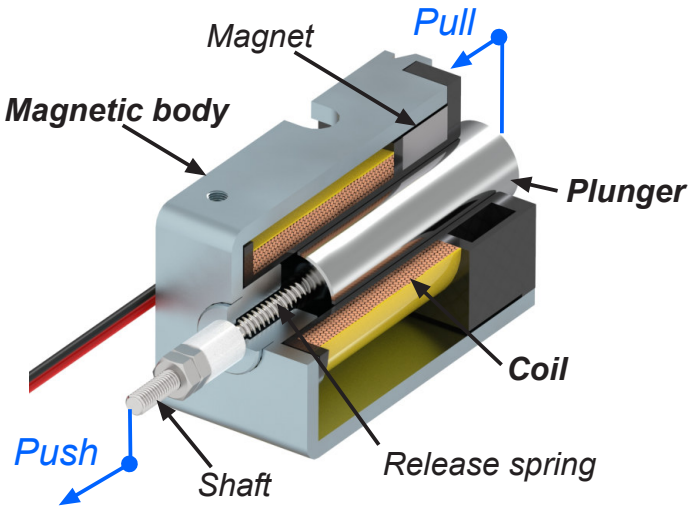
• ERB SERIES

ERB serie electromagnets are bistable linear solenoids, where the stroke movement from initial (unlocked) to final position (locked) is made by electromagnetic forces, the return to initial position takes place by an inverse polarizing pulse combined with external forces or by an incorporated spring.
When it is off, the bistable solenoids has got two working and maintained positions. One will be held by a permanent magnet system and the other one by a return spring or external forces.
Its specifications makes this solenoid perfect to use when both unlocking and locking position are kept for a long time.



Structure, basic components:

Magnetic body:
It is the metal part containing a coil, the core, a magnet system and the fixation holes.

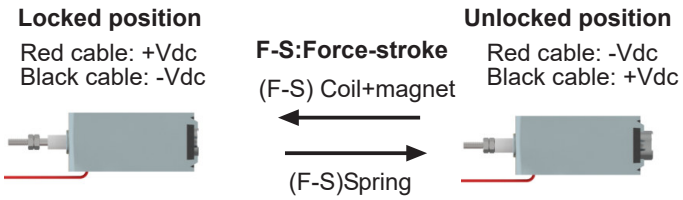
Coil:
It receives the electrical energy to create a magnetic field.

Plunger:
It moves along and inside the coil, it has got a non-magnetic shaft fixed to the plunger. If pulling is needed, fix the element to activate to the plunger. To push, fix the shaft to the element to activate.

• Datasheet rated values conditions (According to DIN VDE 0580):

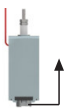
The values of the magnetic force (Fm) depending on the stroke, are obtained in the following conditions:
Room temperature = 35ºC
Coil stabilized at its working temperature.
Rated voltage equal to 90% of the standard one.
Solenoid working in horizontal position.

Work depending on the feeding mode:

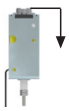


Effective force (Fh) is obtained from magnetic force (Fm), adding and substracting the plunger weight.

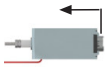
- When the solenoid pulls upwards:
Transition of unlock to lock:
Effective force = Magnetic force - Plunger weight - Spring force
Transition of lock to unlock:
Effective force = Spring force + Plunger weight



- When the solenoid pulls downwards:
Transition of unlock to lock:
Effective force = Magnetic force + Plunger weight - Spring force
Transition of lock to unlock:
Effective force = Spring force - Plunger weight

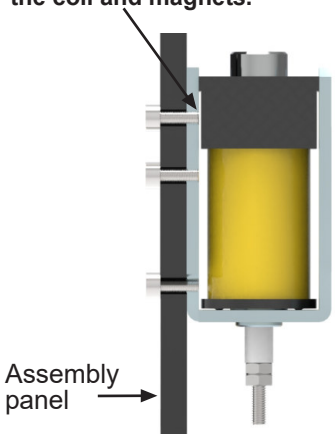


- When the solenoid pulls in horizontal position
Transition of unlock to lock:
Effective force = Magnetic force - Spring force
Transition of lock to unlock:
Effective force = Spring force



- For the units with incorporated return spring:
Effective force = Magnetic force -Spring force ± Plunger weight

• Important:
The fixation screws do not have to exceed the wall of the magnetic body not to damage the coil and magnets.



