

## MODELLI E CARATTERISTICHE - MODELS AND CHARACTERISTICS - MODÈLES ET CARACTÉRISTIQUES MODELLE UND MERKMALE - MODELOS Y CARACTERÍSTICAS

<b>SL1500(THOR)</b>	Motoriduttore per cancelli fino a 1500 Kg, motore 230 V autoventilato con frizione meccanica centrale incorporata. <sup>(I)</sup>	<i>Gearmotor for gates up to 1500 kg, 230 V self-ventilated motor with mechanical clutch, built-in control unit.</i> <sup>(GB)</sup>	Motoréducteur pour portails jusqu'à 1500 kg, moteur 230 V autoventilé avec embrayage mécanique, centrale incorporée. <sup>(E)</sup>	<i>Getriebemotor für Tore bis 1500 kg, 230V Motor mit Eigenbelüftung und mechanischer Kupplung, mit eingebauter Steuerzentrale</i> <sup>(D)</sup>	Motorreductor para verjas de hasta 1500 kg, motor de 230V autoventilado con embrague mecánico, central incorporada <sup>(E)</sup>
<b>THOR 1561</b>	Motoriduttore per cancelli fino a 1500 Kg, motore 380 V autoventilato con frizione meccanica, senza centrale.	<i>Gearmotor for gates up to 1500 kg, 380 V self-ventilated motor with mechanical clutch, without a control unit.</i>	Motoréducteur pour portails jusqu'à 1500 kg, moteur 380 V autoventilé avec embrayage mécanique, sans centrale.	<i>Getriebemotor für Tore bis 1500 kg, 380V Motor mit Eigenbelüftung und mechanischer Kupplung, ohne Steuerzentrale</i>	Motorreductor para verjas de hasta 1500 kg, motor de 380V autoventilado con embrague mecánico, sin central.

## DATI TECNICI - TECHNICAL DATA - DONNÉES TECHNIQUES - TECHNISCHE DATEN - DATOS TÉCNICOS

	Unità di misura - Unit of measure Unité de mesure - Maßeinheit Unidad de medida	SL 1500	TH 1561
Alimentazione - Power supply - Alimentation Speisung - Alimentación	Vac 50 Hz	230	380
	Vdc		
Corrente - Current - Courant - Strom - Intensidad	A	2.2	1.2
Potenza assorbita - Absorbed power - Puissance absorbée Aufgenommene Leistung - Potencia absorbida	W	470	700
Condensatore incorporato - Condenser built-in - Condensateur incorporé - Kondensator eingebaut - Condensator incorporado	µF	30	
Grado di protezione - Protection level Indice de protection - Schutzgrad - Grado de protección	IP	43	43
Coppia - Torque - Couple - Drehmoment - Par	N•m	22	35
Velocità - Speed - Vitesse - Geschwindigkeit - Velocidad	m/s	0.16*	0.16*
Spinta max. - Maximum thrust - Pousée maximum Max. Schub - Empuje max.	N	600	1000
Peso max cancello - Max. weight of gate - Poids max. portail Max. Gewicht Tor - Peso máximo de la cancela	kg	1500	1500
Temperatura di esercizio - Working temperature - Température de service - Betriebstemperatur - Temperatura de servicio	°C (Min. / Max.)	-20° ÷ +70°	
Termoprotezione - Thermal protection - Protection Thermique - Wärmeschutz - Termoprotección	°C	140°	140°
Classe di isolamento - Insulation class - Classe d'isolement - Isolierungsklasse - Clase de aislamiento		1	F
Ciclo di lavoro - Working cycle - Cycle de travail Arbeitszyklus - Ciclo de trabajo	%	40	50
Peso motore - Motor weight - Poids moteur Motorgewicht - Peso del motor	kg	12.5	12

\* Con pignone Z = 18 - \* With pinion Z = 18 - \* Avec pignon Z = 18 - \* Mit Ritzel Z = 18 - \* Con piñón Z = 18

**CURVA DI MAX UTILIZZO**



**CURVE OF MAXIMUM USE**



**COURBE D'UTILISATION MAXIMUM**



**HÖCHSTBENUTZUNGSKURVE**



**CURVA DE USO MÁXIMO**



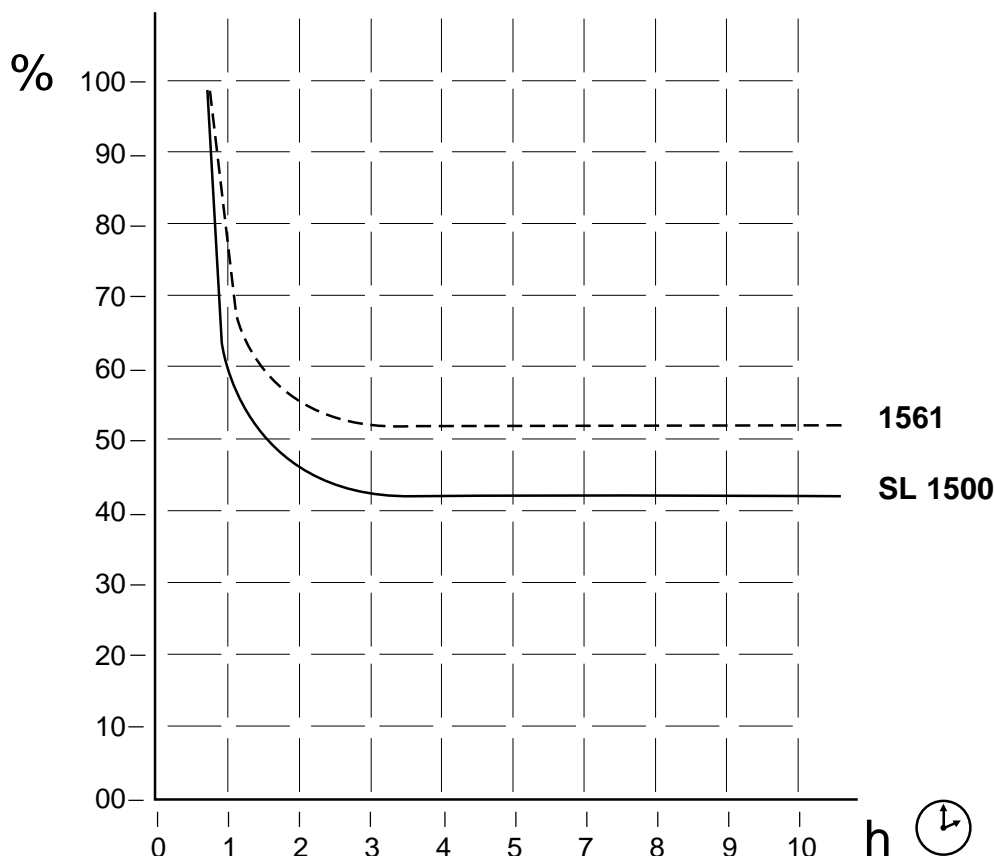
Consente di stabilire il tempo massimo di lavoro in funzione della frequenza di utilizzo. Posizionarsi quindi per sicurezza al di sotto della curva.

*This curve allows you to establish maximum working time according to the frequency of use. For safety reasons, keep below this curve.*

Permet d'établir le temps maximum de travail en fonction de la fréquence d'utilisation. Par sécurité, se positionner par conséquent sous cette courbe.

*Zur Festlegung der maximalen Arbeitszeit in Abhängigkeit von der Benutzungshäufigkeit. Daher zur Sicherheit unter dieser Kurve bleiben.*

Permite establecer el tiempo máximo de trabajo de acuerdo con la frecuencia de uso. Por lo tanto, por razones de seguridad regule por debajo de dicha curva.



Semplificando, la curva di massimo utilizzo è il rapporto percentuale tra il tempo effettivo di lavoro e la somma tra il tempo effettivo di lavoro e tutte le pause. I dati si riferiscono ad una temperatura ambiente di 20°C. L'esposizione ai raggi solari, e comunque l'aumento della temperatura ambiente influiscono abbassando considerevolmente la curva.



*Simplifying, the curve of maximum use is the percentage ratio between actual working time and the sum between actual working time and all the pauses. The data refer to a room temperature of 20°C, exposure to the sun's rays or a rise in room temperature are both influencing factors and will considerably lower the curve.*



En simplifiant, la courbe d'utilisation maximum est le rapport en pourcentage entre le temps de travail effectif et la somme entre le temps de travail effectif et toutes les pauses. Les données se réfèrent à une température ambiante de 20°C, l'exposition aux rayons solaires et dans tous les cas, l'augmentation de la température ambiante ont une influence et abaissent considérablement la courbe.



*Einfacher gesagt, ist die Höchstbenutzungskurve das Verhältnis in Prozenten zwischen der effektiven Arbeitszeit und der Summe der effektiven Arbeitszeit und aller Pausen. Die Daten beziehen sich auf 20°C Raumtemperatur. Sonnenstrahlen und Erhöhung der Raumtemperatur setzen die Kurve bedeutend herab.*



La curva de uso máximo es la relación en porcentaje entre el tiempo efectivo de trabajo y la suma entre el tiempo efectivo de trabajo y todas las pausas. Los datos se refieren a una temperatura ambiente de 20°C. La exposición a los rayos solares y un aumento de la temperatura ambiente influyen bajando considerablemente la curva.

## I VERIFICHE E PRELIMINARI

A) Leggere attentamente le istruzioni. Verificare che il cancello sia adatto ad essere automatizzato e che il tutto risulti conforme a quanto previsto dalle normative vigenti.  
 B) Accertarsi che la struttura del cancello sia solida ed appropriata.  
 C) Accertarsi che il cancello, durante tutto il suo movimento, non subisca punti di attrito e che non vi sia pericolo di deragliamenti.  
 D) Accertarsi della presenza dei franchi di sicurezza.

## GB CHECKING AND PRELIMINARY PROCEDURES

A) Read the instructions carefully. Make sure the gate is suitable for automation and that everything conforms to current standards.  
 B) Make sure the gate's structure is solid and appropriate.  
 C) Ensure that there is no point of friction during the entire movement of the gate.  
 D) Make sure that the safety side panels are installed.

## F CONTRÔLES ET OPÉRATIONS PRÉLIMINAIRES

A) Lire attentivement les instructions. Vérifier que le portail est adapté pour recevoir une automatisation et que l'ensemble est conforme aux prescriptions des normes en vigueur.  
 B) S'assurer que la structure du portail est solide et appropriée.  
 C) S'assurer que le portail, durant tout le mouvement, n'a pas de points de frottement et qu'il n'y a pas de danger de déraillement.  
 D) S'assurer que les côtés de sécurité sont présents.

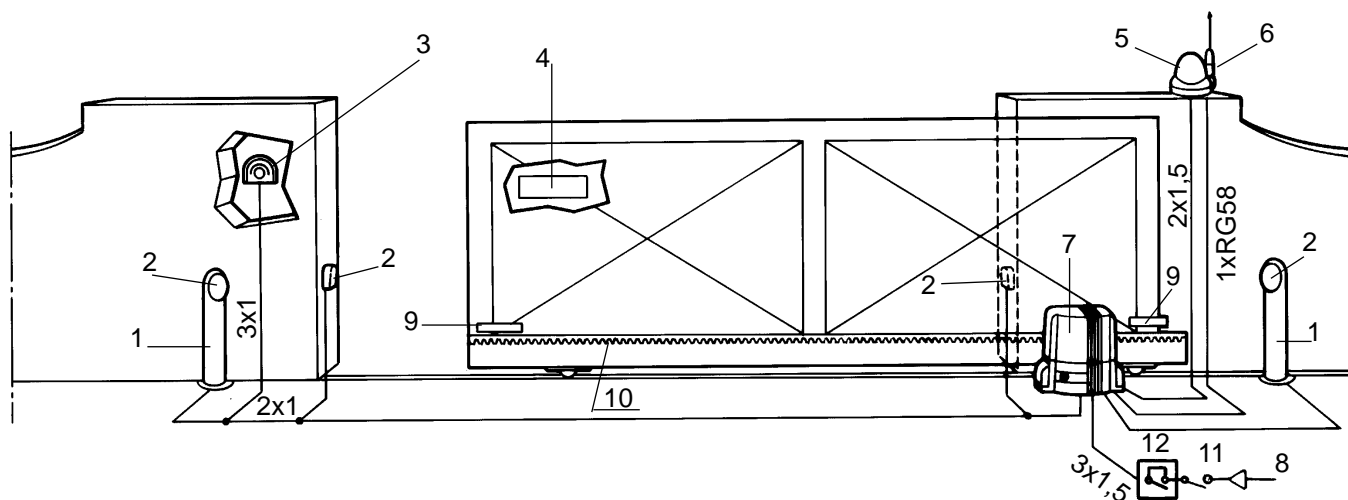
## D PRÜFUNGEN UND VORBEREITUNGEN

A) Lesen Sie die Anleitungen aufmerksam durch. Prüfen Sie, ob das Tor für eine Automatisation geeignet ist und ob alles mit den gültigen Vorschriften übereinstimmt.  
 B) Sicherstellen, dass die Struktur des Tores solide und geeignet ist.  
 C) Sicherstellen, daß das Tor während der gesamten Bewegung auf keine Reibpunkte trifft und keine Entgleisungsgefahr besteht.  
 D) Sicherstellen, dass die Sicherheitsfreiräume vorhanden sind.

## E CONTROLES Y OPERACIONES PRELIMINARES

A) Lea atentamente las instrucciones. Controle que la verja pueda ser automatizada y que todo resulte conforme con cuanto previsto por las normas vigentes.  
 B) Cerciórese de que la estructura de la verja sea sólida y apropiada.  
 C) Cerciórese de que durante todo el movimiento de la verja, esta última no tenga roces y que no haya peligro de descarrilamiento.  
 D) Controle que estén montados los flancos de seguridad.

