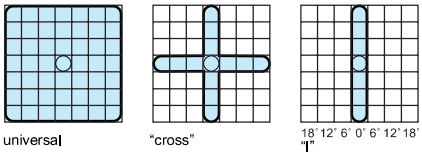
Controllers
For hoisting applications, type **XK**

Controller
The controllers are units designed to control hoisting and materials handling equipment by grouping their electrical circuits.
They comprise adaptable sub-assemblies that enable the construction of many different versions.
Used in association with automation system equipment, they ensure the starting, acceleration and braking of the drive motors.
They are designed for fitting into portable controller stations or controller desks. The mounting is dust and damp protected.

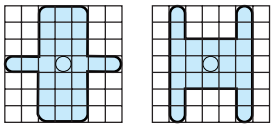
Mechanical block
Articulated mechanical assembly that holds the control lever, lever gate, actuating mechanism, cam carriers, contacts and potentiometer adaptation device.

Control lever
Operating device that enables separate or simultaneous control of the movements.
Fitted to it are dust and damp protecting bellows, the handle and mechanical and electrical safety devices that are actuated when the controller lever is returned to its zero (centre) position.

Lever gate
Standard lever gates



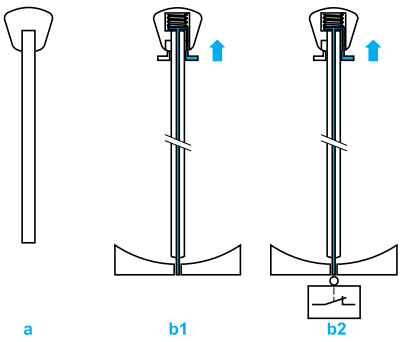
Examples of special lever gates

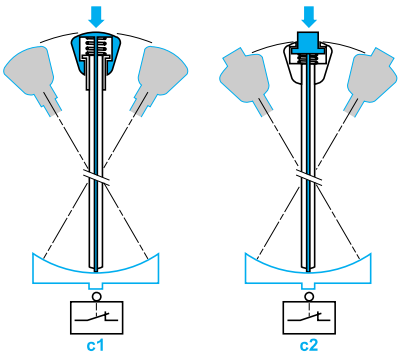


2 types of lever gate:
■ Standard types:
□ universal: allows the lever to move to its maximum travel in 1 or 2 directions simultaneously ("universal" or "8-direction" controller),
□ "cross" or "I" gates: only allow the lever to move to its maximum travel in 1 direction at a time.

■ Special types: related to the application, they are used to control the required combination of movements.

End stops
Additional devices for limiting the lever travel to a number of positions in a given direction.

Handles




a **Simple handle:** fixed knob screwed onto the control lever.

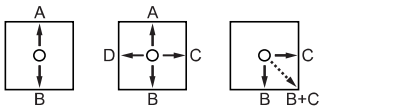
b1 **Handle with zero (centre) position mechanical interlock.**
Operation:
The knob of the handle comprises a fixed part (upper section) and a moving part (lower section).
When the lever is in the zero (centre) position, it is mechanically locked by a sliding rod within the lever.
To disengage the lock, the lower part of the handle is pulled upwards thus freeing the rod.

b2 **Handle with zero (centre) position mechanical interlock + electrical contact.**
Mechanical operation identical to that described above.
When the lever is in the zero (centre) position, the rod actuates a contact block.
The disengagement of the lock causes the contact(s) in the block to change state.

c1 **"Dead man's" handle.**
Operation:
The knob of the handle comprises a fixed part (lower section) and a moving part (upper section).
When the upper section of the knob is pushed downwards it pushes a sliding rod within the lever.
This rod actuates a moving bowl which, in turn, causes a contact block (located in the lower part of the mechanism) to change state and remain in this condition irrespective of the control lever position.

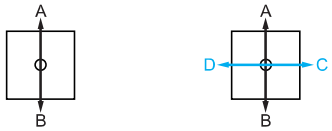
c2 **Handle with built-in flush or projecting pushbutton (audible alarm type).**
Mechanical operation identical to that described above.
The handle is fixed and it is only the pushbutton that operates the sliding rod.

Direction



This is the direction of operation of the control lever away from its zero (centre) position towards one of 2 or 4 directions (either 2 directions directly in line or 4 directions at 90°).
Diagonal movement is the operation of 2 directions simultaneously.

