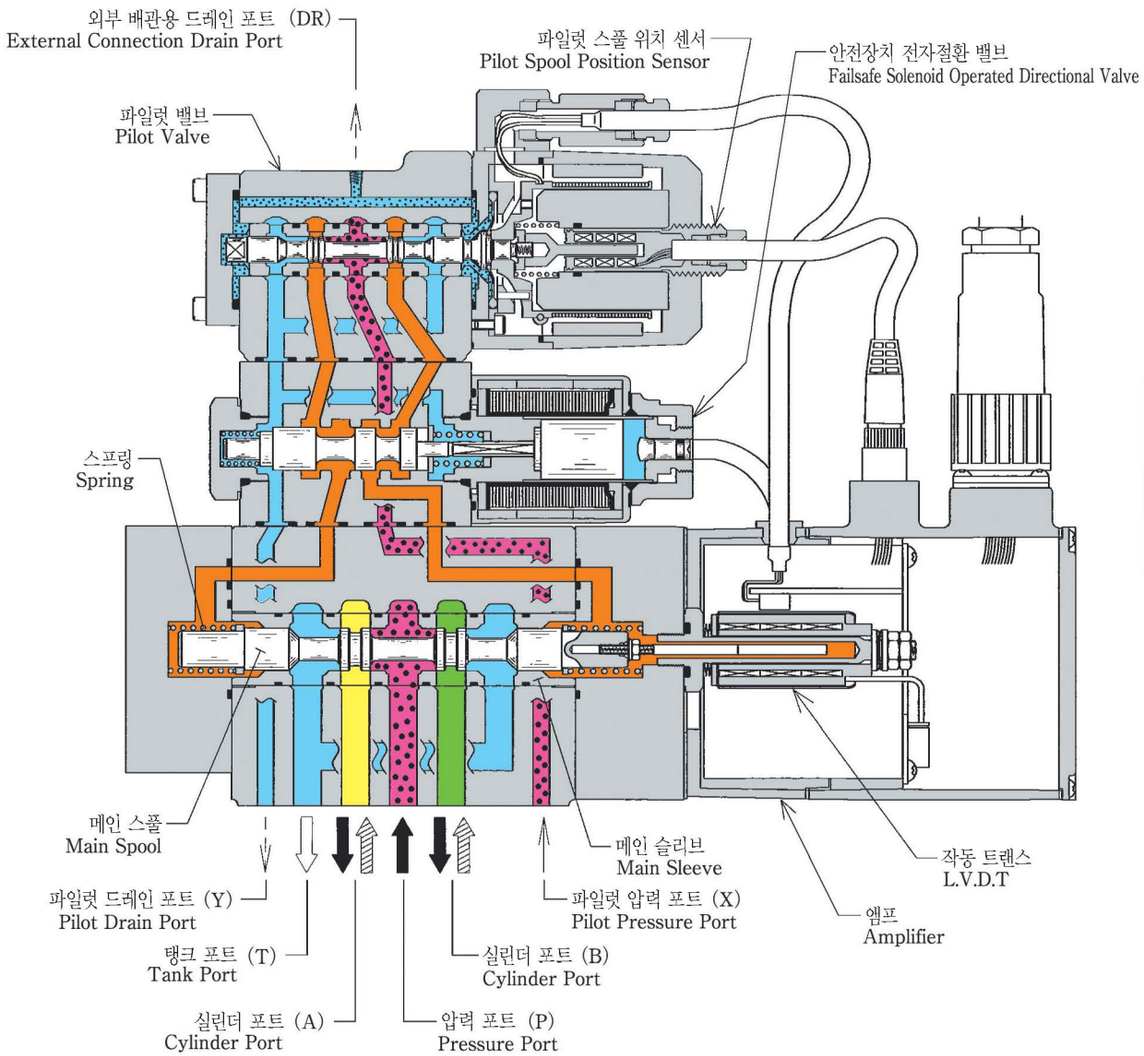




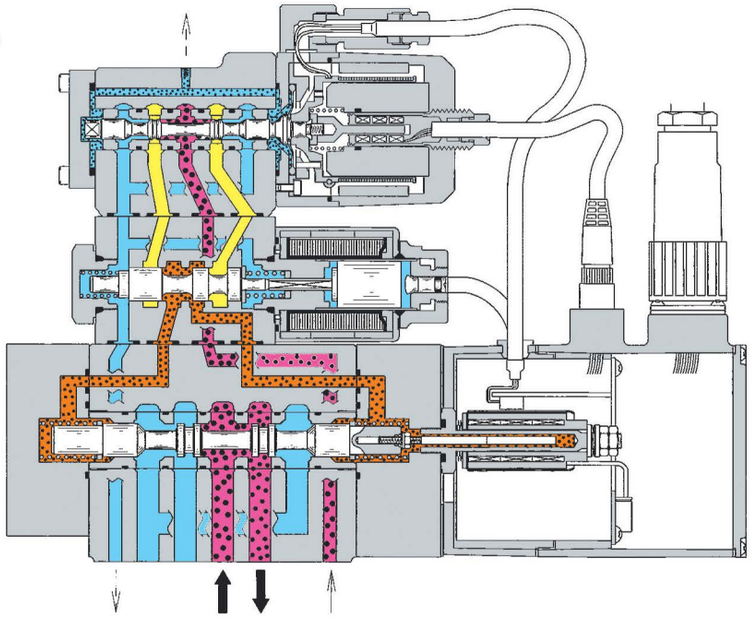
주) 위 그림은 스풀 형식 "S4"를 나타냅니다.
"S3"의 경우는 왼쪽 그림이 됩니다.
(파일럿 밸브 건식형·외부 파일럿·내부 드레인형)

Note) The symbols above indicate the spool types "S4".
The graphic symbol of the spool type "S3" is shown on the left (Pilot Valve:Dry Type/external pilot/internal drain type).

