MJ3K

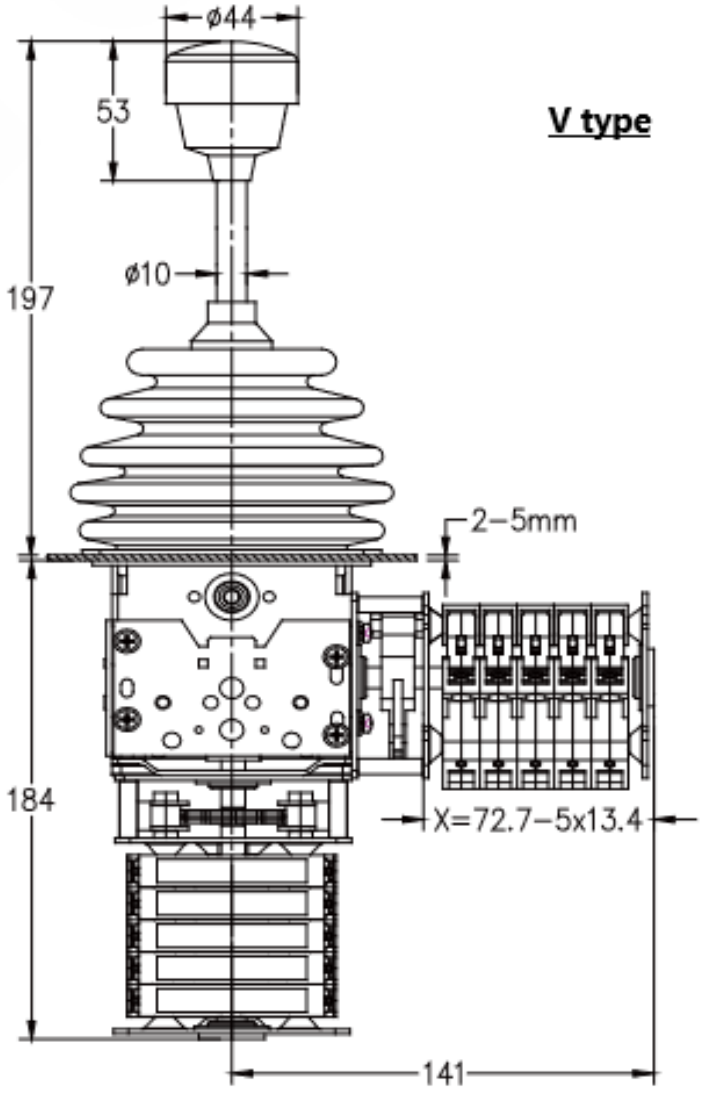
HEAVY INDUSTRIAL JOYSTICK

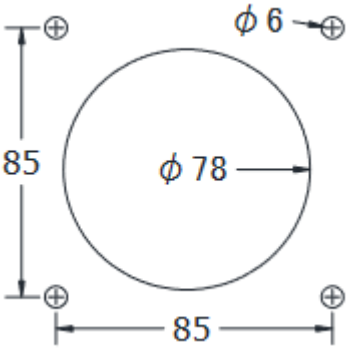
Heavy Industrial joystick MJ3K

MJ3K joysticks offer high-intensity lever and excellent proportional control. They are mainly used in hydraulic or variable frequency motor control such as rotary tables, cranes, work platforms, This joystick is available in one, two or three axes. It can be supplied with contactless Hall effect sensors, long life potentiometers, or only contacts.

- Potentiometers or Hall sensors.
- Large choice of handles
- 1 , 2 or 3 axes (Thumbwheel)
- Proportional control and switch output
- Resistant to oil, maritime climate, ozone and UV radiation
- CE approved, RoHS 2011/65/EU, Annex II, including (EU) 2015/863 compliant.
- Pure silver contacts to ensure durability
- Support horizontal and vertical contact drive arrangements

