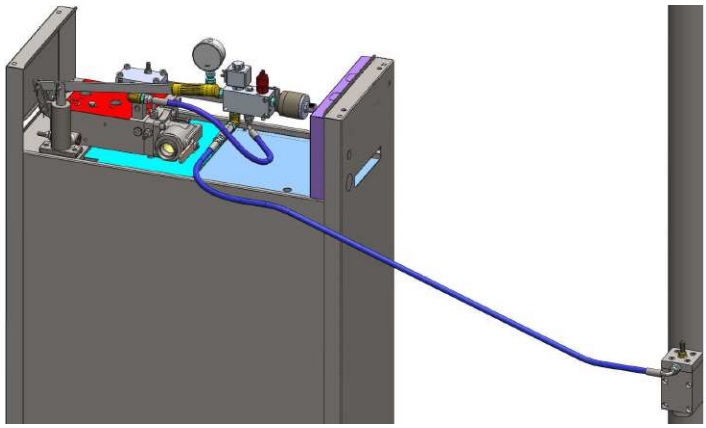
Usage and maintenance manual

Kit for the Unintended Movements of hydraulic lifts “KMI” ®



MORIS ITALIA

Edition: April 2018

MORIS
MACCHINE OLEODINAMICHE
RIDUTTORI IMPIANTI SPECIALI

Usage and maintenance manual

Kit for the Unintended Movements of hydraulic lifts "KMI"

Sommario

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1. Foreword

Dear Customer, we would like to thank you for choosing this MORIS product. We kindly ask you to read carefully the information contained in this document, which will allow you to install the KMI kit safely and with no mistake risks. In case of further needs, we ask you to contact MORIS at:

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E: assistenza@moris.it

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21020 Brebbia (VA)

2. Declaration of conformity

MORIS Italia, as the producer of the device to prevent the unintended movements of the hydraulic lifts fitted with rupture valve, denominated KMI, made by the group of hydraulic actuator, control electronic board and MORIS rupture valve

Issues, for any KMI device supplied to the market, a EU declaration of Conformity that states:

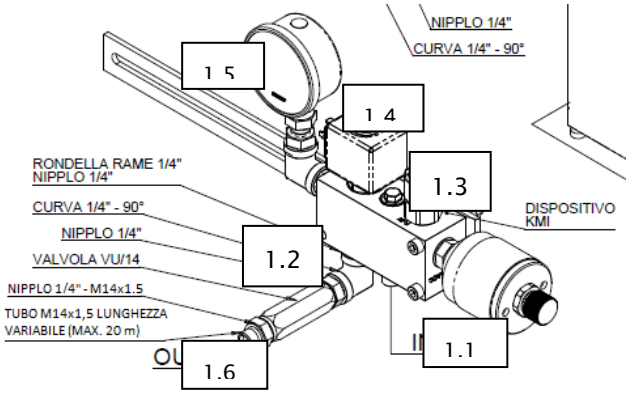
- that the entire system is in compliance to safety and health essential requirements defined inside ANNEX I of Machine Directive 2006/42 CE and to safety and health essential requirements defined inside ANNEX I of Lift Directive 2014/33/UE,
- that the device is confirming to the harmonized norm EN 81.20/50,
- that the device is covered by its EU type examination certificate, issued by IMQ (CE 0051) with n. 733
- that the device is covered by its CE Declaration of Conformity, issued by IMQ (CE 0051) with n. CA50.00605

3. Product Description

The "KMI" kit is a system studied to prevent the risk of an unintended movement of an hydraulic lift equipped with rupture valve.

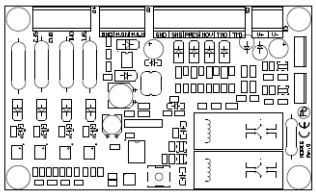
The kit is composed by:

1. Hydraulic actuator, composed by:
   1.1. Hydraulic accumulator
   1.2. Aluminium block
   1.3. Monitoring pressure switch
   1.4. Piloting electrovalve
   1.5. Manometer (optional)
   1.6. Non-returning valve on OUT port



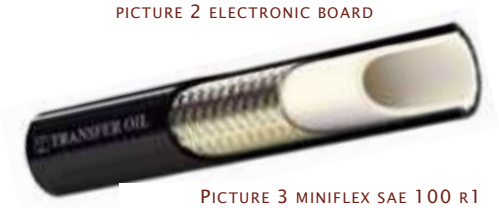
PICTURE 1: HYDRAULIC ACTUATOR

2. Electronic control Board eKMI; two versions are available, with either 12 or 24 VDC power supply voltage

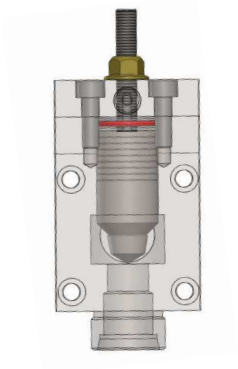


PICTURE 2 ELECTRONIC BOARD

3. Connection miniflex hose with accessories



PICTURE 3 MINIFLEX SAE 100 R1



4. Rupture valve (see table in the next page)

PICTURE 4 RUPTURE VALVE

The conditions of conformity, declared for this kit, are valid only if the installed system has all the elements shown above. The kit can work only with MORIS rupture valves, and only if they are prepared for piloting the "KMI" kit with the hydraulic actuator

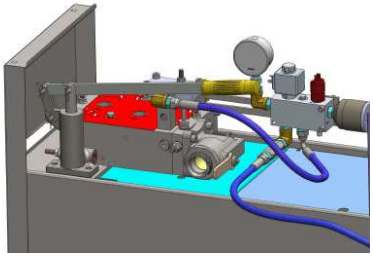
Rupture Valves prepared for "KMI" kit

TYPE:	¾"	1" ¼	1" ½	2"
Certificate (CE0051)	CA50.00694	I0223	I0224	I0227
Model	0825/P-VP22-HP	0393/P	0425/P	0689/P
Max static pressure (bar)	80	45	45	45
Temperature range (°C)	15-60			
Fluid type	Mineral oil			
Viscosity range (cSt)	23-112			

4. Hydraulic actuator functional description

The hydraulic actuator (picture 1) is able to accumulate hydraulic pressure. The accumulated pressure must be greater than the lift static pressure at the moment of the unintended movement; doing so, the rupture valve intervention is ensured upon detection of every unintended movement.

The pressure needed for the actuator charge is taken from a point on the lift main hydraulic circuit (lower part of the rupture valve body, see picture below). The charge is retained inside the actuator thanks to a non-returning valve inside the block 1.2 (see picture 1).



This pressure is discharged when necessary (upon the detection of an unintended movement, or because of a test) on the rupture valve, which will lock instantaneously, due to the received pressure.

The hydraulic actuator is connected to the main hydraulic circuit and to the rupture valve, by means of specific hydraulic hoses.

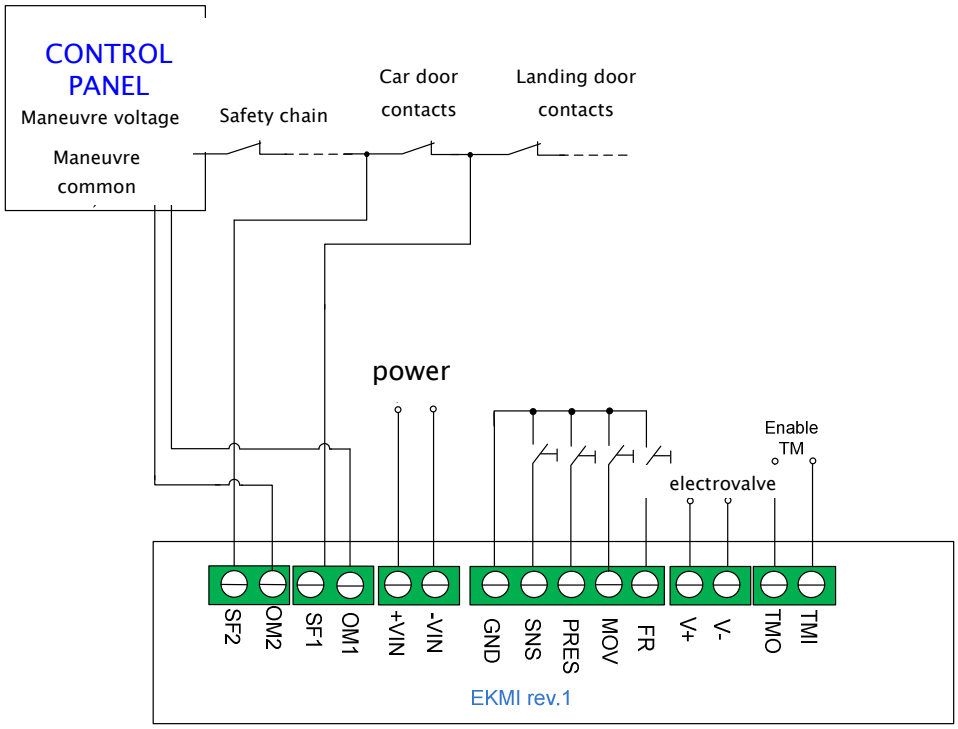
A dedicated electronic board manages the logics of the hydraulic actuator intervention; this board must be interfaced with the lift control panel and with the electrovalve and pressure switch on the actuator.

After the rupture valve intervention, it is possible to unblock the lift by executing a direct drive in up direction.

The pressure switch on the hydraulic actuator, by means of an NO contact, performs the system monitoring. The switch pressure threshold must be regulated at a higher value than the maximum static pressure of the lift (usually around 30 bar). When the value of the pressure inside the actuator goes below the threshold pressure mentioned above (because of a leakage, an accumulator defect or because the actuator released the pressure on the rupture valve), the pressure switch contact will open and the electronic board is putting the lift out of service, until the accumulator will be loaded with the correct pressure and the board will be reset.

5. Description of the electronic board functioning

The electronic control board of the KMI kit has been realized for interfacing with the vast majority of the control panels complying with the Lift Directive 2014/33/UE and for detecting the unintended movement[1]. The inputs and outputs are listed in the picture below:



PICTURE 5: ELECTRONIC BOARD I/O

Phase 1: CHARGE

When the contact GND-PRES is closed, and the electrovalve terminals V+ V- are connected, it is possible to keep the RESET button pressed for about 3 seconds. The status LED from RED becomes GREEN (ready status) and the TM0 TMI contact closes (thus indicating to the control panel that the lift can begin standard operations)

Phase 2: READY

During the normal lift operations, the following signals must be present: V+ V- 2 (which ensures the connection and the efficiency of the electrovalve); GND PRES (pressure switch contact closed = efficient actuator). In absence of unintended movements, the board keeps the TM0 TMI contact closed, and the lift can work normally.

[1] The unintended movement is defined in art.9.13.1 of EN81.2:2010 norm. When the car doors are not closed, and the lift drifts away from the door zone, without control panel commands, an unintended movement has been experienced.

2 KMI has a negative logic: when a harmful situation is detected, the actuator is engaged. This means that actuator is normally in a passive state during the lift functioning. An electrovalve check against failures of grounding or coil cut-off has been implemented, to be certain that the devices will work when required. The electronic board sends, at a fixed cadence, a micro-current signal to the coil, and checks if it is connected and efficient; if such a problem is detected, TM0 TMI contact will open.

Phase 3: INTERVENTION

If the GND MOV, SF1, SF2 contacts are open (lift standing at floor zone with open doors and idle control panel) and successively the GND SNS will open (the car is going outside the door zone), then the board will energize V+ V- terminals to engage the actuator electrovalve and to close the rupture valve; after the intervention of the actuator, the contacts GND PRES and TM0 TMI open. To restore the normal lift functioning, it will be necessary to execute the CHARGE phase3 (see above)

Phase 4: FAULT:

If, during the functioning, either the V+ V- terminals are not connected to the electrovalve, or the GND PRES contact is not closed, the contact TM0 TMI will open and the lift goes in out of service status, until the fault causes are removed, and, consequently, the reset procedures (already described) are completed

ATTENTION: the electronic control board of the KMI kit checks the continuity of the solenoid valve. Always connect the solenoid valve directly to the control board.

NOTE: status of the doors

For the door status monitoring, 2 redundant inputs have been implemented; these can monitor the safety chain before and after the car doors, independently from other elevator block occurancies such as: electrical black-outs, over-travel run, STOP, maintenance movements.

PIN	Description
SF2	Safety chain contacts before doors (Vmax = 48 VAC/DC and 110 VAC+/-10%)
OM2	Safety chain contacts common (related to SF2)
SF1	Safety chain contacts after doors (Vmax = 48 VAC/DC and 110 VAC+/-10%)
OM1	Safety chain contacts common (related to SF1)

+VIN	Power supply positive pole: two board versions are available: Vmax 12VDC or 24 VDC +/-10%
-VIN	Power supply negative pole

GND	Sensor input common
SNS	Door zone safety contact, normally open, closed at floor.
PRES	Normally open pressure switch contact, closed when the device has the correct pressure.
MOV	Motion command contact, normally open, closed when a movement is piloted and intended.
FR	Test contact, normally open: its activation causes the rupture valve intervention, in order to test its functioning

V+	Positive output of RUPTURE VALVE , normally disengaged, active for 10 seconds in case of a block command. Max output +12V 5A or +24 V 2.5A (depending on board version)
V-	RUPTURE VALVE Negative

TMO, TMI	OUTPUT CONTACT OF CONTROL PANEL BLOCK, normally closed, its opening indicates to the control panel a block situation, which allows anyway the completion of the current drive. Typically, this contact can be put in series with motor or oil thermal protections or the overload

3 A green/red dual colour LED indicates the status of the board. It is possible to reset the ready status only after satisfying the logical control signals on the board.

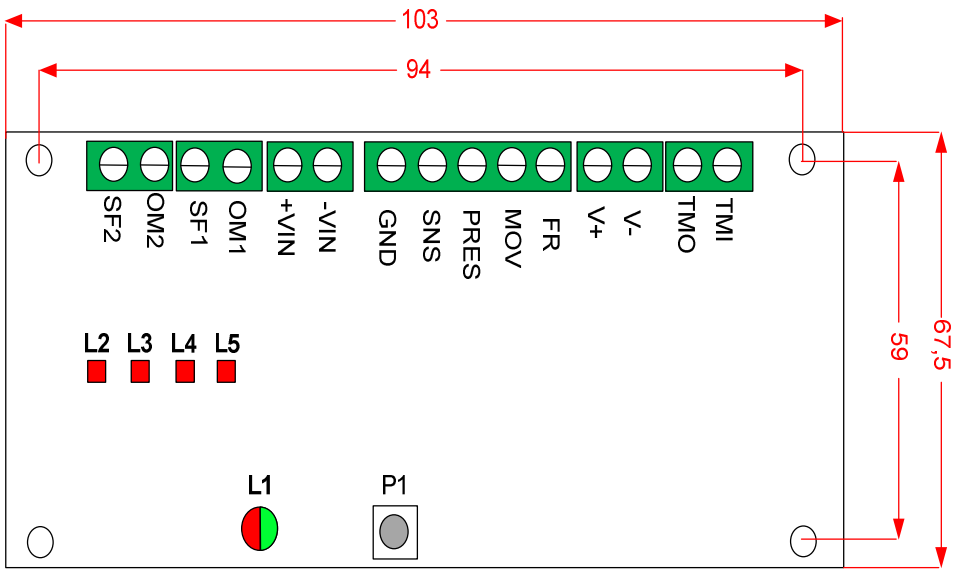
	contact. The contact can commutate up to 110Vac/dc 5A max.

SIGNALLING, STATUS AND COMMANDS

LED L2,L3	Indicate if the input SF2-OM2 is active (safety contacts before car doors)
LED L4,L5	Indicate if the input SF1-OM1 is active (safety contacts after car doors)
LED SNS,PRES,MOV	Indicate if the contacts (of inputs SNS, PRES, MOV) are closed.
LED L1	Dual colour (RED/GREEN) LED, which indicates the electronic board status: GREEN = no malfunctioning; RED = blocked status, where the Rupture Valve has engaged. Alternating RED+GREEN = malfunctioning, detected during the diagnosis periodical tests (coil status detection, pressure switch status, ...).
P1	Reset and test push button: in case of blocked status, the board will have L1 LED lit in RED, the output contact TMO/TMI activated (therefore open), engaged rupture valve (with related pressure switch deactivated); the button T1 allows the reactivation of the nominal lift functioning (therefore the closure of contact TMO/TMI), at the condition that the operations of the block device restore have been performed. The unlock will happen after the button has been continuously pressed for 5 or more seconds. The P1 button works also as a test, when the board is in nominal working conditions (L1 LED is green): if the button is pushed for 3 consecutive times, the block sequence will start, blocking the rupture valve and activating the related signals.
OFF	Removable electric bridging, which can remove the power supply from the board. Removing the bridge means that the board will be completely unpowered, the output TMO/TMI will open, blocking in this way the lift.

Sensor of landing door zone: It must be a safety contact the one that recognizes the door zone; after leaving the door zone, in absence of an intended movement, the KMI device must intervene. In the vast majority of the control panels for hydraulic lifts, a safety device is present to bypass the door safety contacts and to allow the auto-levelling to the machine. A safety contact of this device may be used and can be fed to the SNS input of eKMI.

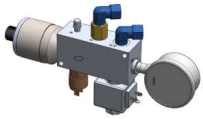
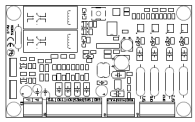
If the auto-levelling enabling device is not present, a safety contact must be provided in the control panel, for the aforementioned purpose.

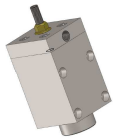
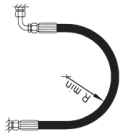


6. Packaging

The KMI kit is delivered in a cardboard box, containing the following material or just mounted onto the power unit.

- Pre-assembled hydraulic actuator, with 12 or VDC electrovalve (at customer choice)
- Electronic board
- Instruction manual
- Rupture valve
- 1/4" connection hoses with connection M14x1,5, complete with connection fittings and non-return valve on OUT port

The following materials can be provided as an option, packaged in the same box:

- N° 2 miniflex hoses (type SAE 100 R1) with straight connections G ¼" with connection M14x1,5 BSPP with lengths different than 1 m
- Normally Open pressure switch with 30-80 bar range
- Electrovalve coil (voltage: 12V dc or 24V dc, according to eKMI board version)
- Cartridge NC for electrovalve
- Accumulator with nitrogen pre-charge.
- Manometer for hydraulic actuator
- Actuator fixing bracket on guide rails or on the power unit (universal)
- Rupture valve arranged for KMI kit
- Fittings to connect new rupture valve on pistons with different oil ports

The following materials are not provided by MORIS:

- ***Car motion sensors (magnets, switches or fixings on car roof)***
- ***Wires or cables for electrical connections of board, control panel and actuator***

7. Cautions before the assembling

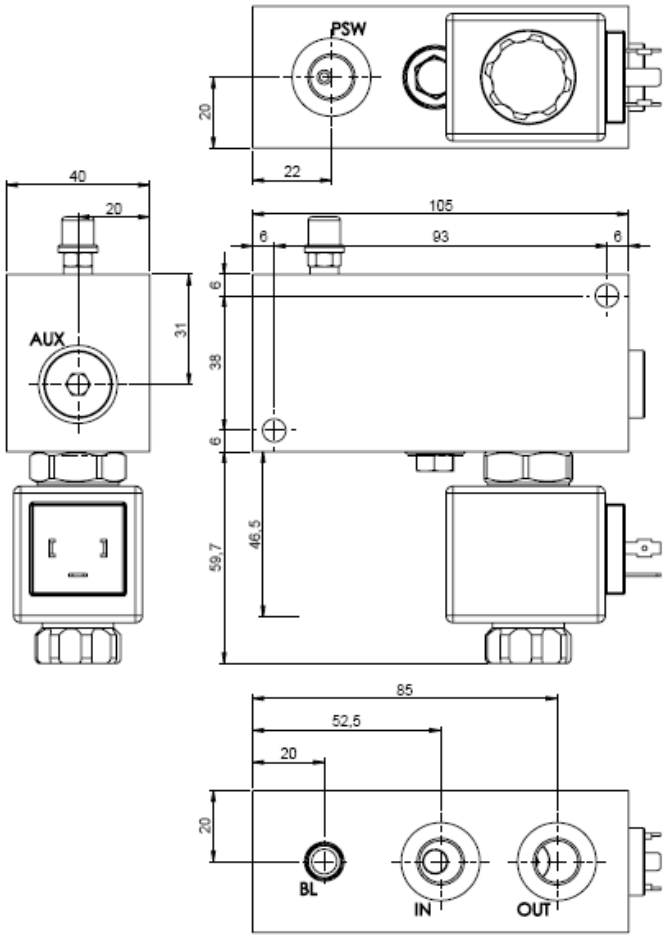
The maintenance personnel must have the knowledge and specialization for lift interventions. The management of the lifts is under safety rules. The general safety rules may change depending by the local laws.

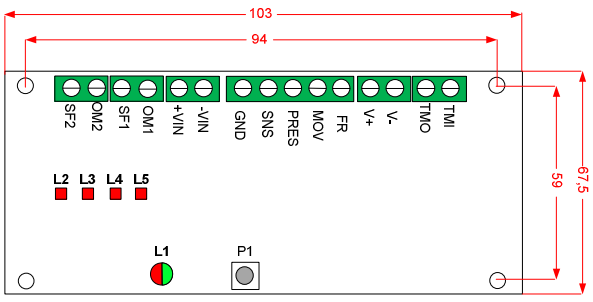
Before to start any work on the lift and its components it is necessary to wear the following safety equipment:

- helmet
- anti weeping shoes
- gloves to protect against slice risk
- protective goggles

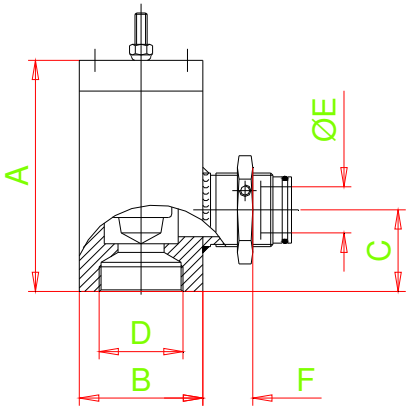
In case of damage, wear or loss of the material, please require and use only original spare parts.

8. Dimensions of actuator and electronic board

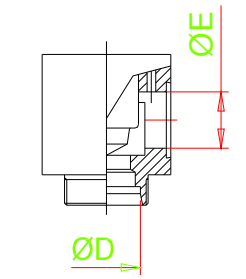




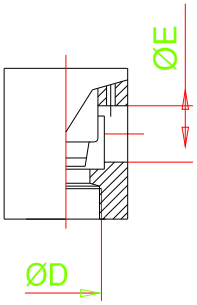
Rupture valves: dimensions of each model



TYPE: 2"



TYPE: 1"1/4 - 1"1/2

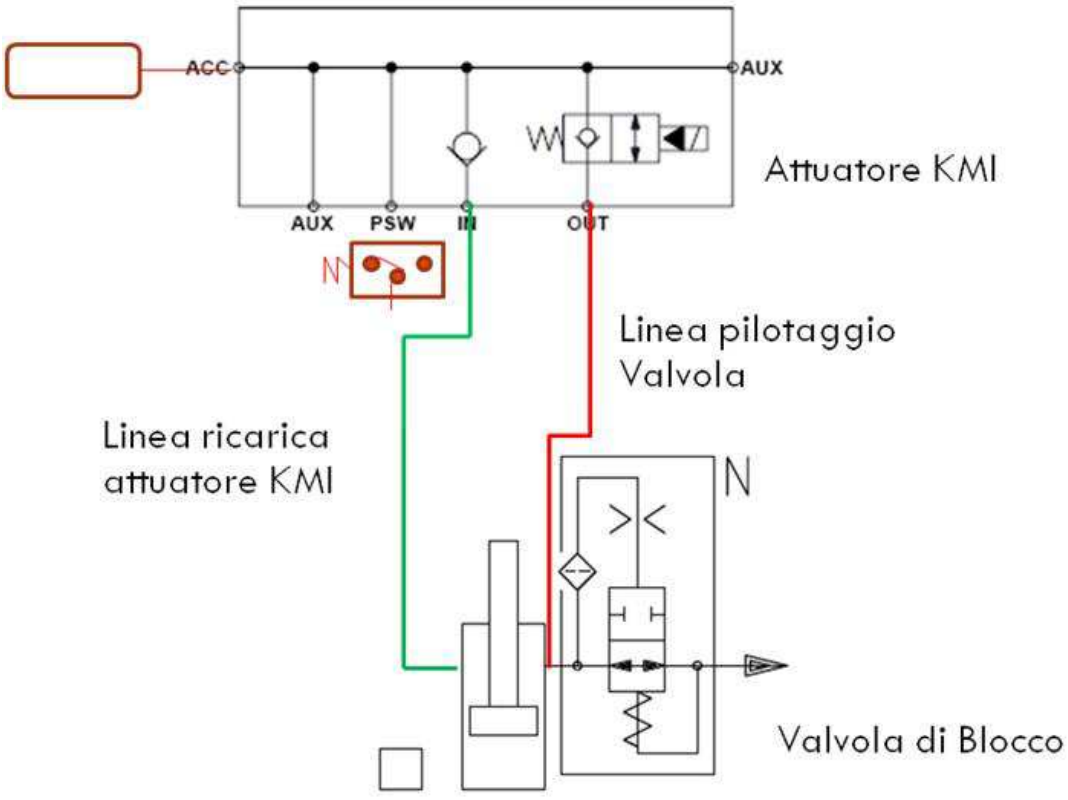


TYPE: 3/4"

		3/4"	1" 1/4	1" 1/2	2"
Qn	MIN	8	15	151	381
	MAX	75	150	380	650
A		100	132	153	186
B		⍁49	⍁70	⍁70	⍁75
C		40	56	56	63
D		22	28 / 35	42	2"/F
E		18	25	30	40
F		/	/	/	24

9. Hydraulic and electrical schematic drawings

Schematic drawing of hydraulic actuator, connected to the rupture valve and to the main

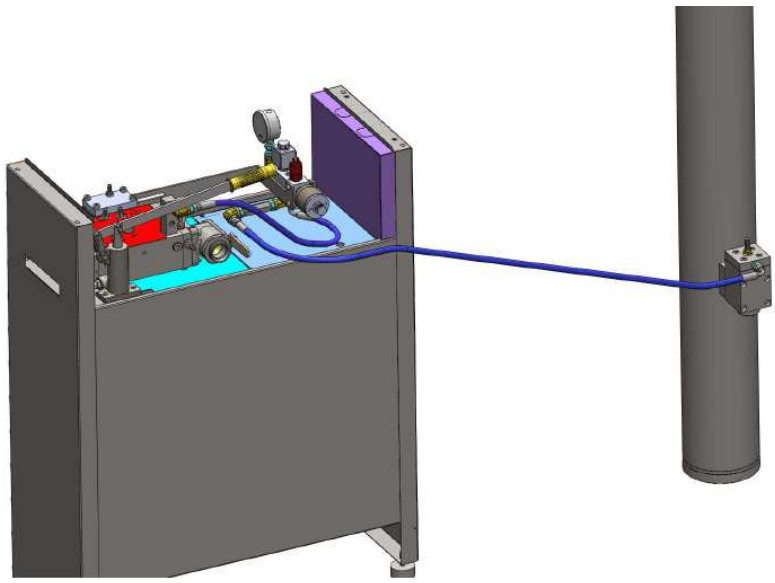


hydraulic circuit for recharge.

10. Assembling instructions

Please check that the material received inside the packaging or installed into the power unit is not damaged and it is conforming to the original order.

The KMI kit can be assembled in different configurations. The most advantageous one is depicted in the picture below, where the recharge pressure is taken from the hydraulic distributor (the main valve):



PICTURE 5 HYDRAULICACTUATOR POSITIONING

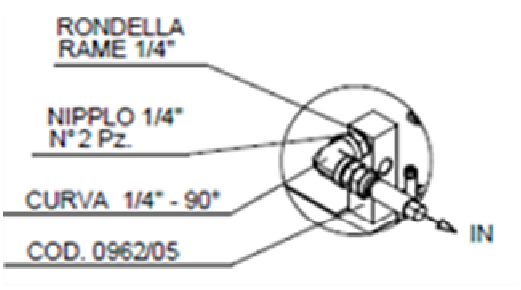
Legend:

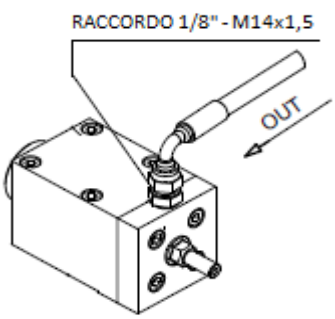
IN = connection of pressure charge circuit AUX of KM, via miniflex hoses

OUT= connection of piloting circuit VB, via miniflex hoses

Several component positionings are possible; here below we describe the one with KMI in the power unit.

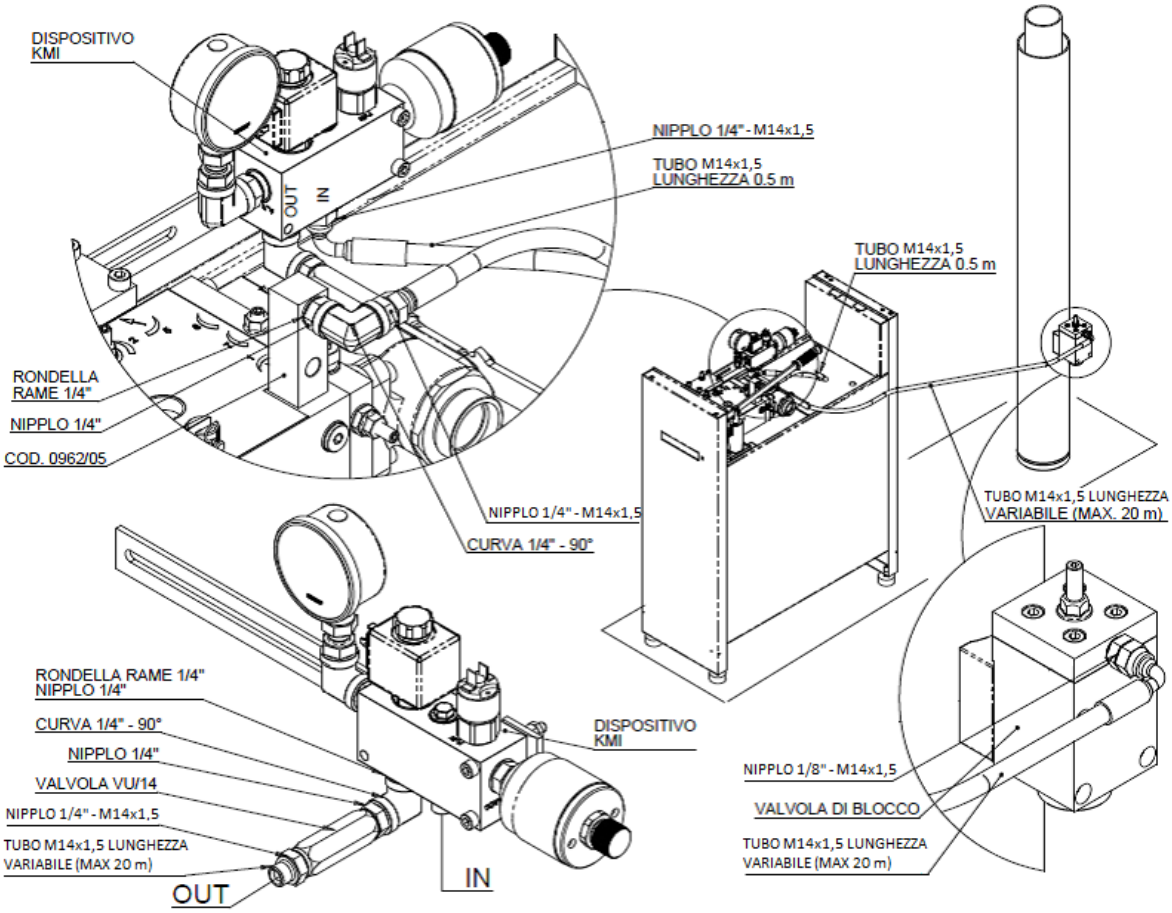
The IN port of the actuator body is connected to a pressure port on a distributor tower; the OUT port of the actuator body is connected to the VB rupture valve cover, using the supplied miniflex hose and the non-return valve





In the following pictures we indicate the assembling instructions ***STARTING FROM THE CONDITION OF ZERO PRESSURE INSIDE THE MAIN HYDRAULIC CIRCUIT***

- Connect with a miniflex hose the OUT port of the KMI with the piloting hole on the rupture valve. *Warning! On the OUT arm a non-return valve must be installed*



Apply pressure to the hydraulic circuit, with the following procedure (with the lift standing at the lowermost floor and after connecting the KMI to both the distributor and to the rupture valve):

- close the ball valve of the power unit
- using the hand pump, charge the KMI
- activate the KMI electrovalve, in order to vent air out from the OUT arm
- recharge the KMI, using the hand pump, to 50/55 bar
- open the ball valve of the power unit

- Finalize the actuator installation, connecting the pressure switch contact and the electrovalve coil as per the picture below; make sure you are using the FAST-ON connectors for both the pressure switch and the electrovalve[4]
- When the pressure switch contact is closed (KMI charged), try to reset the electronic board with the push button; if the LED turns from red to green then the actuator is charged and ready for intervention; if the LED does not turn green, repeat all steps, starting from venting the air out of circuit IN

4 Connect the yellow/green earthing wire to the electrovalve. Place the protection rubber cap on the pressure switch after having connected the wires and regulated (if needed) the contact commutation pressure. If applicable, the hydraulic piping must be inspectable (check section 12.3.1.2 of EN 81.2:2010)

11. Tests of intervention

Verify that KMI is fully functional at least every 6 months. The tests to check the effectiveness of all the kit components are described below:

COMPONENT	TEST	VERIFICATION	NOTES
Hydraulic actuator, rupture valve	Push for 3 consecutive times the electronic board push button, or directly feed 12 or 24 VDC to the electrovalve (depending on version) while the car is travelling in down direction	The car must stop and remain standing; the pressure on the manometer of the power unit have to be near to 0 pressure	After the intervention, verify that no leakages will show on the hoses from VB to actuator. Verify that VB intervention is almost immediate
Automatic recovery of actuator and rupture valve after the intervention	perform a manoeuvre in up direction to unlock the block valve	The car must be free to move in down direction, without further interventions of the rupture valve	If there is a new rupture valve intervention, try to vent the air from circuit OUT from actuator to VB
Automatic recovery of actuator and rupture valve after the intervention	close the shut off valve and pump up to charge the accumulator after the intervention of the block valve	The pressure switch must close the contact and is must be possible to reset the electronic board	In case the recovery action was not successful, check that the pressure switch setting is the same as the maximum static pressure of the lift
Electronic board functioning: electrovalve piloting and pressure switch tests	While the car is moving in down direction, press three consecutive times the test button	The car must stop and remain stopped; verify that VB has activated, by pressing the manual descent button. The reset must not be possible until the actuator recharge.	After the actuator intervention, the status LED, from green turns red and the lift does not accept commands. The recovery will happen, after having recharged pressure in the actuator, by keeping the reset button pushed for 1 second
Electronic board functioning: electrovalve monitoring test	Disconnect one wire of the electrovalve	The electronic board must return an alarm signal no later than 2 minutes from the event	Restore the electrovalve connection and reset the board
Electronic board functioning: operational test	With car standing at door level with open doors, excluding the relevelling circuit, push the manual descent button	The car must stop for the intervention of the hydraulic actuator, after having lost the door zone position	The electronic board reset must follow the pressure charge in the hydraulic actuator

12. Regulations of pressure switch and of unintended movement sensor

The pressure switch is normally pre-set in MORIS. The N.O. contact must close at a pressure higher than the lift static pressure. Please verify that this is true for the lift you are fitting with KMI.

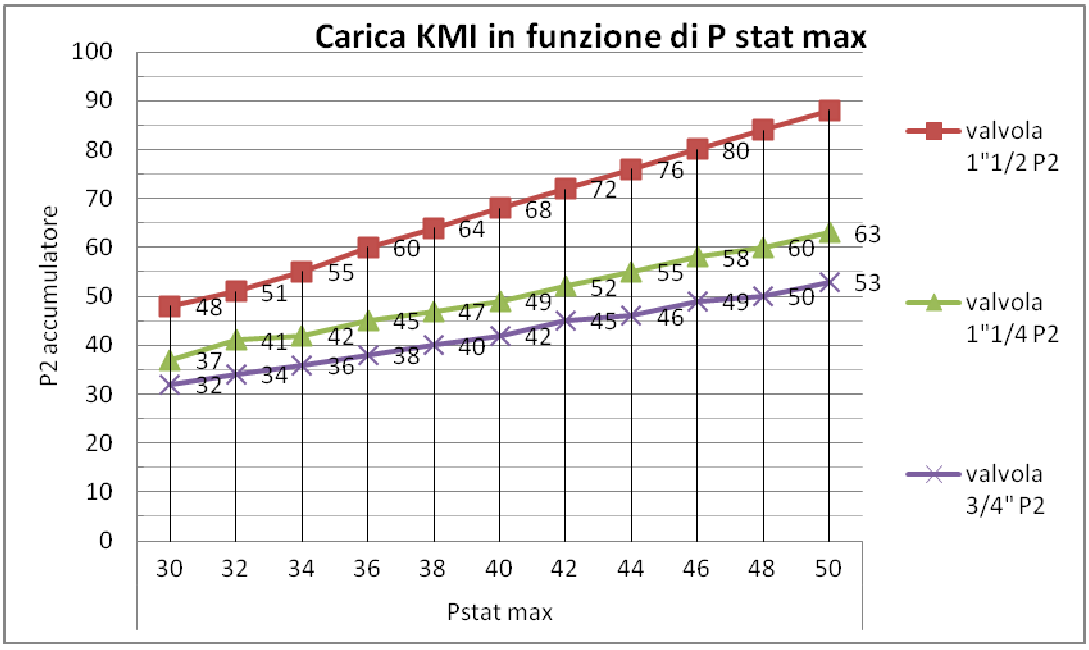
For regulating the pressure switch intervention pressure, follow these steps:

- Connect a manometer (if not present) to the actuator auxiliary port
- Charge the actuator up to the required pressure value
- Connect a voltage meter to the pressure switch contact and verify if it is open or closed
- Regulate the intervention screw of the pressure switch contact and find the setting at which the contact opens. From this point, rotate a few degrees the screw until the contact will close again.

The unintended movement detection happens via a safety switch (i.e. with roller) actuated by a sloped plane at every floor. Regulate the intervention of this contact immediately after the re-levelling zone.

Alternatively, if the control panel has it, it is possible to use one of the free contacts of the open door re-levelling module; this contact will open when the car will go out of the re-levelling zone.

Shown below is a graph with which the theoretical charging pressure of the KMI device can be obtained (the values are shown on the curves for each rupture valve model); these values can be used to pilot the rupture valve at the maximum static pressure indicated in the horizontal axis.



13. Intended use and improper use

The KMI kit, composed by hydraulic actuator, electronic control board eKMI and specific rupture valve (3/4", 1"1/4, 1"1/2, 2"), can be used on every hydraulic lift (for which the whole kit described above has been provided), in order to prevent the car unintended movements. No other usages (i.e. different for these two) can be implemented, or in conditions different from the ones described in this manual. If you are acting against the indications described in this manual, you are conducting an improper use. If in this status, the device and the lift may receive damages and most importantly you could generate extremely harmful and dangerous conditions to the lift passengers and maintenance persons.

The KMI kit, which prevents the risk of unintended movements, is covered by a certification issued by Notified Body IMQ (CE 0051)

Inside KMI kit, the rupture valves are modified according to specifications approved by IMQ, and they have one or more additional holes on their body for interfacing with the KMI actuator by means of flexible hoses, which create an hydraulic connection between the KMI actuator and the rupture valve

For all cases where A.3 amendment compliance is not required, the rupture valves are always manufactured WITHOUT the aforementioned auxiliary holes for KMI device interface

MORIS Italia will not therefore bear any responsibility if the KMI-ready rupture valves (i.e. with auxiliary holes), will be used or installed with any sort of temporary or permanent caps or devices for sealing the auxiliary holes when not connected to the KMI actuator

14. Existing risks

The risk analysis pointed out conditions which must be carefully considered and which could be potential danger sources; the existing risks (contained in the various sections of the risk analysis) are listed below:

- *The pressure switch could remain blocked in closed position, even at zero pressure: for this reason, inspection visits every six months must be planned*
- *The electronic board must have a battery backup power; if not, every blackout causes the elevator stop. During the planned visits, the battery efficiency must be checked*
- *Monitor the battery, in order to ensure that the activation of the actuator will happen also for an unintended movement during a blackout*
- *Check the effectiveness of the hydraulic accumulator at least every 6 months, in order to ensure the efficiency of the actuator commands (pressure switch, NC cartridge, pressure tightness)*
- *The status of the miniflex hoses between VB and actuator must be checked at least every six months*
- *The status of the main hydraulic circuit piping and the pressure tightness seal of the main circuit piping must be checked every 6 months.*
- *The functioning of the hydraulic actuator must be verified at least every 6 months*
- *Execute the test after assembling, indicated in the provided documentation, to ensure that no wiring mistakes (between electronic board and control panel) are made, no part incompatibility is present and no temporary electrical bridging is present.*
- *If the lift is driven until the mechanical block, it is necessary to discharge the actuator, by directly commanding the intervention and, later, recharge it, following the procedure described in the instruction manual; if this is not done, the actuator experiences pressures which are not recommended and may break or have a shorter operative life*
- *The solar exposition of the actuator, or the assembly inside sun-illuminated shafts, or near heat sources will cause pressure variations inside the circuit and stress cycles which will reduce the accumulator operative life, or generate a rupture phenomenon. The compatibility of the actuator to the various environment conditions must be evaluated in each case*
- *If the actuator is assembled outside the lift shaft, or outside the machine room, it must not be accessible to unauthorized people; the piping/hoses must be inspectionable.*
- *The closure of the power unit ball valve is not sufficient to isolate the sources of power, when the actuator has to be connected: the pressure is in fact generated inside the piston, therefore making the closure action of the ball valve useless.*
- *The intervention of the operator, to unblock the VB, may be necessary in case that the actuator has engaged with car at topmost floor and before the car has entered the unintended movement control zone: in this case, the space that the car must travel to unlock the rupture valve could not be sufficient*
- *When applying the KMI kit on lifts not complying to the lift directive, it may be necessary to modify the control panel, to allow the reach of the car in case of fault*

15. Maintenance and replacement of components

The KMI kit does not need maintenance. It is only necessary to periodically check the device effectiveness and to replace the components that might be defective, ineffective or exhausted. The hydraulic actuator has to be recharged at least every three month. The minimum value of the pressure into the accumulator have to be greater then the max static pressure of the lift, in conformity to the graph in the previous page.

16. Safety measures to adopt in case of replacements

When replacing the electronic board, remove the power supply voltage; comply with the connection schemes; verify that the power supply voltage is correct before closing the power supply circuit; ensure the correct earthing of the board.

When replacing the hydraulic actuator or any of its components, completely discharge the main hydraulic circuit and ensure that the car is resting onto the pit buffers. Only after discharging having discharged the actuator primary and secondary circuit, it is possible to continue with the disassembling operations. After the re-assembling, verify the correct piping/hoses seal, then vent the air out of the circuits and make a test of the correct functioning of the device, according to the instructions in this manual

17. Technical specs

HYDRAULIC ACTUATOR	MINIMUM	MAXIMUM
Nitrogen precharge of actuator	12 bar	20 bar
Oil accumulation pressure	30 bar	80Bar
Operating temperature	5°C	45°C
Viscosity	10 cSt	200 cSt
Ambient relative moisture	10%	90%
Length of IN OUT hoses	0,1 m	20 m
Electrovalve voltage (depending on eKMI chosen version)	10 Vdc (or 22 Vdc)	14 Vdc (or 26 Vdc)
Pressure switch regulation range	30 bar	35 bar
Pressure switch hysteresis	-3 bar	+3 bar
eKMI ELECTRONIC BOARD	MINIMUM	MAXIMUM
Power supply voltage (depending on the chosen version)	12 or 24 Vdc -10%	12 or 24 Vdc +10%
Tension safety chain	12 Vdc /24 V ac	48 V dc /110 V ac
Power absorption eKMI in standby	0,5 W	1 W
Power absorption eKMI during piloting of electrovalve	15 W (a 24 V dc)	25 W (a 12 V dc)

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