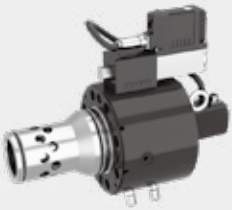
6.10

# 2-way high-response servo Proportional cartridge valve, pilot operated

## Type 2WRCVE...L1X

NG 25 to 100
Max. pressure 350 bar
Max. flow 8000L/min



### Contents



### Features

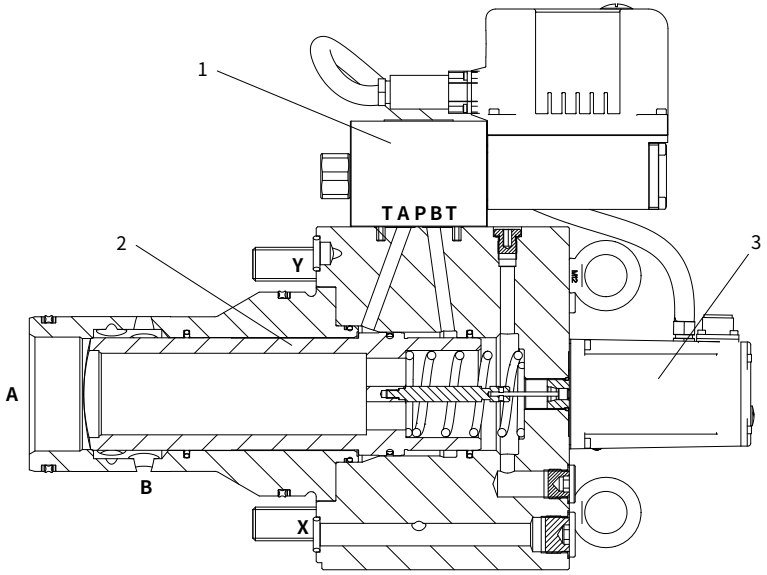
- Pilot operated two-way proportional servo directional valve, main valve core with electrical position feedback.
- The pilot valve adopts a servo level performance spool valve sleeve structure
- Voice coil motor
- Extremely fast step response
- Flow direction B to A and A to B
- With integrated electronics
- Cavity and mounting pattern according to ISO7368
- Typical applications:
  - Injection molding
  - Die-casting machines
  - General presses

## Function and configuration

Valves of type 2WRCVE...-L1X/P... is a pilot proportional servo cartridge valve with valve core position feedback and integrated amplifier

**Set-up:**
They consist of the following assemblies:
-Pilot servo valve with spool valve sleeve structure driven by voice coil valve (1).
-Main valve with reset spring and position feedback (2).
-Main valve displacement sensor and main valve integrated amplifier (3).

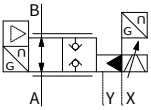
**Function:**
The 2-way servo proportional valves 2WRCVE have a 2-stage design consisting of a pilot valve and a main stage with poppet and LVDT.
Due to the use of a voice coil motor as the pilot valve, the 2WRCVE achieves extremely fast response times: from 10.5ms (NG25) up to 28ms (NG100) with an accuracy of <0.1% of the nominal flow.
The pilot valve actively controls the poppet - independent of the pressure conditions in the main ports. It is basically required that the pilot pressure is at the level of the system pressure. At low system pressure the pilot pressure should be min. 140bar, when high valve dynamics are desired.
The pilot servo valve and main valve of the valve are each equipped with an integrated amplifier with a closed-loop control circuit, which control the main valve and the pilot valve.



