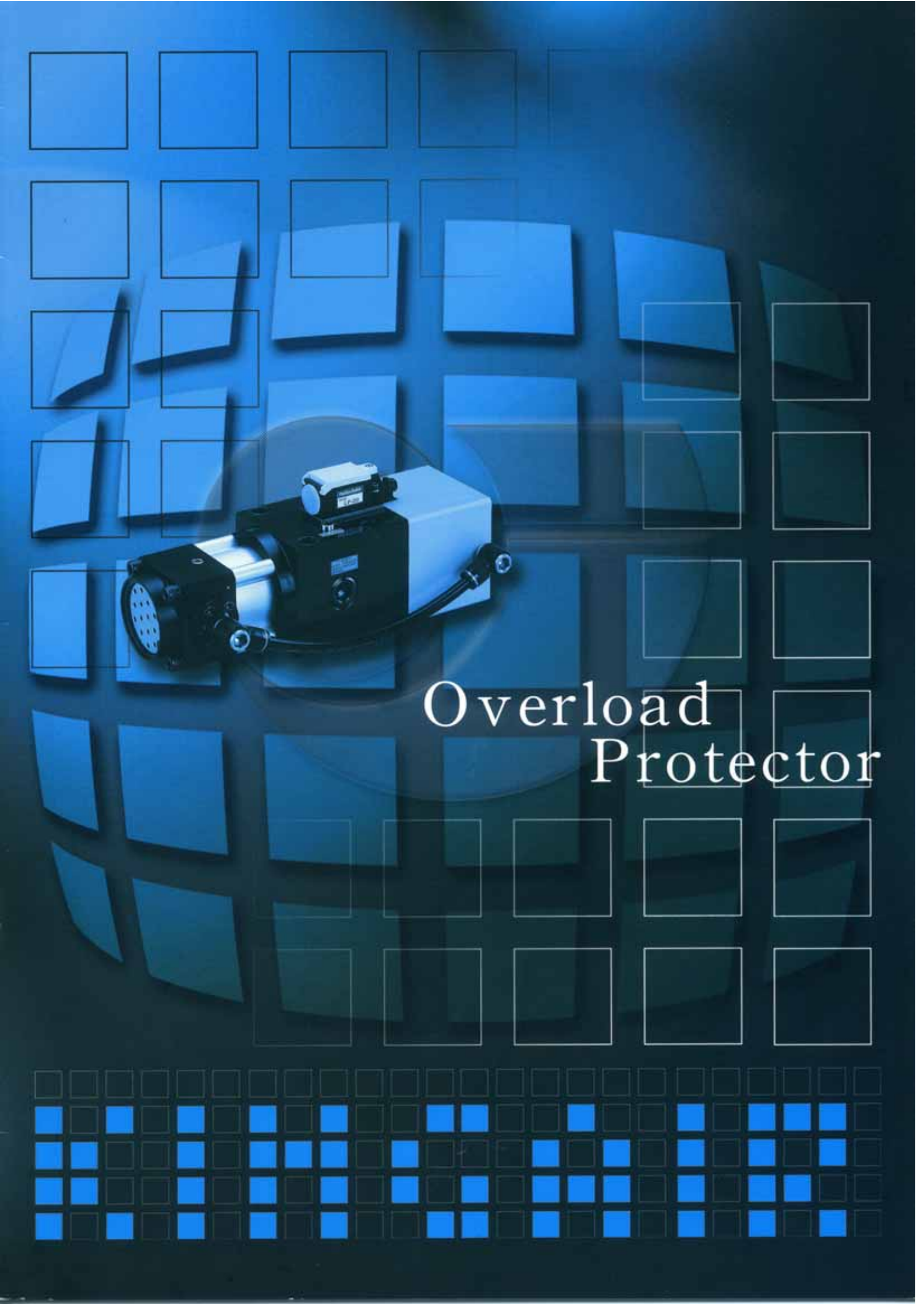
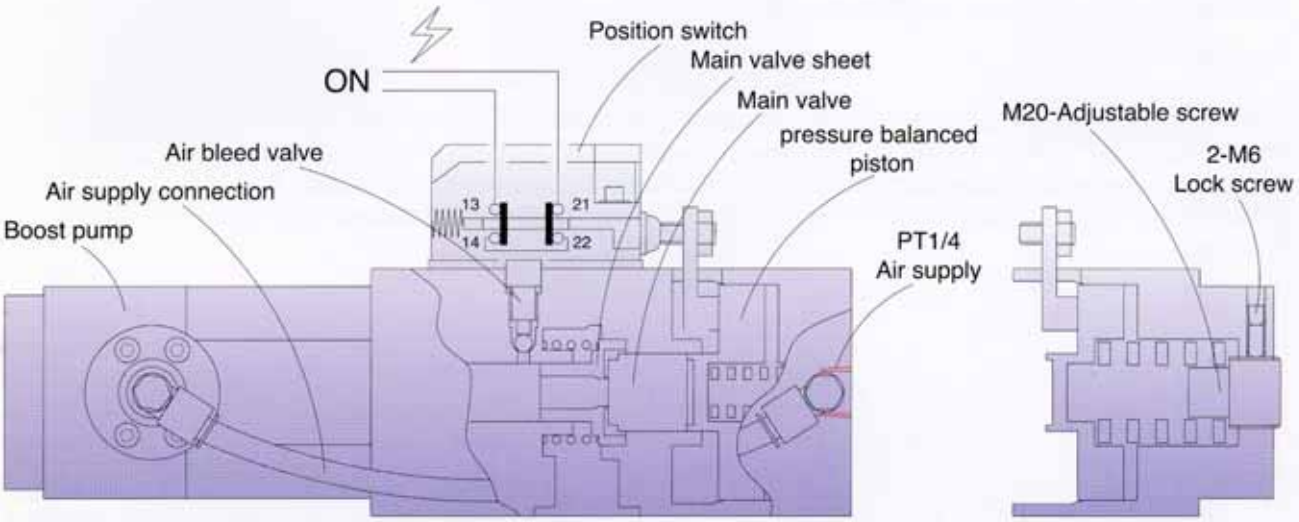