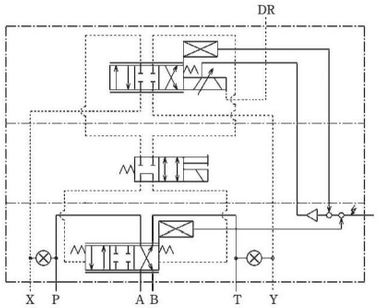
앰프 탑재 2단형 리니어 서보 밸브 (건식형, 고성능형, 안전장치 전자절환 밸브 부착)



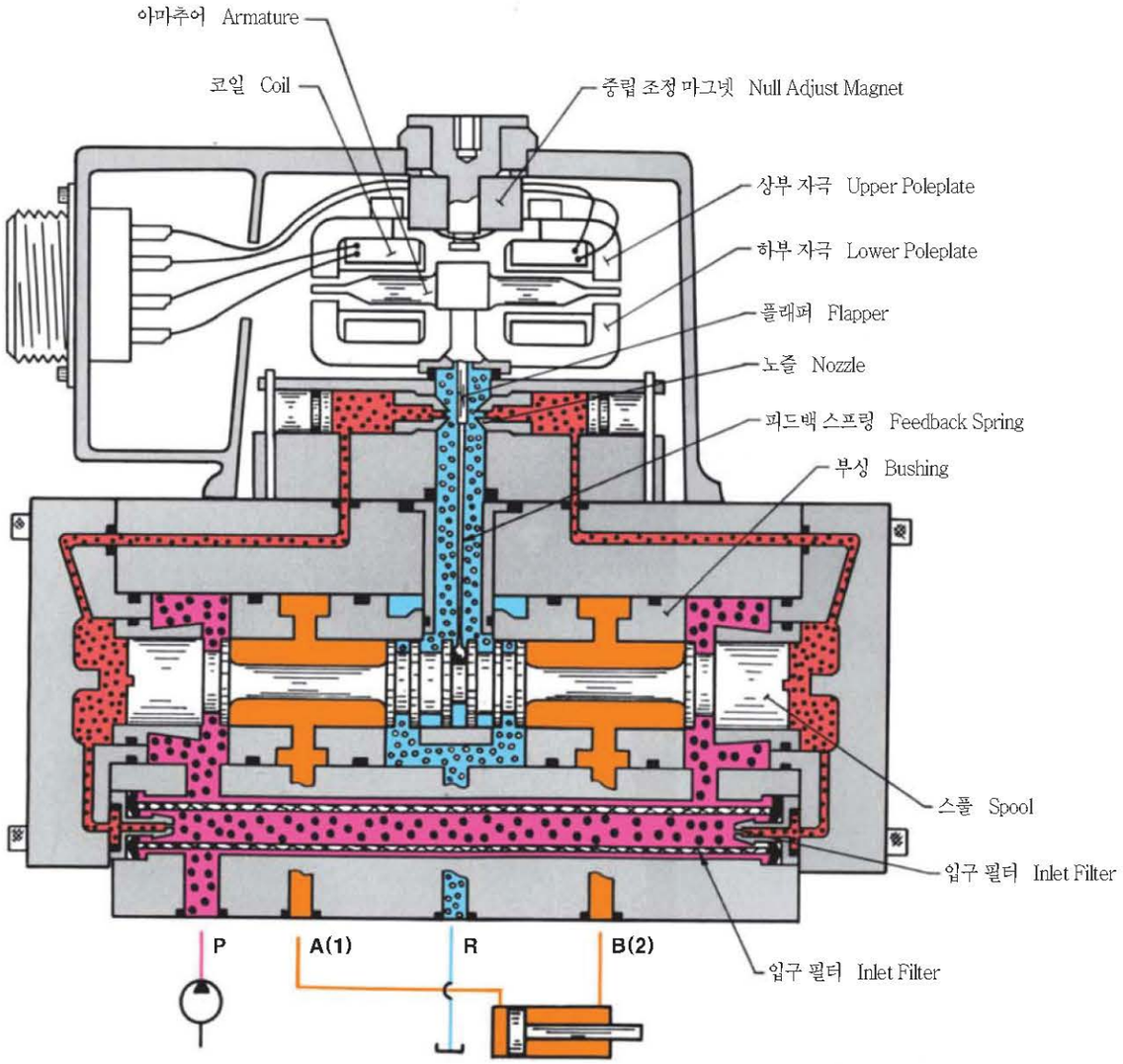
● 안전장치 기능 작동시 (전원 단절시)
When Falesafe Functions Operated (Power Supply Loss)