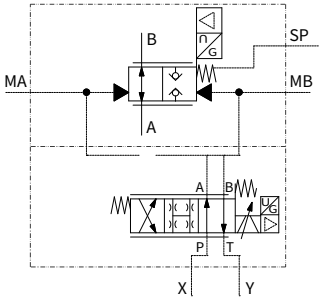
## Symbols

**2WRCVE..-L1X/VL...**

Simplified:

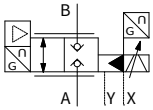



Detailed:

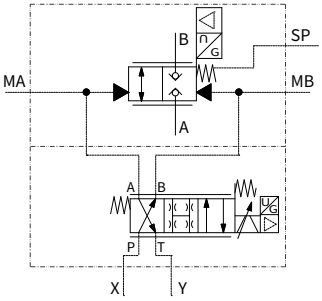



**2WRCVE..-L1X/VK...**

Simplified:

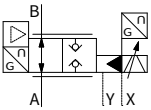



Detailed:




**2WRCVE..-L1X/VWL...**

Simplified:

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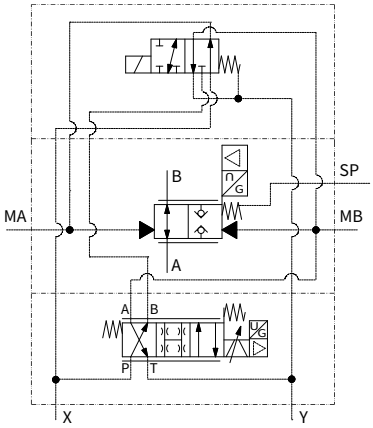
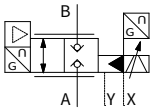
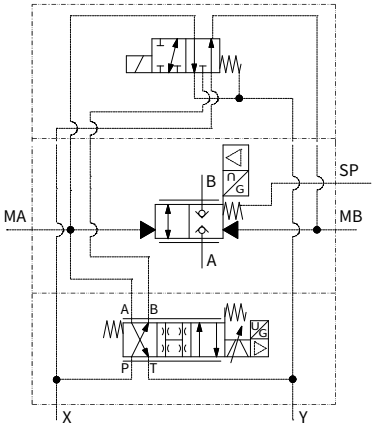



**2WRCVE..-L1X/VWK...**

Simplified:




Detailed:



## Ordering code

| 2 | WRCV | | | S | | – L1X / V | | / | / | ★ |
|---|---|---|---|---|---|---|---|---|---|---|

2/2 directional valve = 2

2-way high-response servo
Proportional cartridge valve = WRCV

With integrated electronics (OBE) = E

Size 25 = 25
Size 32 = 32
Size 40 = 40
Size 50 = 50
Size 63 = 63
Size 80 = 80
Size 100 = 100

Seat piston = S

| Rated flow in L/min at 5 bar valve pressure drop | | |
|---|---|---|
| Size | Type ...S...L (linear) | Type ...S...R (linear with progressive fine control range) |
| 25 | 500 =500 | - |
| 32 | 800 =800 | 600 =600 |
| 40 | 1200 =1K2 | 850 =850 |
| 50 | 2000 =2K0 | 1400 =1K4 |
| 63 | 3600 =3K6 | 3200 =3K2 |
| 80 | 4500 =4K5 | 3900 =3K9 |
| 100 | 8000 =8K0 | 6800 =6K8 |

Characteristic curve form
Linear = L
Linear with progressive fine control range = R

Series L10 to L19 = L1X
(L10 to L19: Unchanged installation and connection dimensions)

The pilot valve is a voice coil motor (VCD) driven proportional servo valve =V

Sandwich plate shut-off valve:
Without shut-off valve, de-energized pilot control valve actively "closes"
WRCVE with applied pilot pressure =K
Without shut-off valve, de-energized pilot control valve actively "opens"
WRCVE with applied pilot pressure =L
With shut-off valve, de-energized shut-off valve actively "closes"
WRCVE with applied pilot pressure =WK
With shut-off valve, de-energized shut-off valve actively "opens"
WRCVE with applied pilot pressure =WL

Spool position monitoring:
Without safety valve and position switch = No code
With safety valve and position switch = E

Electrical interface:
Command value 0~10V (only with integrated electronics (OBE) "E") = A1
Command value 4~20mA (only with integrated electronics (OBE) "E") = F1

