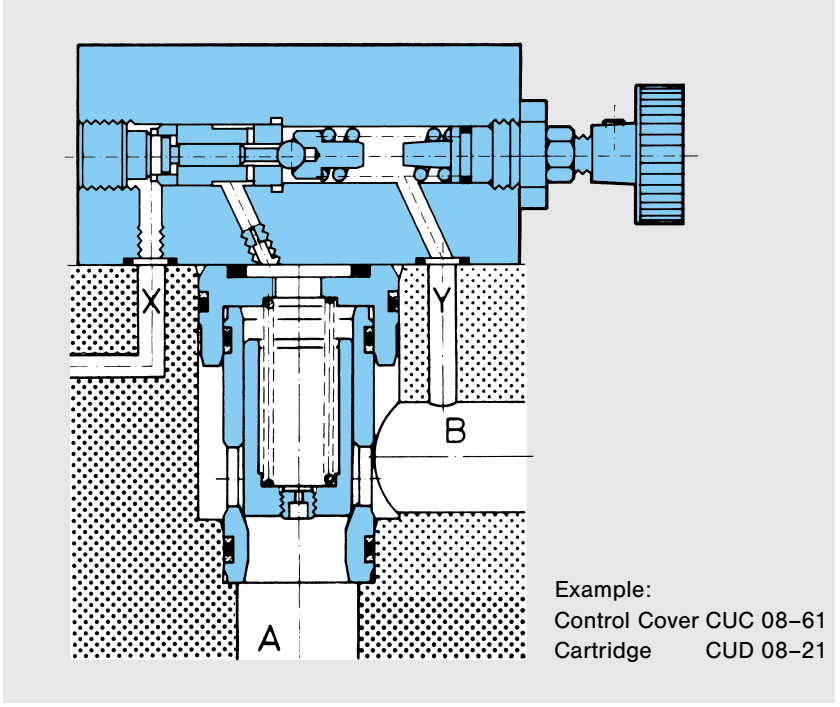
DENISON HYDRAULICS
Unloading Valves CUD, CUC
Cavity according to DIN 24342

Publ. 3–EN 2550–A, replaces 3–EN 255–B

DENISON Hydraulics

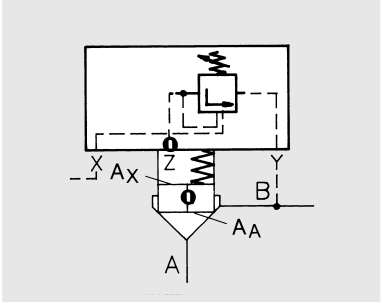
FEATURES

- Pilot operated unloading valve in DIN cartridge design.
- Smooth shifting transitions due to optimized mass/area ratios.
- Consistent 350 bar construction on all parts or higher.
- Precise control of pressure differential of 15 % or 20 %.
- DIN Cartridge Valve Standard.
  - installation per DIN standard 24342
  - consisting of poppet, sleeve, spring, ring, and seals.
  - seals with backup rings.
- DIN Cartridge Covers
  - with integrated pilot valve
  - with optional mounting of a (A) 4D01 (Cetop 03) pilot valve on the cartridge cover for control of vent function.



Example:
Control Cover CUC 08–61
Cartridge CUD 08–21

SYMBOL



A = Working port (pressure)
B = Working port (tank)
X = Pilot port
Y = Drain port

OPERATION

Through the orifice in the bottom of the main poppet pressure in A acts on the pilot valve unloading ball, the counter side of the unloading piston and the main poppet spring chamber. The adjustable spring acting on the unloading ball decides both unloading and relief pressure.