Overload Protector

CONTENTS

KINGAIR

Hydraulic Overload Protector



Pressure balanced type **Spring adjustable type**

Description

The overload protector device for installation in machanical presses in order to keep the pressure of the hydraulic cylinder inside the slider,and protect machine components and dies against excessive load and damage.

Application

The King Air overload protector is composed of the boost pump, released main valv and the position switch. The preload pressure in hydraulic cylinder is produced by means of a pneumatically driven hydralic boost pump. It has two kinds of boost ratio can be selected that to discharge the different pressure for hydraulic cylinder.

There are two working methods of the highly sensitive main valve, the pressure balanced and the spring adjustable,for setting the trigger pressure.
The position switch is used it stop the press as soon as the released main valve operates.

Feature

King Air engineering team analyzed the idea about overload protector, the trigger pressure must be detected by the main valve within 5% tolerance as passible, and the overload pressure must release within 1/1000 second; the position switch is durable and contact point is accurate are have to be.

Function

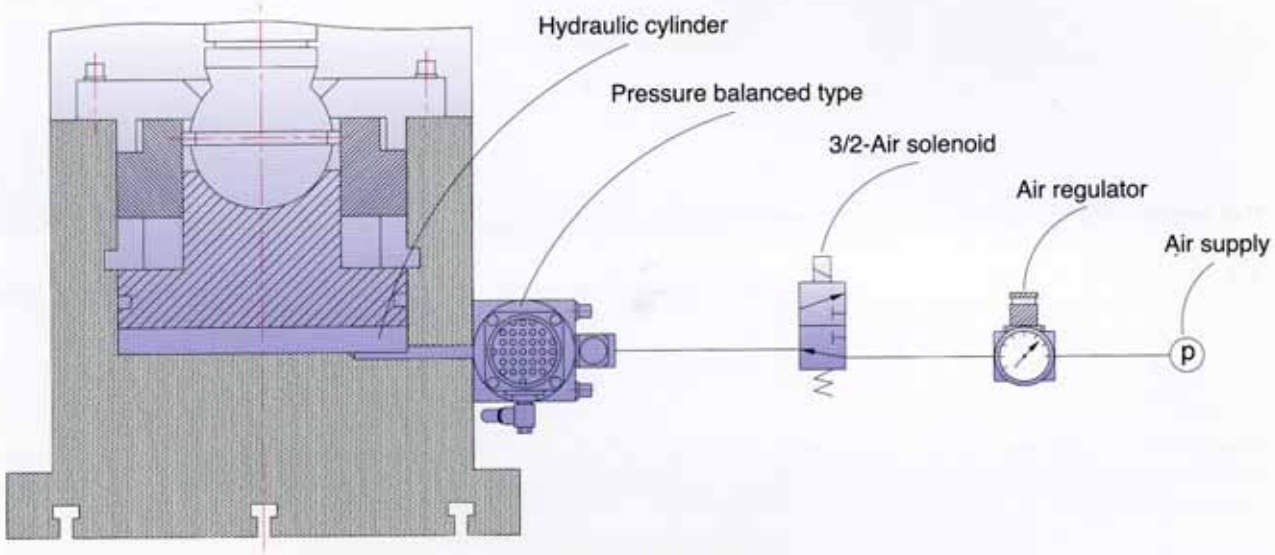
The King Air hydraulic overload protector is designed for two different fluid flow ratio of release, one is used on single crank presses and another is for double crank presses with balanced load on connecting rods.