Seal material: FKM seals = V NBR seals = No code

Enable signal control: Without band enable =No code Band enable =Q

Further details in the plain text

## Technical data

| **General** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | 25 | 32 | 40 | 50 | 63 | 80 | 100 |
| Weight | Without shut-off valve …../...K or .../...L | kg | 8.5 | 11.2 | 17.3 | 24.6 | 47 | 74 | 110 |
| | With shut-off valve …../...WK or .../...WL | | 9.8 | 12.5 | 18.6 | 25.9 | 60 | 87 | 123 |
| Installation position | | | Any, preferably horizontal | | | | | | |
| Storage temperature range | | °C | –20 to +80 | | | | | | |
| Ambient temperature range | | °C | –20 to +50 | | | | | | |

| **Hydraulic** (measured with HLP32, $\vartheta_{oil}$=40°C ±5°C ) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Max. operating pressures | - Ports A, B, SP | bar | 350 | | | | | | |
| | - Pilot control valve port X | | 350 | | | | | | |
| | - Port Y | | 35 | | | | | | |
| Rated flow at Δp = 5bar | – Design ...S...L (linear) | | 500 | 800 | 1200 | 2000 | 3600 | 4500 | 8000 |
| | – Design ...S...R (linear with progressive fine control range) | | - | 600 | 850 | 1400 | 3200 | 3900 | 6800 |
| Pilot valve pressure | | bar | ＞ 140 | | | | | | |
| Max. pilot flow at 140bar pilot pressure | | L/min | 23 | 30 | 40 | 40 | 70 | 80 | 100 |
| Leakage of pilot valve at P = 100bar | | mL/min | ⩽ 400 | | | | | | |
| Hydraulic fluid | | | Mineral oil (HL, HLP) to DIN 51524 | | | | | | |
| Hydraulic fluid temperature range | | °C | –20 to +80; preferably +40 to +50 | | | | | | |
| Viscosity range | | $mm^2/s$ | 20 to 380; preferably 30 to 45 | | | | | | |
| Max. admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c) | | | Class 20/18/15 | | | | | | |
| Hysteresis | | % | ⩽ 0.1 | | | | | | |
| Response sensitivity | | % | ⩽ 0.05 | | | | | | |
| Response time 0~100% step signal | | ms | 10.5 | 12 | 14 | 20 | 17 | 23 | 28 |

| **Electric** | | | |
|---|---|---|---|
| Duty ratio | | % | 100 |
| Supply voltage / ripple | | VDC | Direct voltage 22 ... 30,<br>electric shut-off at <19,<br>ripple <5% effective, surge free |
| Current consumption max. | | A | 3.5 |
| Pre-fusing | | A | 4.0, medium lag |
| Input signal: A1 | Voltage | V | 0…+10,<br>ripple ＜ 0.01%, effective, surge free |
| | Impedance | kΩ | 100 |
| Input signal: F1 | Current | mA | +4…20, ripple ＜ 0.01% effective, surge free,<br>＜ 3.6mA=disable, >3.8mA=enable |
| | Impedance | Ω | ＜ 250 |
| Diagnostic signal | Voltage | V | 0…+10, rated max. 5mA |
| Enable signal | | V | 5...30, Ri = > 8kOhm |
| Electrical connection | | | 6+PE，plug-in connector in accordance with DIN EN 175201-804 standard |
| Protection class of the valve according to EN60529 | | | Ip65 |

## Electrical connections, plug-in connectors

**Installation recommendations**

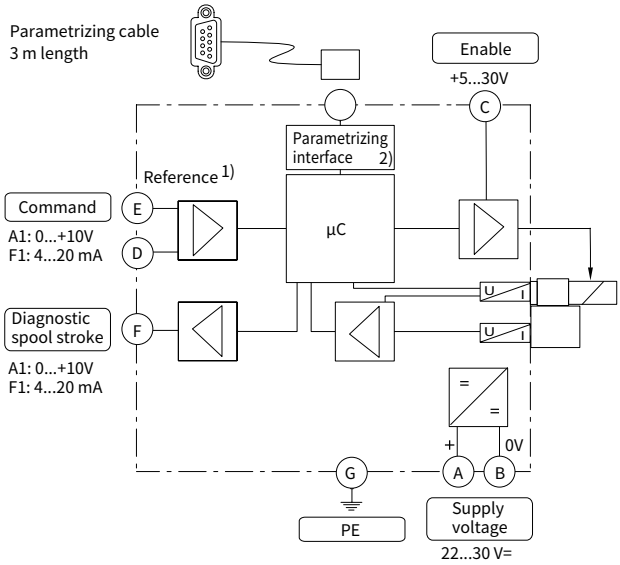
An insufficient pilot oil supply (e.g. due to long distances and/or small diameters) can negatively influence the dynamics of the valve.