V type





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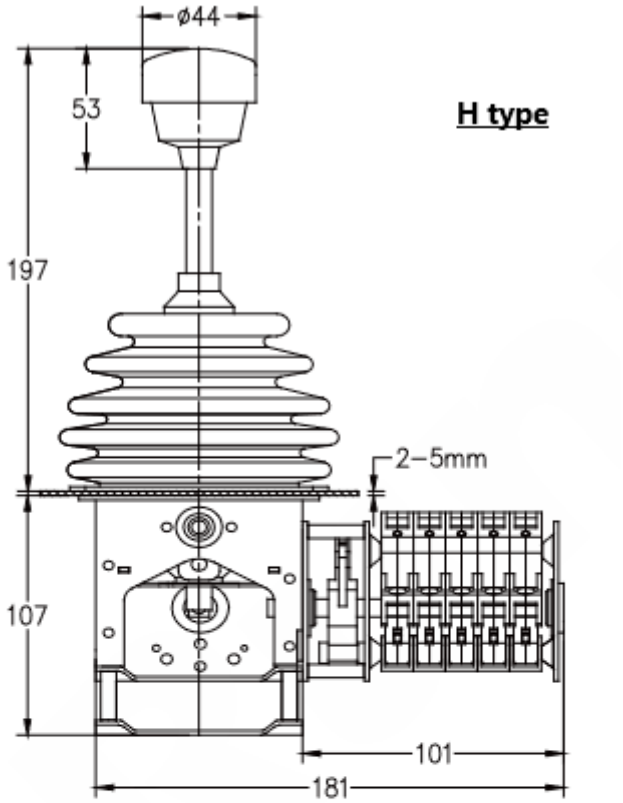
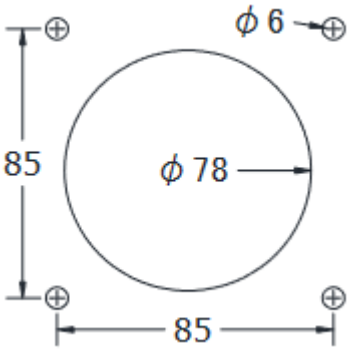
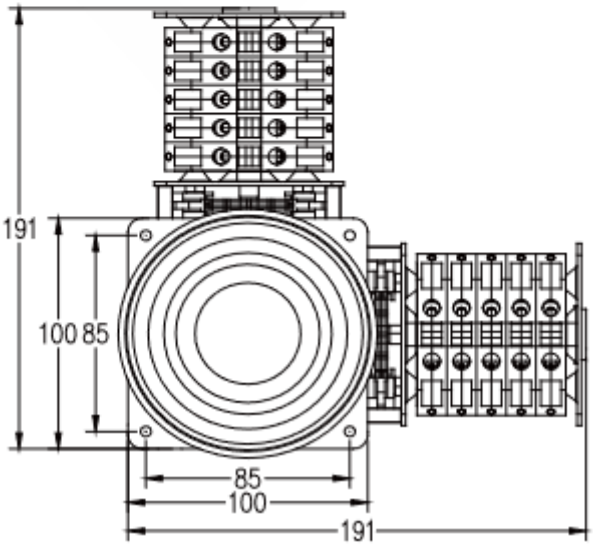
H type







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Technical Information

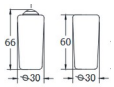
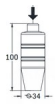
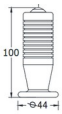
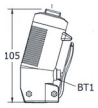
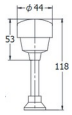
Environmental caracteristics	
Storage Temperature	-50 ~ +80 °C
Operating Temperature	-40 ~ +80 °C
Protection Grade	IP64
Vibration	3g, 10 ~ 200 Hz
Impact	20g, 6 ms, semi-sinusoidal

Mechanical caracteristics	
Mecanical Angle	Potentiometer:32 °,Hall sensor:20°
Operating Torque	5 ~ 50 N
Mechanical Life	5 Millions
Mechanical Error	± 0,5 °

Hall effect sensors	
Power supply voltage	5 ± 0,5 VDC
Curent Consumption	6,5 mA
Resolution Ratio	Infinite
Load Resistance	5 kΩ
Median Voltage (no-load)	48 ~ 52 %
Maximum Voltage	15 VDC
Reversed Polarity Maximum Voltage	14,5 VDC

Potentiometers	
Power supply Voltage	DC 24V
Power supply Current	< 20mA
Resolution Ratio	infinite
Resistance (±10%)	5 kΩ or 10 kΩ
Electrical Angle	±32 °
Output Voltage Range (relative)	0 ~ 100 % or 10 ~ 90 %
Median Voltage	48 ~ 52 %
Maximum Load Voltage	32 V DC
Maximum Power Consumption (25 °C)	0,25 W
Switch Direction	Switch position ±3°

Handle Type

Type	Style	Functions	Dimensions
MH1		With or without button	Ø 30 / L 66-60
MH2		/	Ø 32
MH4		With or without button	Ø 30 / L 84-80
MH5		Lift to release	Ø 35 / L 87
MH6		Press to release	Ø 34 / L 100
MH7		With or without button	Ø 34/44 / L 100 - 95
MH8			Ø 40 / L 58
MH10		Multi-Combinations Deadman Trigger	Refer to datasheet MH10
MH15		Rocker – Deadman Trigger	Refer to datasheet MH15
MH39		Lift to relase	Ø 44 / L118
MH80		With 2 buttons	Ø 39 / L 65

HD5 handle only single axis, Friction & Self-lock or Spring Return+zero interlock
HD6 handle only single axis, Friction & Self-lock