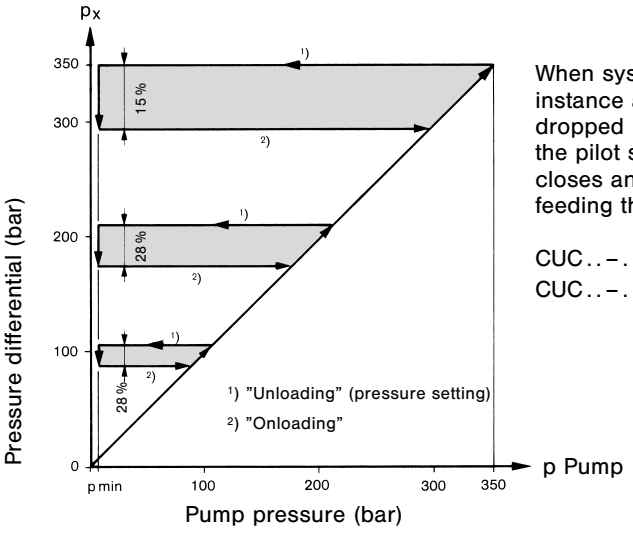
Unloading function: If an external pressure higher than the pilot spring setting is applied in X the unloading piston mechanically pushes the ball far off its seat which totaly unloads the closing pressure on top of the main poppet. In this position the system flow passes from A to B with a pressure drop of about 4 bar.

Over-rided relief function: The hydraulically balanced main poppet is held against its seat by the comparably low main spring force. When system pressure in A excedes the pilot spring setting the ball is pushed off its seat and pilot flow drains to tank via Y. The flow through the precise defined orifice creates a pressure drop which results in the pressure on top of the main poppet being reduced. The higher system pressure in A now lifts the main poppet floating off its seat and allows flow to port B.

DESCRIPTION

DENISON has more than 30 years of experience in the field of cartridge valves and in the design and manufacture of pressure control valves based on the poppet and sleeve concept.
Unloading valves of the CU* design are also based on the pilot operated 2/2 seat valves.
The area ratio of the cartridge assembly $A_A : A_X = 1 : 1$ which minimizes the pilot flow requirements.
The control cover contains the complete pressure control assembly with adjustment options of control knob, acorn nut with locking wire or key lock device.
Pilot pressure connections are included as standard as external and internal connections for venting the main valve through the "X" connection or the directional control valve mounted on the top of the valve.

Recommendation: Pilot pressure for venting (p_X) should for safety reasons have laminar pattern ie. no orifices or such like in order to achieve flatter free control of the main valve.



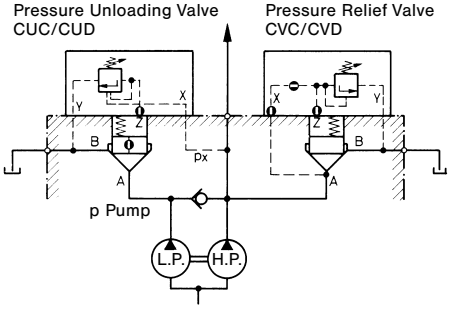
When system pressure (for instance accumulator) has dropped 15 % or 28 % below the pilot setting the valve closes and the pump is feeding the system again.

CUC . . – . . 1/3 = 28 %
CUC . . – . . 5 = 15 %

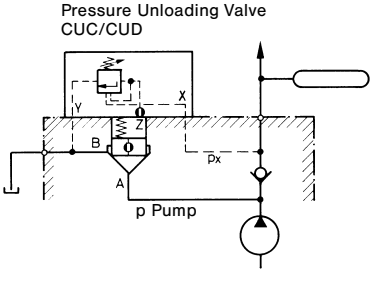
In applications with an accumulator, it should be noted that the CUC and its accompanying check valve should be mounted as close to the accumulator as possible. This will prevent that the Δ p, caused by long feed lines between the CUC and the accumulator, will reduce the selected 15 or 28 % pressure differential (prevention of switching oscillations).

