

**SPECIAL**

Integrated Positiontransducer  
Inductive Poximity switches  
Build in valves  
Double acting-  
telescopic cylinders



Lind Jensens Maskinfabrik A/S  
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## Hydraulic cylinders with integrated position transducers

Combining hydraulics and electronics gives new and greater possibilities for using hydraulic power transmissions. The combination of hydraulic cylinders, transducers and electronically-operated valves are important components for industry to use in solving the demands of productivity and quality. With an integrated position transducer it is possible continuously to register the position of the piston rod.

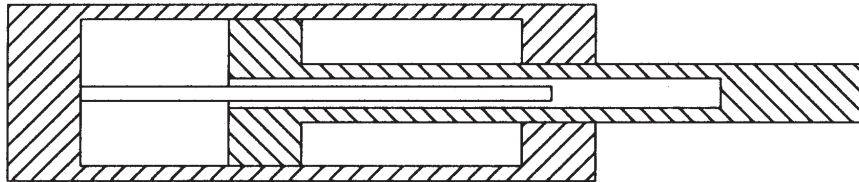


Figure 1. Hydraulic cylinder with integrated position transducer

- are important components of modern machine design as they meet the demand, large flexibility in automation jobs.
- helps simplify machine design and reduce the number of hydraulic components. At the same time, the cylinders have considerable reliability and a long service-life due to the integrated design which protects against external influences such as shock, dirt and humidity from the environment.
- gives opportunities to arbitrarily control position, speed and acceleration with precision. In addition, good repeatability with short time response and high frequency is achieved.

## Applications - possibilities

The LJM series NH XX makes it possible to install intelligent control systems.

These cylinders can be used when:

- Position control requires high precision and high repeatability, independent of the stroke.
- Movements demand a specific and arbitrary velocity profile.
- Short set-up time is important.
- The movements of several cylinders must be synchronised.

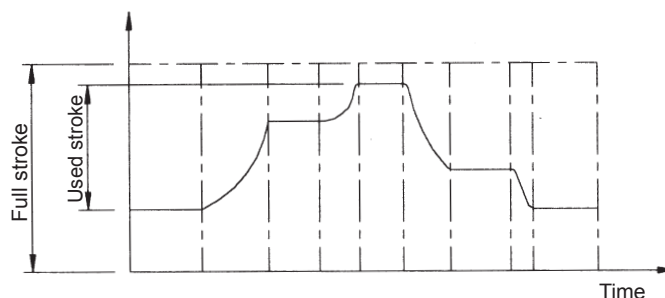


Figure 2. Example of a movement cycle independent of stroke

The LJM cylinders series NH can be used in mobile, industry and marine applications.

### Examples of applications:

Presses  
 Plastic injection moulding machine  
 Moulding machines  
 Rolling mills  
 Robots  
 Cranes  
 Stabilizers  
 Forest machinery  
 Excavation machinery

Heavy construction equipment  
 Bending Machines  
 Harbour ramps  
 Platforms  
 Test equipment  
 Machine tools  
 Agricultural machinery  
 Wind mills  
 Wood working machinery

These integrated transducer cylinders can be used in open as well as closed-loop control systems.