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Product Configuration

No.	Item	Content
1	Serie	**MJ3K**
2	Operation Mode	**F**. Friction **S**. Spring Return **T** Spring Return+zero interlock **L**. Friction & Self-lock
3	Limiter Plate	**Y.** Y axis **P**. Cross (X & Y) **Q**. Without (Full) **S**. Square
4	Switch assembly type	**H:**Switch assembled horizontal (Standard) **V :**Switch assembled vertical
5	Electrical Output Form With Hall Sensors	**H100**. Input. 5V DC, Output 0~2,5~5V (Rail to Rail)
		H80. Input. 5V DC, Output 0,5~2,5~4,5V
	Electrical Output Form With Potentiometers	**POT (VALUE)**. Standard potentiometer(s)
		CT (VALUE). With center tap
		2410. Input. 24V DC, Output 0~10V
		2410A. Input. 24V DC, Output -10~0~10V
		2410S. Input. 24V DC, Output 10~0~10V
		2405. Input. 24V DC, Output 0~5V
		2405A. Input. 24V DC, Output -5~0~5V
		2405S. Input. 24V DC, Output 5~0~5V
		2442. Input. 24V DC, Output 4~12~20mA
		2422. Input. 24V DC, Output 20~4~20mA
6	Potentiometer type	**1K, 2K, 5K, 10K, 20K** or **H** (Hall sensor)
7	Contact arrangement	**Cf contact arrangement page 6-7**
8	Handle Type	**MH1,MH2,MH4,MH5,MH6,MH7,MH8,MH10,MH15,MH39** or **MH80**
9	Mounting Type	**M2 :**85X85 central hole Ø63 **M5 :** 85X85 central hole Ø78

Example : **MJ3K – S – P – V – CT (10K) – 05 (5) – MH10 – M5**

MJ3K : Industrial joystick

- **S** : Spring return device
- **P** : 2 axis with cross limiter plate (X & Y axis)
- **V :** Switch assembled vertical
- **CT (10K)** : Potentiometer with center tap

5(5) : Contact arrangement

- **MH10** : Handle type MH10
- **M5** : Mounting type M5

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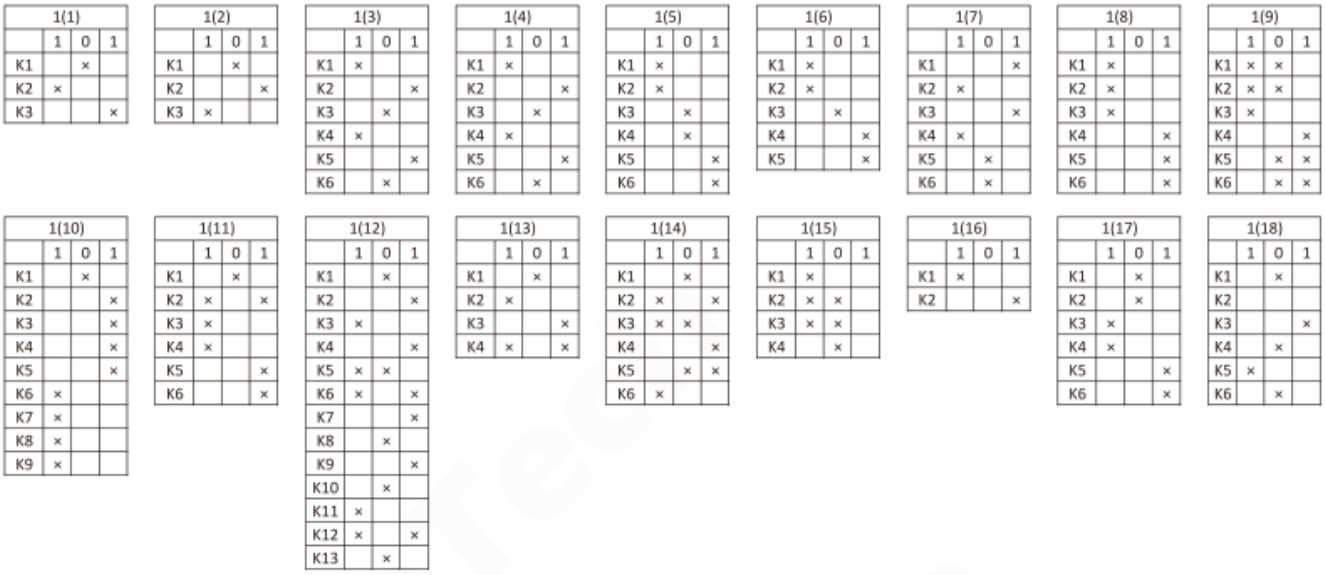
Contact arrangement :

1 step per direction :