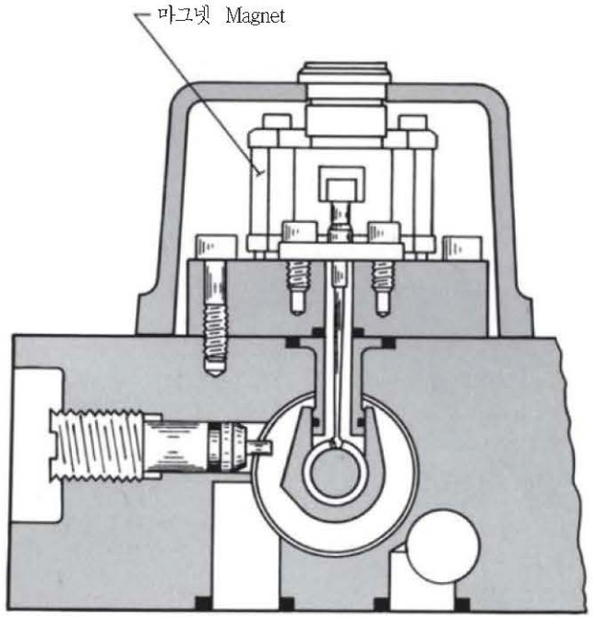


상세 유압기호 Detailed Graphic Symbol

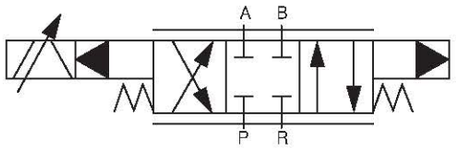


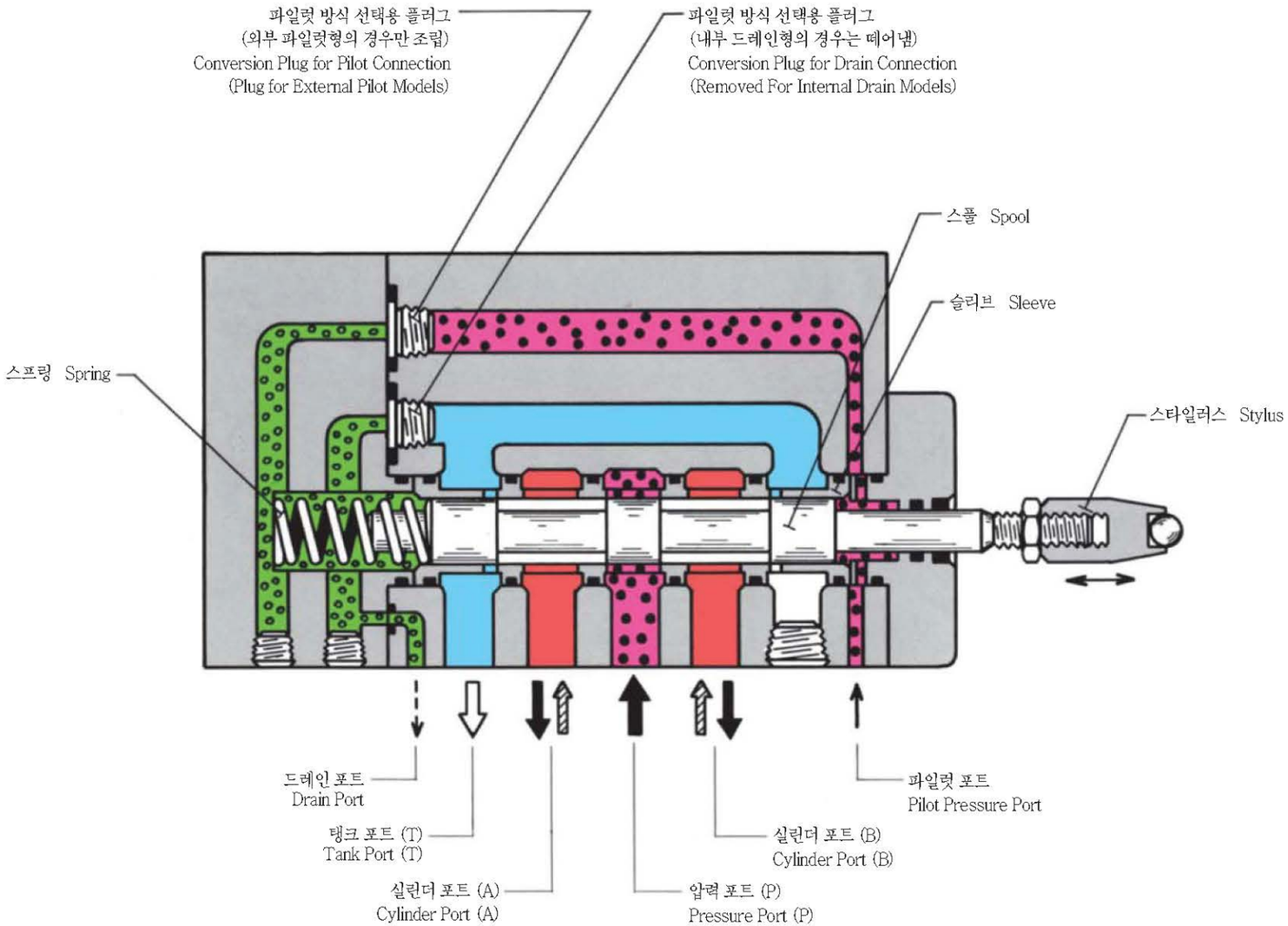
⊗ : 파일럿 형식, 드레인 형식 선택용 플러그
Plugs for selecting the pilot and drain types