Installation

There are two selections of installation style :

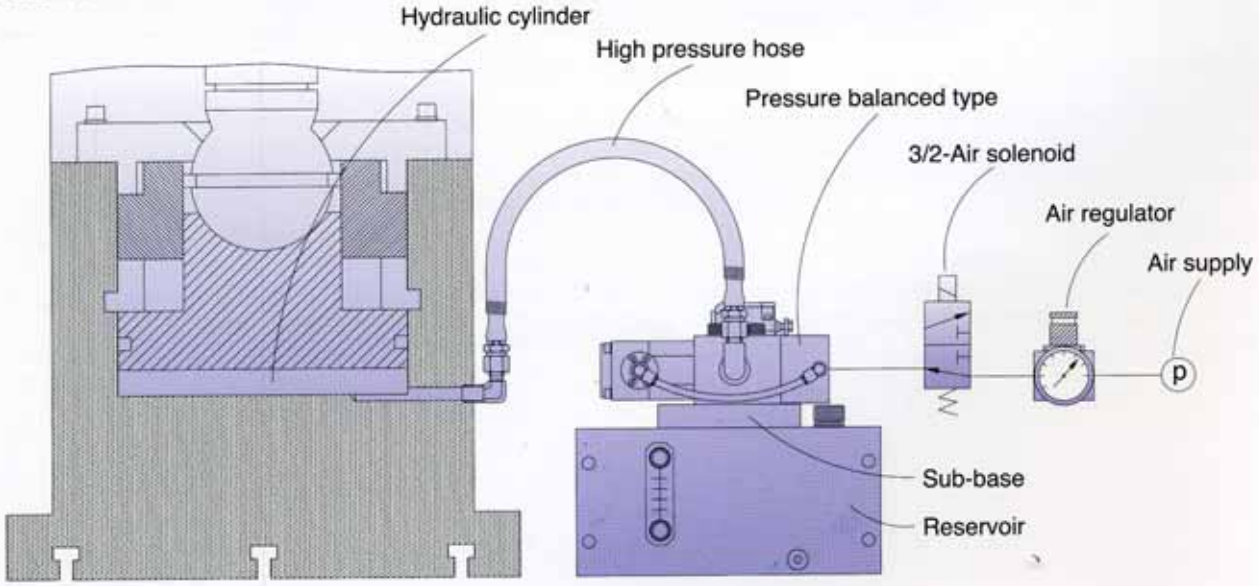
Flanged form

The overload protector is bolted directly on to the connection of the cylinder volume. This installation offers minimum resistance to the fluid flow as additional pipe connections between hydraulic cylinder and overload protector are not required. The arrangement is particularly effective with respect to achieving fast response during overload.



In-line form

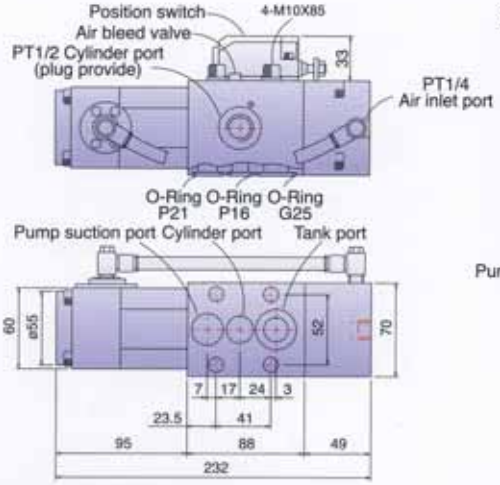
For machanical presses where it is not possible to flange the overload protector, it may be necessary to install the in-line form. In this case the overload protector is bolted on the sub-base to the reservoir.
In order to achieve faster response, the piping should be arranged to offer minimum resistance to the fluid flow.