TYPICAL APPLICATIONS

Hydraulic system to vent the low pressure side (L.P.) of double pumps



Accumulator system



GENERAL

• Design	Poppet type
• Type of mounting	Manifold cavity DIN 24342
• Port sizes	NG 25, NG 32
• Mounting position	optional
• Direction of flow	A→B
• Ambient temperature range	– 20 . . . + 80 °C
• Suitability for special working conditions	Consult DENISON

HYDRAULIC CHARACTERISTICS

• Operating pressure range		
– inlet (Port A)	0 . . . 350 bar	
– outlet (Port B)	0 . . . 30 bar	
– Port X	350 bar max.	
– Port Y	without pressure to tank	
• Pressure setting range	7 . . . 105 bar	
	7 . . . 210 bar	
	7 . . . 350 bar	
	NG 25	NG 32
• Nominal flow	200 l/min	450 l/min
• Max. flow	300 l/min	600 l/min
• Pilot flow max.		
– at 50 bar	0.6 l/min [1]	0.7 l/min [1]
	1.1 l/min [2]	1.5 l/min [3]
– at 350 bar	0.7 l/min [1]	0.8 l/min [1]
	1.6 l/min [2]	2.7 l/min [3]

[1] at 50 l/min flow
[2] at 300 l/min flow
[3] at 600 l/min flow

• Fluid	Mineral oil according DIN 51524/25 (other fluids on request)
• Contamination level	Max. permissible contamination level according to NAS 1638 Class 8 (Class 9 for 15 micron and smaller) or ISO 17/14
• Fluid temperature range	– 18 . . . + 80 °C
• Viscosity range	10 . . . 650 cSt; optimal 30 cSt

TYPE OF ADJUSTMENT

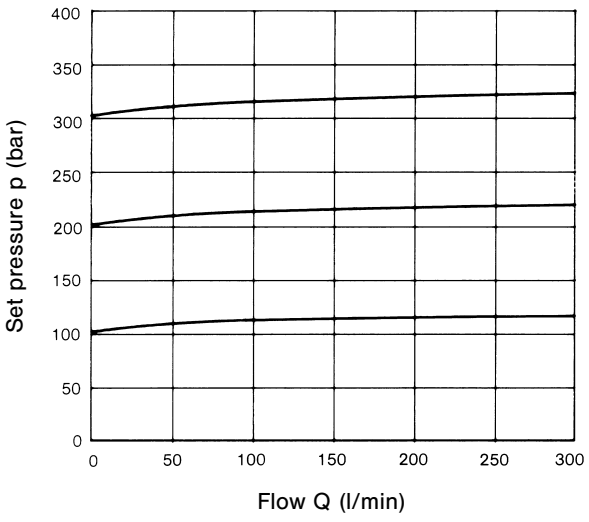
• Manual	
• Rotation	3.75 x 360°
• Operating torque	72 Ncm

If the performance characteristics outlined above do not meet your requirements, please consult your local DENISON Office.