Movement

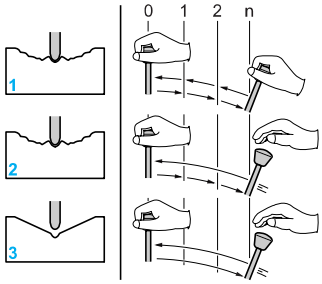


The movement is the combination of 2 directions either side of the zero position that are directly in line.

Electrical position

This is the change of state of a contact block obtained by angular displacement of the control lever.

Types of lever movement



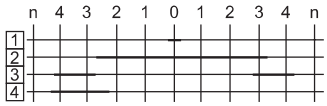
Three different types of lever operation for each direction:
1 **Notched positions, with stayput operation.**
The control lever is moved notch by notch from its zero (centre) position to its maximum travel position in the required direction.
The lever maintains its position when the operator releases the handle.
2 **Notched positions, with spring return to zero operation.**
Notched operation identical to that described above but with an automatic device that returns the lever to its zero (centre) position when the operator releases the handle.
3 **Unnotched positions, with spring return to zero operation.**
The control lever of the controller is moved from its zero (centre) position to its maximum travel position in the required direction without notching.
Irrespective of its position, the lever spring returns to the zero (centre) position when the operator releases the handle.

Electrical contacts

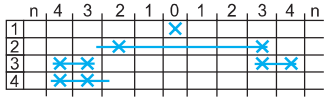
When designing the scheme take into account that all contacts are closed until actuated (opened) by an operating cam.

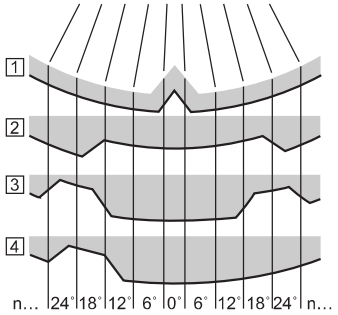
Cam schemes

Electrical scheme in accordance with IEC 113-4



Controller scheme in accordance with IEC 337-2A





The contact blocks are actuated by a series of various length cams which are arranged to provide the required scheme.
These cams can either be:
□ variable composition, i.e. comprising different sub-assemblies mounted on a cam carrier,
□ predetermined, i.e. for a function that is widely used in conventional schemes.
Example: reversing cams for direction of operation.

Cam carriers

Mechanism designed for mounting cams on for controllers with variable composition cams.

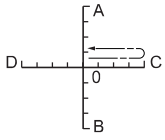
Cam actuation of contacts

When actuated by the cam lobe, the contact opens thus ensuring positive opening operation. Therefore, the presence of a cam corresponds to the absence of a cross or line on the scheme.

Example of graphic representation of a scheme

The various methods for indicating the operating sequence of the contacts are represented by schemes in accordance with IEC 113-4 or IEC 337-2A (section 2).
The ordering grids for XK controllers are designed in accordance with IEC 337-2A (section 2).
Take particular note of the way an assured electrical overlapping is represented as is shown for contacts 2 and 4 between positions 2 and 3 (see diagram to left).

Operating cycle

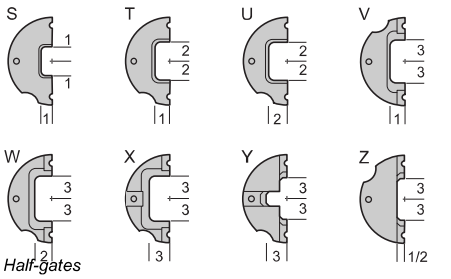


An operating cycle applied from an initial common O position is the passing from this initial position to the extreme position in each direction and subsequent return to the initial O position.

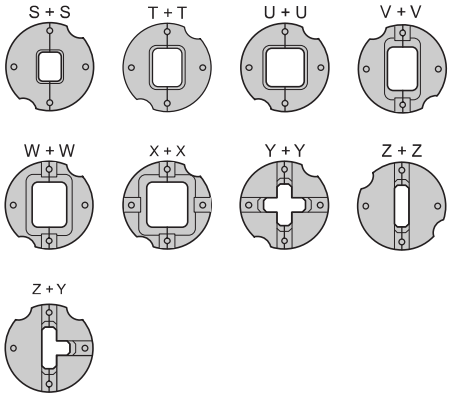
Controllers
For “light hoisting” applications, type **XKB**

109229-34_M

XKB ●



Half-gates



9 main combinations

Compact and lightweight units, designed to control “light hoisting” and materials handling equipment. Mainly for use in portable stations.
2 models:
- **XKB A**: controllers with predefined, non modifiable, scheme.
- **XKB E**: controllers with variable composition schemes.