To avoid this, an accumulator can be connected to port XX at the valve body. A short-term undersupply with pilot oil can be compensated via this accumulator.

Sizing data: see operation manual.

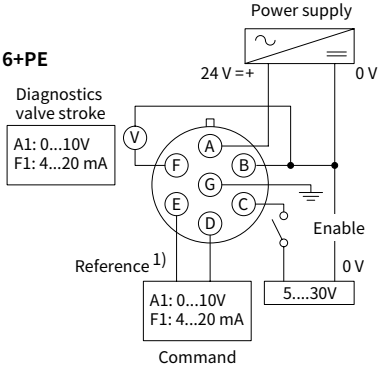
Please also consider the product range of Hengli batteries and Hengli Accumulator Sizing Software.

**Block circuit diagram electronics**




**Pinout:**

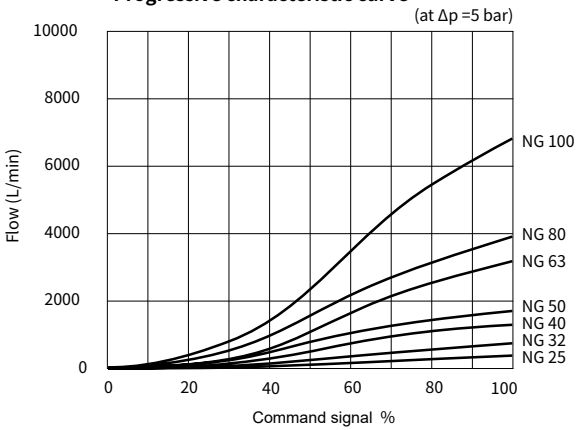
**Pin assignment 6+PE**



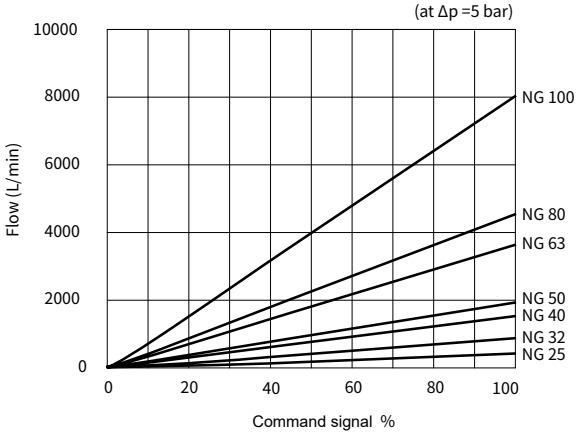

Notes: 1) Cannot be connected to 0V of the power supply voltage.
2) This model of product can provide dedicated debugging cables, and can be ordered separately if needed.

## Characteristic curves (measured with HLP46, $\vartheta_{oil}$=50°C , ΔP=5bar)

**Progressive characteristic curve**




**Linear characteristic curve**



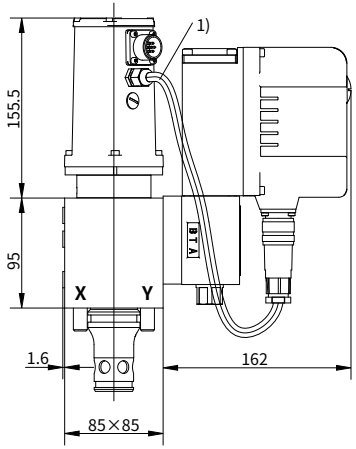

Opening point factory set to 3 %.