1(1)	1	0	1
K1		×	
K2	×		
K3			×

1(2)	1	0	1
K1		×	
K2			×
K3	×		

1(3)	1	0	1
K1	×		
K2			×
K3		×	
K4	×		
K5			×
K6		×	

1(4)	1	0	1
K1	×		
K2			×
K3		×	
K4	×		
K5			×
K6		×	

1(5)	1	0	1
K1	×		
K2	×		
K3		×	
K4		×	
K5			×
K6			×

1(6)	1	0	1
K1	×		
K2	×		
K3		×	
K4			×
K5			×

1(7)	1	0	1
K1			×
K2	×		
K3			×
K4	×		
K5		×	
K6		×	

1(8)	1	0	1
K1	×		
K2	×		
K3	×		
K4			×
K5			×
K6			×

1(9)	1	0	1
K1	×	×	
K2	×	×	
K3	×		
K4			×
K5		×	×
K6		×	×

1(10)	1	0	1
K1		×	
K2			×
K3			×
K4			×
K5			×
K6	×		
K7	×		
K8	×		
K9	×		

1(11)	1	0	1
K1		×	
K2	×		×
K3	×		
K4	×		
K5			×
K6			×

1(12)	1	0	1
K1		×	
K2			×
K3	×		
K4			×
K5	×	×	
K6	×		×
K7			×
K8		×	
K9			×
K10		×	
K11	×		
K12	×		×
K13		×	

1(13)	1	0	1
K1		×	
K2	×		
K3			×
K4	×		×

1(14)	1	0	1
K1		×	
K2	×		×
K3	×	×	
K4			×
K5		×	×
K6	×		

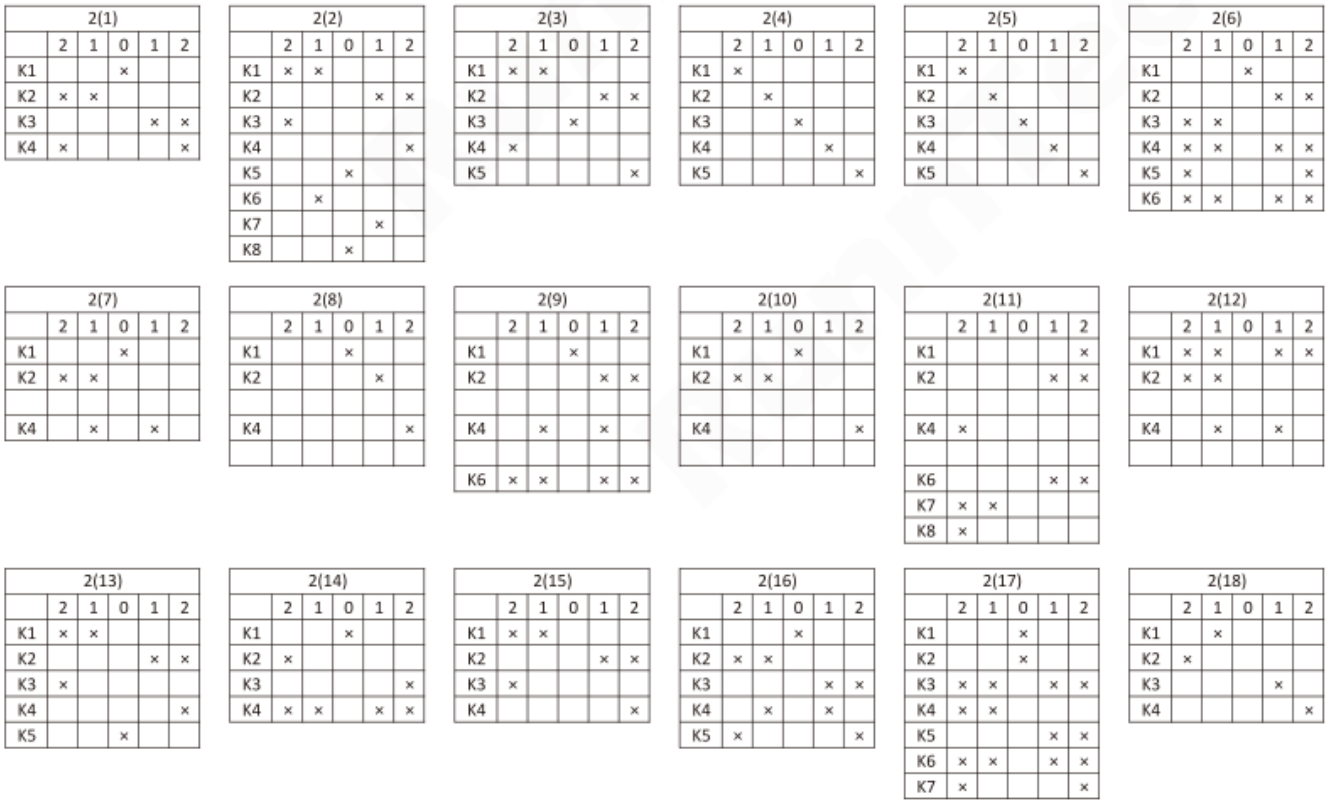
1(15)	1	0	1
K1	×		
K2	×	×	
K3	×	×	
K4		×	