Control lever
Length: 130 mm. Travel in each direction: 28° maximum.

Lever gate
Universal and modifiable.
Specific, by adding half-gates to the universal lever gate (referenced by letter) 9 main combinations. .

End stops
The total lever travel can be limited to 20° or 12° by using removable end stops (**XKB Z972** for 20°, **XKB Z971** for 12°) when the lever gate comprises half-gates Y or Z.

Handles
- Simple handle with zero (centre) position contact (closed at zero).
- Handle with zero (centre) position mechanical interlock + contact (closed at zero).
- “Dead man’s” handle with contact (open when handle released).
- Handle with built-in flush or projecting pushbutton and contact (open when pushbutton or handle released).

Note: *it is important to decide which type of handle is required when selecting the controller, since modification cannot be affected after installation.*

Electrical positions
3 positions maximum in each direction.

Types of lever movement
- **Notched positions, with stayput operation**: 3 notches maximum in each direction (12°, 20°, 28°).
- **Notched positions, with spring return to zero operation**: 3 notches maximum in each direction (12°, 20°, 28°). (XKB E: only 1 contact may be used at each notch.)
- **Unnotched positions, with spring return to zero operation**: 28° maximum travel in each direction. (XKB E: only 1 contact may be used for each spring return to zero position.)

Contacts
The contact blocks used for establishing the scheme are located in a monobloc assembly. There are 2 types:
- □ Block with 4 contacts per movement.
- □ Block with 4 contacts per movement + 1 zero (centre) position contact.

For both types, an additional contact is available. Its function depends on the type of handle.

Cam schemes
- **XKB A**: standard schemes can be established using predefined cams. These cams are moulded and cannot be modified.

2 versions:
- □ Using a block with 4 contacts per movement: 2 reversing cams and 2 function cams per movement.
- □ Using a block with 4 contacts per movement + 1 zero (centre) position contact: 2 reversing cams and 2 function cams per movement + 1 zero (centre) position cam.

- **XKB E**: special schemes can be established using snap-on cams (for each position) mounted on cam carriers. (overlapping contact operation is not possible).

2 versions:
- □ Using a block with 4 contacts per movement: 4 variable composition cams per movement.
- □ Using a block with 4 contacts per movement + 1 zero (centre) position contact: 4 variable composition cams per movement + 1 fixed composition zero (centre) position cam.

Legend
One 100 x 100 mm anodised aluminium legend plate with matt satin finish.
Standard “hoist-long travel” and “traverse-slew” symbols or text (to be stated on Order form, see page 13).

Potentiometer adaptation
- 2 potentiometers maximum per movement when using block with 4 contacts per movement.
- 1 potentiometer maximum per movement when using block with 4 contacts per movement + 1 zero (centre) position contact.

Characteristics: page 11
Order form: pages 13 and 14
Dimensions: page 40

Controllers
For “light hoisting” applications, type **XKB**

Environment

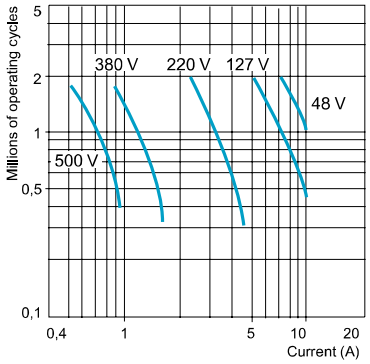
Conformity to standards			IEC 337-1, NF C 63-140, VDE 0660 part 2
Product certifications			XKB A: CSA ∿ 300 V “heavy duty”, ⎓ “standard duty”, ASE: 500 mV max., 10 A max., 100 VA max., USSR
Protective treatment			Standard version “TC”
Ambient air temperature	For storage	**°C**	- 40…+ 70
	For operation	**°C**	- 20…+ 70
Operating position			All positions
Vibration resistance			6 gn (1 to 70 Hz)
Shock resistance	Conforming to IEC 68-2-27		20 gn, duration 11 ms
Electric shock protection	Conforming to IEC 536 and NF C 20-030		Class I
Maximum operating lever force required in each direction		**daN**	< 1.7
Degree of protection	Conforming to IEC 529		IP 54 (unit with simple handle mounted in dust and damp proof enclosure)
Mechanical durability (In millions of operating cycles)			1 in each direction
Weight		**kg**	**XKB A** and **XKB E**: ≂ 0.850