Flow at different Δp: $Q_{actual} = Q_{nominal} \bullet \sqrt{\frac{\Delta p_{actual}}{\Delta p_{nominal}}}$ .

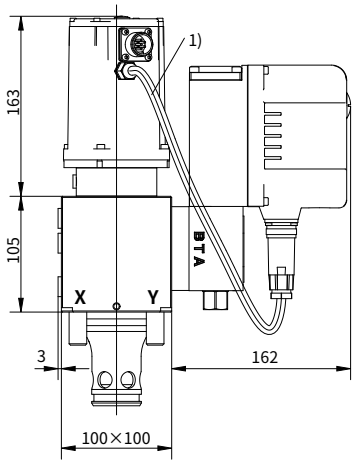
## Unit dimensions

(nominal dimensions in mm)

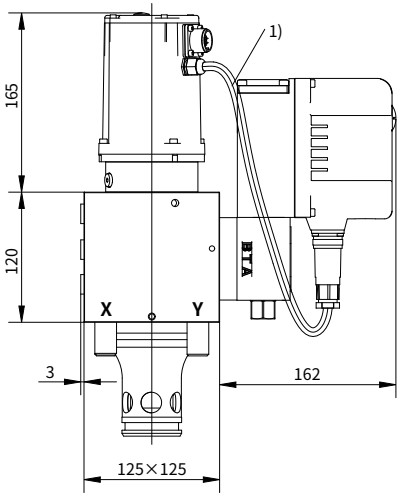
**NG 25**



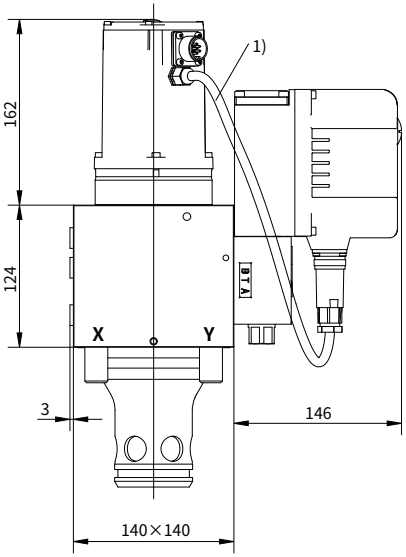

**NG 32**




**NG 40**




**NG 50**




| Size | Fastening bolts class 12.9 | Tightening torque |
|---|---|---|
| 25 | 4 - M12×100 | 125 Nm |
| 32 | 4 - M16×60 | 300 Nm |

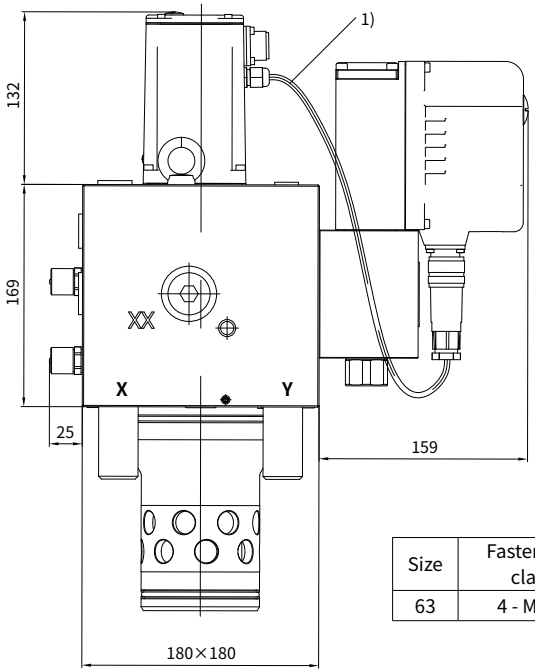
| Size | Fastening bolts class 12.9 | Tightening torque |
|---|---|---|
| 40 | 4 - M20×70 | 600 Nm |
| 50 | 4 - M20×80 | 600 Nm |

Notes: 1) This communication cable has been installed at the factory, please do not disassemble it unless necessary.