1(16)	1	0	1
K1	×		
K2			×

1(17)	1	0	1
K1		×	
K2		×	
K3	×		
K4	×		
K5			×
K6			×

1(18)	1	0	1
K1		×	
K2			
K3			×
K4		×	
K5	×		
K6		×	

2 steps per direction :



2(1)	2	1	0	1	2
K1			×		
K2	×	×			
K3				×	×
K4	×				×

2(2)	2	1	0	1	2
K1	×	×			
K2				×	×
K3	×				
K4					×
K5			×		
K6		×			
K7				×	
K8			×		

2(3)	2	1	0	1	2
K1	×	×			
K2				×	×
K3			×		
K4	×				
K5					×

2(4)	2	1	0	1	2
K1	×				
K2		×			
K3			×		
K4				×	
K5					×

2(5)	2	1	0	1	2
K1	×				
K2		×			
K3			×		
K4				×	
K5					×

2(6)	2	1	0	1	2
K1			×		
K2				×	×
K3	×	×			
K4	×	×		×	×
K5	×				×
K6	×	×		×	×

2(7)	2	1	0	1	2
K1			×		
K2	×	×			
K4		×		×	

2(8)	2	1	0	1	2
K1			×		
K2				×	
K4					×

2(9)	2	1	0	1	2
K1			×		
K2				×	×
K4		×		×	
K6	×	×		×	×

2(10)	2	1	0	1	2
K1			×		
K2	×	×			
K4					×

2(11)	2	1	0	1	2
K1					×
K2				×	×
K4	×				
K6				×	×
K7	×	×			
K8	×				

2(12)	2	1	0	1	2
K1	×	×		×	×
K2	×	×			
K4		×		×	

2(13)	2	1	0	1	2
K1	×	×			
K2				×	×
K3	×				
K4					×
K5			×		

2(14)	2	1	0	1	2
K1			×		
K2	×				
K3					×
K4	×	×		×	×

2(15)	2	1	0	1	2
K1	×	×			
K2				×	×
K3	×				
K4					×

2(16)	2	1	0	1	2
K1			×		
K2	×	×			
K3				×	×
K4		×		×	
K5	×				×

2(17)	2	1	0	1	2
K1			×		
K2			×		
K3	×	×		×	×
K4	×	×			
K5				×	×
K6	×	×		×	×
K7	×				×

2(18)	2	1	0	1	2
K1		×			
K2	×				
K3				×	
K4					×

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3 steps per direction :

3(1)

	3	2	1	0	1	2	3
K1				×			
K2	×	×	×				
K3					×	×	×
K4	×	×				×	×
K5	×						×

3(2)

	3	2	1	0	1	2	3
K1				×			
K2	×	×	×		×	×	×
K3	×	×	×				
K4					×	×	×
K5	×	×				×	×
K6	×						×

3(3)

	3	2	1	0	1	2	3
K1			×	×			
K2	×	×	×				
K3		×					
K4	×	×					
K5	×						
K6	×						
K7				×	×		
K8					×	×	×
K9					×		
K10						×	×
K11							×
K12							×

3(4)

	3	2	1	0	1	2	3
K1				×			
K2	×	×	×				
K3					×	×	×
K4			×		×		
K5	×	×				×	×
K6	×						×

3(5)

	3	2	1	0	1	2	3
K1				×			
K2					×	×	×
K3	×	×	×				
K4	×		×		×		×
K5	×	×				×	×

3(6)

	3	2	1	0	1	2	3
K1	×	×	×		×	×	×
K2	×	×	×				
K3			×		×		
K4		×				×	
K5	×						×

3(7)

	3	2	1	0	1	2	3
K1			×				
K2		×					
K3	×						
K4					×		
K5						×	
K6							×

3(8)

	3	2	1	0	1	2	3
K1				×			
K2				×			
K3							
K4			×		×		
K5		×				×	
K6	×						×

3(9)

	3	2	1	0	1	2	3
K1				×			
K2	×	×	×		×	×	×
K3	×	×	×				
K4					×	×	×
K5			×		×		
K6		×				×	
K7	×						×

3(10)

	3	2	1	0	1	2	3
K1					×	×	×
K2	×	×				×	×
K3		×	×				×

3(11)