Contact block characteristics

Type		Monobloc assembly comprising 9 double-break contacts (8 function contacts and 1 zero position contact mounted at lever base) or monobloc assembly comprising 11 double-break contacts (8 function contacts + 2 zero position contacts and 1 zero position contact mounted at lever base)
Conventional thermal current	**A**	10 conforming to IEC 337-1, NF C 63-140, VDE 0660, CSA C 22-2 n° 14
Rated insulation voltage	**V**	≂ 500 conforming to NF C 20-040, VDE 0110, IEC 158-1
Insulation category		Group C conforming to NF C 20-040 and VDE 0110
Contact operation		Slow break, double-break contacts with positive opening operation; N/O (green operator). N/C contact (red operator): zero position contact mounted at lever base
Resistance across terminals	**mΩ**	⩽ 25 (in accordance with NF C 93-050, at 1 A)
Terminal referencing		Conforming to CENELEC EN 50013
Short-circuit protection		10 A cartridge fuse type gG conforming to IEC 337-1B, VDE 0660 part 2

Operational power
Conforming to IEC 337-1
Utilisation categories AC-11 and DC-11
Operating rate: 3600 operating cycles/hour
Load factor: 0.5

a.c. supply ∿ 50-60 Hz
∩∩∩ Inductive circuit



d.c. supply ⎓

Power broken in W for 1 million operating cycles

Voltage V	**24**	**48**	**120**
∩∩∩	90	90	75

Connection	Captive screw clamp terminals	Clamping capacity: □ minimum 1 x 0.5 mm², □ maximum, with or without cable end: 2 x 1.5 mm² or 1 x 2.5 mm², or by clips conforming to NF C 20-120

Order form: pages 12 to 15
Dimensions: page 40

Controllers

For “light hoisting” applications, types **XKB A** and **XKB E**

Grid for composing the reference of a controller

Reference of controller type XKB

	Model	Contacts	Handle	Lever movement AB	Lever movement CD	Potentiometer adaptation
XKB						

Model

With predefined scheme	**A**
With variable composition scheme	**E**

Contact blocks

Block with 4 contacts per movement	Screw clamp terminal connections	**1**
	6.3 clip connections	**2**
Block with 4 contacts per movement + 1 zero (centre) position contact	Screw clamp terminal connections	**3**
	6.3 clip connections	**4**

Handle

Simple + zero (centre) position electrical interlocking (contact closed in rest position)	**1**
With zero (centre) position mechanical and electrical interlocking (contact closed in rest position)	**2**
“Dead man’s” type (contact open when released)	**4**
With built-in flush pushbutton (contact open in rest position)	**5**
With built-in projecting pushbutton (contact open in rest position)	**6**

Type of lever movement

On movement AB

Movement not required (blocked)	**0**
Notched positions, with stayput operation	**1**
Unnotched positions, with spring return to zero operation	**2**
Notched positions, with spring return to zero operation *(1)*	**3**

On movement CD

Movement not required (blocked)	**0**
Notched positions, with stayput operation	**1**
Unnotched positions, with spring return to zero operation	**2**
Notched positions, with spring return to zero operation *(1)*	**3**

Potentiometer adaptation

Without adaptation nor potentiometer		**0**
Adaptation only (without potentiometer)	On movement AB	**4**
	On movement CD	**5**
	On movements AB + CD	**6**
Adaptation + potentiometer *(2)*	On movement AB	**7**
	On movement CD	**8**
	On movements AB + CD	**9**

(1) Type of lever operation recommended when using a potentiometer.
(2) Potentiometer type and value to be stated on the Order form. For standard application potentiometers, see page 44.