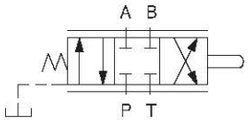
KS 유압기호
Graphic Symbol



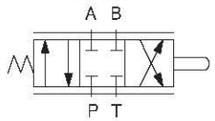


KS 유압기호
Graphic Symbol

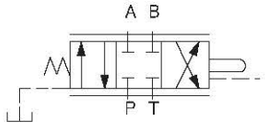
외부 드레인형
Ext. Drain



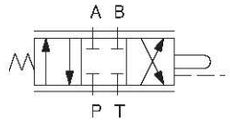
내부 드레인형
Int. Drain



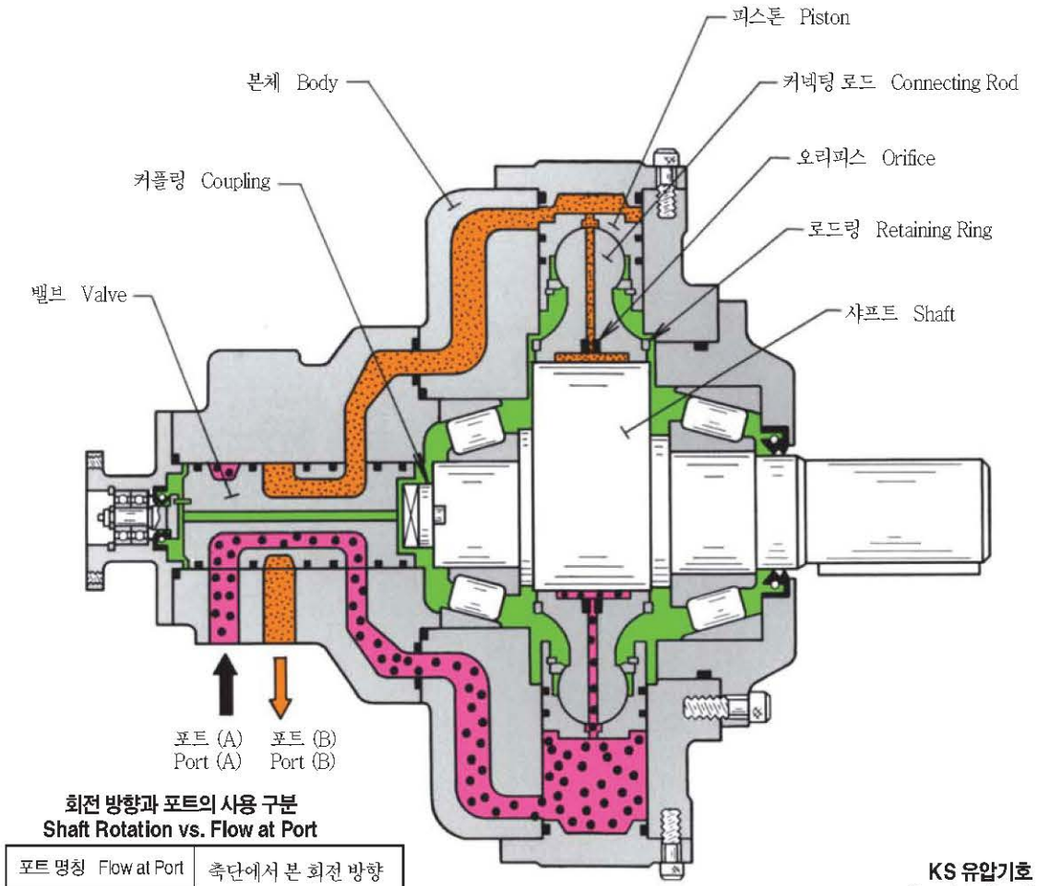
외부 파일럿 · 외부 드레인형
Ext. Pilot, Ext. Drain