	3	2	1	0	1	2	3
K1				×			
K2	×	×	×				
K3					×	×	×
K4			×		×		
K5	×	×				×	×
K6	×						×
K7	×	×	×		×	×	×

3(12)

	3	2	1	0	1	2	3
K1				×			
K2	×	×	×		×	×	×
K3	×		×		×		×
K4	×	×				×	×

3(13)

	3	2	1	0	1	2	3
K1				×			
K2					×	×	×
K3	×	×	×				
K4						×	×
K5	×	×					
K6							×
K7	×						

3(14)

	3	2	1	0	1	2	3
K1					×	×	×
K2	×	×	×				
K3			×		×		
K4		×				×	
K5	×						×

3(15)

	3	2	1	0	1	2	3
K1				×			
K2					×	×	×
K3	×	×	×				
K4					×	×	×
K5	×	×	×				
K6		×	×	×	×	×	
K7	×	×	×		×	×	×
K8	×						×
K9	×	×				×	×
K10	×						×
K11					×	×	×
K12	×	×	×				

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4 steps per direction :

4(1)

	4	3	2	1	0	1	2	3	4
K1					×				
K2	×	×	×	×					
K3						×	×	×	×
K4	×	×	×				×	×	×
K5	×	×						×	×
K6	×								×

4(2)

	4	3	2	1	0	1	2	3	4
K1					×				
K2	×	×	×	×		×	×	×	×
K3	×	×	×	×					
K4						×	×	×	×
K5	×	×	×				×	×	×
K6	×	×						×	×
K7	×								×

4(3)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					

4(4)

	4	3	2	1	0	1	2	3	4
K1					×				
K2	×	×	×	×		×	×	×	×
K3						×	×	×	×
K4	×	×	×	×					

4(5)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					

4(6)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					
K4	×	×	×				×	×	×
K5	×	×						×	×
K6	×								×
K7	×	×	×	×	×				

4(7)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					
K4		×		×		×		×	
K5		×	×				×	×	
K6	×								×

4(8)

	4	3	2	1	0	1	2	3	4
K1				×		×	×	×	×
K2			×			×			×
K3		×					×		×
K4	×							×	×

4(10)

	4	3	2	1	0	1	2	3	4
K1					×				
K2	×	×						×	×
K3		×	×	×		×	×	×	
K4	×	×	×	×		×	×	×	×
K5	×	×	×	×	×				
K6				×	×	×			
K7					×				
K8	×	×						×	×
K9	×				×				×
K10	×	×	×				×	×	×
K11				×	×	×	×		

4(11)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					
K4				×		×			
K5	×	×	×				×	×	×
K6	×	×						×	×
K7	×								×

4(12)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					
K4						×	×	×	×
K5	×	×	×				×	×	×
K6	×	×						×	×
K7	×								×
K8	×	×	×	×		×	×	×	×

4(13)

	4	3	2	1	0	1	2	3	4
K1					×				
K2					×				
K3						×	×	×	×
K4	×	×	×	×					
K5	×	×	×	×		×	×	×	×
K6	×	×	×				×	×	×
K7	×	×						×	×
K8	×								×
K9	×								
K10									×

4(14)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					
K4	×	×	×	×					
K5						×	×	×	×
K6	×	×	×	×		×	×	×	×
K7					×	×	×	×	×
K8	×	×	×	×	×				×
K9					×				
K10	×	×	×				×	×	×
K11			×	×	×	×	×		
K12	×								×
K13		×	×	×		×	×	×	
K14		×	×	×	×	×	×	×	
K15						×	×	×	×
K16	×	×	×	×					
K17					×				

4(15)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3				×	×	×			
K4	×	×							
K5			×						
K6	×	×					×	×	×
K7		×					×	×	
K8		×							×
K9	×	×	×			×	×	×	×
K10	×	×	×	×					
K11						×	×	×	×
K12					×				
K13	×	×	×	×	×	×			
K14					×				

4(19)

	4	3	2	1	0	1	2	3	4
K1					×				
K2						×	×	×	×
K3	×	×	×	×					
K4	×	×	×		×		×	×	×
K5	×	×	×	×					
K6						×	×	×	×
K7			×	×			×	×	
K8						×	×	×	×
K9	×	×	×	×					
K10					×				
K11	×	×	×	×		×	×	×	×
K12	×	×	×	×					
K13						×	×	×	×
K14	×	×	×				×	×	×
K15	×	×						×	×
K16	×								×

4(20)

	4	3	2	1	0	1	2	3	4
K1					×				
K2	×	×	×	×					
K3						×	×	×	×
K4	×	×	×	×		×	×	×	×
K5					×	×	×	×	×
K6	×	×	×	×	×				
K7					×				
K8	×	×	×				×	×	×
K9	×	×						×	×
K10	×								×
K11	×	×	×	×		×	×	×	×
K12	×	×	×	×		×	×	×	×