Characteristics: page 11
Dimensions: page 40

Order form

(specimen suitable for photocopying)

Controllers

For “light hoisting” applications, type **XKB A**

Controllers XKB A with predefined, non modifiable schemes, factory assembled

See example on page 15

Customer		Schneider Electric Industries			
Company	Customer’s reference	Sales office - Subsid. - Plant	Editor	Geographical zone	Order N°

Reference (use the grid for composing the reference of a controller on page 12)

			Model	Contacts	Handle	Lever movement AB	Lever movement CD	Potentiometer adaptation
Number of identical units		XKB	A					

For Schneider Electric Industries use only

Order N°	Item N°		MOD	ETI	POI	GLV	CTS	MAB	MCD	PAB	PCD
		XKB									

Lever gate

In accordance with the half-gates available, sketch and crosshatch the lever’s field of movement on the scheme grids below.
In the absence of this information, the controller will be supplied with a “universal” gate.

Potentiometer adaptation

Cross ☒ the required position on the schemes below.

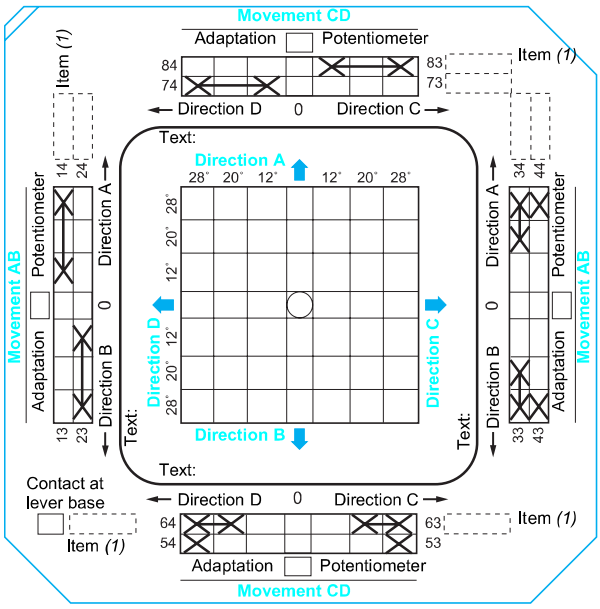
On movement AB	Type/size:
	Value:
On movement CD	Type/size:
	Value:

Legend

Without legend	☐
With blank legend **XKB Y1**	☐
With “traverse-slew” symbols, **XKB Y2**	☐
With “hoist-long travel” symbols, **XKB Y3**	☐
With specific engraved text, **XKB Y1001** (clearly state the text on the scheme below)	☐
Left-hand operated unit	☐
Right-hand operated unit	☐

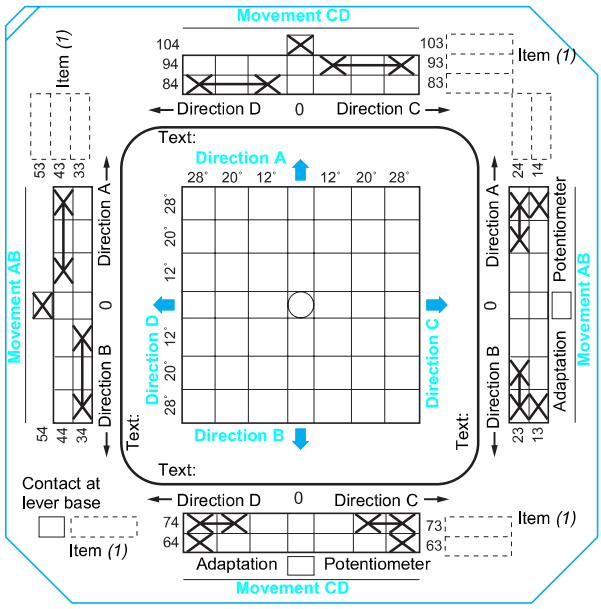
Scheme 1: 4 contacts per movement (viewed from above)

Orientation locater



Scheme 2: 4 contacts + 1 zero (centre) position contact per movement (viewed from above)

Orientation locater



(1) Reserved for contact identification in the automation system scheme. It is not possible to mark it on the controller.

Characteristics: page 11

Dimensions: page 40

Order form

(specimen suitable for photocopying)

Controllers

For “light hoisting” applications, type **XKB E**

Controllers XKB E with variable and modifiable schemes, factory assembled

Customer		Schneider Electric Industries			
Company	Customer’s reference	Sales office - Subsid. - Plant	Editor	Geographical zone	Order N°

Reference (use the grid for composing the reference of a controller on page 12)

			Model	Contacts	Handle	Lever movement AB	Lever movement CD	Potentiometer adaptation
Number of identical units		XKB	E					

For Schneider Electric Industries use only										
Order N°	Item N°		MOD	ETI	POI	GLV	CTS	MAB	MCD	PAB	PCD
		XKB									

Lever gate

In accordance with the half-gates available, sketch and crosshatch the lever’s field of movement on the scheme grids below.
In the absence of this information, the controller will be supplied with a “universal” gate.

Potentiometer adaptation

Cross ☒ the required position on the schemes below.

On movement AB	Type/size:
	Value:
On movement CD	Type/size:
	Value:

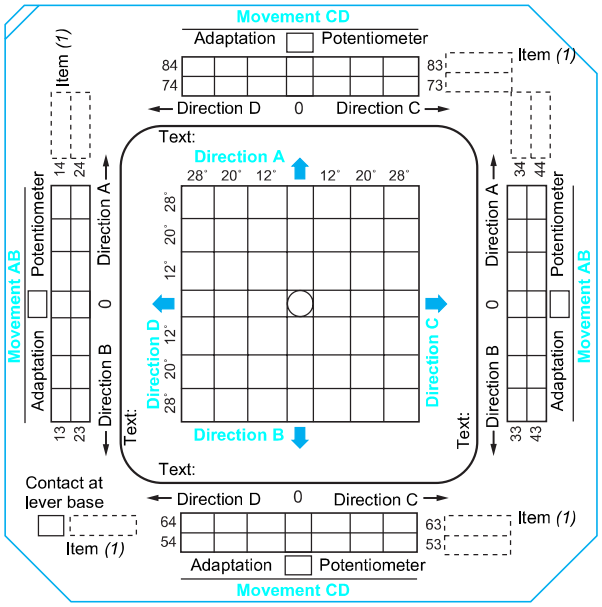
Legend

Without legend	☐
With blank legend, **XKB Y1**	☐
With “traverse-slew” symbols, **XKB Y2**	☐
With “hoist-long travel” symbols, **XKB Y3**	☐
With specific engraved text, **XKB Y1001** (clearly state the text on the scheme below)	☐
Left-hand operated unit	☐
Right-hand operated unit	☐

⚠ If the scheme is not defined, all **XKB E** controllers will be supplied with the standard scheme as used for XKB A.

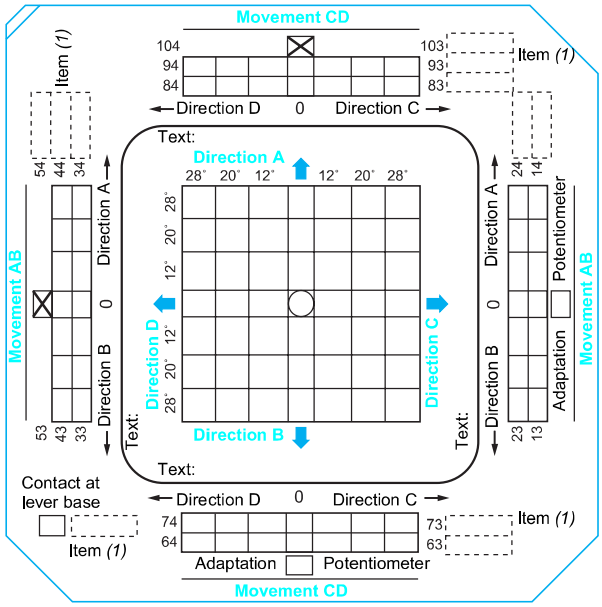
Scheme 1: 4 contacts per movement (viewed from above)

Orientation locater



Scheme 2: 4 contacts + 1 zero (centre) position contact per movement (viewed from above)

Orientation locater



(1) Reserved for contact identification in the automation system scheme. It is not possible to mark it on the controller.
Spring return operation: only 1 contact can be used with spring return at each notch.

Order form example

Controllers

For “light hoisting” applications, type **XKB E**

Ordering form completion example

Requirement

A 2 movement controller:
“hoist-long travel”.
“Universal” lever gate, limited to 2 “lower” positions. **XKB**

Model
With variable composition scheme (customised electrical scheme as shown below)

Contact blocks
Block with 4 contacts + 1 zero (centre) position contact per movement (screw clamp terminals).

Handle
“Dead man’s” type

Type of lever operation on movement AB
Unnotched positions, with spring return to zero operation

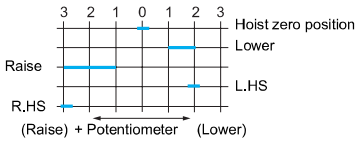
Type of lever operation on movement CD
Notched positions, with spring return to zero operation

Potentiometer adaptation
With adaptation device + potentiometer on movement AB, standard 4700 Ω, size 15, model

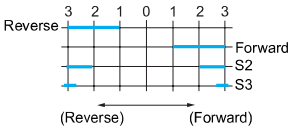
Composition of the reference (see page 12)

E	3	4	2	3	7
E	3	4	2	3	7

Electrical scheme for movement AB “hoist”



Electrical scheme for movement CD “long travel”



Lever gate

In accordance with the half-gates available, sketch and crosshatch the lever’s field of movement on the scheme grids below.
In the absence of this information, the controller will be supplied with a “universal” gate.

Potentiometer adaptation

Cross ☒ the required position on the schemes below.

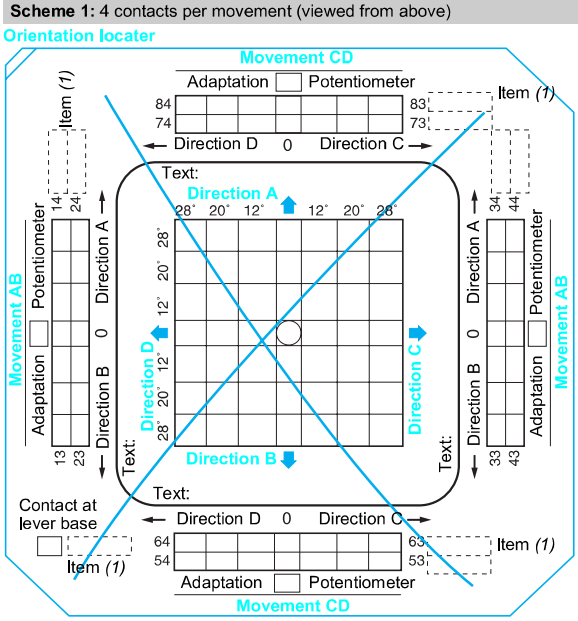
On movement AB	Type/size: XKZ A15047
	Value: 4700 Ω
On movement CD	Type/size:
	Value:

Legend

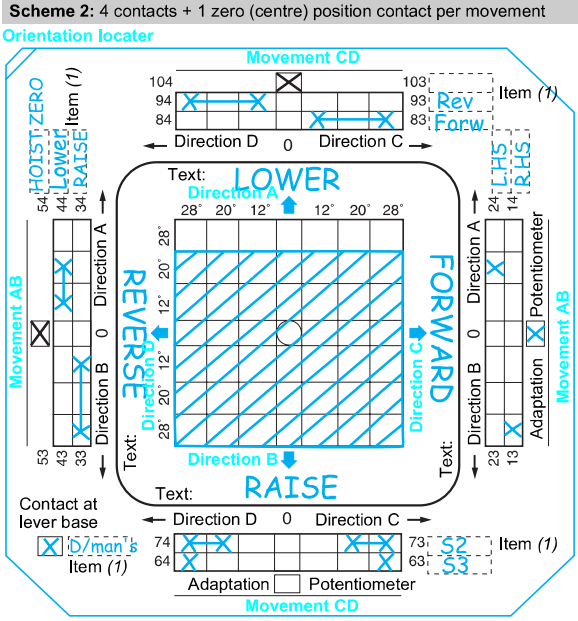
Without legend	☐	With specific engraved text, **XKB Y1001** (clearly state the text on the scheme below)	
With blank legend, **XKB Y1**	☐	Left-hand operated unit	☐
With “traverse-slew” symbols, **XKB Y2**	☐	Right-hand operated unit	☒
With “hoist-long travel” symbols, **XKB Y3**	☐		

⚠ If the scheme is not defined, all **XKB E** controllers will be supplied with the standard scheme as used for XKB A.

Scheme 1: 4 contacts per movement (viewed from above)



Scheme 2: 4 contacts + 1 zero (centre) position contact per movement



(1) Reserved for contact identification in the automation system scheme. It is not possible to mark it on the controller.
Spring return operation: only 1 contact can be used with spring return at each notch.