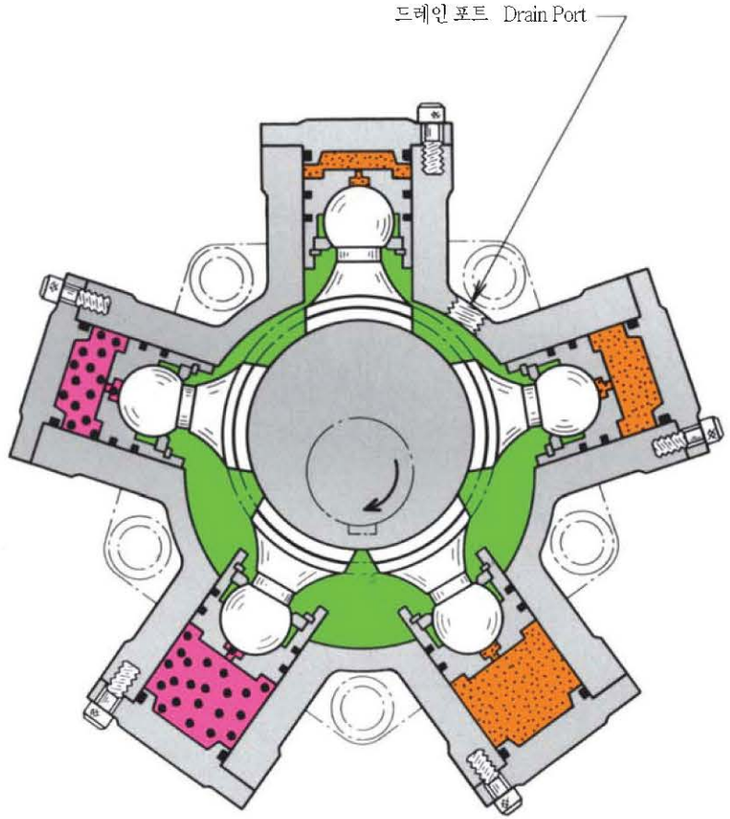


외부 파일럿 · 내부 드레인형
Ext. Pilot, Int. Drain



래디얼 피스톤형 저속 고토르크 모터





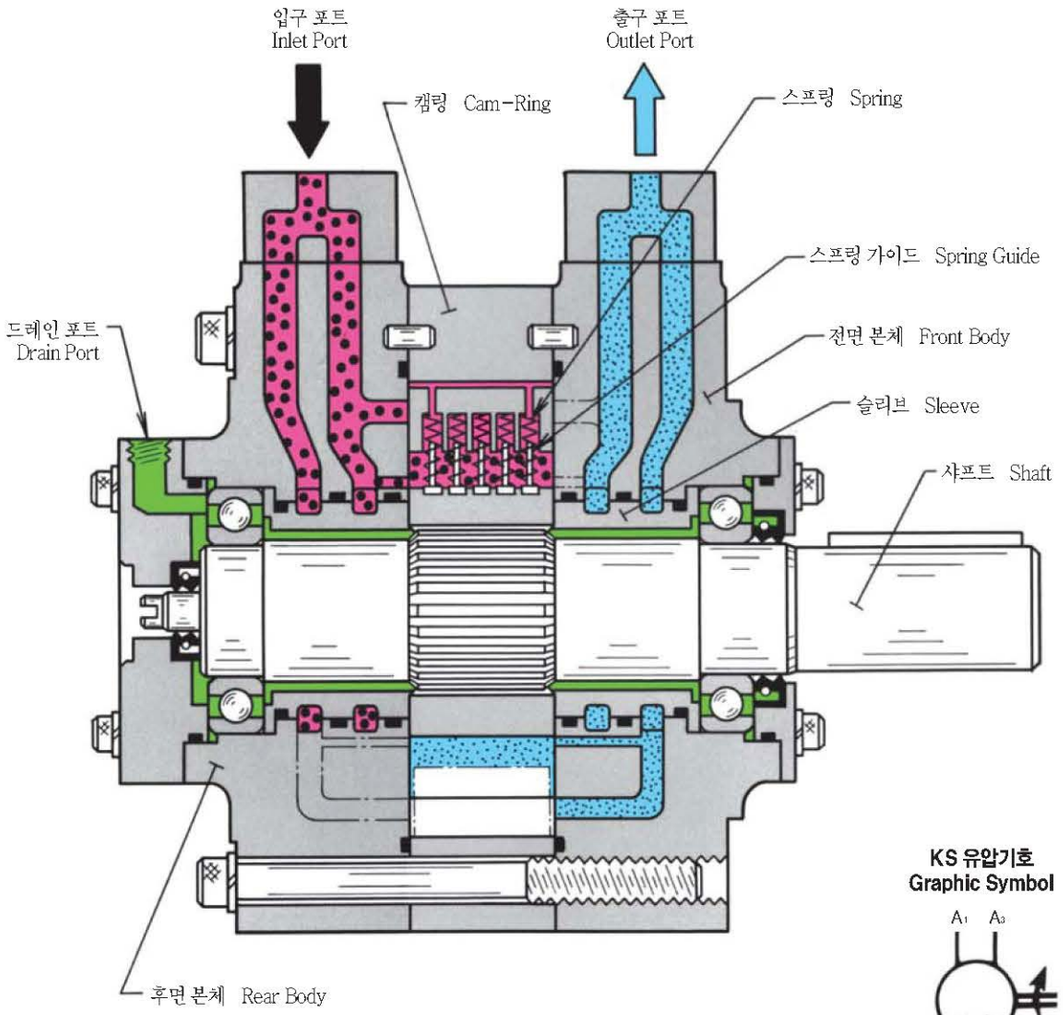
회전 방향과 포트의 사용 구분
Shaft Rotation vs. Flow at Port

포트 명칭 Flow at Port		축단에서 본 회전 방향 Shaft Rotation Viewed from Shaft End
포트 (A) Port (A)	포트 (B) Port (B)	
입구 Inlet	출구 Outlet	시계 방향 Clockwise
출구 Outlet	입구 Inlet	반시계 방향 Anti-Clockwise