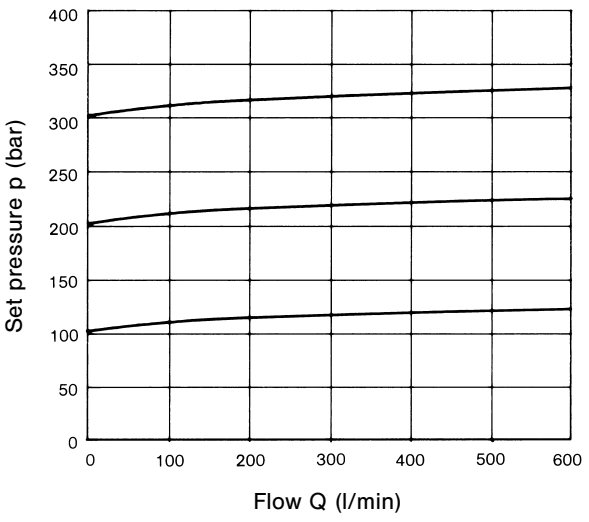
CURVES

at 40 cSt and 50 °C

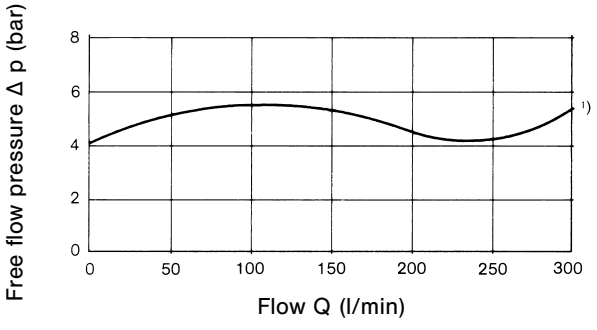
p-Q-Characteristics
CUC08 / NG 25



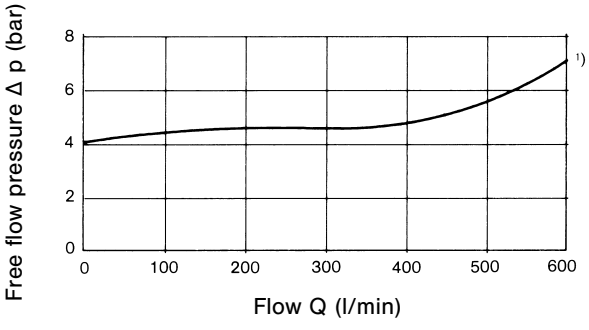
p-Q-Characteristics
CUC10 / NG 32



Δ **p-Q-Characteristics** (at 350 bar)
CUC08 / NG 25



Δ **p-Q-Characteristics** (at 350 bar)
CUC10 / NG 32



[1]) main spool spring force included

Please note that all test data given is typical and can be influenced by application.

ORDERING CODE – CARTRIDGE

Model Number: **CUD .. – 21 – 6 – A .**

1 **Series**
CUD = Pressure unloading function

2 **Seat Valve Size**
08 = NG 25
10 = NG 32

3 **Area Ratio A_A : A_X**
21 = 1 : 1
spool with an orifice in bottom of cartridge

4 **Spring**
6 = cracking pressure 4 bar

5 **Design Letter**

6 **Seal Class**
1 = NBR (Buna N) Standard
4 = EPDM
5 = VITON®

Weight-Cartridge

CUD08	0.4 kg
CUD10	1.0 kg

ORDERING CODE – CONTROL COVER & SYMBOLS

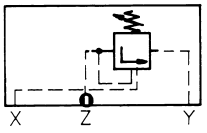
Model Number: CUC .. – .. – . – . – A .

1 **Series**
CUC = Pressure unloading function

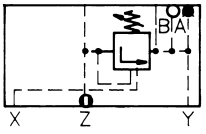
2 **Cover Size**
08 = NG 25
10 = NG 32

3 **Control Cover**

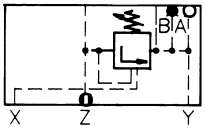
61 = with internal pilot valve



62 = with internal pilot valve, to mount a 4/2-directional valve CETOP 03 (4D01), sol. de-energized: main valve closed



63 = with internal pilot valve, to mount a 4/2-directional valve CETOP 03 (4D01), sol. de-energized: main valve open (vented)



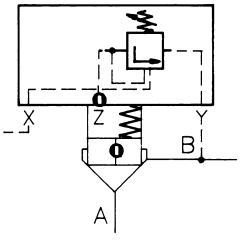
4 **Pressure Setting Range**
1 = 7...105 bar (Pressure differential 28 %)
3 = 7...210 bar (Pressure differential 28 %)
5 = 7...350 bar (Pressure differential 15 %)

5 **Type of Control**
1 = Hand knob 32 mm dia.
2 = Hand knob 50 mm dia.
3 = Acorn nut with lead seal
4 = Adjusting device with key lock (key order no. 700–70619)

6 **Design Letter**

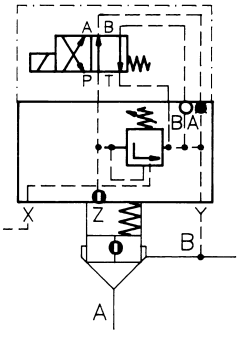
Seal Class
1 = NBR (Buna N) Standard
4 = EPDM
5 = VITON ®

SYMBOL – EXAMPLES



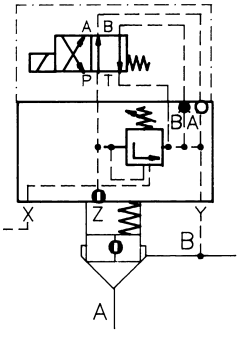
Cover Code 61

Unload function A→B when pilot pressure is in "X", see page 9.



Cover Code 62

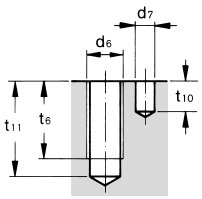
Unload function A→B when pilot pressure is in "X", or when solenoid is energized, see page 10.



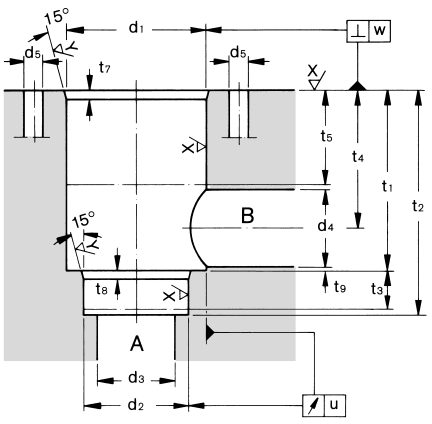
Cover Code 63

Free flow from A→B to tank when solenoid is de-energized, see page 10.

Section A–B



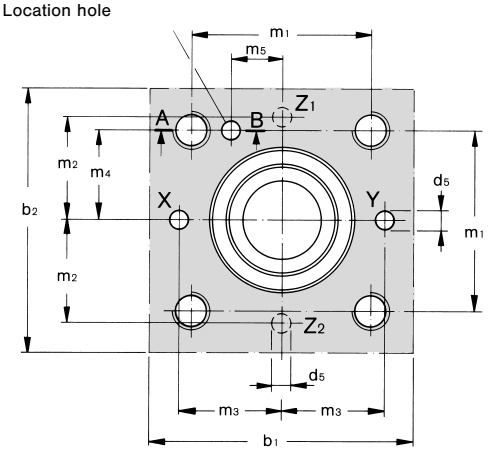
Cavity



Ra max (µm) X = 1.6 Y = 2.5

Configuration for control cover

Location hole



A = Working port
B = Working port
X = Pilot port
Y = Drain port
Z1, Z2 = additional pilot ports
Z1 = preferred inlet
Z2 = preferred outlet

Dimension	Tolerance	NG 25	NG 32
b_1 [1]		100	102
b_2 [1]		85	102
d_1	H7	45	60
d_2	H7	34	45
d_3		25	32
d_4 [2]	min.	25	32
	max.	32	40
d_5 [3]	max.	6	8
d_6		M12	M16
d_7	H13	6	6
m_1	± 0.2	58	70
m_2	± 0.2	33	41
m_3	± 0.2	33	41
m_4	± 0.2	29	35
m_5	± 0.2	16	17
t_1	$^{0}_{+0.1}$	58	70
t_2	$^{0}_{+0.1}$	72	85
t_3 [5]		12	13
t_4 [2]	d_4 min.	44	52
	d_4 max.	40.5	48
t_5 [5]		30	30
t_6 [4]		25	35
t_7		2.5	2.5
t_8		2.5	2.5
t_9	min.	1.0	1.5
t_{10}	min.	10	10
t_{11} [4]	max.	31	42
u		0.03	0.03
w		0.05	0.1

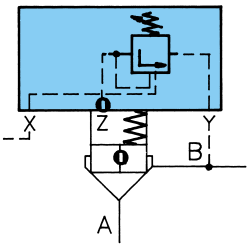
[1] Cover parts (adjusting devices, pilot heads) can exceed dimension b_1 and b_2.

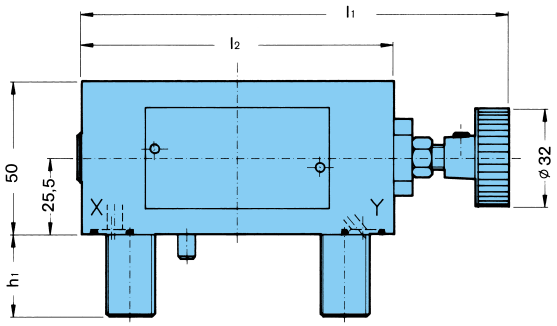
[2] Port B can vary around the centre line of port A.
Note:
Holes for mounting screws and pilot oil must not be damaged.

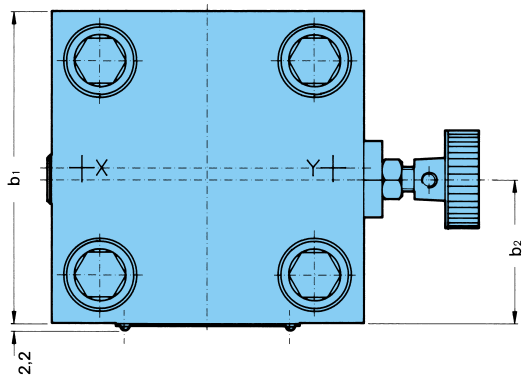
[3] Drilling depth and drilling angle of pilot ports are related to circuitry and arrangement of valves within the manifold.

[4] Recommended depth of screw (minimum) for cast iron is dia. of thread times 1.25.

[5] Close-tolerance work depth.







Model number:

CUC . . –61 – . – . – A .

(for details see page 7)

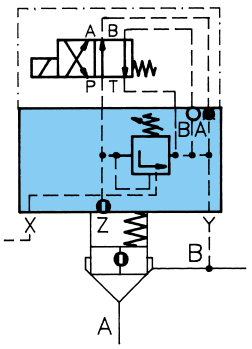
Dimensions

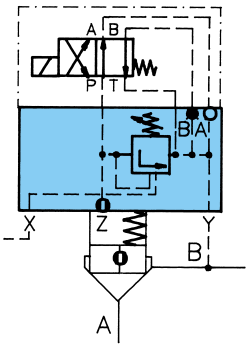
	CUC08 NG 25	CUC10 NG 32
l_1 max.	138	140
l_2	100	102
b_1	85	102
b_2	38.5	47
h_1	18	27
Weight	3 kg	4 kg