### QUADRO D'INSIEME (SL1500 con centrale incorporata) / VIEW OF THE ASSEMBLY (SL 1500 with built-in control unit) VUE D'ENSEMBLE - GESAMTANSICHT (SL 1500 mit eingebauter Steuerzentrale) DIBUJO DE CONJUNTO



## I

- 1) Colonnina
- 2) Fotocellula
- 3) Selettore a chiave o tastiera digitale
- 4) Cartello di avvertenza
- 5) Lampeggiatore
- 6) Antenna
- 7) SL 1500
- 8) Linea di alimentazione
- 9) Staffe per fincorsa
- 10) Cremagliera
- 11) Interruttore generale
- 12) Interruttore differenziale

## GB

- 1) Column
- 2) Photocell
- 3) Key selector or digital keypad
- 4) Warning sign
- 5) Flashing light
- 6) Aerial
- 7) SL 1500
- 8) Power supply line
- 9) Microswitch brackets
- 10) Rack
- 11) Main switch
- 12) Differential switch

## F

- 1) Colonne de support
- 2) Cellule photoélectrique
- 3) Sélecteur à clé et clavier digital
- 4) Panneau d'avertissement
- 5) Clignotant
- 6) Antenne
- 7) SL 1500
- 8) Ligne d'alimentation
- 9) Pattes de fin de course
- 10) Crémaillère
- 11) Interrupteur général
- 12) Interrupteur différentiel

## D

- 1) Säule
- 2) Photozelle
- 3) Schlüsselwählschalter oder digitale Tastatur
- 4) Hinweisschild
- 5) Blinklicht
- 6) Antenne
- 7) SL 1500
- 8) Speisungsleitung
- 9) Anschlagbügel
- 10) Zahnstange
- 11) Hauptschalter
- 12) Differentialschalter

## E

- 1) Columnita
- 2) Fotocélula
- 3) Selector de llave o teclado digital
- 4) Placa de advertencia
- 5) Luz intermitente
- 6) Antena
- 7) SL 1500
- 8) Línea de alimentación
- 9) Bridas de tope
- 10) Cremallera
- 11) Interruptor general
- 12) Interruptor diferencial

## ① INFORMAZIONI PER L'UTENTE

Ad installazione avvenuta, l'utente deve essere informato sulle prestazioni dell'apricancello, e di tutti i rischi che possono derivare da un uso improprio o scorretto. L'utente deve evitare di porsi in situazioni di pericolo, cioè stazionare nel raggio d'azione del cancello quando esso è in movimento, non opporsi al movimento del cancello stesso, vietare ai bambini di giocare in prossimità del cancello e tenere fuori dalla loro portata i telecomandi.

Tutti gli interventi di manutenzione, riparazione o verifiche periodiche devono essere eseguiti da personale professionalmente qualificato, documentati e custoditi dall'utilizzatore.

- L'utente, in caso di anomalia, deve astenersi da qualsiasi tentativo di intervento e chiamare l'installatore per la riparazione.
- L'utente può solo eseguire la manovra manuale.

## Ⓒ INFORMATION FOR THE USER

*Once installed, the user must be informed about the performance of the gate opening system and of all the risks that could arise from an improper or incorrect use. The user must avoid placing himself in hazardous situations, that is, staying within the gate's range of action when it is moving, trying to resist gate movement; children must not be allowed to play near the gate and always keep remote controls out of their reach.*

*All maintenance, repairs or periodical checks must be carried out by professionally qualified personnel, documented and kept by the user.*

- *In the case of malfunctioning the user must not endeavour to resolve it but call the installer.*
- *The user can only carry out the manual operations.*

## Ⓕ INFORMATIONS POUR L'USAGER

Lorsque l'installation a été effectuée, l'utilisateur doit être informé sur les performances du dispositif d'automatisation et sur tous les risques qui peuvent dériver d'une utilisation improprie ou incorrecte. L'utilisateur doit éviter de se mettre en situation de danger, c'est-à-dire de stationner dans le rayon d'action du portail quand celui-ci est en mouvement ; il ne doit pas s'opposer au mouvement du portail, il doit interdire aux enfants de jouer à proximité du portail et conserver les télécommandes hors de leur portée.

Toutes les interventions de maintenance, réparation ou les contrôles périodiques doivent être effectuées par du personnel professionnellement qualifié; les opérations doivent être documentées et la documentation doit être conservée par l'utilisateur.

- En cas d'anomalie, l'utilisateur doit s'abstenir de toute tentative d'intervention et appeler l'installateur pour la réparation
- L'utilisateur peut seulement effectuer la manœuvre manuelle.

## Ⓓ INFORMATIONEN FÜR DEN BENUTZER

*Nach erfolgter Installation muss der Benutzer immer über die Leistungen des Toröffners und alle Risiken informiert werden, die durch einen unsachgemäßen oder unkorrekten Gebrauch entstehen können. Der Benutzer muss vermeiden, sich in Gefahrensituationen zu begeben, bzw. im Aktionsbereich des Tors zu verweilen, wenn sich das Tor bewegt, sich der Torbewegung nicht widersetzen, Kindern verbieten, in der Nähe des Tors zu spielen und die Fernsteuerung außer ihrer Reichweite halten.*

*Alle Eingriffe wie Wartung, Reparatur oder regelmäßige Überprüfungen müssen von beruflich qualifiziertem Personal ausgeführt werden. Sie müssen mit Unterlagen belegt werden, die vom Benutzer aufzubewahren sind.*

- *Im Fall von Störungen darf der Benutzer keine Eingriffe ausführen, sondern muss zur Reparatur den Installateur rufen.*
- *Der Benutzer kann nur die manuelle Handhabung ausführen.*

## Ⓔ INFORMACIONES PARA EL USUARIO

Cuando haya finalizado la instalación, informe al usuario sobre el uso del dispositivo para abrir verjas y sobre todos los riesgos que puede correr a causa de un uso impropio o incorrecto del mismo. El usuario tiene que evitar situaciones de peligro, es decir pararse en el radio de acción de la verja cuando la misma está en movimiento, oponerse al movimiento de la misma, prohibir a los niños jugar en proximidad de la verja y mantener fuera del alcance de los mismos los controles remotos.

Todas las operaciones de mantenimiento, reparación o controles periódicos tienen que ser efectuados por personal cualificado, registradas y conservadas por el usuario.

- En caso de anomalía, el usuario tiene que abstenerse de efectuar cualquier reparación y llamar al instalador.
- El usuario puede efectuar la maniobra manual.



MANOVRA MANUALE - MANUAL OPERATIONS - MANŒUVRE MANUELLE  
MANUELLE HANDHABUNG - MANIOBRA MANUAL

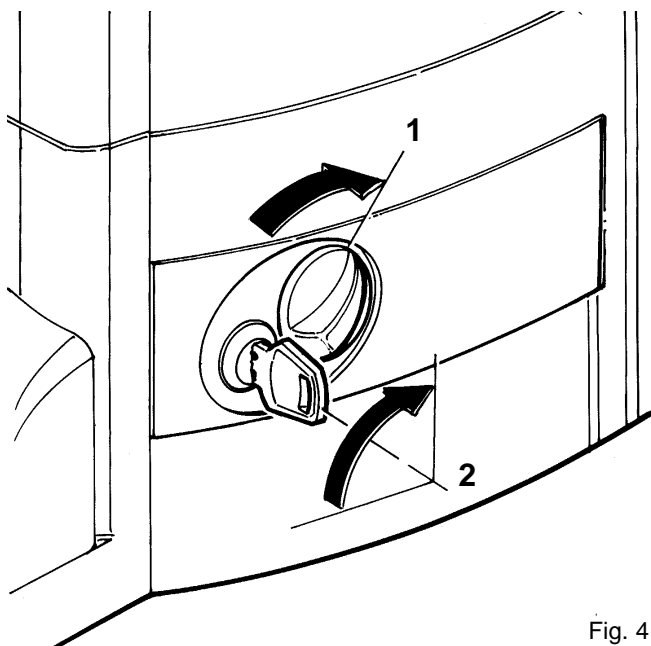


Fig. 4

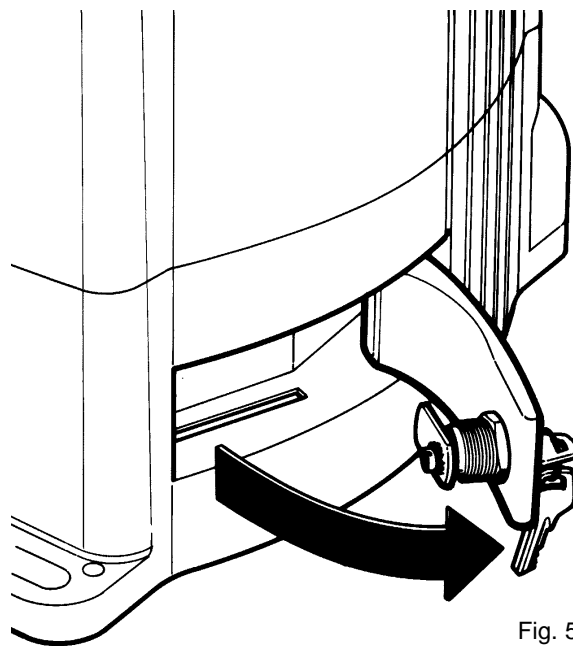


Fig. 5

- |                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Ⓘ</p> <p>1) Ruotare verso l'alto il copriserratura (1).<br/>2) Inserire la chiave e ruotarla in senso orario di 90° (2).<br/>3) Tirare a se la maniglia agendo dapprima sulla chiave stessa fino a portarla perpendicolare al THOR (Fig. 5).<br/>Un microinterruttore di sicurezza fa in modo che non possa avviarsi in posizione manuale.</p> | <p>Ⓒ</p> <p>1) Slide the key cover upwards (1).<br/>2) Insert the key and turn it 90° clockwise (2).<br/>3) Pull the handle towards you, turning the key, until it is perpendicular to SL 150 (Fig. 5).<br/>A safety microswitch prevents it from being able to start in the manual position.</p> | <p>Ⓕ</p> <p>1) Tourner le cache-serrure vers le haut (1).<br/>2) Introduire la clé et la tourner de 90° dans le sens des aiguilles d'une montre (2).<br/>3) Tirer vers soi la poignée en agissant d'abord sur la clé proprement dite de manière à la placer perpendiculairement au THOR (Fig. 5).<br/>Un microinterruteur de sécurité fait en sorte que le dispositif ne puisse pas se mettre en position manuelle.</p> | <p>Ⓓ</p> <p>Die Abdeckung des Schlosses (1) nach oben drehen (1).<br/>Den Schlüssel einstecken und um 90° nach rechts drehen (2).<br/>Den Griff durch Betätigung des Schlüssels nach vorne ziehen, bis er senkrecht zu THOR steht (Abb.5).<br/>Ein Mikroschalter bewirkt, dass er nicht in manueller Position angelassen werden kann.</p> | <p>Ⓔ</p> <p>1) Gire hacia arriba el cubrecerradura (1).<br/>2) Introduzca la llave y gírela 90° hacia la derecha (2).<br/>3) Tire de la manija hacia Ud., actuando antes sobre la llave hasta colocarla perpendicularmente a THOR (fig. 5).<br/>Un microinterruptor de seguridad impide que se pueda poner en marcha en posición manual.</p> |
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DIMENSIONI D'INGOMBRO - OVERALL DIMENSIONS - DIMENSIONS D'ENCOMBREMENT  
RAUMBEDARF - DIMENSIONES EXTERIORES MÁXIMAS

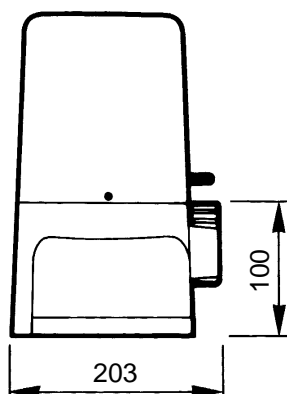
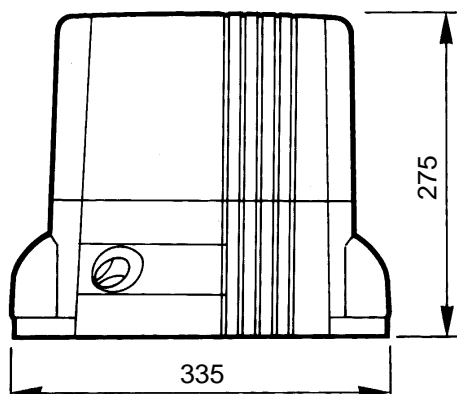


Fig. 6

- Ⓘ Con pignone Z 18, escluso piastra di fondazione
- Ⓒ With pinion Z 18, foundation plate excluded.
- Ⓕ Avec pignon Z 18, plaque de fondation exclue.
- Ⓓ Mit Ritzel Z 18 Fundamentplatte ausgeschlossen
- Ⓔ Con piñón Z 18, excluida la placa de fundación.



**① MURATURA DELLA PIASTRA DI FONDAZIONE**

Avvitare a mano per ognuna delle 4 zanche in dotazione 1 dado M 12 basso per tutto il filetto.

Infilare le quattro zanche nella piastra di fondazione fig. 7

Prevedere una o più guaine per il passaggio di cavi elettrici. Inserire nel calcestruzzo la piastra avendo cura di metterla perfettamente in bolla.

È importante rispettare la distanza della piastra di fondazione dalla cremagliera (bisogna quindi sapere anzi tempo se sarà saldata al cancello oppure fissata con viti e distanziali), in modo da poter usufruire del fissaggio asolato del motoriduttore.

**② SCELLEMENT DE LA PLAQUE DE FONDATION**

Visser à la main pour chacune des agrafes fournies 1 écrou M12 bas jusqu'en bas de la partie filetée.

Enfiler les quatre agrafes dans la plaque de fondation (fig. 7).

Prévoir une ou plusieurs gaines pour le passage des câbles électriques. Sceller la plaque dans le ciment en ayant soin de la mettre parfaitement de niveau.

Il est important de respecter la distance entre la plaque de fondation et la crémaillère (il faut donc savoir en temps utile si elle sera soudée au portail ou bien vissée avec les vis et les entretoises), de manière à pouvoir utiliser la fixation à fente du motoréducteur.

**③ EINMAUERN DER FUNDAMENTPLATTE**

Für jedes der 4 mitgelieferten Verankerungsbeine 1 flache M12 Mutter mit Gewinde ganz von Hand anschrauben.

Die 4 Verankerungsbeine in die Fundamentplatte einstecken, Abb. 7.

Einen oder mehrere Mäntel für den Durchgang von Elektrokabeln vorsehen. Die Platte in den Beton einfügen und perfekt nivellieren.

Wichtig ist, dass der Abstand der Fundamentplatte von der Zahnstange eingehalten wird (man muss vorher wissen, ob die Zahnstange an das Tor geschweisst oder mit Schrauben und Distanzstücken befestigt wird), so dass der Getriebemotor mit Schlitz befestigt werden kann.

**④ COLOCACIÓN DE LA PLACA DE FUNDACIÓN**

Enrosque a mano hasta el fondo las cuatro tuercas M 12 bajas en las 4 grapas suministradas de serie.

Introduzca las cuatro grapas en la placa de fundación (fig. 7).

Disponga de una o varias vainas para pasar los cables eléctricos. Introduzca en el hormigón la placa teniendo cuidado en colocarla perfectamente nivelada.

Es importante respetar la distancia de la placa de fundación desde la cremallera (por consiguiente, es necesario saber por anticipado si ésta será soldada a la verja, o fijada con tornillo y distanciadores), para poder aprovechar la las ranuras de regulación de la sujeción del motorreductor.

**⑤ WALLING THE FOUNDATION PLATE**

Screw right down by hand, for each of the 4 fish-tail clamps provided, 1 M12 low nut.

Insert the four clamps in the foundation plate, Fig. 7.

Use one or more sheaths for the passage of the electric cables. Insert the plate in the concrete, taking care to place it perfectly level.

It is important to observe the distance of the foundation plate from the rack (hence you must know in advance whether it is going to be welded to the gate or secured with screws and spacers), so you can make use of the slotted fixing on the gearmotor.

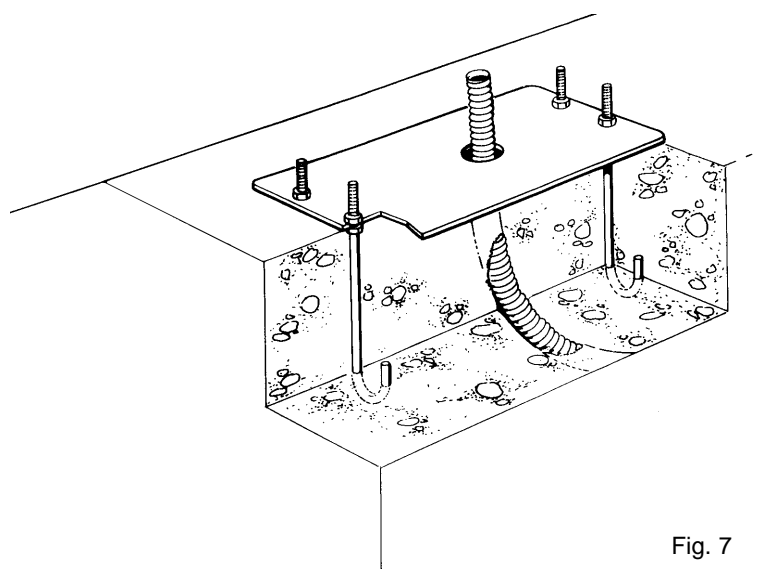


Fig. 7

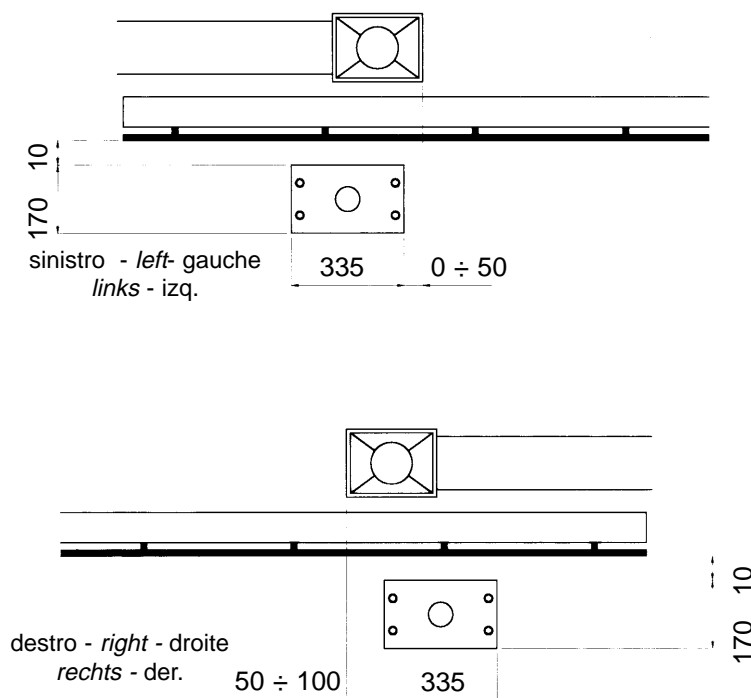


Fig. 8

## I FISSAGGIO MOTORIDUTTORE

- Togliere le due alette copritivi tirandole verso l'alto.
- Appoggiare il THOR sulla piastra di fondazione murata preventivamente.
- Avvitare i 4 dadi bassi qualora si voglia regolare in altezza (max 10 mm) il motoriduttore, altrimenti non utilizzarli. (fig. 10)

Inserire le 4 rondelle.

Bloccare energeticamente con chiave da mm 19 i dadi M 12 e gli eventuali controdadi bassi.

Inserire le due alette copritivi (estetiche) facendo pressione dall'alto al basso.

## F FIXATION MOTORÉDUCTEUR

- Enlever les deux cache-vis en les tirant vers le haut.
- Poser le THOR sur la plaque de fondation préalablement scellée.
- Visser les 4 écrous bas si on désire régler en hauteur le motoréducteur (10 mm maximum), en cas contraire, ne pas les utiliser (fig. 10).

Mettre les 4 rondelles.

Serrer à fond les écrous M12 et les éventuels contre-écrous bas avec une clé de 19 mm.

Remettre les deux cache-vis en faisant pression du haut vers le bas.

## D BEFESTIGUNG DES GETRIEBEMOTORS

- Die zwei Abdeckflügel nach oben ziehen und entfernen.
- Den THOR auf die vorher eingemauerte Fundamentplatte stützen.
- Die vier flachen Muttern anschrauben (max. 10 mm), falls der Getriebemotor in der Höhe verstellt werden soll, andernfalls die Muttern nicht benutzen, Abb. 10.

Die 4 Unterlegscheiben einfügen.

Die Muttern M12 und die eventuellen flachen Gegenmuttern energisch mit einem 19 mm Schlüssel blockieren.

Die zwei Abdeckflügel wieder durch Druck von oben nach unten einsetzen (nur zur Ästhetik).

## E SUJECIÓN DEL MOTORREDUCTOR

- Quite las dos aletas que cubren los tornillos, tirándolas hacia arriba.
- Apoye el THOR sobre la placa de fundación fijada previamente.
- Enrosque las 4 tuercas bajas si desea regular la altura del motorreductor (10 mm. máx.), en caso contrario, no las use (fig. 10).

Introduzca las 4 arandelas.

Apriete firmemente las tuercas M 12 y las posibles contratuercas bajas con una llave de 19 mm.

Introduzca las dos aletas para cubrir los tornillos (estéticas) presionando desde arriba hacia abajo.

## GB FIXING THE GEARMOTOR

- Remove the two screw covers, pulling them upwards.
- Place SL 1500 on the already walled foundation plate.
- Tighten the 4 low nuts if you wish to adjust the height of the gearmotor (10 mm maximum), otherwise do not use them Fig. 10).

Fit the 4 washers.

Tighten firmly the M12 nuts, and any low counter nuts, with a 19 mm size spanner.

Put the screw covers back in place, pushing them down from the top.

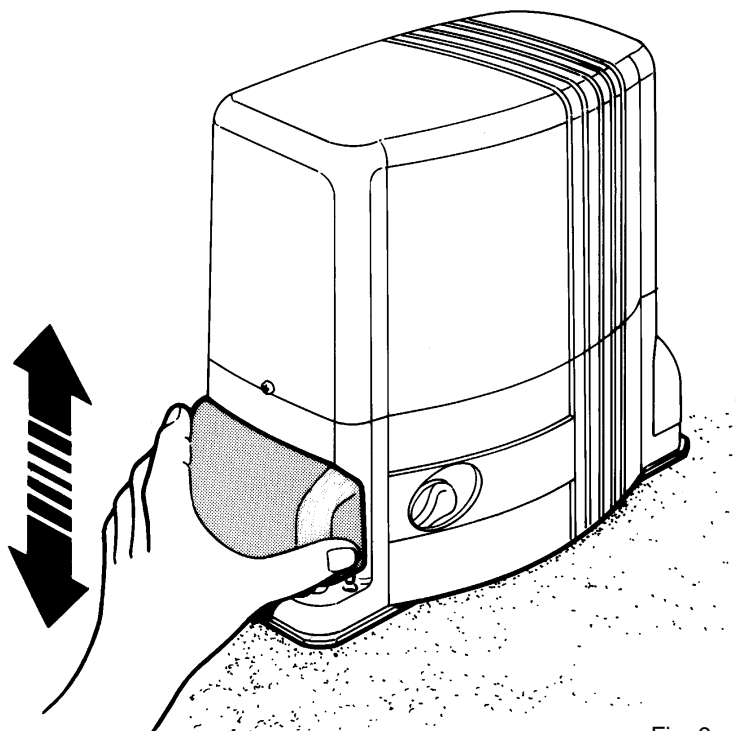


Fig. 9

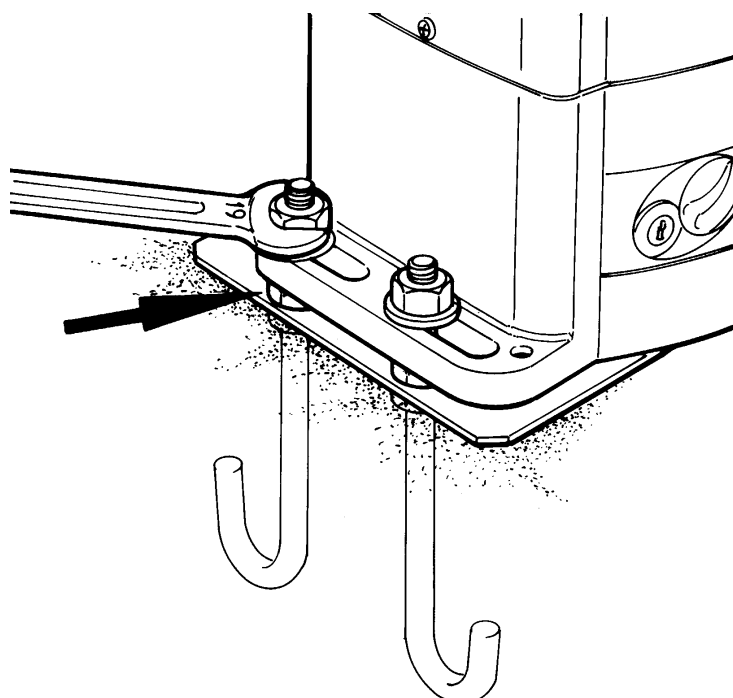


Fig. 10



## ① FISSAGGIO DELLA CREMAGLIERA

Predisporre il THOR in "funzionamento manuale".  
Appoggiare sull'ingranaggio il 1° elemento di cremagliera fig. 11 e bloccarlo al cancello, facendo scorrere l'anta.  
Per un corretto posizionamento degli altri elementi è necessario utilizzare un elemento che funzioni da controcremagliera.  
È importante che fra cremagliera ed ingranaggio ci sia un gioco di almeno 1 mm. in modo che il peso del cancello non gravi mai sul motoriduttore.

Posizionare in modo approssimativo le due staffe di finecorsa in dotazione, sulla cremagliera, ed agendo manualmente sul cancello, procedere al fissaggio definitivo con i grani in dotazione (fig. 12).

Tenere presente che quando la staffa di finecorsa interviene sulla molla del motoriduttore, il cancello scorrerà per altri 50 mm. circa. Tenere quindi il giusto anticipo delle staffe onde evitare l'incaglio del cancello.

## ② FIXATION DE LA CRÉMAILLÈRE

Sélectionner le "fonctionnement manuel".  
Mettre en appui sur l'engrenage le 1er élément de la crémaillère (fig. 11) et le bloquer au portail en faisant coulisser ce dernier.  
Pour un positionnement correct des autres éléments, il faut utiliser un élément faisant fonction de contre-crémaillère.  
Il est important qu'il y ait un jeu d'au moins 1 mm entre la crémaillère et l'engrenage de manière que le poids du portail ne pèse jamais sur le motoréducteur.

Positionner de manière approximative les deux pattes de support pour microinterrupteur de fin de course sur la crémaillère et, en agissant manuellement sur le portail, procéder à la fixation définitive avec les goujons fournis (fig. 12).

Attention: quand la patte de support du microinterrupteur intervient sur le ressort du motoréducteur, le portail coulisse encore sur 50 mm environ. Positionner donc les pattes en avant d'autant pour éviter que le portail se coince.

## ③ BEFESTIGUNG DER ZAHNSTANGE

Den THOR auf "manuellen Betrieb" stellen.  
Das 1. Zahnstangenelement auf das Zahnrad stützen (Abb. 11) und am Tor blockieren, dabei den Flügel gleiten lassen.  
Für das korrekte Positionieren der anderen Elemente muss ein Teil benutzt werden, das als Gegenzahnstange dient.  
Wichtig ist, dass zwischen Zahnstange und Zahnrad ein Spiel von mindestens 1 mm ist, so dass das Torgewicht nie auf dem Getriebemotor liegt.

Die zwei mitgelieferten Anschlagbügel ungefähr an der Zahnstange anordnen und, indem das Tor manuell betätigt wird, mit den mitgelieferten Stiftschrauben endgültig befestigen (Abb. 12).

Berücksichtigen, dass das Tor noch etwa 50 mm gleitet, nachdem der Anschlagbügel auf die Feder des Getriebemotors trifft. Daher die richtige Vorverstellung der Bügel einhalten, damit das Klemmen des Tors verhindert wird.

## ④ FIJACIÓN DE LA CREMALLERA

Coloque el THOR en "funcionamiento manual".  
Apoye sobre el engranaje el 1° elemento de la cremallera (fig. 11) y bloquéelo a la verja, haciendo correr la hoja.  
Para posicionar correctamente los demás componentes, use un elemento que cumpla la función de contracremallera.  
Es importante que entre la cremallera y el engranaje haya un juego de 1 mm como mínimo, para que el motorreductor nunca soporte el peso de la verja.

Coloque aproximadamente las bridas de tope suministradas de serie sobre la cremallera y, actuando manualmente sobre la verja, fíjelas definitivamente con los tornillos sin cabeza de serie (fig. 12).

Tenga en cuenta que cuando la brida de tope interviene sobre el muelle del motorreductor, la verja se deslizará por otros 50 mm aprox. Por lo tanto, instale las bridas en la posición exacta para que la verja no se trabaje.

## ⑤ FIXING THE RACK

Select the "manual" functioning mode.  
Place the first rack element on the gear (Fig. 11), and lock it to the gate by letting it slide along.  
To ensure correct positioning of the other elements it is necessary to use an element that functions as a counter-rack.  
It is important that there be a certain amount of play between rack and gear (at least 1 mm) so the gate's weight never bears down on the gearmotor.

Roughly position the two limit switch brackets (provided) on the rack and, manually moving the gate, fix them definitely with the dowels provided (fig. 12).

Attention: when the microswitch bracket operates the gearmotor spring, the gate will slide about another 50 mm so make sure the brackets' timing is correct to avoid the gate getting stuck.

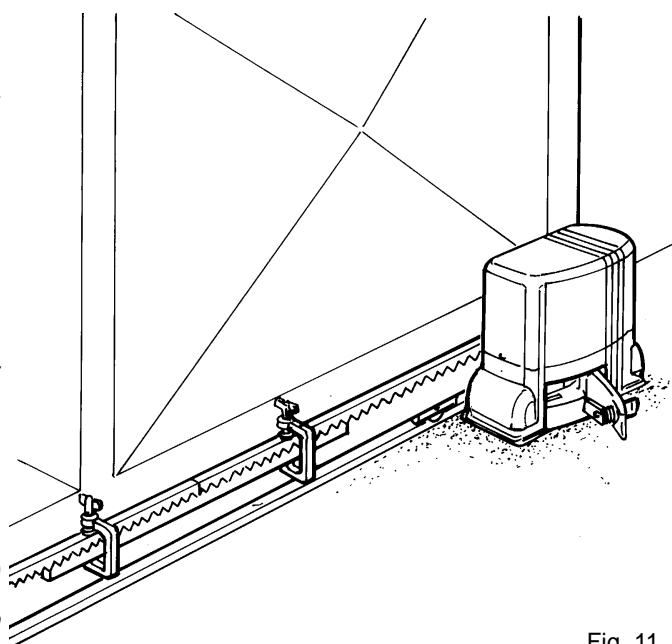


Fig. 11

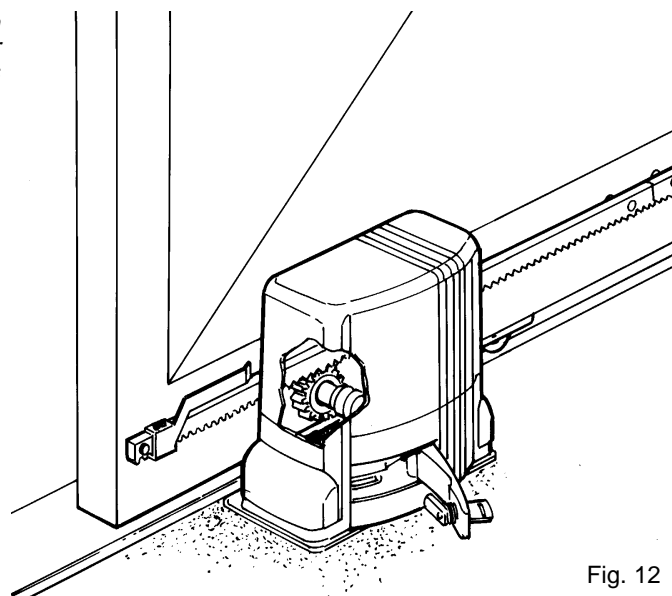


Fig. 12

① **REGOLAZIONE DELLA FRIZIONE MECCANICA**

Togliere il coperchio dal motoriduttore, agire con il cacciavite a taglio sull' apposita vite (fig. 13).

Attenzione, il motoriduttore viene fornito con la frizione regolata al massimo, occorre che inizialmente si diminuisca la coppia.

Per aumentare la coppia ruotare in senso orario.

Per diminuire la coppia ruotare in senso antiorario.

ⓐ **ADJUSTING THE MECHANICAL CLUTCH**

Remove the gearmotor cover, using a slot screwdriver (fig. 13).

Attention: the gearmotor is supplied with the clutch adjusted at maximum; it will be necessary to reduce torque initially.

To increase torque, turn clockwise.

To reduce torque, turn counterclockwise.

ⓕ **RÉGLAGE DE L'EMBRAYAGE MÉCANIQUE**

Enlever le couvercle du motoréducteur, agir avec un tournevis à fente sur la vis de réglage (fig. 13).

Attention : le motoréducteur est fourni avec l'embrayage réglé au maximum, il faut initialement diminuer le couple.

Pour augmenter le couple, tourner la vis dans le sens des aiguilles d'une montre.

Pour diminuer le couple, tourner la vis dans le sens contraire aux aiguilles d'une montre.

ⓓ **EINSTELLUNG DER MECHANISCHEN KUPPLUNG**

Den Deckel des Getriebemotors entfernen, indem die spezielle Schraube mit einem Schraubenzieher betätigt wird (Abb. 13).

Achtung: wenn der Getriebemotor geliefert wird, ist die Kupplung auf das Maximum eingestellt. Am Anfang muss der Drehmoment reduziert werden.

Zur Erhöhung des Drehmoments, nach rechts drehen.

Zur Reduzierung des Drehmoments, nach links drehen.

Der Getriebemotor mit eingebauter Steuerzentrale verfügt auch über eine elektronische Kupplung, um eine feinere Einstellung zu gewährleisten.

ⓔ **REGULACIÓN DEL EMBRAGUE MECÁNICO**

Quite la tapa del motorreductor, desenroscando el tornillo correspondiente con un destornillador (fig. 13).

Atención: el motorreductor se suministra con el embrague regulado al máximo; es necesario que al inicio se disminuya el par.

Para aumentar el par, gire hacia la derecha.

Para disminuir el par, gire hacia la izquierda.

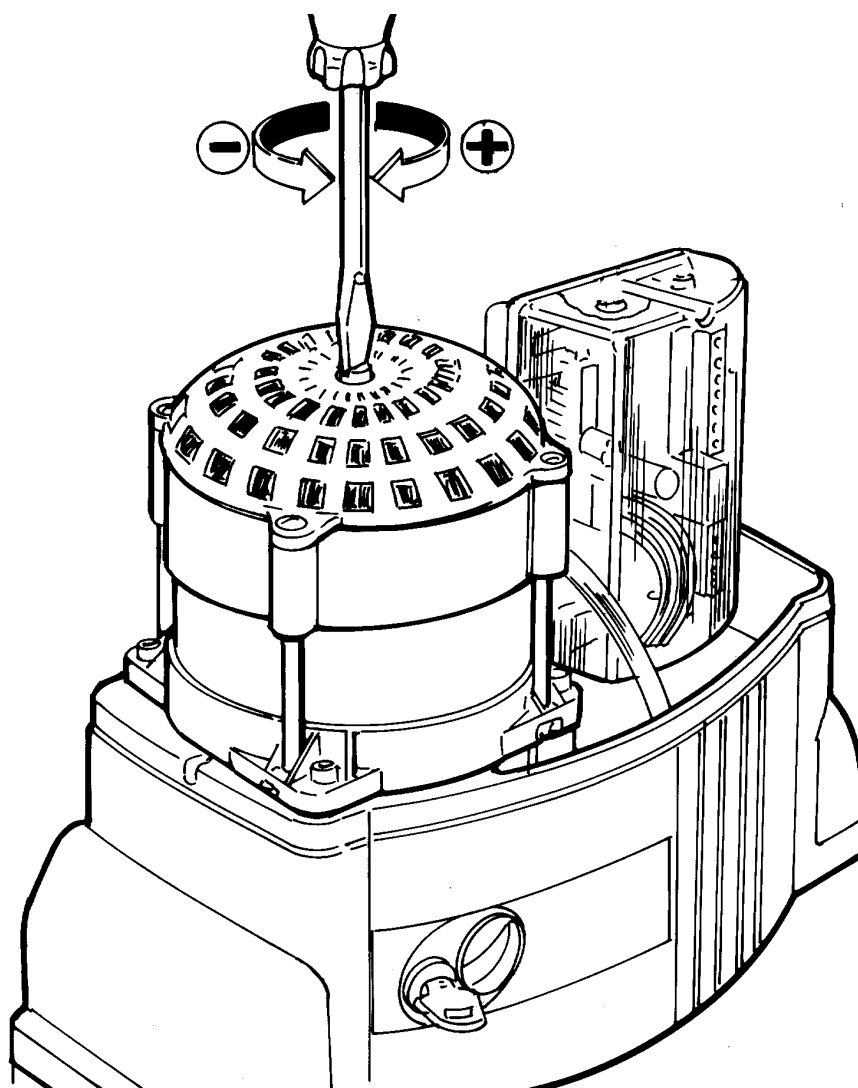


Fig. 13

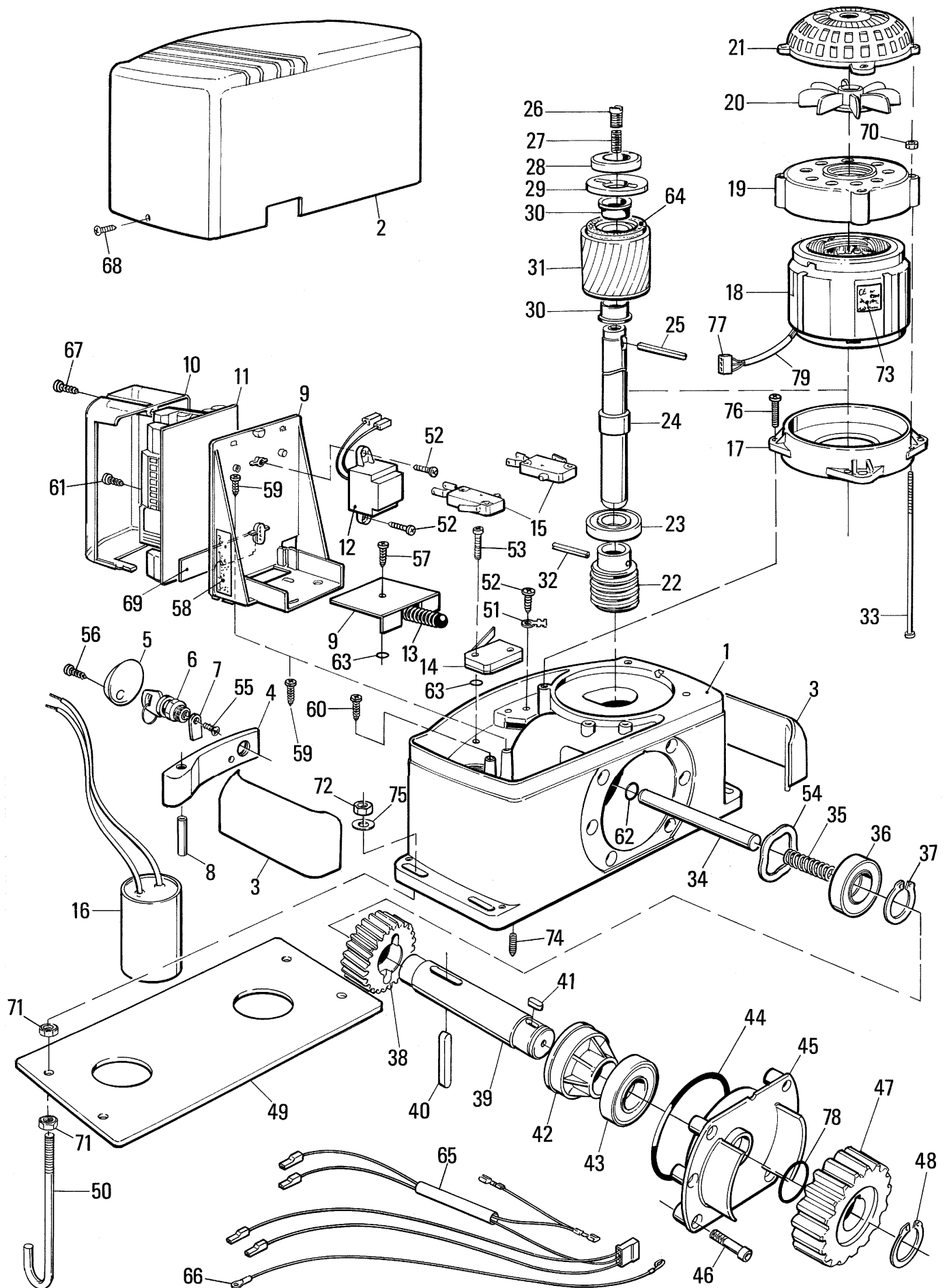
① CATALOGO RICAMBI

Ⓒ SPARE PARTS CATALOGUE

Ⓕ CATALOGUE DES RECHANGES

Ⓓ ERSATZTEILKATALOG

Ⓔ CATÁLOGO DE RECAMBIOS



Pos.	Code	(I) Descrizione	(GB) Description	(F) Description	(D) Beschreibung	(E) Descripción
1	BMGTH 34567	Guscio alluminio	Aluminium case	Coque aluminium	Aluminiumgehäuse	Caja de aluminio
2	PPD0123 4540	Coperchio motore	Motor cover	Couvercle moteur	Motordeckel	Tapa del motor
3	PPD0121 4540	Copri fissaggio	Fixing cover	Cache-vis	Abdeckung für Befestigung	Aletas cubridoras
4	BMMS 34567	Maniglia di sblocco	Unlock handle	Poignée de déblocage	Entriegelungsgriff	Manija de desbloqueo
5	PPD0119 4540	Copriserratura	Lock cover	Cache-serrure	Schlossdeckel	Cubrecerradura
6	CM-B 1630	Chiave Meroni	Meroni key	Clé Meroni	Meroni schlüssel	Llave Meroni
7	PMD0166 4610	Levetta per serratura	Lever for lock	Levier pour serrure	Hebel für Schloss	Patilla para cerradura
8	G6X50 5123	Grano	Dowel	Goujon	Stiftschraube	Tornillo sin cabeza
9	BPBS 4540	Base scatola centrale	Central box base	Base boîtier central	Basis für Kasten der Steuerzentrale	Base caja central
10	MPCO2 4540	Coperchio scatola centrale	Central box cover	Couvercle boîtier central	Deckel für Kasten der Steuerzentrale	Tapa caja central
11	MTHA5	Centrale elettronica	Electronic control unit	Centrale électronique	Elektronische Steuerzentrale	Central electronica
12	TRA-G 1025	Trasformatore	Transformer	Transformateur	Transformateur	Transformador
13	MO-D 2640	Molla per finecorsa	Spring for limit switch	Ressort pour microint. de fin de course	Feder für Endanschlag	Muelle para final de carrera
14	MICROI-C 1617	Microswitch	Microswitch	Microinterrupteur	Mikroschalter	Microinterruptor
15	MICROI 1617	Microswitch	Microswitch	Microinterrupteur	Mikroschalter	Microinterruptor
16	25U450 0727	Cond. polipropilene 25U	25U polypropylene duct	Cond. polypropylène 25U	Kondensator aus Polypropylen 25U	Condensador polipropilene 25U
17	BMC1 4567	Calotta inferiore	Bottom cap	Calotte inférieure	untere Kappe	Tapa inferior
18	PEDS65 4650	Statore	Stator	Stator	Stator	Estator
19	BMCS 4567	Calotta superiore	Top cap	Calotte supérieure	obere Kappe	Tapa superior
20	PPD0169 4540	Ventola esterna	External fan	Ventilateur extérieur	äußeres Flügelrad	Ventilador exterior
21	PPD0170 4540	Copri ventola esterna	External fan cover	Protection ventilateur extérieur	Abdeckung für äußeres Flügelrad	Tapa del ventilador exterior
22	PMD0133 4610	Vite senza fine	Worm screw	Vis sans fin	Schnecke	Tornillo sin fin
23	PMCU7 4630	Cuscinetto 6204 2RS	Bearing 6204 2RS	Roulement 6204 2RS	Lager 6204 2RS	Cojinete 6204 2RS
24	PMD0175 4610	Albero motore	Driving shaft	Arbre moteur	Motorwelle	Arbol motor
25	PMC66A 4630	Chiavetta acciaio 8x7x15	Steel key 6x6x45	Clavette acier 6x6x45	Stahlkeil 6x6x45	Chaveta de acero 6x6x45
26	PMDGRF 4610	Grano di regolazione	Adjustment dowel	Goujon de réglage	Verstellstift	Tornillo sin cabeza de regulacion
27	MO-E 2640	Molla spingi frizione	Clutch pusher spring	Ressort pousse-embayage	Kupplungsdruckfeder	Muelle de empuie del embrague
28	PMCU6 4630	Cuscinetto 6203 2RS	Bearing 6203 2RS	Roulement 6203 2RS	Lager 6203 2RS	Cojinete 6203 2RS
29	PMD0173 4610	Disco spingi frizione	Clutch pusher disk	Disque pousse-embayage	Kupplungsdruckscheibe e selbstschmierer.	Disco de empuje del embrague
30	PMCBR2 4630	Bronzina autolubrificante	Self-lubricating bushing	Douille autolubrificante	Bronzelager	Casquillo autolubrificante
31	PECR65 4670	Rotore	Rotor	Rotor	Rotor	Rotor
32	PMCS6 4630	Spina elastica	Spring pin	Chevillle élastique	Spannstift	Pasador elastico
33	V6X110 5102	Vite 6x110	6x110 screw	Vis 6x110	Schraube 6x110	Tornillo 6x110
34	PMD0167 4610	Perno di sblocco	Unlock pin	Pivot de déblocage	Entriegelungszapfen	Perno de desbloqueo
35	MO-N 2640	Molla sblocco	Unlock spring	Ressort de déblocage	Entriegelungsfeder	Muelle de desbloqueo
36	PMCU3 4630	Cuscinetto 6005 ZZ DI	Bearing 6005 ZZ DI	Roulement 6005 ZZ DI	Lager 6005 ZZ DI	Cojinete 6005 ZZ DI
37	PMCSE30 4630	Anello seeger D 30	Snap ring D 30	Bague seeger D 30	Seeger-Ring D 30	Arandela seeger D 30
38	PMD0132 4610	Ruota condotta	Driven wheel	Roue menée	Getriebenes Rad	Rueda conducida
39	PMD0131 4610	Albero condotto	Driven shaft	Arbre menée	Getriebene Welle	Arbol conducido
40	PMC128 4630	Chiavetta acciaio 12x8x70	Steel key 12x8x70	Clavette acier 12x8x70	Stahlkeil 12x8x70	Chaveta de acero 12x8x70
41	PMC87A 4630	Chiavetta acciaio 8x7x15	Steel key 8x7x15	Clavette acier 8x7x15	Stahlkeil 8x7x15	Chaveta de acero 8x7x15
42	PPD0120 4540	Distanziale corona	Ring spacer	Entratoise couronne	Distanzstück für Krone	Distanziador corona
43	PMCU10 4630	Cuscinetto 6206 ZZ	Bearing 6206 ZZ	Roulement 6206 ZZ	Lager 6206 ZZ	Cojinete 6206 ZZ
44	GOR-N 5501	O-Ring	OR	Joint OR	O-Ring	Junta torica
45	BMFP010 34567	Flangia esterna	External flange	Bride extérieure	Äußerer Flansch	Brida exterior
46	V5X15-A 5102	Vite 5x15	5x15 screw	Vis 5x15	Schraube 5x15	Tornillo 5x15
47	PMD0177 4610	Pignone per cremagliera Z=18	Pinion for rack Z= 18	Pignon pour crémaillère Z=18	Ritzel für Zahnstange Z=18	PiOon para crenallera Z= 18
48	PMCSE25 4630	Anello seeger D 25	Snap ring D 25	Bague seeger D 25	Seeger-Ring D 25	Arandela seeger D 25
49	PMD0139 4610	Piastra ancoraggio	Anchorage plate	Plaque d'ancrage	Ankerplatte	Placa de anclaje
50	PMD0140 4610	Zanca fissaggio	Fish-tail clamp	Agrafe de fixation	Verankerungsbein	Grapa de sujecion
51	MMCO1 2620	Occhiello isolato	Insulated slot	Oeillet isolé	Schlitz	Argolla aislada
52	V4.2X9.5 5101	Vite autofil. 4.2X9.5	4.2x9.5 screw	Vis 4.2x9.5	Schraube 4.2x9.5	Tornillo 4.2x9.5
53	V2.9X16 5101	Vite autofil. 2.9x16	2.9x16 screw	Vis2.9x16	Schraube 2.9x16	Tornillo 2.9x16
54	PMCAC1 4630	Anello compensatore V4x5	Compensator ring 4x5 screw	Anneau compensateur Vis 4x5	Ausgleichsring Schraube 4x5	Anillo compensador Tornillo 4x5
55	V2.9X6.5A 5101	Vite autofil. 2.9x6.5	2.9x6.5 screw	Vis 2.9x6.5	Schraube 2.9x6.5	Tornillo 2.9x6.5
56	V2.9X19 5101	Vite autofil. 2.9x19	2.9x19 screw	Vis 2.9x19	Schraube 2.9x19	Tornillo
57	EMRO 4870	Etichetta morsettiera	Terminal board label	Etiquette bornier	Klemmenbrettetikett	Etiqueta del tablero de bornes
59	V4.8X13 5101	Vite autofil. 4.8x13	4.8x13 screw	Vis 4.8x13	Schraube 4.8x13	Tornillo 4.8x13
60	V4.2X9.5 5101	Vite autofil. 4.2X9.5	4.2X9.5 screw	Vis 4.2X9.5	Schraube 4.2X9.5	Tornillo 4.2X9.5
61	V2.9X9.5A 5101	Vite autofil. 2.9x9.5	2.9x9.5 screw	Vis 2.9x9.5	Schraube 2.9x9.5	Tornillo 2.9x9.5
62	GOR-P 5501	O-Ring	OR	Joint OR	O-Ring	Junta torica
63	RO3 5120	Rondella	Washer	Rondelle	Unterlegscheibe	Arandela
64	PMD0172 4610	Disco ferodo	Ferod disk	Disque ferodo	Bremsscheibe	Disco ferodo
65	CF0193 5320	Cablaggio finecorsa	Limit switch wiring	Câblage microint. f.c.	Endschalterkabel	Cableado final de carrera
66	CT200 5320	Cablaggio terra	Earth wiring	Câblage mise à la terre	Erddrahtung	Cableado tierra
67	V2.9X9.5A 5101	Vite autofil. 2.9x9.5	2.9x9.5 screw	Vis 2.9x9.5	Schraube 2.9x9.5	Tornillo 2.9x9.5
68	V4.2X9.5B 5101	Vite autofil. 4.2x9.5	4.2x9.5 screw	Vis 4.2x9.5	Schraube 4.2x9.5	Tornillo 4.2x9.5
69	BPC 4540	Copri foro	Hole cover	Cache-trou	Lochabdeckung	Tapa para agujero
70	D6 5102	Dado M6	M6 nut	Ecrou M6	Mutter M6	Tuerca M6
71	D12B 5110	Dado M12	M12 nut	Ecrou M12	Mutter M12	Tuerca M12
72	D12 5110	Dado autobloccante M12	M12 self-locking nut	Ecrou M12 autobloquant	Selbstsichermutter M12	Tuerca M12 autobloquante
73	ETH1551 4870	Etichetta motoriduttore	Gearmotor label	Etiquette motorréducteur	Getriebemotoretikett	Etiqueta motorreductor
74	G6X14 5123	Grano 6x14	6x14 Dowel	Goujon 6x14	Stift 6x14	Tornillo sin cabeza 6x14
75	R12 5120	Rondella Ø12	Washer D12	Rondelle D12	Unterlegscheibe D12	Arandela D12
76	V6.3X25 5101	Vite autofil. 6.3x25	6.3x25 screw	Vis 6.3x25	Schraube 6.3x25	Tornillo 6.3x25
77	C3VF 2015	Connettore Alex	Alex connector	Connecteur Alex	Alex Verbinder	Connector Alex
78	GOR-M 5501	Guarnizione paraolio	Oil splash guard seal	Joint pare-huile	Olabdichtung	Sello de aceite
79	CGU8B 5310	Guaina PVC	PVC sheath	Gaine PVC	PVC Mantel	Vaina de PVC

**IMPORTANTE / IMPORTANT**

**Compilare ad installazione avvenuta e trattenere ad uso garanzia.  
To be completed after installation and kept for use as a warranty**

**Dati cliente / Client data**

Nome e cognome ..... Telefono .....  
Name and surname ..... Telephone .....

Indirizzo .....  
Address .....

Apparecchiatura tipo ..... Matricola .....  
Appliance type ..... No. Code .....

Data di installazione ..... Termine garanzia .....  
Installation date ..... Warranty expiry date .....

Installatore ..... Ditta .....  
Installer ..... Messrs .....

Indirizzo ..... Telefono .....  
Address ..... Telephone .....

**Descrizione materiale installato / Description of the components installed**

Centrale di comando Control box	Radio Radio	Dispositivi di sicurezza Safety devices	Note Notes

**Controlli periodici / Periodical check-ups**

Data / Date ..... Descrizione / Description.....  
Data / Date ..... Descrizione / Description.....  
Data / Date ..... Descrizione / Description.....  
Data / Date ..... Descrizione / Description.....

**Da compilare in caso di anomalia (inviare fotocopia della pagina allegandola all'attuatore in riparazione)**

**To fill in case of defect (send copy of the page enclosed with the actuator to be repaired)**

Difetto segnalato / Defect .....  
.....

**Parte riservata alla NICE SPA per comunicazioni al cliente****Space reserved for NICE SPA to communicate with the Clients**

Data registrazione ..... Data riparazione..... N. Riparazione .....

Date of registration ..... Repair date ..... Repair number .....

Parti sostituite .....

Parts replaced .....

Note / Note..... Firma tecnico / Technician signature .....

.....

.....

A termini di legge ci riserviamo la proprietà di questo manuale con divieto di riprodurlo o di renderlo comunque noto a terzi o a ditte concorrenti senza nostra autorizzazione.

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carta riciclata 100%



CENTRO STAMPA - ODERZO (TV)

ISTTH 4865

DATI TECNICI - TECHNICAL DATA - DONNÉES TECHNIQUES - TECHNISCHE DATEN - DATOS TÉCNICOS

	Unità di misura - Unit of measure Unité de mesure - Maßeinheit Unidad de medida	1500
Alimentazione - <i>Power supply</i> - Alimentation <i>Speisung</i> - Alimentación	Vac 50Hz	230
Assorbimento di linea - <i>Line input</i> - Absorption de ligne <i>Linienaufnahme</i> - Absorción de la línea	A	3.5
Potenza assorbita - <i>Absorbed power</i> - Puissance absorbée <i>Aufgenommene Leistung</i> - Potencia absorbida	W	650
Condens. incorporato - <i>Condenser built-in</i> - Condens. incorporé - <i>Kondensator eingebaut</i> - Condensator incorp.	µF	30
Grado di protezione - <i>Protection level</i> Indice de protection - <i>Schutzgart</i> - Grado de protección	IP	43
Coppia - <i>Torque</i> - Couple - <i>Drehmoment</i> - Par	Nm	30
Velocità - <i>Speed</i> - Vitesse <i>Geschwindigkeit</i> - Velocidad de rotación nomina	m/s	0.16
Spinta max. - <i>Maximum thrust</i> - Pousée maximum <i>Max. Schub</i> - Empuje max.	N	800
Peso max cancello - <i>Max.weight of gate</i> - Poids max.portail <i>Max. Gewicht Tor</i> - Peso maximo de la cancela	kg	1500
Temp. di esercizio - <i>Working temperature</i> - Température de service - <i>Betriebstemperatur</i> - Temperatura de servicio	°C (Min. / Max.)	-20° ÷ +70°
Termoprotezione - <i>Thermal protection</i> - Protection Thermique - <i>Wärmeschutz</i> - Termoprotección	°C	140°
Classe di isolamento - <i>Insulation class</i> - Classe d'isolement - <i>Isolierungsklasse</i> - Clase de aislamiento		1
Ciclo di lavoro - <i>Working cycle</i> - Cycle de travail <i>Arbeitszyklus</i> - Ciclo de trabajo	%	40
Peso motore - <i>Motor weight</i> - Poids moteur <i>Motorgewicht</i> - Peso del motor	kg	12.5

### 1) Description of the product:

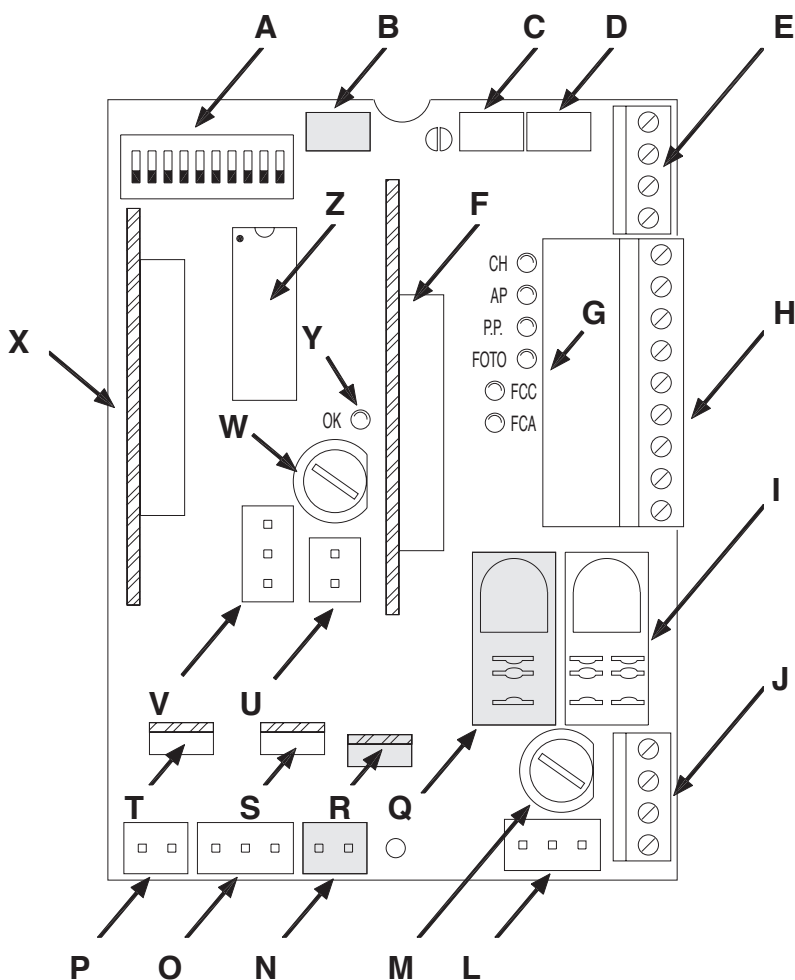
This gate and door automation unit controls the ROBO, OTTO and THOR gearmotors with single-phase alternating current.

The control unit varies depending on the type of gearmotor to control, e.g.: Force Adjustment, Gate Open Indicator and Courtesy Light.

It also features a series of functions that can be selected by "Dip-Switches" (mini-switches) and adjustments performed by Trimmers.

The control unit features input status Led's located near such inputs, while another Led near the microprocessor indicates that the internal logic works correctly.

To make it easier to recognise the various parts, **fig.1** shows the main components.



- A** Function selection Dip-Switch
- B** Force adjustment trimmer
- C** Working Time TL adjustment trimmer
- D** Pause Time TP adjustment trimmer
- E** Terminal board for aerial and 2nd channel
- F** RADIO board slot
- G** Input status LED's
- H** Input/output control terminal board
- I** "Common" relay
- J** Power input terminal board / Flashing light
- L** Primary transformer connector
- M** Line fuse (5A)
- N** "Courtesy Light" output connector (only on OTTO)
- O** Motor power output
- P** Capacitor slot connector
- Q** "Torque" relay
- R** Triac "Courtesy Light" (only on OTTO)
- S** Triac Close
- T** Triac Open
- U** Secondary transformer connector
- V** FCA / FCC limit switch input
- W** Low voltage rapid fuse (500mA)
- X** PIU board slot
- Y** OK Led
- Z** Microprocessor

**1**

	<b>Product Code*</b>	<b>Control Unit Code*</b>	<b>Additional Function</b>
ROBO	RO1000	ROA3	Force adjustment Trimmer
	RO1020		
	RO1010	ROA4	"Torque" Relay
THOR	TH1551	THA5	Force adjustment Trimmer
	TH2251	THA6	"Torque" Relay
OTTO	OT21	OTA1	"Courtesy Light" output

\* = add to code V1 for the 120 V 50/60 Hz version.

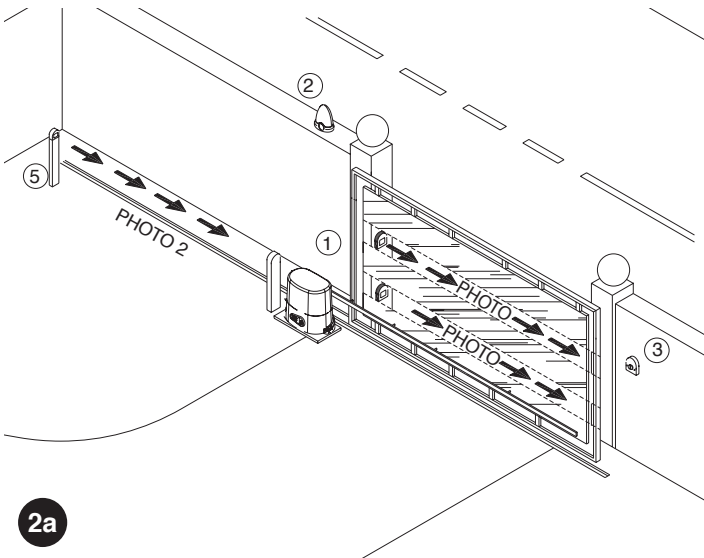
## 2) Installation:

**⚠ Automatic gate and door systems may only be installed by qualified fitters in the full respect of the law. Comply with the warnings shown in the “Warnings for fitters” file.**

### 2.1) Typical system layout

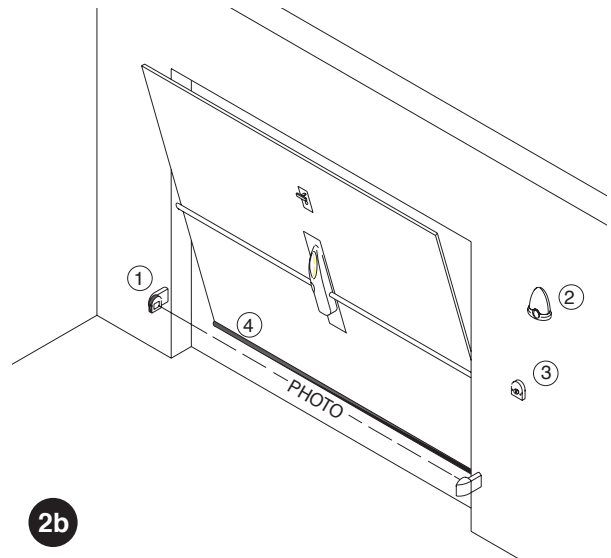
In order to explain certain terms and aspects of an automatic door or gate system, we will now illustrate a typical system layout.

#### ROBO / THOR



2a

#### OTTO



2b

- 1) Pair of “Photo” photocells
- 2) Flashing lamp
- 3) Keylock selector
- 4) Pneumatic edge
- 5) Pair of “Photo 2” photocells

In particular, please note that:

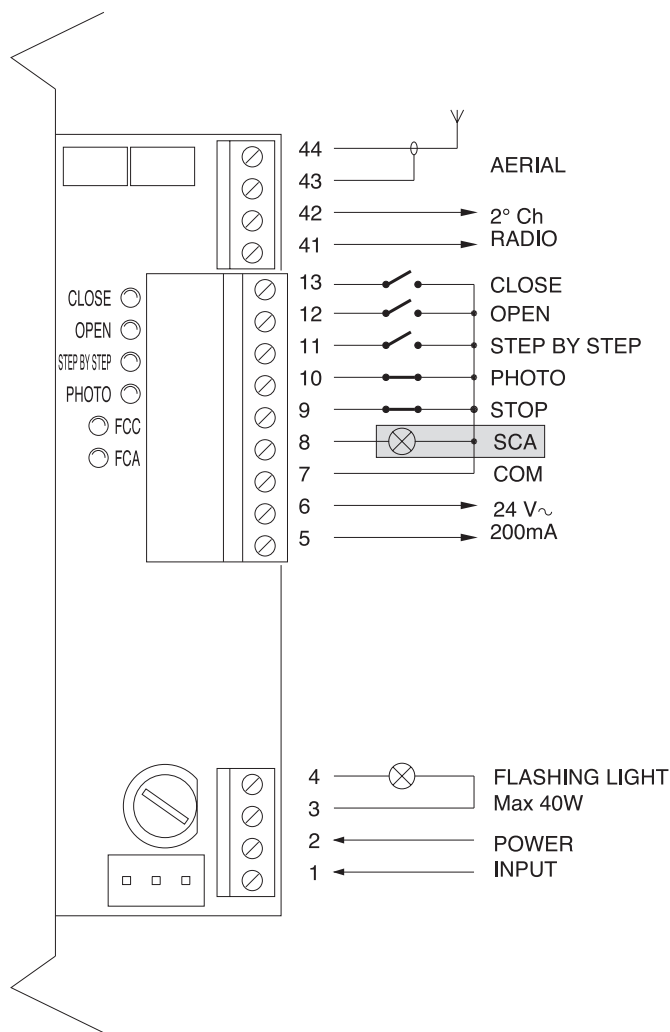
- All the photocells produced by NICE feature the synchronism system which eliminates the problem of interference between two pairs of photocells (please consult the photocell instructions for further details).
- The “Photo” pair of photocells have no effect during opening while they invert movement during closing.
- The “Photo2” pair of photocells have no effect during closing while they invert movement during opening.

### 2.2) Electrical connections

**⚠ To safeguard the operator and avoid damaging the components while you are wiring or plugging in the various cards: under no circumstances may the unit be electrically powered.**

- Power the unit using a 3 x 1.5 mm<sup>2</sup> cable: should the distance between the unit and the earth connection exceed 30m, install an earth plate near the unit.
- Use wires with a minimum cross-section of 0.25mm<sup>2</sup> to connect low voltage safety circuits.
- Use shielded wires if the length exceeds 30m and only connect the earth braid to the control unit side.
- Do not make connections to cables in buried boxes even if they are completely watertight.
- If the inputs of the Normally Closed (NC) contacts are not used they should be jumped with the “24V common” terminal except for the photocell inputs if the phototest function is enabled, for further information please see the “Phototest” paragraph.
- If there is more than one (NC) contact on the same input, they must be connected in SERIES.
- If the inputs of the Normally Open (NA) contacts are not used they should be left free.
- If there is more than one (NA) contact on the same input, they must be connected in Parallel.
- The contacts must be mechanical and potential-free; no stage connections are allowed, such as those defined as “PNP”, “NPN”, “Open Collector”, etc..

### 2.2.1) Electrical diagram



3

### 2.2.2) Description of connections

A brief description of the possible control unit output connections follows.

Terminals	Functions	Description
1-2	Power input	= Mains power line
3-4	Flashing light	= Output for connecting flashing light to mains voltage (max. 40W)
5-6	24 Vac	= 24Vac output to 24Vac services (Photo, Radio, etc.) Max. 200mA
7	Common	= Common for all inputs
8	Gate open indicator	= Max. 24 Vac output for gate open indicator 2W (Not used on OTTO)
9	Stop	= Input for stopping the manoeuvre with a brief reverse phase
10	Photo	= Input for safety devices (photocells, pneumatic edges)
11	Step-by-step (PP)	= Input for cyclic functioning ("Open" - "Stop" - "Close" - "Stop")
12	Open	= Input for opening
13	Close	= Input for closing
41-42	2nd Radio Ch	= Output for the second radio receiver channel if there is one
43-44	Aerial	= Input for the radio receiver aerial

### 2.2.3) Phototest

“Phototest” is the best possible solution for safety devices in terms of reliability and it puts the control unit and safety photocells in “category 2” according to UNI EN 954-1 standard (ed. 12/1998).

Before every manoeuvre is begun, the relative safety devices are checked and only if everything is in order will the manoeuvre start. Should the test be unsuccessful (the photocell is blinded by the sun, cables have short circuited, etc.) the failure is identified and the manoeuvre is not carried out.

To obtain the Phototest function:

- Using the additional “PIU” board.
- Setting Dip Switch 10 to ON
- Creating a special layout in the safety device connections as shown in **fig. 4a** so that the photocell transmitters are no longer directly powered by the service output but from terminals 7 and 8 of the “PIU” board. The maximum current that the “PIU” board can use on the “Phototest” output is 100mA (2 pairs of nice photocells)
- Powering the receivers directly from the service output of the control unit (terminals 5-6).

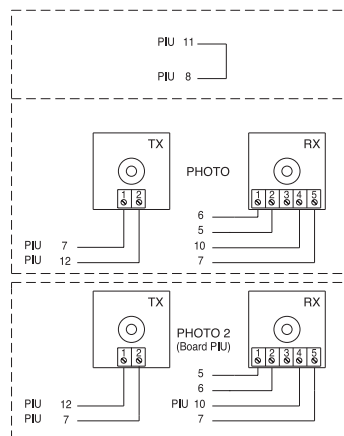
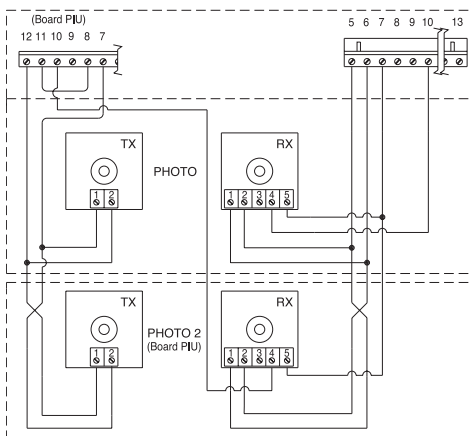


If at a later time the Phototest function is no longer required, lower Dip Switch 10 and modify the connection layout as shown in **fig. 4b**.

The photocells are tested as follows: when movement is required, it is first checked that all the receivers involved in the movement give their consent, then power to the transmitters is disconnected after which it is checked that all the receivers signal the fact by removing their consent; the transmitters are then powered and the consent of all the receivers is verified once more. Only if this sequence is successfully carried out will the manoeuvre be performed.

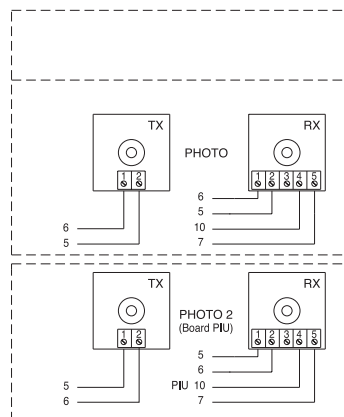
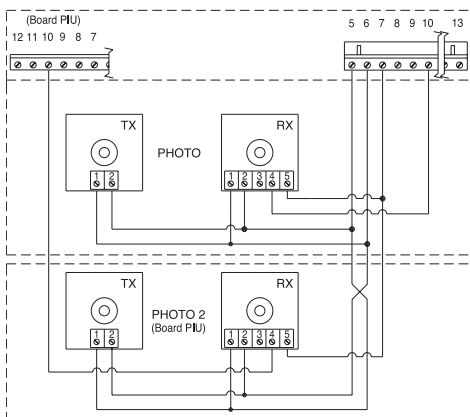
Synchronism should always be activated on the two transmitters by cutting the jumpers; this is the only way of ensuring that the two pairs of photoelectric cells do not interfere with one another. Check the instructions in the photocell manual regarding synchronised operation.

If a “Phototest” input is not used (e.g.: Photo2) but the “phototest” function is required, jumper the unused input as shown in **fig. 4c**.



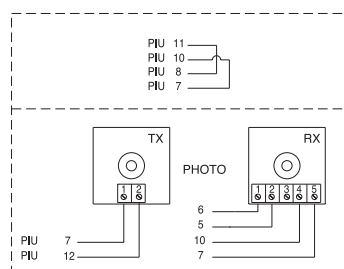
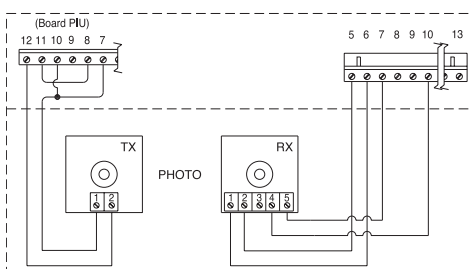
4a

“Photo” and “Photo2” with “Phototest”



4b

“Photo” and “Photo2” without “Phototest”



4c

“Photo” with “Phototest”

### 2.2.4) Checking connections

⚠ The following operations entail working on live circuits; most of these run on extra-low safety voltage so they are not dangerous but some are contain mains voltage which means they are **HIGHLY DANGEROUS!** Pay the greatest of attention to what you are doing and **NEVER WORK ALONE!**

- Power the unit and check that voltage between terminals 5-6 is approx. 24 Vac.
- Check that the “OK” Led flashes rapidly for a few moments and then that it flashes at a regular frequency.
- Now check that the Led’s relative to the N.C. (Normally Closed) contacts are on (all safety devices active) and that the Led’s relative to the N.A. (Normally Open) inputs are off (no command present); if this is not the case, check the connections of the various devices and make sure they are in good working order. The STOP input switches off both FCA and FCC.
- Make sure the limit switches are connected properly; move the limit switch lever and check that the relative limit switch cuts in and switches off the relative Led on the control unit.
- Release the leaf, take it to the halfway point and then block it; it is now free to move in either the opening or closing direction.
- Now make sure that movement occurs in the right direction, that is, see whether the movement set on the unit corresponds to that of the leafs. This check is of paramount importance, if the direction is wrong, in some cases (in the “Semiautomatic” mode, for instance) the “Automatic” system might appear to be working properly; in fact, the “Open” cycle is similar to the “Close” cycle

but with one basic difference: the safety devices are ignored in the closing manoeuvre which is normally the most dangerous, and they will trigger in the opening manoeuvre causing the gate to close against the obstacle with disastrous results!

- To see whether or not the direction of rotation is correct, give a short pulse to the Step-by-Step (PP) input; the first manoeuvre the unit will carry out after being powered is always an “Open” one, so simply verify that the automatic system moves in the opening direction; if this movement is incorrect, proceed as follows:
  - ➡ Turn the power off
  - ➡ Turn the motor and the limit switch power connectors 180°. (Ref. “O” and Ref. “V” of **Fig.1**)
  - ➡ Once this has been done, check whether the direction of rotation is now correct by repeating previous point.



The “OK” Led located in the centre of the board has the task of signalling the status of the internal logic: regular flashing at 1 second intervals indicates that the internal microprocessor is active and waiting for commands. When the microprocessor recognises a variation in the state of an input (whether it is a command or a function Dip-Switch input) it generates a rapid double flash even if the variation does not have any immediate effect. Extremely rapid flashing for 3 s means that the control unit has just been powered or is carrying out internal testing. Irregular flashing, lastly, means that the test has been unsuccessful and that a fault has occurred.

### 3) Adjustments:

Adjustments can be made with the trimmers that modify the following parameters:

#### Working time (TL):

Adjusts the maximum duration of the opening or closing manoeuvre.

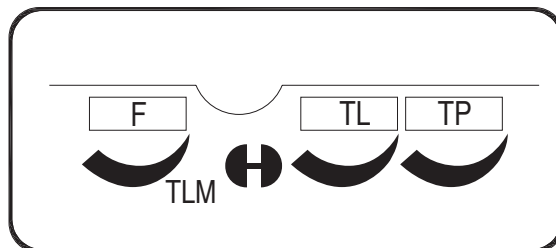
To adjust the working time TL, select the “Semiautomatic” operating mode by moving Dip-Switch 1 to ON and adjust the TL trimmer to halfway along the travel distance. Then run a complete opening cycle followed by a complete closing cycle and readjust the TL trimmer in order to leave enough time for the whole manoeuvre plus a margin of about 2 to 3 s.

If the trimmer is at maximum and there still is not enough time, cut the TLM jumper on the printed circuit between the TL and the TP trimmers in order to provide more working time.

#### Pause Time (TP):

In the “Automatic” mode, this adjusts the delay between the end of the opening manoeuvre and the beginning of the closing manoeuvre.

To adjust Pause Time TP, select the “Automatic” operating mode by moving Dip-Switch 2 to ON and adjust the TP trimmer as required. Then carry out an opening manoeuvre and check the time elapsed before “Automatic” closing manoeuvre.



#### Force (F):

Fitted on the control unit, this adjusts maximum Force.

Take great care when adjusting the Force (F) trimmer as this may affect the level of safety of the automatic system. Trial by error is required to adjust this parameter, measuring the force applied to the leaf and comparing it with regulatory values.

In the RO1010 and OT21 control units, Force is adjusted with a multi-position Switch located on the casing of the control unit power transformer.

## 4) Testing

After the above checks and adjustments, the system can now be tested.

**⚠ The automation system must be tested by qualified and expert personnel who must establish what tests to perform according to the relative risk.**

Testing is the most important part of the whole installation phase. Each single component, e.g. the gearmotor, emergency stop, photocells, etc., may require a specific test phase; please follow the procedures shown in the respective instructions manuals.

**To test the control unit, perform the following operations:**

1. Function selection:
  - Set Dip-Switch 1 to ON ("Semiautomatic" operation)
  - If the connections shown in **fig.4a** have been made in order to use the "Phototest" function, (if the PIU board is fitted) set Dip-Switch 10 to ON ("Phototest" function).
  - Set all the other Dip-Switches to OFF
2. Press the "Open" or "Step-by-Step" button and check that:
  - the flashing lamp activates
  - an opening manoeuvre starts
  - the movement stops when the opening limit switch FCA is reached.
3. Press the "Close" or "Step-by-Step" button and check that:
  - the flashing lamp activates
  - a closing manoeuvre starts
  - the movement stops when the closing limit switch FCC is reached
4. Start an opening manoeuvre and check that during the manoeuvre the cut-in of a device:
  - Connected to the "Stop" stops the manoeuvre with a brief reverse phase.
  - Connected to the "Photo" input has no effect
  - Connected to the "Photo2" input stops and inverts the manoeuvre (if the PIU board is fitted).
5. Start a closing manoeuvre and check that during the manoeuvre the cut-in of a device:
  - Connected to the "Stop" stops the manoeuvre with a brief reverse phase.
  - Connected to the "Photo" input stops and inverts the manoeuvre
  - Connected to the "Photo2" input has no effect (if the PIU board is fitted).
6. On the connected inputs, check that the activation of the input causes a step in the sequence:
  - Step-by-step input: Sequence = "Open" – "Stop" – "Close" – "Stop"
  - Open input: Sequence = "Open" – "Stop" – "Open" – "Stop"
  - Close input: Sequence = "Close" – "Stop" – "Close" – "Stop"
  - Partial Open input: Sequence = "Partial Open" – "Stop" – "Close" – "Stop" (if the PIU board is fitted).
7. If the "Phototest" function is used, check the test is efficient (if the PIU board is fitted):
  - Interrupt the "Photo" photocell, then start a manoeuvre and check this is not performed
  - Interrupt the "Photo2" photocell, then start a manoeuvre and check this is not performed
  - Short the "Photo" photocell contact, then start a manoeuvre and check this is not performed
  - Short the "Photo2" photocell contact, then start a manoeuvre and check this is not performed
8. Perform the tests for detecting Impact Forces as required by EN 12445.

If further functions are activated after testing has finished that could reduce the safety of the system, specific testing of these functions must be performed.

## 5) Operating modes

In the manual operating mode, the “Open” input enables the opening manoeuvre and the “Close” input enables the closing manoeuvre. The “Step-by-Step” input enables an alternating closing and opening manoeuvre.

Movement stops as soon as the command in input stops. If the limit switches trigger or “Photocell2” (on the PIU card) fails to enable during an opening manoeuvre, movement will stop; during a closing manoeuvre, on the other hand, movement will stop if “Photocell” does not enable. Both in the opening or closing phases, movement will be brought to an abrupt halt by means of “Stop”. When a movement is stopped, stop the input command before giving a command to start a new movement.

When one of the automatic functioning modes (“Semiautomatic”, “Automatic” or “Close Always”) is operational, a command impulse on the Open input will begin an opening manoeuvre. An impulse to the “Step-By-Step” input begins an alternating closing and opening manoeuvre. A second impulse on the “Step-By-Step” input or on the input that started movement will cause it to stop.

Both in the opening or closing phases, movement will be brought to an abrupt halt by means of “Stop”.

If, instead of an impulse to a command input a continuous signal is maintained, a state of “priority” will be created in which the other command inputs are disabled (**useful if you want to connect a timer or a Night-Day selector**).

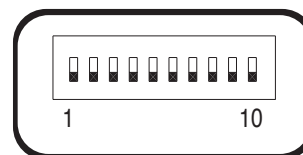
If an automatic functioning mode has been chosen, the opening manoeuvre will be followed by a pause and then a closing manoeuvre. If “Photocell” triggers during the pause, the timer will be reset with a new pause time; if, on the other hand, there is a “Stop” during the pause, the closing function will be cancelled and the system will “Stop”.

Nothing will happen if “Photocell” triggers during an opening manoeuvre but if “Photocell2” (on the PIU card) triggers, this will invert the direction of movement; if “Photocell” triggers during a closing manoeuvre, this will invert the direction of movement followed by a pause and then a closing manoeuvre.

## 6) Programmable functions

The unit features a set of microswitches used to operate various functions so as to make the system more suitable to user needs and safer in various conditions of use. All the functions can be activated by moving the relative Dip-Switch to the “On” position and deactivated by moving them to “Off”.

**▲ Some of the programmable functions are linked to safety aspects; carefully evaluate the effects of a function and see which gives the highest possible level of safety.**



Use the Dip-Switches to select the various operating modes and add the functions required according to this table:

<b>Switch 1-2:</b>	<b>Off-Off</b>	= “Manual” movement (i.e.: man Present)
	<b>On -Off</b>	= “Semiautomatic” movement
	<b>Off-On</b>	= “Automatic” movement (i.e.: automatic closing)
	<b>On -On</b>	= “Automatic + always “Closes” movement
<b>Switch 3:</b>	<b>On</b>	= Condominium operating mode <not available in the manual mode>
<b>Switch 4:</b>	<b>On</b>	= Pre-flashing
<b>Switch 5:</b>	<b>On</b>	= Close 5” after “Photo” <in “Automatic”> or “Close” after “Photo” <in “Semiautomatic”>
<b>Switch 6:</b>	<b>On</b>	= “Photo” safety also in opening
<b>Switch 7:</b>	<b>On</b>	= Gradual departure
<b>Switch 8:</b>	<b>On</b>	= Deceleration
<b>Switch 9:</b>	<b>On</b>	= Brake
<b>Switch 10:</b>	Without PIU board	(on Robo) On = Gate open indicator with proportional flashing
		(on Otto) On = Courtesy light time = 4 minutes
	With PIU board	On = “Phototest” function

**N.B.:** Some functions are only possible in determined conditions, these are indicated in the notes placed between the symbols “<...>”.

## 6.1) Description of functions

Here is a brief description of the functions that can be added by moving the relative Dip-Switch to "ON".

<b>Switch 1-2: Off-Off</b>	= "Manual" movement (man present)
<b>On-Off</b>	= "Semiautomatic" movement
<b>Off-On</b>	= "Automatic" movement (automatic closing)
<b>On-On</b>	= "Automatic + Always Closes" movement

In the "Manual" operating mode, the gate will only move as long as the relative control button is held down.

In the "Semiautomatic" operating mode a command impulse will perform the whole movement until the Working Time limit expires or the mechanical stop is reached. In the "Automatic" operating mode, an opening manoeuvre is followed by a pause and then an automatic closing manoeuvre.

The "Always Closes" function comes into play following a power failure; if the gate is open, a closing manoeuvre takes place, automatically preceded by 5 seconds of pre-flashing.

<b>Switch 3: On</b>	= Condominium operating mode (not available in the Manual mode)
---------------------	-----------------------------------------------------------------

In the Condominium operating mode, once an opening manoeuvre has started it cannot be interrupted by other command pulses on "Step-by-Step" or "Open" until the gate has finished opening.

During a closing manoeuvre, a new command pulse will stop the gate and reverse the direction of movement in order to open the gate.

<b>Switch 4: On</b>	= Pre-flashing
---------------------	----------------

A command impulse activates the flashing lamp followed by movement 5 s later (2 s later in the manual mode).

<b>Switch 5: On</b>	= "Close" 5 s after "Photo" <in the "Automatic" mode> or "Close" after "Photo" <in the "Semiautomatic" mode>
---------------------	--------------------------------------------------------------------------------------------------------------

This function, if in the "Automatic" mode, allows the gate to be kept open only for the time required for transit; when "Photo" finishes, the manoeuvre stops. After 5 s a closing manoeuvre will automatically begin. If "Photo" triggers in the "Semiautomatic" mode during a closing manoeuvre the "Automatic" closing manoeuvre is activated with the adjusted pause time.

<b>Switch 6: On</b>	= Safety "Photo" also during the opening manoeuvre
---------------------	----------------------------------------------------

The "Photo" safety device is normally just active during the closing manoeuvre; if Dip-Switch 6 is turned "On" the safety device will also trigger during the opening manoeuvre.

In the "Semiautomatic" or "Automatic" modes, the opening manoeuvre will start again immediately after the photocell has been disengaged.

<b>Switch 7: On</b>	= Gradual departure
---------------------	---------------------

Starts the manoeuvre gradually, preventing the automatic system from being jolted.

<b>Switch 8: On</b>	= Deceleration
---------------------	----------------

Deceleration reduces speed to 30% of rated speed in order to prevent unnecessary jolts at the end of a manoeuvre.



*As well as reducing the speed of the manoeuvre, the deceleration function also reduces motor torque by 70%.*

*For systems requiring elevated torque, this decrease may cause the motor to stop immediately.*

### ROBO – THOR version:

Following the opening or closing manoeuvre which takes place at the end of the Working Time. A deceleration phase lasting as the Working Time (TL) is carried out .

If the manoeuvre is terminated by the limit switches and the deceleration phase is not performed, adjust Working Time so that deceleration begins 30-50 cm before the limit switches cut in.

### OTTO version:

Following the closing manoeuvre the deceleration phase lasts 3 s if triggered by the limit switches and as much as the Working Time (the deceleration function works better with the limit switches).

During the opening manoeuvre a gradual stopping function is used instead of the deceleration feature.

**▲ If the deceleration function is used on sensitive installations and if this lasts more than 3 s, install a mains filter of at least 6A with attenuation of 30dB on the mains**

**power terminals near the control unit in order not to exceed the limits of electromagnetic emission specified in the EN 50081-1 standard.**

**Switch 9: On** = Brake

At the end of the movement a motor brake procedure is performed, initially slight and then more incisive in order to stop the gate rapidly but without jolts.

**Switch 10: On**

**ROBO - THOR**

Without the PIU board fitted:

- Gate open indicator with proportional flashing

With the PIU board fitted:

- "Phototest"

**OTTO**

Without the PIU board fitted:

- Courtesy light time = 4 minutes

With the PIU board fitted:

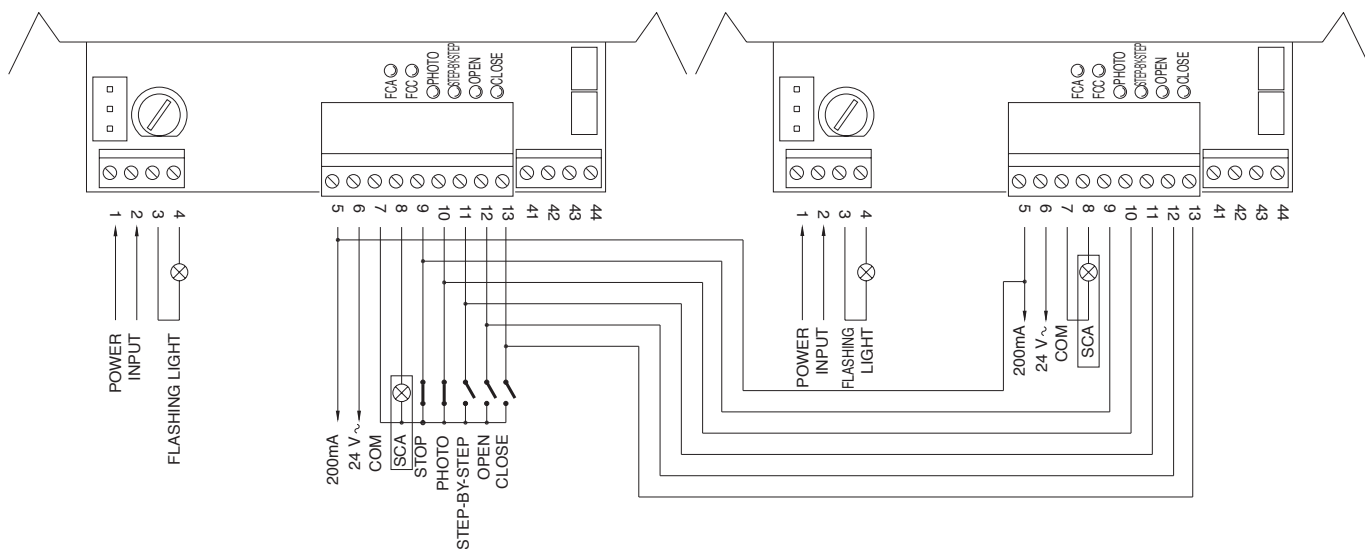
- "Phototest"

This function controls photocell efficiency at the beginning of each manoeuvre. See the "Phototest" chapter.

**7) Using 2 control units on opposed leaves**

To create an automation system working with 2 opposed leaves:

- Use two motors with the control units connected as indicated in **fig. 5**.
- Connect the flashing light and the "Gate Open Indicator" to any one of the two control units .
- The inputs must be connected in parallel.
- The "Common" of the inputs can be connected to one of the 2 control units.
- Connect the 0Volts (Terminal 5) of the two control units.
- The "Phototest" function must not be used
- The "Condominium" function ( Dip-Switch 3) should be fitted as this allows the leaves to be resynchronised if the 2 control units become unsynchronised.



## 8) Accessories

### “PIU” Card

The control unit is already fitted with all the functions used in a normal installation. In order to allow the system to be used in special installations, an optional card called “PIU” has been produced which adds new functions such as traffic light signalling, courtesy light, electric locking, “Photocell2”, partial opening and “Phototest”.

**Red** = Red traffic light  
This is normally always off and switches on when the gate moves.

**Green** = Green traffic light  
This is normally on and switches off when the gate moves

**Electric lock** = Output for electric lock command.  
The electric lock is activated for 1.5 s. at the start of the opening movement.

**Courtesy light/  
Phototest** = Output that if used to control the courtesy light, turns on a courtesy light at the beginning of each movement which remains on after the movement has finished for a time programmed with the T.Cor. trimmer on the “PIU” board.  
If the “Phototest” function is activated (Dip-Switch 10 = ON) this output allows the photocells to be tested at the beginning of each manoeuvre.

### “RADIO” Card

The control unit features a connector for plugging in a radio card, produced by Nice, which activates the “Step-by-Step” input and allows the control unit to be remote-controlled with a transmitter.

**Partial open** = Input for partial opening (Partial Open, Stop, Close, Stop). This performs the same function as the “Step-by-Step” on the main board, with the difference that the open manoeuvre lasts for the time set up on the T.A.P.P. trimmer on the “PIU” board.

**Photo 2** = 2nd safety device input. This safety device cuts in just during the opening manoeuvre causing the gate to stop and eventually close if a “Semiautomatic” or “Automatic” operation mode is programmed on the control unit.

**24 V** = 24V output used to power services such as photocells or the like. Terminal 11 is also the common for the inputs.

## 9) Maintenance

The control unit, being electronic, needs no particular maintenance. However, periodically make sure (at least once every six months) that the device adjusting motor force is in perfect working order; adjust with the trimmer if necessary.

Carry out the whole test phase again to check that the limit switches, safety devices (photocells, pneumatic edges, etc.) and the flashing light are in perfect working order.

## 10) Disposal

This product is made from various kinds of material, some of which can be recycled.  
Make sure you recycle or dispose of the product in compliance with current laws and bye-laws.

**▲ Some electric components may contain polluting substances; do not dump them.**

## 11) What to do if ....

This section will help fitters to solve some of the most common problems that may arise during installation.

### No LED is on:

- Check whether the control unit is powered (check mains voltage is present at terminals 1-2 and a voltage of approx. 24Vac at terminals 5-6).
- Check the 2 mains fuses have not blown; if none of the Led's is on a serious fault has probably occurred and the control unit should therefore be replaced.

### The OK LED flashes regularly but the INPUT Led's do not reflect the state of the respective inputs

- Carefully check the connections on input terminals 7-13.

### The manoeuvre does not start

- Check that the Led's of the "Stop" (FCA + FCC), "Photo" and "Photo2", if installed, safety device are on and that the relative command Led that is activated ("Step-By-Step", "Open" or "Close") remains on for the whole duration of the command.

### The gate changes direction during a manoeuvre

An inversion is caused by:

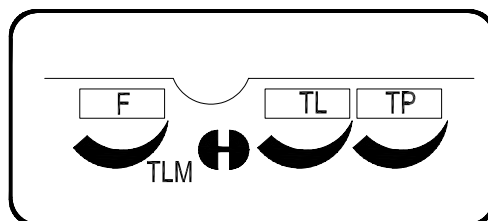
- The photocells triggering ("Photo2" during the opening manoeuvre, or "Photo" during the closing manoeuvre); in this case, check the connections of the photocells and check the input Led's.

## 12) Technical specifications

Mains power input	: 230 Vac 50/60 Hz
Versions /V1	: 120 Vac 50/60 Hz
Max. current for 24V services	: 200mA
Flashing lamp output	: For flashing lamps at mains voltage, maximum power 40 W
Gate open indicator output "SCA"	: For indicator lamps at 24 Vac, maximum power 2 W
Operating temperature	: -20 ÷ 70 °C
Working Time on ROBO/THOR	: Adjustable from 2.5 to >60 s, or from <50 a to >120 s with TLM
Working Time on OTTO	: Adjustable from 2.5 to >20 s, or from <20 to >40 s with TLM
Pause Time	: Adjustable from 5 to > 160 s.

### On the PIU card

Partial opening time ROBO/THOR	: Adjustable from 1 to > 30 s.
Partial opening time OTTO	: Adjustable from 1 to > 14 s.
Courtesy light time	: Adjustable from 1 to > 180 s.

**(GB)**

A force adjustment trimmer (**F**) has been **added** to the THA5 control unit for TH1551 and TH1551/V1 type motors. Associated with the mechanical friction, this enables more accurate force adjustment.

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**(I)**

Nella centrale THA5 di comando dei motori di tipo TH1551 e TH1551/V1 è stato **aggiunto** il trimmer di regolazione della forza (**F**) che associato alla frizione meccanica consente una migliore regolare le forza in gioco.

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**(F)**

Dans la logique THA5 pour la commande des moteurs de type TH1551 et TH1551/V1 on a **ajouté** le trimmer de réglage de la force (**F**) qui associé à l'embrayage mécanique permet un réglage plus précis de la force.

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**(D)**

Zur Steuerung THA5 der Motoren TH1551 und TH1551/V1 wurde der Trimmer zur Einstellung der Kraft (**F**) **hinzugefügt**, mit dem vereint mit der mechanischen Kupplung eine genauere Einstellung der Kraft möglich ist.

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**(E)**

En la central THA5 de accionamiento de los motores tipo TH1551 y TH1551/V1 se ha **incorporado** el trimmer de regulación de la fuerza (**F**), que asociado al embrague mecánico permite una regulación más precisa de la fuerza.

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**(PL)**

W centrali THA5 do sterowania silnikami typu TH1551 i TH1551/V1 **zamontowany został jeszcze jeden** trimmer do regulacji siły (**F**), który dostosowany do sprzęgła mechanicznego pozwala na dokładniejsze wyregulowanie siły.