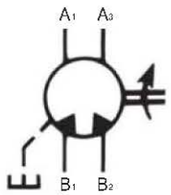
KS 유압기호
Graphic Symbol

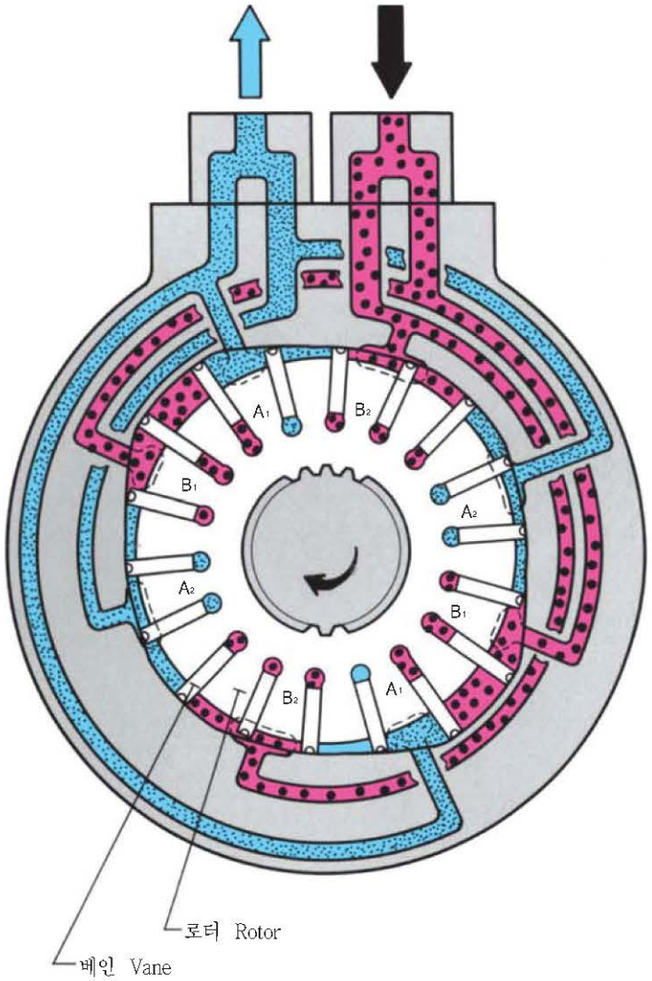
베인형 저속 고토르크 모터

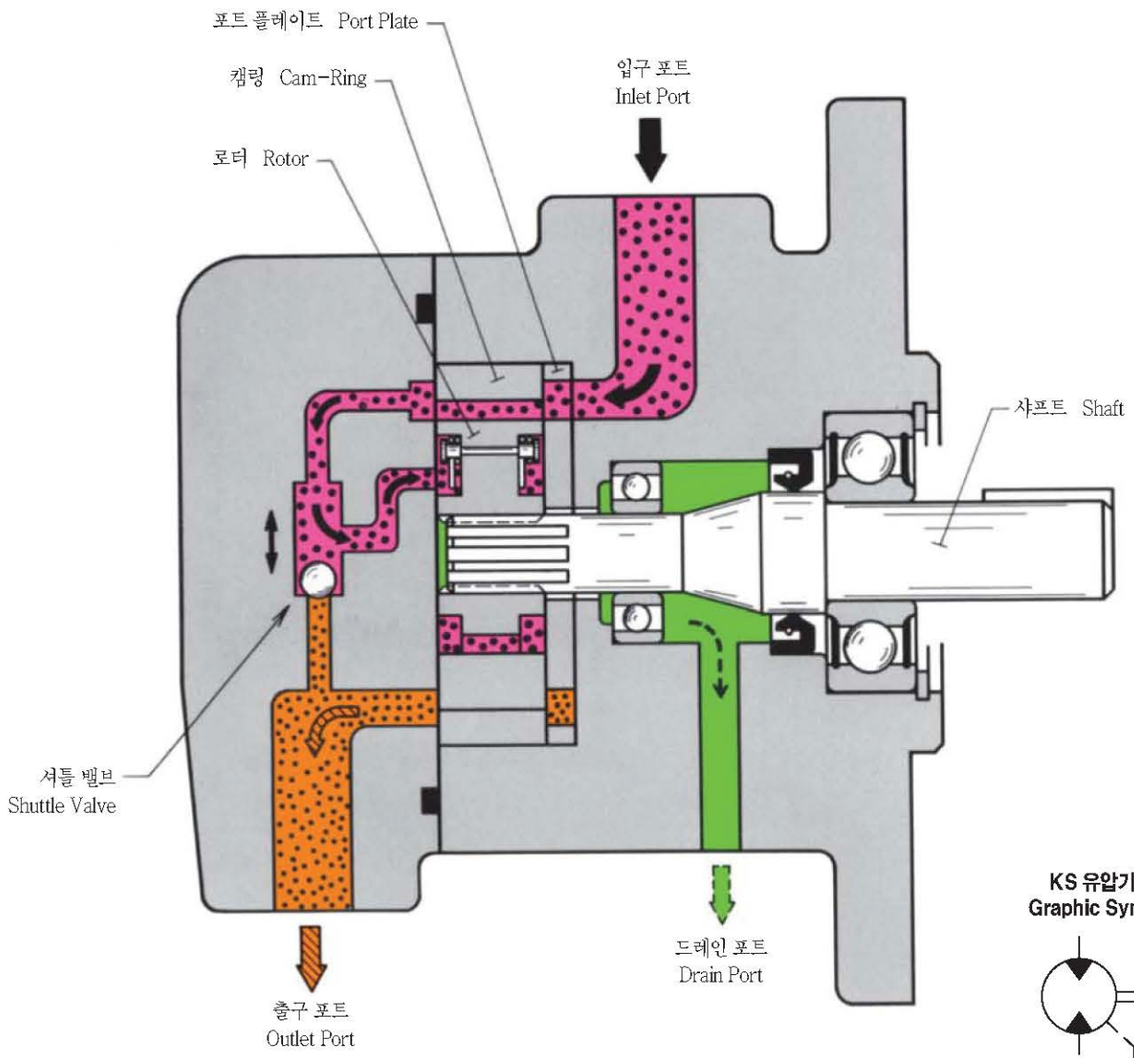
Vane Type
Low Speed High Torque Hydraulic Motors