4 Mounting screws DIN 912–12.9
(supplied with cover)

Series	Dimensions	Torque
CUC08	M12 x 55	130 Nm
CUC10	M16 x 60	330 Nm

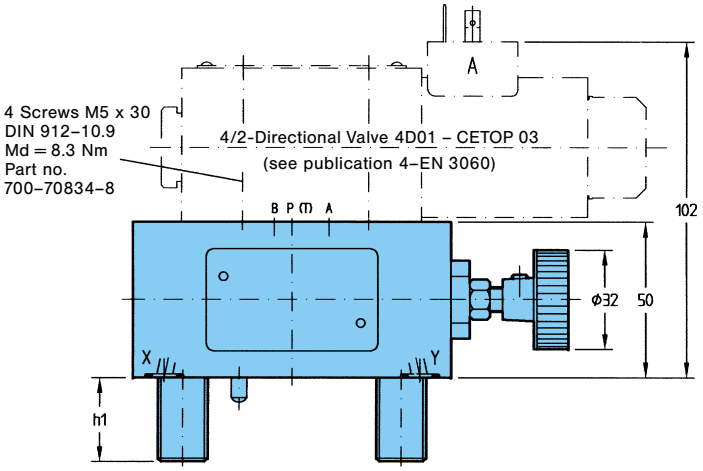
to mount 4/2-Directional Valve CETOP 03

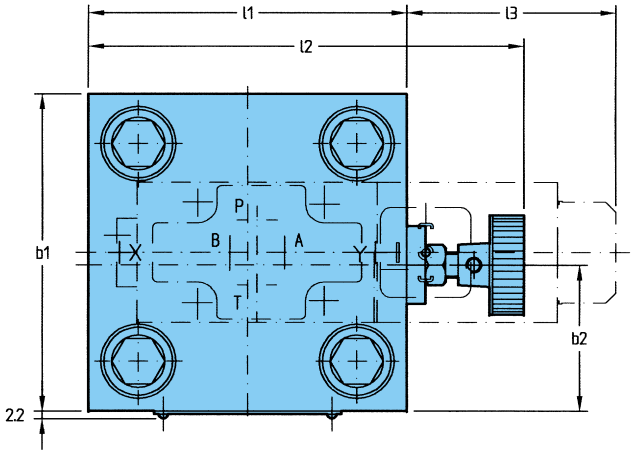




Model number: CUC.. | –62–.–.–A. | –63–.–.–A.

(for details see page 7)





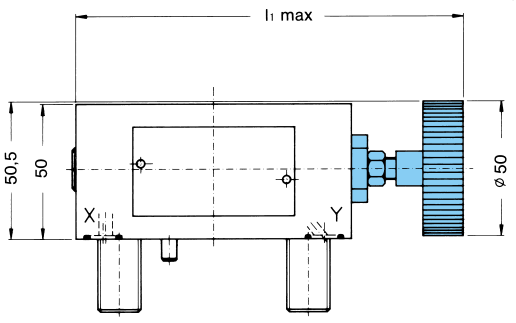
Dimensions

	CUC08 NG 25	CUC10 NG 32
l_1	100	102
l_2 max.	138	140
l_3	49.5 AC 61.2 DC	48.5 AC 60.2 DC
b_1	85	102
b_2	38.5	47
h_1	18	27
Weight	3 kg	4 kg

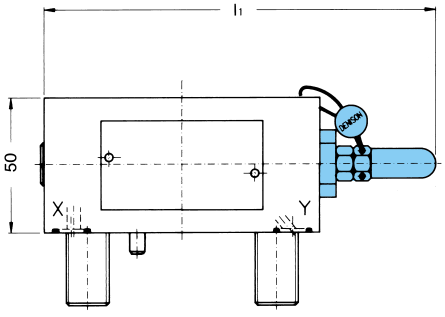
4 Mounting screws DIN 912–12.9
(supplied with cover)

Series	Dimensions	Torque
CUC08	M12 x 55	130 Nm
CUC10	M16 x 60	330 Nm

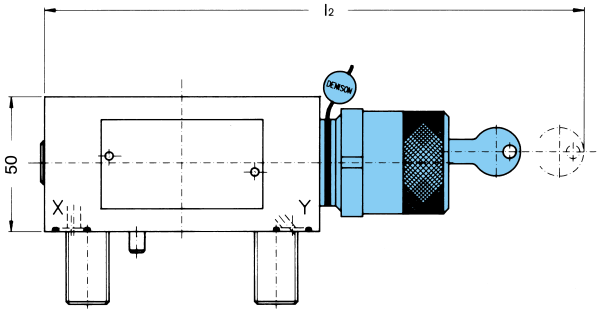
Type of Control-Code 2
Hand knob 50 mm dia.



Type of Control-Code 3
Acorn nut with lead seal



Type of Control-Code 4
Adjusting device with key lock.
Key must be ordered separately,
order no. 700–70619



Dimensions

	CUC08 NG 25	CUC10 NG 32
l_1	138	140
l_2	198	200