## Unit dimensions

(nominal dimensions in mm)

**NG 63**



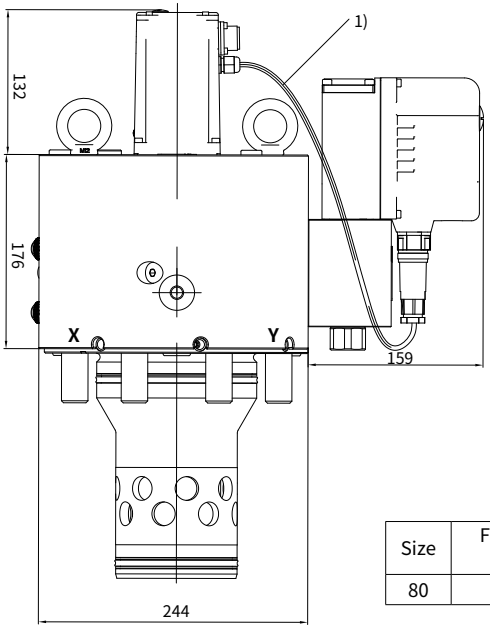

| Size | Fastening bolts class 12.9 | Tightening torque |
|---|---|---|
| 63 | 4 - M30×160 | 1775 Nm |

Notes: 1) This communication cable has been installed at the factory, please do not disassemble it unless necessary.

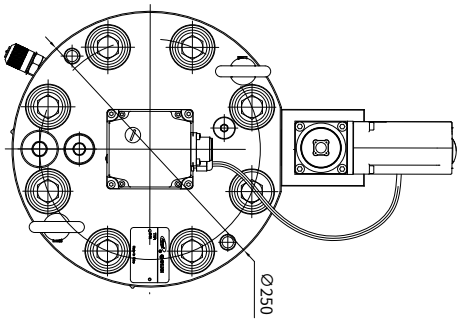
## Unit dimensions

(nominal dimensions in mm)

### NG 80




| Size | Fastening bolts class 12.9 | Tightening torque |
|---|---|---|
| 80 | 8 - M24×160 | 890 Nm |

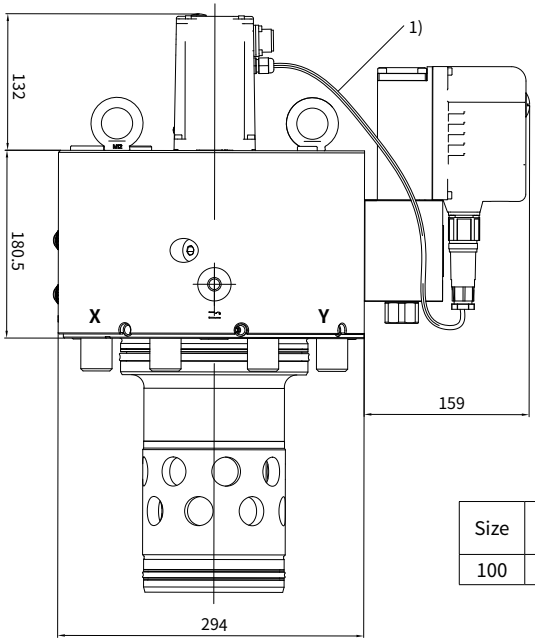



Notes: 1) This communication cable has been installed at the factory, please do not disassemble it unless necessary.

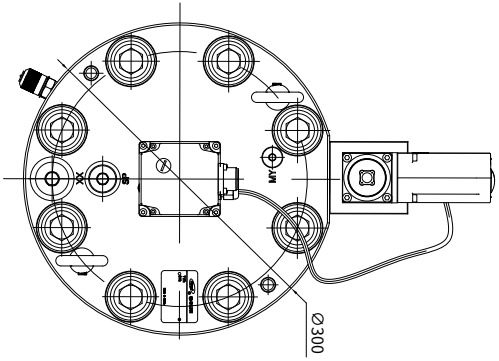
## Unit dimensions

(nominal dimensions in mm)