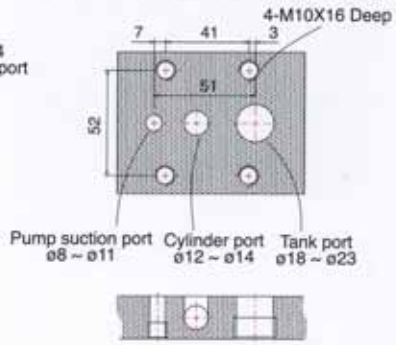
KINGAIR

LA Series, Pressure Balanced Type

For single crank presses



Sub-base machining drill working

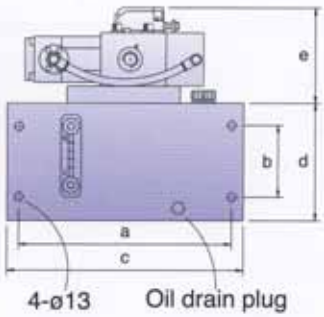


Description

This series is application of the single crank presses, two kinds of the boost ratio can choice to discharge different preload pressure reguirements of hydraulic cylinder.

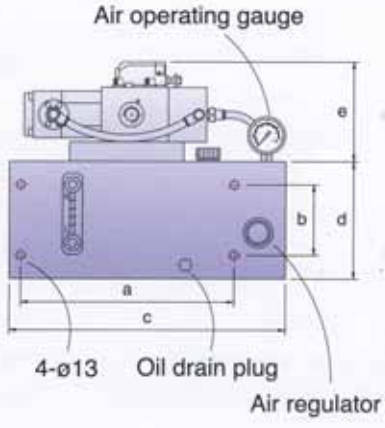
The trigger pressure setting is depends on adjustable air regulator for balanced piston of overload protector.

Model no.		LA257	LA507
Medium		compressed air, filted	
Air supply	(kg/cm²)	2.85~5.6	2.85~5.6
Air consumption	(Nl/min)	180	180
Operation noise	(dB)	76	76
Hydraulic fluid		ISO-VG-32 or equivalent	
Discharge pressure	(kg/cm²)	Air pressure x 20	Air pressurex42
Trigger pressure	(kg/cm²)	Air pressure x 70	Air pressurex70
Release ratio	(cm³/s)	12000	12000
Recommended air operating range	(kg/cm²)	4~5.6	3.5~5.6



This model is including overload protector, sub-base and reservoir.

Model no.		LA257-T1	LA257-T	LA507-T1	LA507-T
Volume (l)		1.45	3.8	1.45	3.8
a	(mm)	201	271	201	271
b	(mm)	70	90	70	90
c	(mm)	230	300	230	300
d	(mm)	110	150	110	150
e	(mm)	128	128	128	128



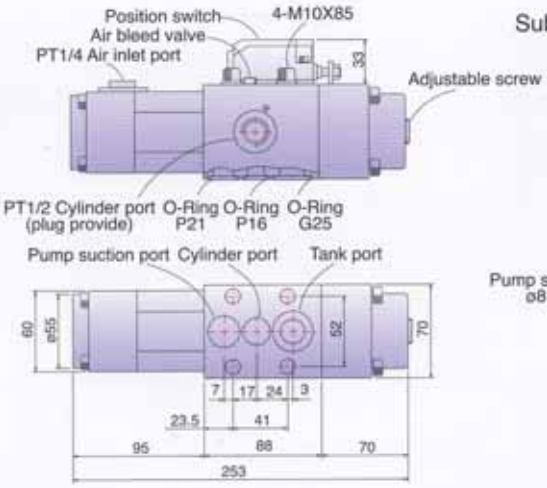
This model is including overload protector, sub-base and reservoir with pneumatically element.

Model no.		LA257-T-AS	LA507-T-AS
Volume (l)		3.8	3.8
Valve voltage		AC 110V 50/60 Hz	AC 110V 50/60 Hz
a	(mm)	271	271
b	(mm)	90	90
c	(mm)	351	351
d	(mm)	150	150
e	(mm)	128	128

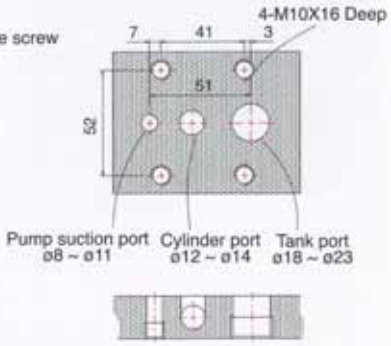
KINGAIR

LS Series , Spring Adjustable Type

For single crank presses



Sub-base machining drill working

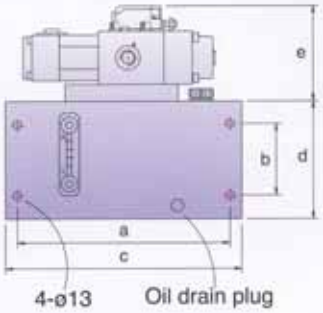


Description

This series is application of the single crank presses, two kinds of the boost ratio can choice to discharge different preload pressure requirements of hydraulic cylinder.

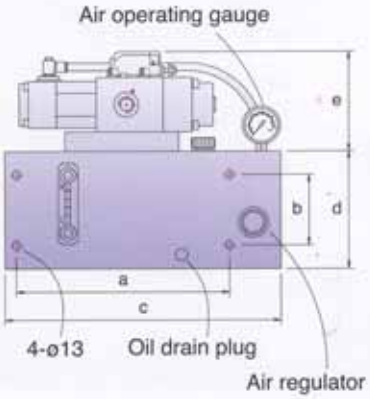
The trigger pressure setting is depends on adjustable spring behind the balanced piston of overload protector.

Model no.		LS257	LS507
Medium		compressed air, filted	
Air supply	(kg/cm^2)	2.85~5.6	2.85~5.6
Air consumption	(Nl/min)	180	180
Operation noise	(dB)	76	76
Hydraulic fluid		ISO-VG-32 or equivalent	
Discharge pressure	(kg/cm^2)	Air pressurex20	Air pressurex42
Trigger pressure	(kg/cm^2)	Spring adjustable	Spring adjustable
Release ratio	(cm^3/s)	12000	12000
Recommended trigger pressure range (at air pressure 5 kg/cm^2)	(kg/cm^2)	265~375	315~375



This model is including overload protector, sub-base and reservoir.

Model no.		LS257-T1	LS257-T	LS507-T1	LS507-T
Volume (l)		1.45	3.8	1.45	3.8
a	(mm)	201	271	201	271
b	(mm)	70	90	70	90
c	(mm)	230	300	230	300
d	(mm)	110	150	110	150
e	(mm)	128	128	128	128



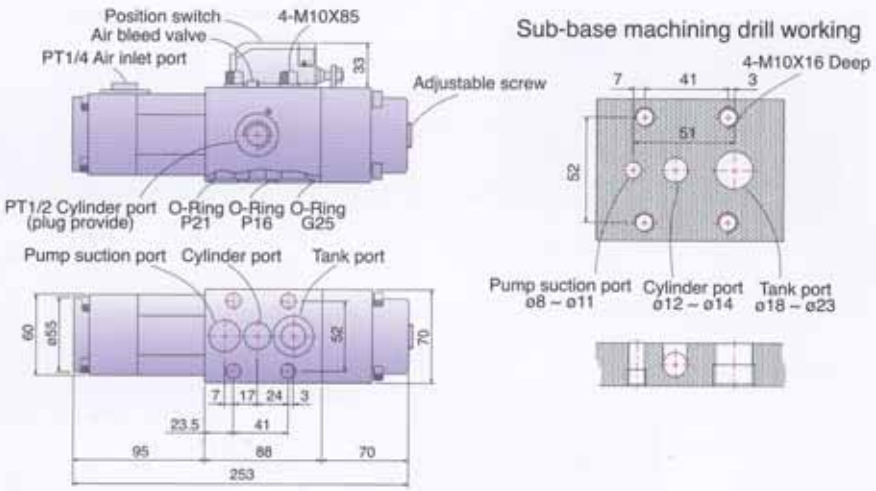
This model is including overload protector, sub-base and reservoir with pneumatically element.

Model no.	LS257-T-AS	LS507-T-AS
Volume (l)	3.8	3.8
Valve voltage	AC 110V 50/60 Hz	AC 110V 50/60 Hz
a (mm)	271	271
b (mm)	90	90
c (mm)	351	351
d (mm)	150	150
e (mm)	128	128

KINGAIR

LS Series, Spring Adjustable Type

For single crank presses

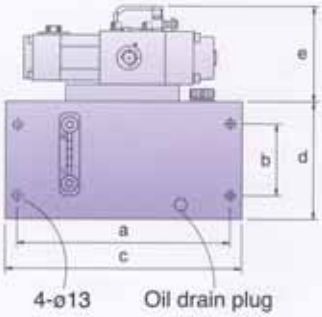


Description

This series is application of the single crank presses, two kinds of the boost ratio can choice to discharge different preload pressure requirements of hydraulic cylinder.

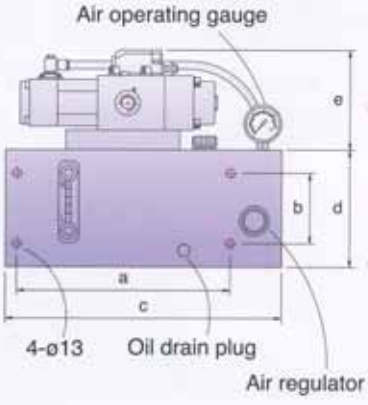
The trigger pressure setting is depends on adjustable spring behind the balanced piston of overload protector.

Model no.		LS258	LS508
Medium		compressed air, filted	
Air supply	(kg/cm^2)	2.85~5.6	2.85~5.6
Air consumption	(Nl/min)	180	180
Operation noise	(dB)	76	76
Hydraulic fluid		ISO-VG-32 or equivalent	
Discharge pressure	(kg/cm^2)	Air pressurex20	Air pressurex42
Trigger pressure	(kg/cm^2)	Spring adjustable	Spring adjustable
Release ratio	(cm^3/s)	16500	16500
Recommended trigger pressure range (at air pressure 5 kg/cm^2)	(kg/cm^2)	200~375	335~375



This model is including overload protector, sub-base and reservoir.

Model no.	LS258-T1	LS258-T	LS508-T1	LS508-T
Volume (l)	1.45	3.8	1.45	3.8
a (mm)	201	271	201	271
b (mm)	70	90	70	90
c (mm)	230	300	230	300
d (mm)	110	150	110	150
e (mm)	128	128	128	128



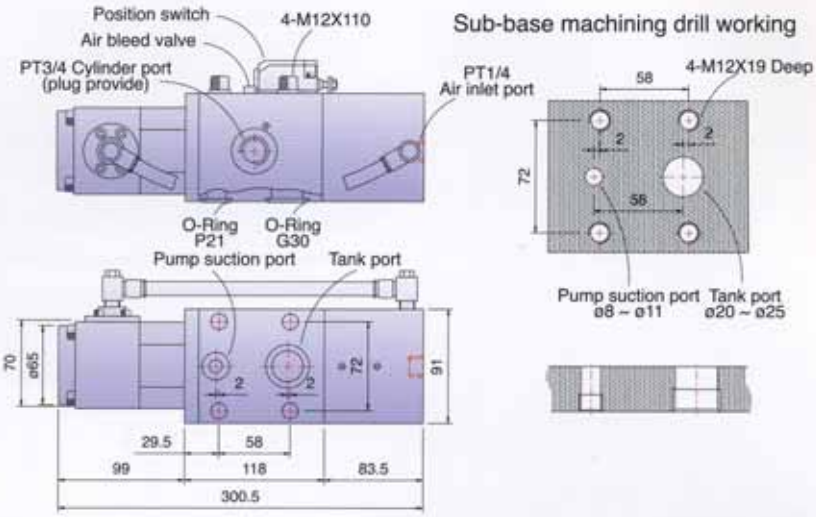
This model is including overload protector, sub-base and reservoir with pneumatically element.

Model no.	LS258-T-AS	LS508-T-AS
Volume (l)	3.8	3.8
Valve voltage	AC 110V 50/60 Hz	AC 110V 50/60 Hz
a (mm)	271	271
b (mm)	90	90
c (mm)	351	351
d (mm)	150	150
e (mm)	128	128

KINGAIR

LA Series, Pressure Balanced Type

For double crank presses

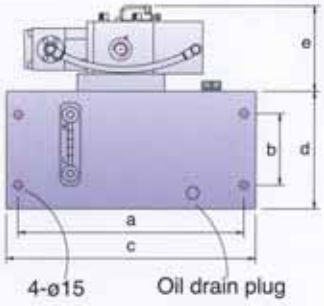


Description

This series is application of the double crank presses, two kinds of the boost ratio can choice to discharge different preload pressure requirements of hydraulic cylinder.

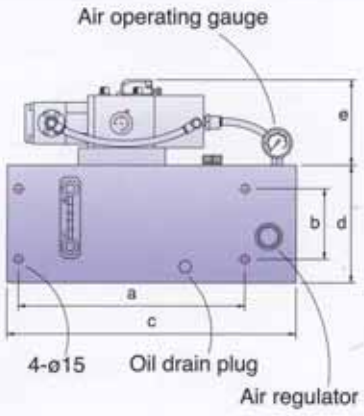
The fluid flow rate of discharge and release is amplified as it able to discharge preload pressure faster and release overload pressure quickly of the hydraulic cylinders inside slider. For actuality it may be essential to install the in-line form.

Model no.		LA259	LA509
Medium		compressed air, filted	
Air supply	(kg/cm^2)	2.85~5.6	2.85~5.6
Air consumption	(Nl/min)	270	270
Operation noise	(dB)	80	80
Hydraulic fluid		ISO-VG-32 or equivalent	
Discharge pressure	(kg/cm^2)	Air pressure x 23	Air pressure x 45
Trigger pressure	(kg/cm^2)	Air pressure x 65	Air pressure x 65
Release ratio	(cm^3/s)	45000	45000
Recommended air operating range	(kg/cm^2)	4~5.6	3.5~5.6



This model is including overload protector, sub-base and reservoir.

Model no.		LA259-T	LA509-T
Volume	(l)	8	8
a	(mm)	387	387
b	(mm)	110	110
c	(mm)	425	425
d	(mm)	180	180
e	(mm)	149	149



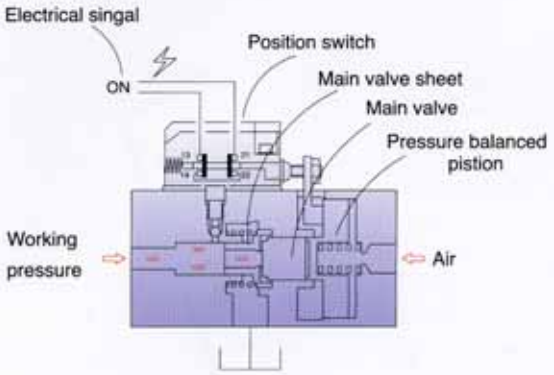
This model is including overload protector, sub-base and reservoir with pneumatically element.

Model no.		LA259-T-AS	LA509-T-AS
Volume	(l)	8	8
Valve voltage		AC 110V 50/60 Hz	AC 110V 50/60 Hz
a	(mm)	387	387
b	(mm)	110	110
c	(mm)	515	515
d	(mm)	180	180
e	(mm)	149	149

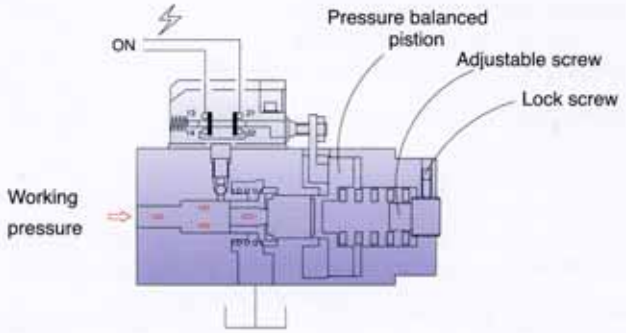
Normal press operation

When the preload pressure is applied by operation the boost pump, the pressure balanced piston is pushed to right by the main valve operated. Then the position switch is turned on and the press becomes ready for operation.

Pressure balanced type



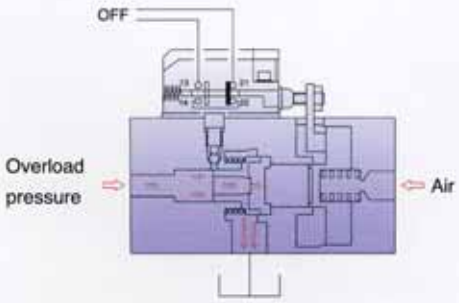
Spring adjustable type



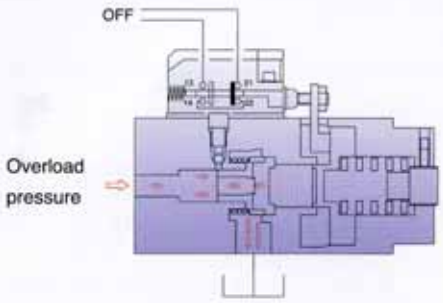
Overload protector triggered condition

When pressure in the hydraulic cyinder is exceeds the set of overloading, the pressure balanced piston is pushed to position that cut off the circuit of position switch to stop the press, and the preload pressure is rapidly released into the reservoir.

Pressure balanced type



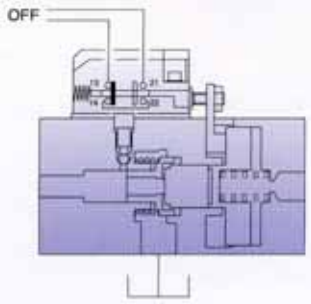
Spring adjustable type



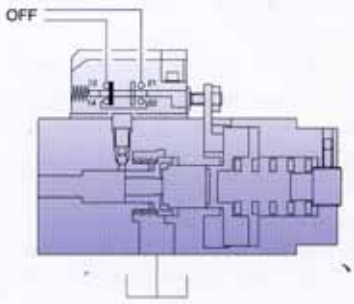
Cylinder pressure drop down

When overloading operation is completed, the pressure is decreased, the pressure balanced piston moves back to left by spring force. The position switch is turned off and the press can't be operated.

Pressure balanced type



Spring adjustable type



Mathematical Derivation

Selection of Pressure balanced type :

A Decision of air pressure (PA) :

1. The operation air pressure should be lower than available air pressure in the factory.
2. When air is gained from the air supply source for the clutch/brake and the balancer, the pressure is decided by the air supply source.

B Press rated capacity (F) :

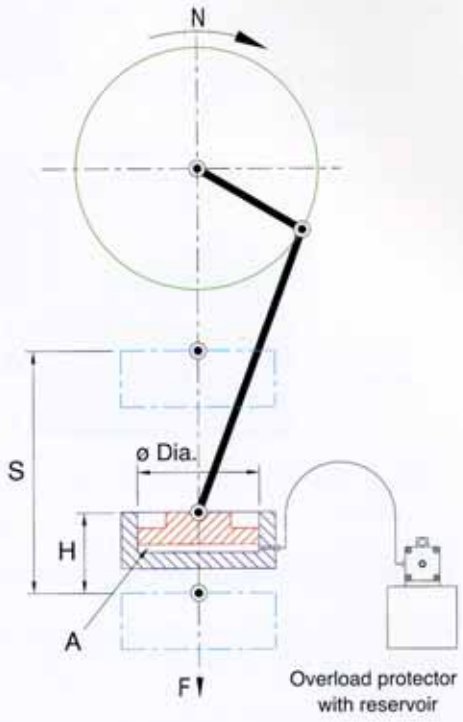
F = press capacity X 1.0 ~ 1.2
usually 1.1 (10% up) is recommended.

C Overload trigger pressure (PH) :

$$(PH) = \frac{\text{Press rated capacity (kg.f)}}{\text{Hydraulic cylinder area (cm}^2\text{)}} = \frac{F}{A} \quad \text{.....(1)}$$

(PH) = air pressure (PA) X 70 times .....(2)

1. (PH) should be calculated by above equations (1) and (2)
2. Overload trigger pressure (PH) should be selected as higher as possible. (example : 350 kg/cm^2)
3. It is benefitial to standardize pressure of all the presses.



D Flow rate check for overload protector

The flow rate of the hydraulic cylinder should be less than that of the overload protector.

Flow rate of hydraulic cylinder :

$Q = A \times V$ $\quad V = N\sqrt{SH - H^2} / 87.5$

Q = Hydraulic cylinder flow rate (cm^3/s)
A = Hydraulic cylinder area (cm^2)
V : Press ram decending speed at rated press capacity generation point.
N : Press cycle per minute (spm)
S : Stroke length (mm)
H = Press rated capacity generation point above bottom of the stroke (mm)

E Example of calculation :

• CONDITIONS :

Factory air pressure :	5.5 kgf/cm^2
Clutch/Brake, Balancer pressure :	5.0 kgf/cm^2
Press capacity :	130 ton
Press cycle per minute (N) :	50 spm
Stroke length (S) :	200 mm
Rated capacity generation point (H) :	5 mm above bottom of stroke
Hydraulic cylinder dia. :	230 mm

• Overload Trigger Pressure (PH) :

$$(PH) = \frac{F}{A} = \frac{130000\text{kgf} \times 1.1}{23^2 \times \pi/4\ \text{cm}^2} \fallingdotseq 345\ \text{kgf/cm}^2$$

(PH) = (PA) x 70 = 4.93 kgf/cm x 70 ≒ 345 kgf/cm^2

☆ Overload trigger pressure = 345 kgf/cm^2
☆ Air pressure = 4.93 kgf/cm^2

• Overload Flow Rate Check :

$V = 50\sqrt{200 \times 5 - 5^2} / 87.5 = 17.8$ cm/sec
$Q = 23^2 \times \pi/4$ cm^2 x 17.8 cm/sec = 7395 cm^3/sec

☆ Depends on above equations, the flow rate of the hydrdulic cylider (Q) should be less than overload protector, then, the model no. to be selected is LA257 or LA507.

Selection of spring adjustable type :

1. The calculations of air pressure (PA), trigger pressure (PH), press capacity (F) and flow rate (Q) is the same with pressure balanced type.
2. Please consult us about trigger pressure (PH), It's benefit to the setting of overload protector.

KINGAIR

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