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5 steps per direction :

5(1)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×		×	×	×	×	×
K3							×	×	×	×	×
K4	×	×	×	×	×						
K5	×	×	×	×				×	×	×	×
K6	×	×	×						×	×	×
K7	×	×								×	×
K8	×										×

5(2)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×						
K3							×	×	×	×	×
K4	×	×	×	×				×	×	×	×
K5	×	×	×						×	×	×
K6	×	×								×	×
K7	×										×

5(3)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2							×	×	×	×	×
K3	×	×	×	×	×						
K4	×	×	×	×				×	×	×	×
K5	×	×	×						×	×	×
K6	×	×								×	×
K7	×										×

5(4)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2							×	×	×	×	×
K3	×	×	×	×	×						

5(5)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×		×	×	×	×	×
K3	×	×	×	×				×	×	×	×
K4	×	×	×						×	×	×
K5	×	×							×	×	
K6	×	×	×	×	×						
K7							×	×	×	×	×
K8	×										×
K9			×	×	×		×	×	×		

5(6)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2											
K3	×	×	×	×				×	×	×	×
K4	×	×	×						×	×	×
K5	×	×								×	×
K6	×	×	×	×	×						
K7							×	×	×	×	×
K8	×										×
K9											

5(7)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2						×					
K3				×	×	×	×	×			
K4						×	×	×	×	×	×
K5	×	×				×				×	×
K6	×				×	×	×				×

5(8)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×						
K3							×	×	×	×	×
K4					×		×				
K5				×				×			
K6	×		×						×		×
K7	×	×								×	×

5(9)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2							×	×	×	×	×
K3	×	×	×	×	×						
K4							×	×	×	×	×
K5	×	×	×	×	×						
K6	×	×	×	×	×		×	×	×	×	×
K7					×	×	×				
K8						×					
K9	×	×	×	×	×						
K10							×	×	×	×	×
K11	×	×	×	×				×	×	×	×
K12	×	×	×						×	×	×
K13	×	×								×	×
K14											×
K15	×										
K16						×					
K17						×					

5(10)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×						
K3							×	×	×	×	×
K4	×	×	×	×	×		×	×	×	×	×
K5	×	×	×	×				×	×	×	×
K6	×	×	×						×	×	×
K7	×	×								×	×
K8	×										×
K9	×	×	×	×	×		×	×	×	×	×

5(11)

	5	4	3	2	1	0	1	2	3	4	5
K1	×	×	×	×	×		×	×	×	×	×
K2	×	×	×	×	×						
K3	×										×
K4		×	×						×	×	
K5		×		×				×		×	
K6						×					
K7					×		×				
K8				×				×			
K9			×						×		
K10		×								×	
K11	×										×
K12							×	×	×	×	×
K13	×	×	×	×	×						

5(12)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×						
K3							×	×	×	×	×
K4	×		×		×		×		×		×
K5			×	×				×	×		
K6	×	×								×	×

5(13)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2							×	×	×	×	×
K3	×	×	×	×	×						
K4						×					
K5	×	×	×	×				×	×	×	×
K6	×	×								×	×
K7	×										×
K8	×	×	×	×	×		×	×	×	×	×
K9	×	×	×						×	×	×

5(14)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×						
K3							×	×	×	×	×
K4					×		×				
K5				×				×			
K6			×						×		
K7		×								×	
K8	×										×

5(15)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2							×	×	×	×	×
K3	×	×	×	×	×						
K4	×	×	×	×				×	×	×	×
K5	×	×	×						×	×	×
K6	×	×								×	×
K7	×										×
K8	×	×	×	×	×		×	×	×	×	×

5(16)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2							×	×	×	×	×
K3	×	×	×	×	×						
K4	×			×	×		×	×			×
K5	×	×	×	×				×	×	×	×
K6	×	×								×	×
K7						×					

5(17)

	5	4	3	2	1	0	1	2	3	4	5
K2	×	×	×						×	×	×
K3	×	×							×	×	
K4	×										×
K5	×	×	×	×	×						
K6							×	×	×	×	×
K7						×					

5(18)

	5	4	3	2	1	0	1	2	3	4	5
K1						×					
K2	×	×	×	×	×						
K3							×	×	×	×	×
K4	×	×	×	×	×		×	×	×	×	×
K5	×	×	×	×				×	×	×	×
K6	×	×	×						×	×	×
K7	×	×								×	×
K8	×										×
K9	×										×

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6 steps per direction :

6(1)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2							×						
K3								×	×	×	×	×	×
K4	×	×	×	×	×	×							
K5	×	×	×	×	×				×	×	×	×	×
K6	×	×	×	×						×	×	×	×
K7	×	×	×								×	×	×
K8	×	×	×	×	×	×		×	×	×	×	×	×
K9	×	×										×	×
K10	×												×