**NG 100**



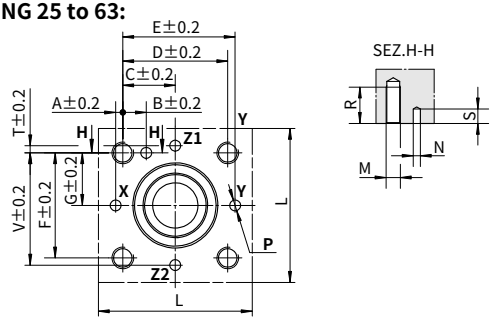

| Size | Fastening bolts class 12.9 | Tightening torque |
|---|---|---|
| 100 | 8 - M30×150 | 1775 Nm |



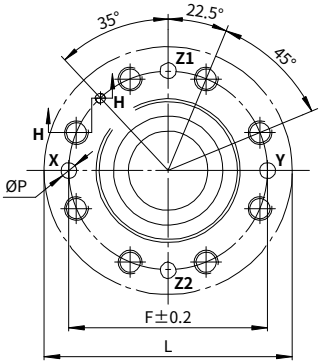

Notes: 1) This communication cable has been installed at the factory, please do not disassemble it unless necessary.

## Installation dimensions according to DIN ISO 7368 (dimensions in mm)

**NG 25 to 63:**




**NG 80, 100:**




| Size | 25 | 32 | 40 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|---|
| A | 4 | 6 | 7.5 | 8 | 12.5 | - | - |
| B | 13 | 18 | 19.5 | 20 | 24.5 | - | - |
| C | 29 | 35 | 42.5 | 50 | 62.5 | - | - |
| D | 58 | 70 | 85 | 100 | 125 | - | - |
| E | 62 | 76 | 92.5 | 108 | 137.5 | - | - |
| F | 58 | 70 | 85 | 100 | 125 | 200 | 245 |
| G | 29 | 35 | 42.5 | 50 | 62.5 | - | - |
| $L_{min}$ | 85 | 102 | 125 | 140 | 180 | 250 | 300 |
| M | M12 | M16 | M20 | M20 | M30 | M24 | M30 |
| ØN | 6 | 6 | 6 | 8 | 8 | 10 | 10 |
| $ØP_{max}$ | 6 | 8 | 10 | 10 | 12 | 16 | 20 |
| R | 30 | 38 | 46 | 46 | 66 | 50 | 66 |
| $S_{max}$ | 8 | 8 | 8 | 8 | 8 | 8 | 10 |
| T | 4 | 6 | 7.5 | 8 | 12.5 | - | - |
| V | 62 | 76 | 92.5 | 108 | 137.5 | - | - |
| Ød1 | 45 | 60 | 75 | 90 | 120 | 145 | 180 |
| Ød2 | 34 | 45 | 55 | 68 | 90 | 110 | 135 |
| $Ød3_{max}$ | 25 | 32 | 40 | 50 | 63 | 80 | 100 |
| $Ød4_{max}$ | 27 | 38.5 | 54.5 | 62.5 | 87 | 100 | 120 |
| L1 | $58^{+0.1}_{0}$ | $70^{+0.1}_{0}$ | $87^{+0.1}_{0}$ | $100^{+0.1}_{0}$ | $130^{+0.1}_{0}$ | $175^{+0.2}_{0}$ | $210^{+0.2}_{0}$ |
| L2 | $72^{+0.1}_{0}$ | $85^{+0.1}_{0}$ | $105^{+0.1}_{0}$ | $122^{+0.1}_{0}$ | $155^{+0.1}_{0}$ | $205^{+0.2}_{0}$ | $245^{+0.2}_{0}$ |
| L3 | 70 | 83 | 102 | 117 | 150 | 200 | 239 |
| L4 | 57 | 68.5 | 84.5 | 97.5 | 127 | 170.5 | 205.5 |
| L5 | 30 | 30 | 30 | 35 | 40 | 40 | 50 |
| L6 | 2.5 | 2.5 | 3 | 3 | 4 | 5 | 5 |
| L7 | 2.5 | 2.5 | 3 | 3 | 4 | 5 | 5 |
| U | 0.03 | 0.03 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| W | 0.05 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |