

Chapter 6:

Explanation of the Hafner type numbering system



Review of previous chapters

In the earlier chapters we introduced you to the most important characteristics of directional valves.

We have summarized them below:

Categorizing control valves by the following criteria ([chapter 3](#)):

- **Basic design**
(spool valve, poppet valve)
- **Actuation**
(mechanically, manually, pneumatically or electrically actuated valves)
- **Number of positions**
(2-, 3-, 4-, 5-way)
- **Number of ports (in combination with positions)**
(2/2-way, 3/2-way, 5/2-way, 5/3-way, ...)
- **Normal position**
(for 2/2- and 3/2-way valves: normally closed or open, for 5/3-way valves: center closed, exhausted, pressurized)

By design ([chapter 4](#)) we have to distinguish between poppet and spool valves. It is important to understand the difference in order to select the right valve for any application.

- **2/2- or 3/2-way** electrically and directly actuated poppet valves: directly controlled by the plunger of the solenoid system.
- **3- or 5-way** electrically actuated spool valves: controlled by an additional pilot-valve

Introduction to directional valves ([chapter 5](#)):

- **ISO symbols** and their meaning when it comes to function and positions
- **Numbering of their ports**

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Explanation of the Hafner type numbering system

The HAFNER type numbers are a combination of letters and numbers, which carry further meaning. The most important characteristics of the valves are to be found in the type number.

The type number contains 3 major blocks (1-3)



To explain the system we use the valve type MH 510 701 G. This number has 3 main parts plus a suffix (block 4, variable).

... the fourth block indicates a special variation.



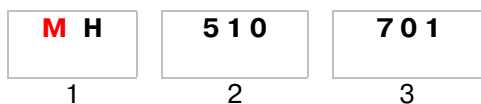
The valve is defined by the 3 main blocks. The fourth block is there to indicate extra features, special materials etc.

Although there are some exceptions, this standard covers most of the products.

Block 1 - actuation

The first letter defines **the mode of actuation** of the valve

Type



- **B** = Mechanically or manually actuated
- **H** = Hand lever valve
- **P** = Pneumatically actuated
- **M** = Solenoid valve

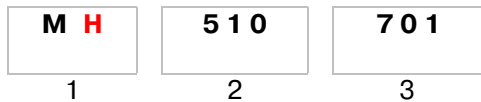
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Type

The next letter(s) give further information



- **B** = Mechanically or manually actuated
 - **BV** = stem actuated valve
 - **BR** = roller lever valve
 - **BL** = roller lever valve with idle return
 - **BA** = stem valve with coupling for knob
 - **BH** = push-pull valve
- **H** = Hand lever valve
 - **HV** = with spring return (one stable position)
 - **HVR** = indexed
 - **HV(R)N** = valve-body with interface following NAMUR-standard
- **P** = Pneumatically actuated - no further information for standard products
 - **PN** = valve-body with NAMUR-interface
- **M** = Solenoid valve
 - **MH** = with manual override to turn, normally closed
 - **MD** = momentary manual override to push, normally closed
 - **MOH** = normally open MH valve (2/2 and 3/2-way)
 - **MOD** = normally open MD valve (2/2 and 3/2-way)
 - **MEH / MED** = with external pilot feed
 - **MEOH** = n.o. and with external pilot feed
 - **MK** = modified MH-valve, with solenoid MA16 (low power consumption 1.8W and for valve terminals)
 - **MNH / MND** = valve-body with NAMUR-interface
 - **MNOH** = valve-body with NAMUR-interface, normally open

This list is not limited to the types mentioned above, but only gives an overview about the most common products. There are many more.

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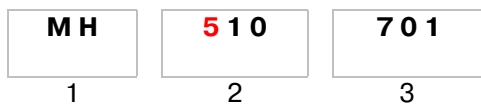
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Block 2

The second block contains information about the number of ports, the number of stable positions and the type of spring.

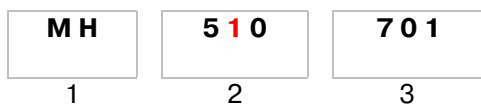
Number of ports in main valve



The first digit displays the number of ports.

- **2** = 2-way = 2 ports (2/2)
- **3** = 3-way = 3 ports (3/2 or 3/3)
- **5** = 5-way = 5 ports (5/2 or 5/3)

Positions



The second digit displays the number of positions and whether the valve has one or two stable positions.

- **1** = one stable position (single sol. / pilot)
- **2** = two stable positions (double sol. / pilot)
- **3** = 3-positions (_/3-way valves)

Return



In combination with the second digit (in this case "1"), the third digit informs about the type of spring:

- **10** = air spring (no *mechanic spring*)
- **11** = mechanic spring inside, can also be executed as a combination of an air- with a mechanic spring. At double solenoid valves the third number is always a "0" as they don't have any spring return.

Center position

for 3-position valves (e.g. MH 531 701)



In case we are talking about a 3-position valve, the third number defines the center position:

- **31** = Center closed
- **32** = Center exhausted
- **33** = Center pressurized

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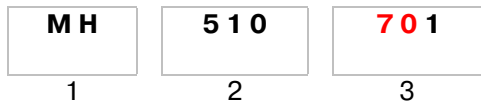
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Block 3

Block 3 contains information about orifice size and ports.

Orifice size



Ports are BSP threaded by default.

NPT threads are to be indicated by a "NPT" suffix in block 4.

The second digit in block 3 defines the type of connection:

- **0** = tapped working ports 2 and 4
- **4** = 4 mm push-in fitting(s) in port(s) 2 and 4
- **6** = 6 mm push-in fitting(s) in port(s) 2 and 4

The first digit(s) represent the orifice and thread size.

- **20** = DN 2 mm, port: M5
- **30** = DN 3 mm, port: M5 or G1/8"
- **34** = DN 3 mm, 4 mm push-in fitting
- **40** = DN 4 mm, port: G1/8"
- **46** = DN 4 mm, 6 mm push-in fitting
- **50** = DN 5 mm, port: G1/8"
- **70** = DN 7 mm, port: G1/4"
- **80** = DN 8 mm, port: G1/4"
- **10** = DN 10 mm, port: G3/8"
- **12** = DN 12 mm, port: G1/2"
- **18** = DN 18 mm, port: G3/4"

The orifice size also lets us know about the flow:

- **20** = DN 2 mm, flow: 115 ... 125 l/min
- **30** = DN 3 mm, flow: 280 l/min
- **40** = DN 4 mm, flow: 450 l/min
- **50** = DN 5 mm, flow: 650 l/min
- **70** = DN 7 mm, flow: 1250 l/min
- **80** = DN 8 mm, flow 1450 l/min
- **10** = DN 10 mm, flow: 2250 l/min
- **12** = DN 12 mm, flow: 3000 l/min
- **18** = DN 18 mm, flow: 6000 l/min

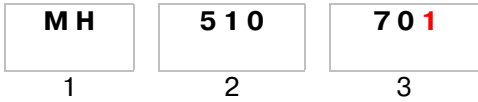
You can get more information about flow from the catalogue.

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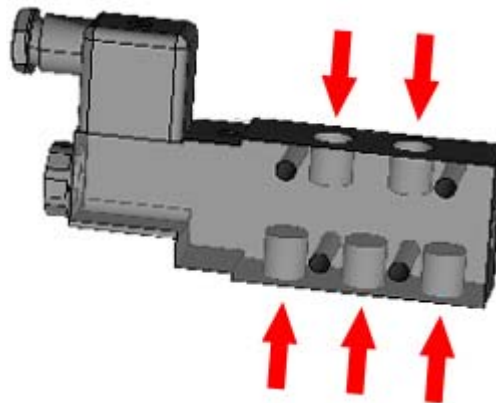
Position of ports



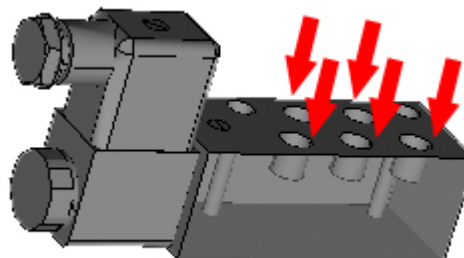
The last digit in block 3 defines the position of the ports within the body:

- **1** = Standard, ports on both sides of the valve
- **2** = All the ports on one side
- **3** = For manifold-plates only, supply and exhaust on one side, working ports on opposite side in the valve
- **4** = For manifold-plates only, all the ports are in the plate.

Standard (e.g. MH 510 701, MH 510 703)



All the ports on one side (e.g. MH 510 502, MH 510 704)



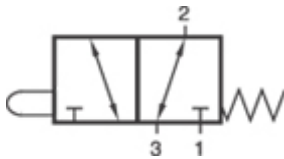
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On the following four pages we explain some exemplary type numbers based on catalogue items:

BV 311 201



Block 1

Actuation: **BV**

- **B** = Mechanically actuated
- **V** = Stem

Block 2

- First digit: number of ports = **3**
- Second digit: number of (stable) positions = **1**
- Third digit: return = **1** = mechanic spring
 - ⇒ 3/2-way valve
 - ⇒ Mechanic spring return

Block 3

First and second digit: orifice size = **20** = orifice size 2 mm

Third digit: position of the ports = **1** = standard

- ⇒ M5 tapped ports (belongs to orifice size 2 mm)
- ⇒ Port 1 and 3 on one side, working port 2 on the opposite side.

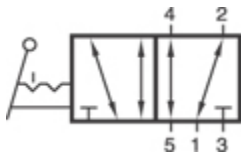
Therefore the valve **BV 311 201** is a:

- Stem actuated valve
- 3/2-way with mechanic spring return
- M5-ports on both sides of the valve, orifice size 2 mm

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HVR 520 701



Block 1

Actuation: **HVR**

- H = Hand lever valve
- VR = Indexed (without spring return)

Block 2

- First digit: number of ports = **5**
- Second digit: number of (stable) positions = **2**
- Third digit: return 0 = non = 2 stable positions
 - ⇒ 5/2-way valve
 - ⇒ 2 stable positions

Block 3

First and second digit: orifice size = **70** = orifice size 7 mm

Third digit: position of the ports = **1** = standard

- ⇒ G 1/4" tapped ports (belongs to orifice size 7 mm)
- ⇒ Ports 1, 3, 5 on one side, working ports 2, 4 on the opposite side.

Therefore the valve HVR 520 701 is a:

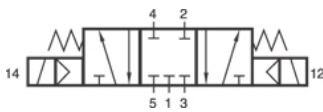
- Hand-lever valve
- 5/2-way indexed
- G 1/4" ports on both sides of the valve, orifice size 7 mm

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MD 531 401 24 DC



Block 1

Actuation: **MD**

- M = Solenoid valve
- D = Manual override to push, momentary

Block 2

- First digit: number of ports = **5**
- Second digit: number of positions = **3**
- Third digit (if second one is a 3): center 1 = closed
 - ⇒ 5/3-way valve
 - ⇒ Center closed

Block 3

First and second digit: orifice size = **40** = orifice size 4 mm

Third digit: position of the ports = **1** = standard

- ⇒ G 1/8" tapped ports (belongs to orifice size 4 mm)
- ⇒ Ports 1, 3, 5 on one side, working ports 2, 4 on the opposite side.

Block 4

(Misc.) **24DC** for MD and MK valves only: voltage

Therefore the valve MD 531 401 24 DC is a:

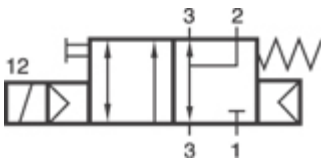
- Solenoid valve with manual override to push
- 5/3-way center closed
- G 1/8" ports on both sides of the valve, orifice size 4 mm
- Integrated solenoid 24V DC

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MNH 311 701



Block 1

Actuation: **MNH**

- M = Solenoid valve
- N = NAMUR-interface
- H = Manual override to turn

Block 2

- First digit: number of ports = **3**
- Second digit: number of (stable) positions = **1**
- Third digit: return = **1** = mechanic spring inside (in this case a combined spring).
 - ⇒ 3/2-way valve
 - ⇒ Normally closed
 - ⇒ With combined mech.-pneum. spring

Block 3

First and second digit: orifice size = **70** = orifice size 7

Third digit: position of the ports = **1** = standard, in combination with the N in Block 1 with NAMUR-interface.

- ⇒ G 1/4" tapped ports (belongs to orifice size 7 mm)
- ⇒ Ports 1, 3, 5 on one side, working ports in accordance to NAMUR-standard (VDI/VDE 3845)

Therefore the valve MNH 311 701 is a:

- Solenoid valve with manual override to turn
- 3/2-way n.c.
- NAMUR-interface and ports 1, 3, 5 G 1/4, orifice size 7 mm

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As you can see the HAFNER type numbering system is following a standard that allows you to understand what type of valve is in use or required whenever those numbers are mentioned.

An overview about the structure of the Hafner type numbers can also be found on page 16 and 17 in the valve catalogue 2016:

page 16

Type numbering system on the basis of MNH 510 701 24DC

Block 1 MNH

Actuation

M	Solenoid valve	Without manual override
MMD	Solenoid valve with momentary manual override	10 mm
MD	Solenoid valve with momentary manual override	normally 16 mm
MOD	Solenoid valve with momentary manual override	normally 16 mm
MH	Solenoid valve with bistable manual override	2- and 3-way n.o. normally 22 mm plus
MOH	Solenoid valve with bistable manual override	normally 22 mm plus
MEH	Solenoid valve with bistable manual override	With external pilot feed
MNH	Solenoid valve with bistable manual override	NAMUR-interface
MNOH	Solenoid valve with bistable manual override	NAMUR-interface
MK	Solenoid valve with momentary manual override	Low power
MNK	Solenoid valve with momentary manual override	Low power NAMUR-interface
P	Pneumatically actuated valve	
HV	Lever actuated valve with spring return	
HVR	Lever actuated valve indexed	
BV/BG	Stem actuated valve	
BZ	Stem actuated valve, actuation by pulling the stem	
BR	Roller lever valve	
BL	Roller lever valve with idle return	
BA	Valve for panel mounting	
BH	Push-pull button valve for panel mounting	
BHP	Push-pull button valve with pneumatic reset	
VA	OR-gate	
ES	AND-gate	
SE	Quick-exhaust valve	
DR	Flow regulator, uni-directional	
D	Flow regulator, bi-directional	
DRN	Flow regulator with NAMUR-interface	
UB	Air-recirculation block with NAMUR-interface	
SENR	Quick-Exhaust block with NAMUR-interface	
BHN	Block and block / block and bleed valves with NAMUR-interface	
ZVP	Plates for cylinder-valve combinations	
ZPN	Various accessory plates	

Block 2 510

Function

First number: 2 = 2-way, 3 = 3-way or 5 = 5-way valve

Second number: 1 = actuation by permanent signal, 2 = actuated by impulse, 3 = 3-way valves, 33 = 5/3-way valves, 33_ = 3/3-way valves

Third number: For 5/3-way and 3/3-way valves: 1 = middle position closed, 2 = middle position exhausted, 3 = middle position pressurized

Other valves: 0 = pneumatic spring, 1 = mechanical spring (MH-, MNH- and PN-valves have a combined spring)

210	2/2-way	Pneumatic spring return
310	3/2-way	Pneumatic spring return
311	3/2-way	Combined / mechanical spring return (depends on type)
320	3/2-way	Double solenoid
510	5/2-way	Pneumatic spring return
511	5/2-way	Combined / mechanical spring return (depends on type)
520	5/2-way	Double solenoid
531	5/3-way	Centre closed
532	5/3-way	Centre exhausted
533	5/3-way	Centre pressurized

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The Hafner valve type numbering system consists of at least 3 blocks. Block 4 is to be used for voltage indication or special suffixes. Please note: This overview is not intended to be exhaustive.

Block 3 701

Size & Position of Ports

In-line valves:

Orifice size	Ports	Position of Ports
201	2 mm	M5
202	2 mm	M5
243	2 mm	PI 4 mm
301	3 mm	G 1/8"
302	3 mm	M5
341	3 mm	PI 4 mm
401	4 mm	G 1/8"
461	4 mm	PI 6 mm
442	4 mm	PI 4 mm
462	4 mm	PI 6 mm
501	5 mm	G 1/8"
502	5 mm	G 1/8"
701	7 mm	G 1/4"
711	7 mm	G 1/4"
801	8 mm	G 1/4"
101	10 mm	G 3/8"
121	12 mm	G 1/2"
181	18 mm	G 3/4"

Direct acting valves:

Orifice size	Ports	Position of Ports
010	1 mm	M5
012	1,2 mm	M5
015	1,2 mm	G 1/8"
305	3 mm	G 1/8"
309	3 mm	G 1/4"
014	1,2 mm	G 1/8"
019	1,2 mm	G 1/8" - pil 6 mm
013	1,2 mm	G 1/8"
017	1,2 mm	G 1/8" - G 1/4"
313	3 mm	G 1/8"
317	3 mm	G 1/8" - G 1/4"

Valves for manifold assembly:

Orifice size	Ports	Position of Ports
105	1,2 mm	G 1/4" - G 1/8"
239	3 mm	G 1/4"
339	3 mm	G 1/4"
304	3 mm	Flange for manifold
503	5 mm	G 1/8"
504	5 mm	Flange for manifold
703	7 mm	G 1/8"
704	7 mm	Flange for manifold
104	10 mm	Flange for manifold

Block 4 24DC

Suffixes

Block 4 is to be used to indicate the voltage at solenoid valves or to give further information on special executions. Block 4 can consist of several suffixes.

Voltages	6VDC, 12VDC, 24VDC, 48DC, 24VAC, 110AC, 230AC
O.S.	without coil
NPT	NPT threads
TT	Low temperature
HT	High temperature
VES	Full stainless steel
KES	Stainless steel with PA pilot-head
G	Valves can be used in-line and also on manifold plates
Ex	ATEX-approved non-electrical valve
Ex ia	ATEX-approved for Ex ia coils
Ex m	ATEX-approved for Ex m coils
Ex nA	ATEX-approved for Ex nA coils
Ex e mb	ATEX-approved for Ex e mb coils
Ex dm	ATEX-approved for Ex dm coils
Ex d	ATEX-approved for Ex d coils
EDS	Brass-free to the outside
BMF	Entirely brass-free

Please note: Valves type "G" (e.g. 701 G) can be used as an in-line valve as well as for manifold assembly.

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