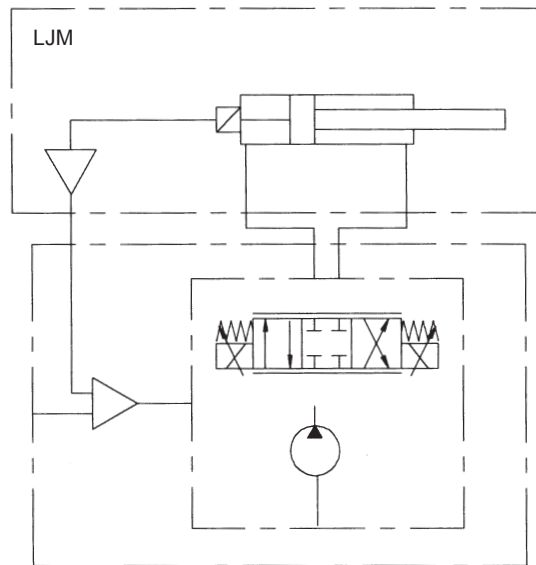


Figure 3. Basic sketch of a control system

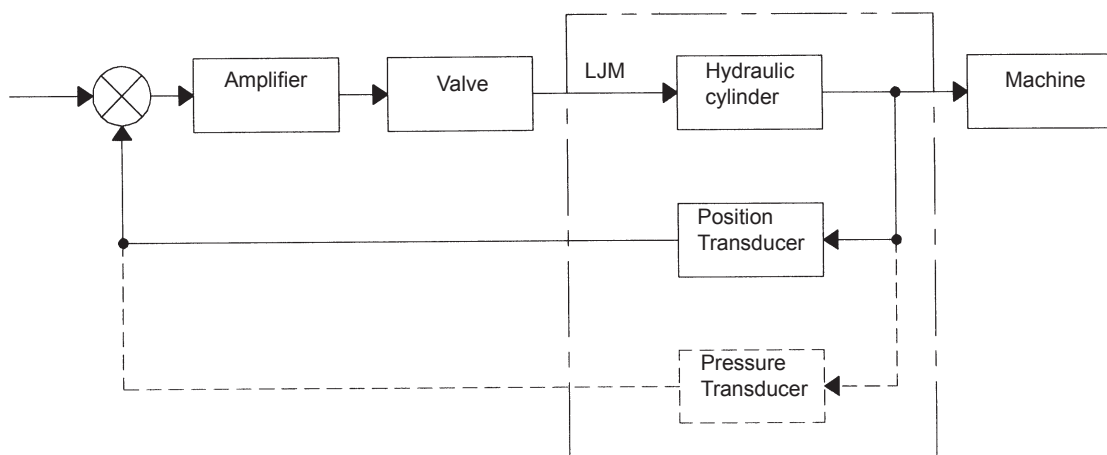


Figure 4. Block diagram for a closed-loop control system

**Construction.** The stationary part of the transducer is secured to the endcap of the cylinder and the moveable part is secured to the piston rod of the cylinder. It has to be a hollow piston rod. The position measuring is done when the transducer produces an analogue or digital signal depending on where the moveable part is according to the stationary part which means proportionally to the stroke of the cylinder.

The seals in the cylinder are of Teflon which secures that the stick-slip condition at its opimum. At the same time it gives the cylinder a higher effeciency. This is of great importance to achieve an exact position.

### Basic version

- The fundamental design is based on standard cylinders in the NH series.
- The smallest diameter of a piston rod is  $\varnothing 30\text{mm}$ .

### Possibilities/alternatives

- Assembly blocks/manifolds for mounting of directional valves.
- Built in cartridge.
- Inductive proximity switches.
- Through piston rod.