6(2)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2							×						
K3	×	×	×	×	×	×							
K4								×	×	×	×	×	×
K5	×	×	×	×	×				×	×	×	×	×
K6	×	×	×	×						×	×	×	×
K7	×	×	×								×	×	×
K8	×	×										×	×
K9	×												×

6(3)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2	×	×	×	×	×	×							
K3								×	×	×	×	×	×
K4	×	×	×	×	×				×	×	×	×	×
K5	×	×	×	×						×	×	×	×
K6	×	×	×								×	×	×
K7	×	×										×	×
K8	×												×
K9													

6(4)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1	×	×	×	×	×	×		×	×	×	×	×	×
K2								×	×	×	×	×	×
K3	×	×	×	×	×	×							
K4	×	×	×	×	×				×	×	×	×	×
K5	×	×	×	×						×	×	×	×
K6	×	×	×								×	×	×
K7	×	×										×	×
K8	×												×
K9							×						
K1							×						

6(5)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2								×	×	×	×	×	×
K3	×	×	×	×	×	×							
K4	×	×	×	×	×				×	×	×	×	×
K5	×	×	×	×						×	×	×	×
K6	×	×	×								×	×	×
K7	×	×	×	×	×	×		×	×	×	×	×	×
K8	×	×										×	×
K9	×												×
K10													

6(6)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2								×	×	×	×	×	×
K3	×	×	×	×	×	×							
K4													
K5													
K6													
K7													
K8													
K9													
K10													

6(7)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2	×	×	×	×	×	×		×	×	×	×	×	×
K3							×	×	×	×	×	×	×
K4	×	×	×	×	×	×							
K5	×	×	×	×	×				×	×	×	×	×
K6	×	×	×	×						×	×	×	×
K7	×	×	×								×	×	×
K8	×	×										×	×
K9	×												×

6(8)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1	×												×
K2	×	×										×	×
K3	×	×	×								×	×	×
K4	×	×	×								×	×	×
K5	×	×	×	×						×	×	×	×
K6	×	×	×	×	×				×	×	×	×	×
K7	×	×	×	×	×				×	×	×	×	×
K8	×	×	×	×	×	×		×	×	×	×	×	×
K9	×	×	×	×	×	×							
K10							×	×	×	×	×	×	×
K11							×						
K12	×	×	×	×	×	×							
K13								×	×	×	×	×	×
K14							×						
K15	×	×	×	×	×	×							
K16								×	×	×	×	×	×

6(9)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2							×						
K3	×	×	×	×	×	×							
K4								×	×	×	×	×	×
K5	×	×	×	×	×				×	×	×	×	×
K6	×	×	×	×						×	×	×	×
K7	×	×	×								×	×	×
K8	×	×										×	×
K9	×												×
K1	×	×	×	×	×	×	×	×	×	×	×	×	×

6(10)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2						×		×					
K3	×	×	×	×	×	×		×	×	×	×	×	×
K4	×	×	×	×	×	×							
K5								×	×	×	×	×	×
K6	×	×	×	×	×				×	×	×	×	×
K7	×	×	×	×						×	×	×	×
K8	×	×	×								×	×	×
K9	×	×										×	×
K10	×												×

6(11)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2							×						
K3	×	×	×	×	×	×							
K4								×	×	×	×	×	×
K5	×	×	×	×	×				×	×	×	×	×
K6	×	×	×	×						×	×	×	×
K7	×	×	×								×	×	×
K8	×	×										×	×
K9	×												×
K10							×						

6(12)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							x						
K2							x						
K3							x						
K4							x						
K5								x	x	x	x	x	
K6		x	x	x	x	x							
K7		x	x	x	x	x		x	x	x	x	x	
K8		x	x	x	x	x			x	x	x	x	
K9				x	x	x				x	x	x	
K10					x	x					x	x	
K11						x						x	
K12													
K13													
K14													
K15													
K16													
K17													
K18													
K19													
K20													

6(13)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1								×	×	×	×	×	×
K2	×	×	×	×	×	×							
K3						×		×					
K4					×				×				
K5				×						×			
K6			×								×		
K7		×										×	
K8	×												×

6(14)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1							×						
K2	×	×	×	×	×	×							
K3								×	×	×	×	×	×
K4	×	×			×	×		×	×			×	×
K5		×	×	×	×				×	×	×	×	
K6	×	×	×							×	×	×	

6(15)

	6	5	4	3	2	1	0	1	2	3	4	5	6
K1		×		×		×		×		×		×	
K2	×			×	×				×	×			×
K3	×	×	×								×	×	×
K4								×	×	×	×	×	×

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