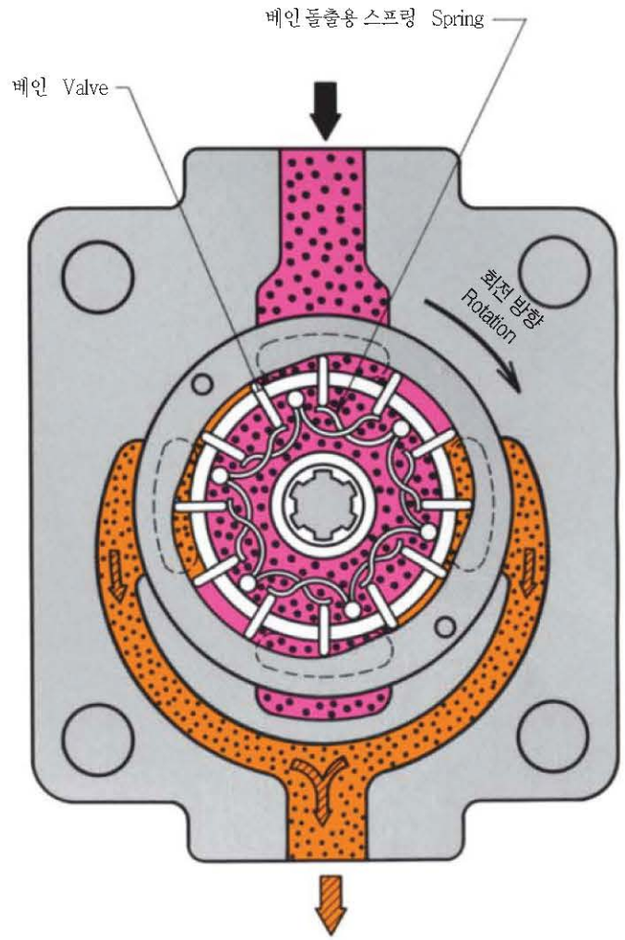


KS 유압기호
Graphic Symbol

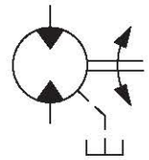


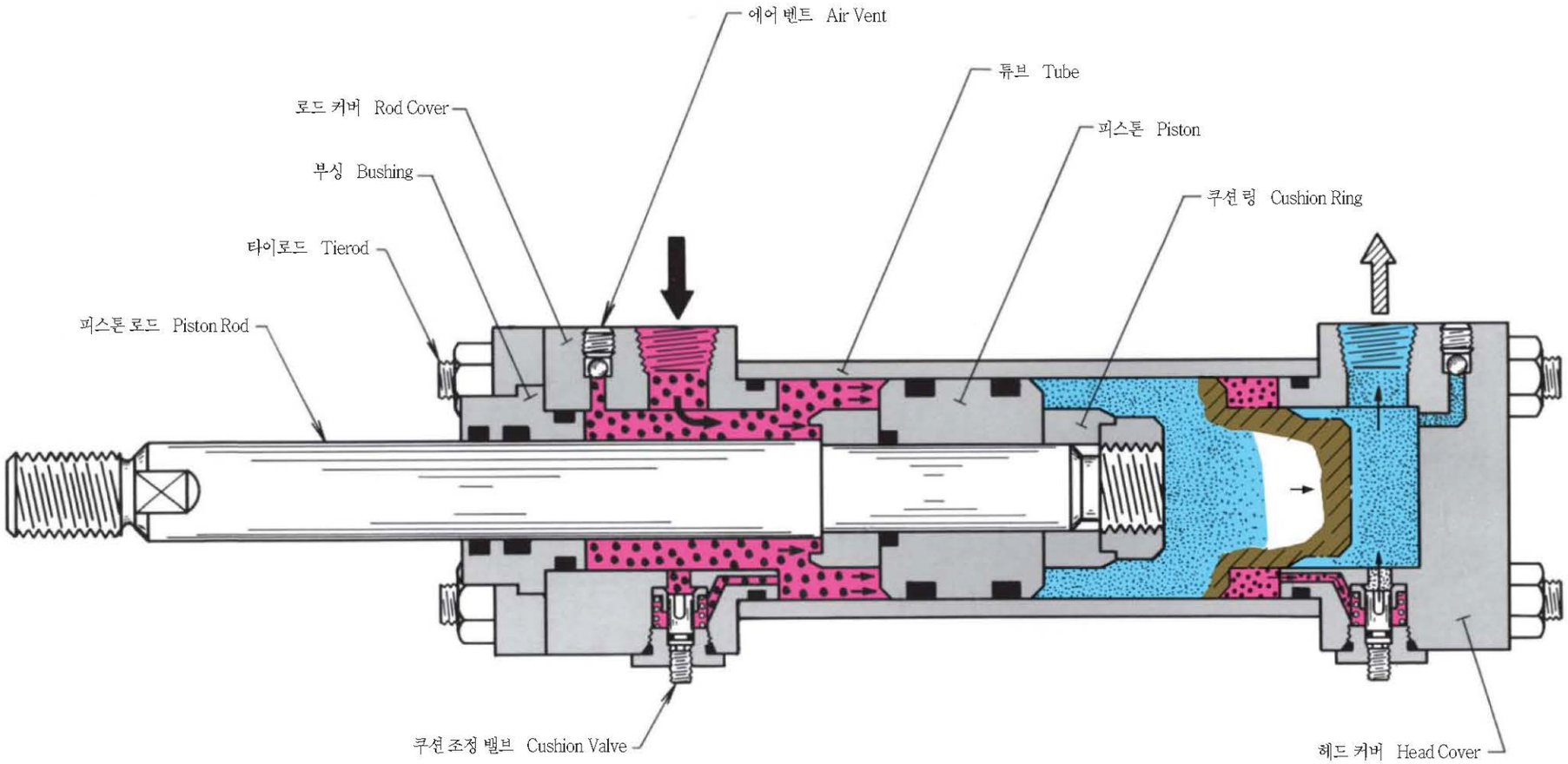




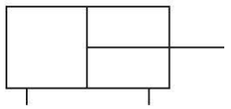


KS 유압기호
Graphic Symbol



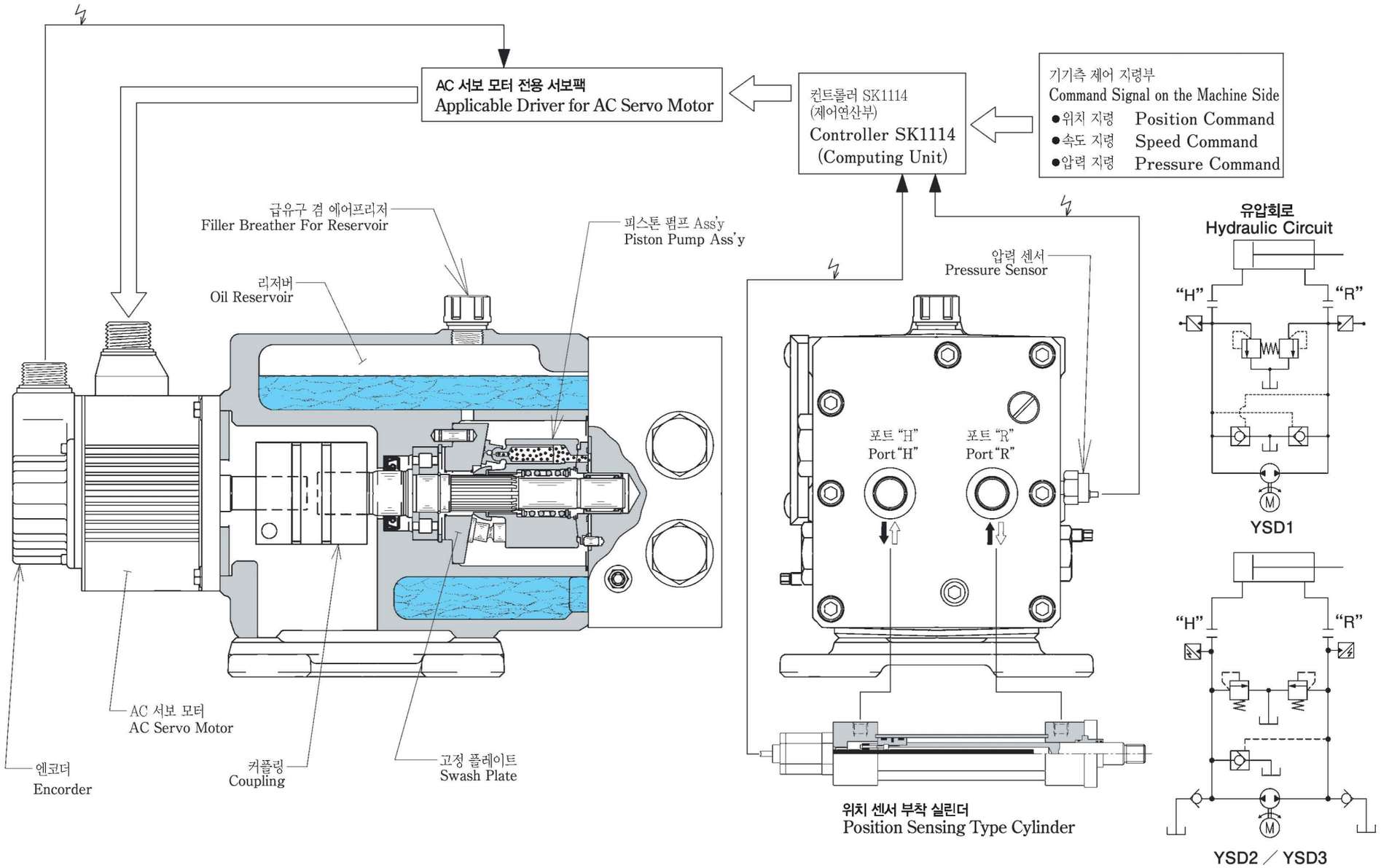


KS 유압기호
Graphic Symbol