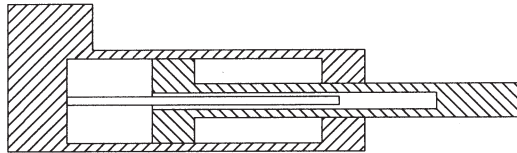


Figure 5. Hydraulic cylinder with manifold

### Transducers

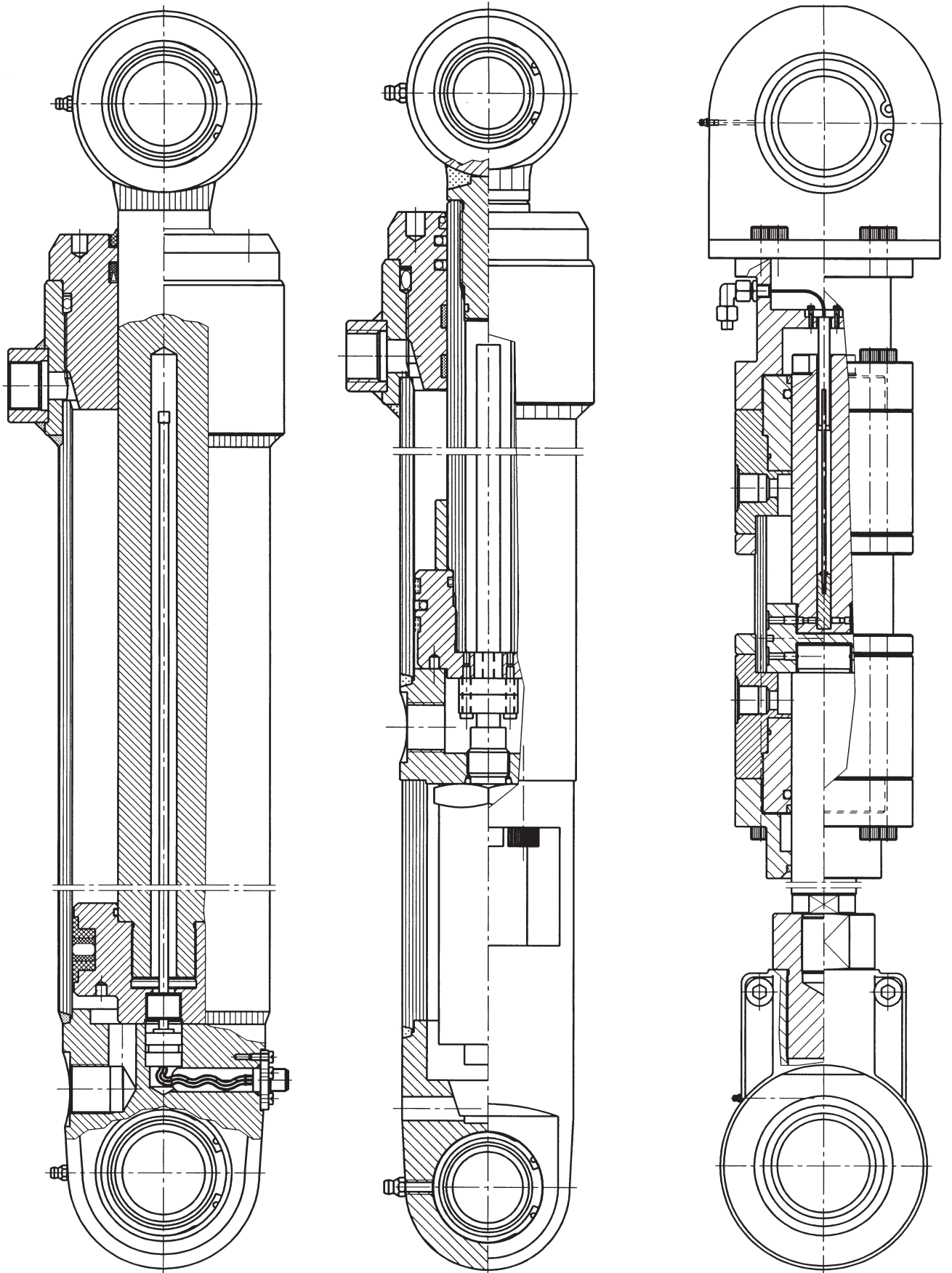
As standard the cylinder is delivered wiht one of the types of transducers below. How to choose is depending on what the cylinder has to be used for:

- **Potentiometer-transducer**
- **Magnetostrictive-transducer**
- **Inductive-transducer**



# NH XX

## Hydraulic cylinders with position transducer



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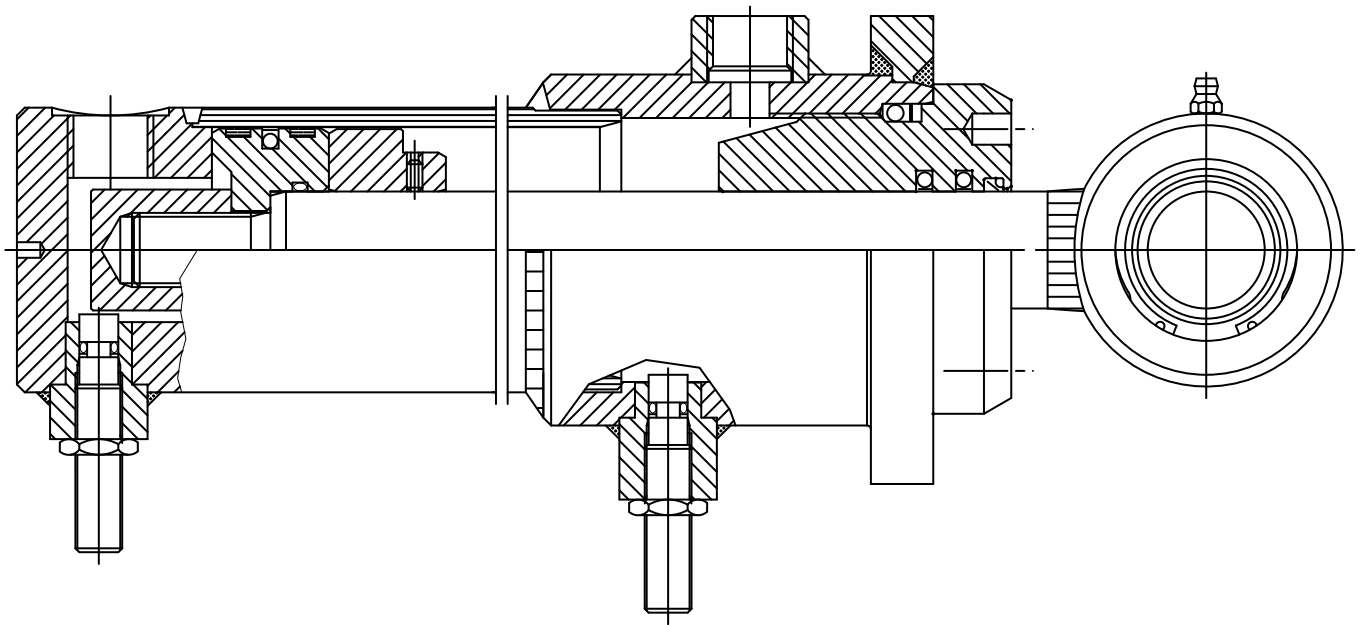
# LJM

 **Hydraulik**  

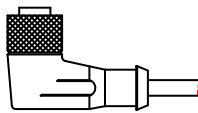
Document 1000062173 - Version 00 - 201102



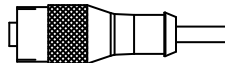
# Inductive Proximity switches



STIK  
STECKER  
PLUG

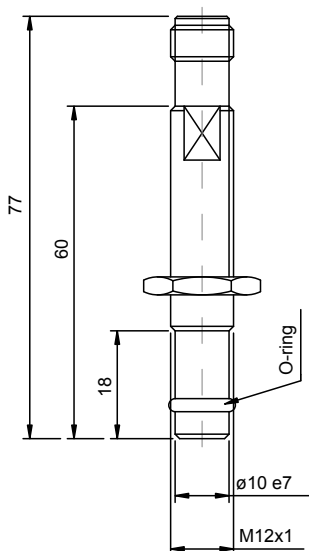


BKS - S 20



BKS - S 19

## Inductive Proximity switches NH 30 cylinder



Housingsize:

Nominal sensing distance:

Operating zone:

Supply voltage:

Max. current load:

Switching frequency:

Shortcircuit protected:

Material:

Max. pressure:

Protection class:

Workingtemperature

M12 x 1

1,5 mm

0- 1,2 mm

10 - 30 V DC

200 mA

1000 Hz

Ja, Yes

stainless

500 bar

IP 68

-25 +80 Grad C

### General

High pressure inductive proximity switches for cylinder applications.

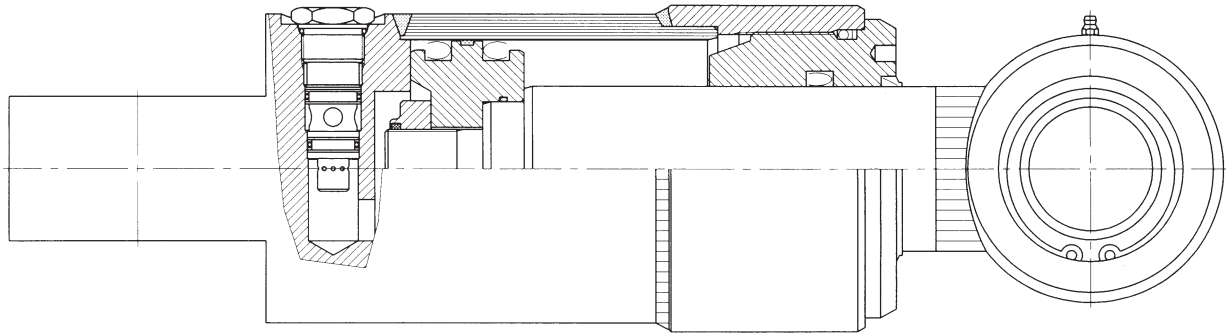


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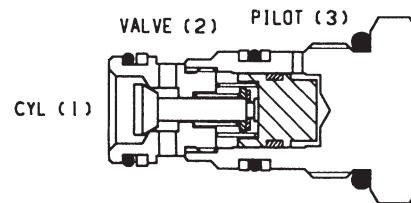
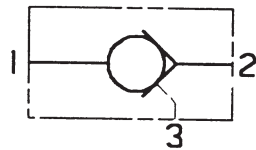


# Build-in valves

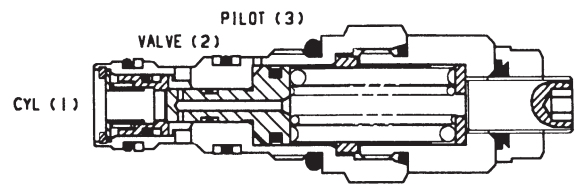
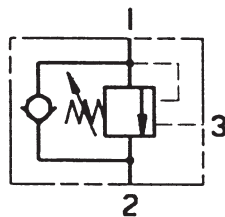


LJM's cylinders can be supplied with two types of build-in load holding valves - pilot operated check valves and overcentre valves.

Pilot operated check valve



Overcentre valve or load holding valve



- \* Single or dual function.
- \* Two sizes - up to 30 lpm and up to 90 lpm.
- \* Rated for 350 bar.
- \* Available with all types of balancing for proportional and closed centre PCVs, regenerative flow, variations in tank pressure etc.
- \* Different pilot ratios available.
- \* All valve types in each flow size fits the same cavity.

## Function (overcentre valve):

The OCV is basically a pilot assisted leak tight relief valve.

The pilot pressure will help the cylinder pressure (or the load induced pressure) to open the valve.

Each valve has a fixed pilot ratio which determines how much influence the pilot pressure has on the opening of the valve.



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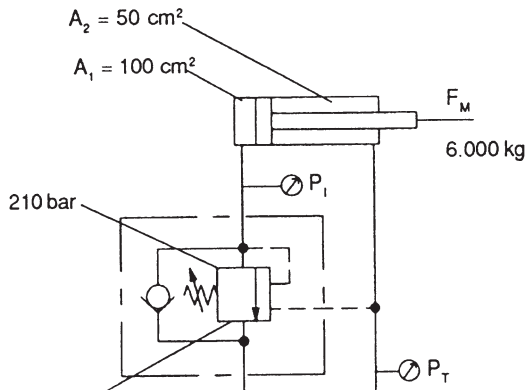




# Build-in valves

Pilot pressure is calculated as follows:

$$PP = \frac{\text{Relief valve setting} - \text{load induced pressure}}{\text{Pilot ratio}}$$



$$P_i = \frac{6.000 \text{ kg}}{100 \text{ cm}^2} = \underline{60 \text{ bar}}$$

$$P_T = \frac{210 - 60}{5} = \underline{30 \text{ bar}}$$

$$F_M = 210 \times 100 = \underline{21.000 \text{ kg}}$$

I.e. 30 bar is required to open the valve, if the cylinder is subjected to a load greater than 21,000 kgs. the valve opens as a relief valve.

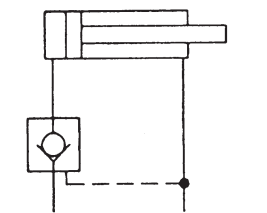
Valve type	Valve type	Pilot ratio	l/min
Overcentre valve	1 CE 30	2:1, 5:1, 10:1	30
	1 CER 30	2:1	
	1 CEB 30	5:1	
Pilotoperated checkvalve	4 CK 30	3:1	
Overcentre valve	1 CE 90	4:1	90
	1 CER 90	4:1	
	1 CEB 90	4:1	
Pilotoperated checkvalve	4 CK 90	3:1	

CE Non balanced valve.

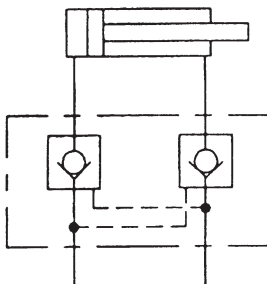
CER Part balanced, to be used in systems with closed centre PCVs.

CEB Fully balanced, to be used in regenerative systems

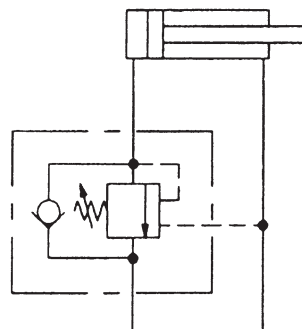
## Build-in valves



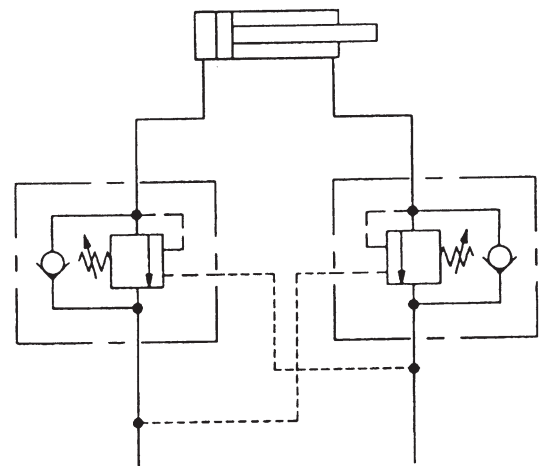
Single pilot operated checkvalve



Double pilot operated chechvalve



Single overcentrevalve



Double overcentrevalve

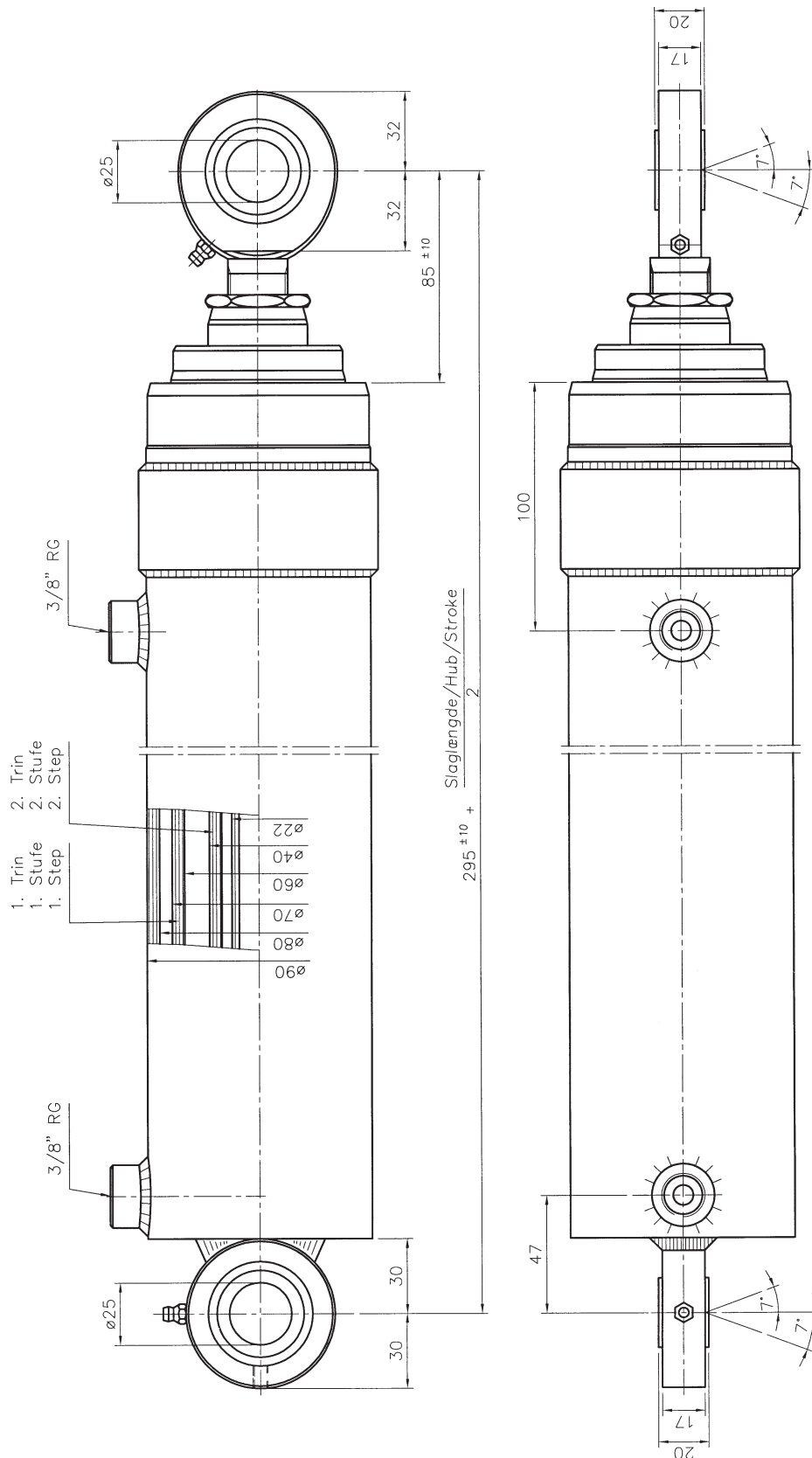




# LJM

2-trins teleskopcylinder, dobbeltvirkende  
Zweistufiger Teleskopzylinder, doppeltwirkend  
Two-stage telescope cylinder, double acting

## Målskitse/Massblatt/Dimension sketch



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Hydraulik



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 Zweistufiger Teleskopzylinder, doppeltwirkend  
 Two-stage telescope cylinder, double acting

Arbejdstryk/ Betriebsdruck/ Operating pressure	:	max. 175 bar
Cylinderrør/ Zylinderrohr/ Cylinder tube	:	Honet stålør/ Gehontes Stahlrohr/ Honed tubular steel
Stempelstang/ Kolbenstange/ Piston rod	:	Centerlesslebet stål - hårdtforchromet og poleret
	:	Zentrisch geschliffener Stahl - hartverchromt und poliert
	:	Centreless ground steel - hard chrome plated and polished
Slaglængde / Hub / Stroke	:	Efter ønske / Nach Wunsch / Acc. to requirements
Pakninger / Dichtungen / Seals	:	Anerkendt fabrikat / anerkanntes Fabrikat / Recognized make
Ekstra tilbehør / Zusatz-Zubehör / Accessories	:	Vippebeslag / Kippbeschlag / Trunnion mounting

Arealer Flächen Areas		Trin 1 Stufe1 Step 1		Arealer Flächen Areas		Trin 2 Stufe 2 Step 2		Tryk- og trækkræfter (MP) Druck- und Zugkräfte (MP) Compressive and tractive forces (MP)			
(cm <sup>2</sup> )		(cm <sup>2</sup> )		(cm <sup>2</sup> )		(cm <sup>2</sup> )		Ved/bei/at: 175 Bar			
								Trin/Stufe/Step 1	Trin/Stufe/Step 2	Trin/Stufe/Step 1	Trin/Stufe/Step 2
Tryk Druck Comp.	Træk Zug Trac.	Tryk Druck Comp.	Træk Zug Trac.	Tryk Druck Comp.	Træk Zug Trac.	Tryk Druck Comp.	Træk Zug Trac.	Tryk Druck Comp.	Tryk Druck Comp.	Træk Zug Trac.	Træk Zug Trac.
50,27	15,58	24,48	11,91	8,80	4,28	2,72	2,08				

Alle angivne mål er i (mm) / Alle angegebenen Maße in (mm) / All dimensions are in (mm)

### Bestillingskode / Bestellbezeichnung / Order code

## LJM-X-T-X-D/d-D/d x L/L-X-X-()

Type/Typ/Model:

Grundtyper/Grundtypen/Basic types:

- S: Sfærisk leje / Spärisches Gelenklager / Spherical bearing
- V: Vippebeslag / Kippbeschlag / Trunnion mounting
- T: Teleskopcylinder / Teleskopzylinder / Telescope-cylinder

Funktion/Funktion/Function:

- D: Dobbeltvirkende / Doppeltwirkend / Double acting
- E<sub>1</sub>: Enkeltvirkende, tryk / Einfach wirkend, Druck / Single acting, Compressive
- E<sub>2</sub>: Enkeltvirkende, træk / Einfach wirkend, Zug / Single acting, tractive

Cylinderdiameter: 1. trin  
 Zylinderdurchmesser; 1. stufe  
 Bore: 1st step

Stempelstangsdiameter: 1. trin  
 Kolbenstangendurchmesser: 1. stufe  
 Piston rod diameter: 1st step

Cylinderdiameter: 2. trin  
 Zylinderdurchmesser: 2. stufe  
 Bore: 2nd step

Stempelstangsdiameter: 2. trin  
 Kolbenstangendurchmesser: 2. stufe  
 Piston rod diameter: 2nd step

Pakninger/Dichtungen/Seals:

- TN: Teflon-Nitril
- TV: Teflon-Viton

Stempelstangsophæng:  
 Befestigung der Kolbenstange:

- Piston rod mounting:
- S: Sfærisk leje / Sphärisches Gelenklager / Spherical bearing

Vippebeslags placering:  
 Platzierung des Kippbeschlages:  
 Position of trunnion mounting:

Tal: Afstand fra vippetap til ophæng på stempelstang

Ziffer: Abstand vom Schwenkzapfen bis zur Befestigung an der Kolbenstange

Digit: Distance from tipping trunnion to mounting on piston rod

Slaglængde del/Hublänge Teil/Stroke part

Slaglængde del/Hublänge Teil/Stroke part



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