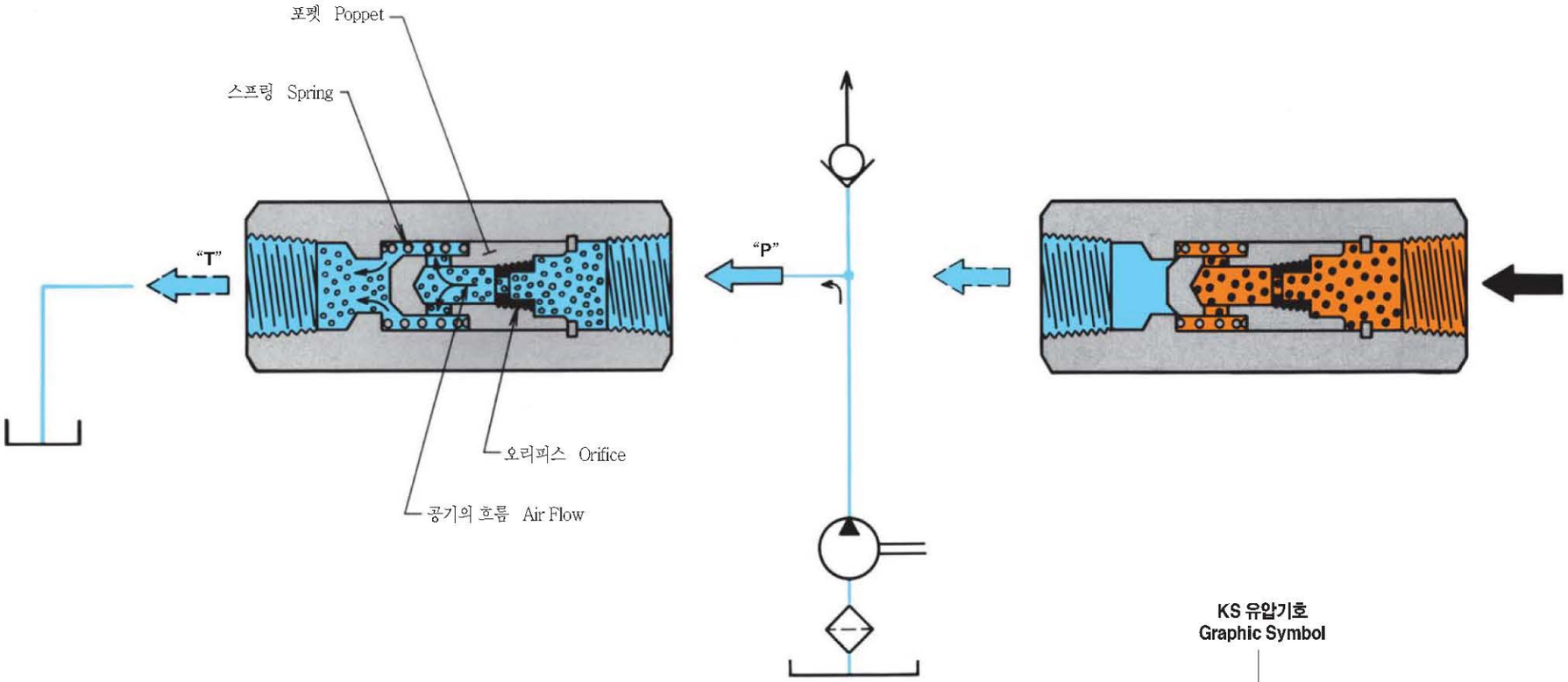
IH 서보 드라이브 팩

Intelligent Hydraulic Servo Drive Pack

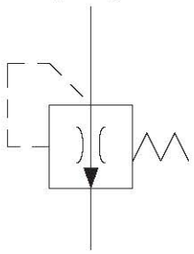


● 열린 상태 (공기배출시)
Open Condition (At Air Bleeding)

● 닫힌 상태
Closed Condition



KS 유압기호
Graphic Symbol



유압기기작동원리도집

2018년 12월 2차개정판

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