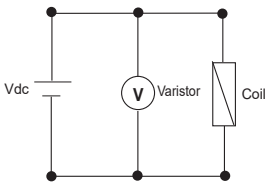
• CUSTOMIZATION ERB SERIES

The models described in the catalogue are standard and minimum manufacturing batches are not required. However, there is the possibility of customizing them to suit better customer's needs. See below some of the most common customizations.
If any modification is needed, please ask NAFSA about the possibility and the minimum manufacturing batch required.

1. ELECTRICAL CUSTOMIZATION

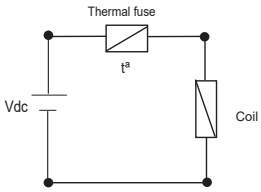
a) Electronics integrated in the coil:

a.1) For peak supression
Examples:

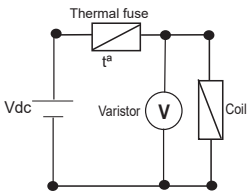


a.2) Thermal fuse
Examples:

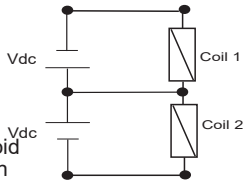
*The thermic resettable polyswitchs are used in coils with low duty cycles against overheating, caused by long time under voltage and not respected the duty cycle times.
It can be used also as timer.



a.3) Thermal fuse and peak supression
Examples:



a.4) Double coil
Examples:

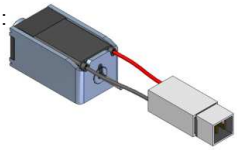


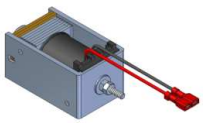
Our standard ERB series has only a coil, that has to be electrically polarized to get the desired movement sense, to avoid this supply polarization inversion we can produce the ERB series with two coils, that will be feeded individually to get the desired movement sense.
The two coil version solenoid will have less force than the single one or higher power for the same force as the coil has to be divided in two.

b) Cable length modification and terminal or connector mounted over cables:

All bistable models have supply cables, this length can be modified to customer requirement.
Likewise any kind of terminals or connectors can be added to the cables.

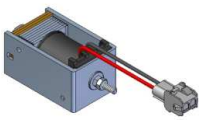
Example 1:





Example 2:

Example 3:



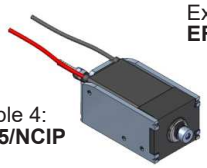
2. INSULATION CLASS CUSTOMIZATION:

Depending on the model, insulation class can be increased until B(130ºC).

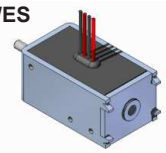
3. PROTECTIÓN RATE CUSTOMIZATION IP (EN60529):

The standard model are IP00, but for the mechanical part IP40 can be obtained and for the electrical part IP65 through coil overmolding..

Example 4:
ERB35/NCIP



Example 5:
ERDI35-07/ES



4. MECHANICAL CUSTOMIZATION

4.1) Shaft modifications:
Length and shape can be modified.

a) Flat

b) Spherical

c) Threaded

d) Transverse hole

e) Grooved

f) Threaded hole

4.2) Plunger modifications:
Length and shape can be modified.

a) Flat

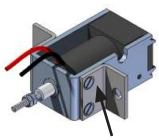
b) Threaded hole

c) Fork joint

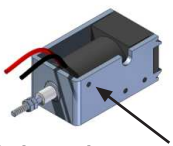
d) Flat faces

e) Grooved

4.3) Fixing holes modification:



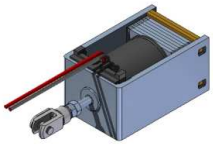
Model customized with extra holes and fixing sheet: ERB35/NS



Standard model:
ERB35/N

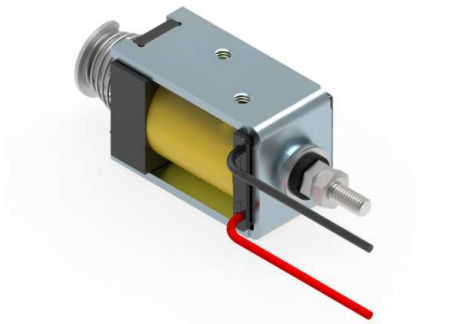
4.4) Fastening element added as Fork joints as DIN71752:

Example:
ERB50/N+Fork joint



NOTE: All this customizations cannot be applied to all models, ask NAFSA for each case.

• ERB 20-15-06/C TYPE

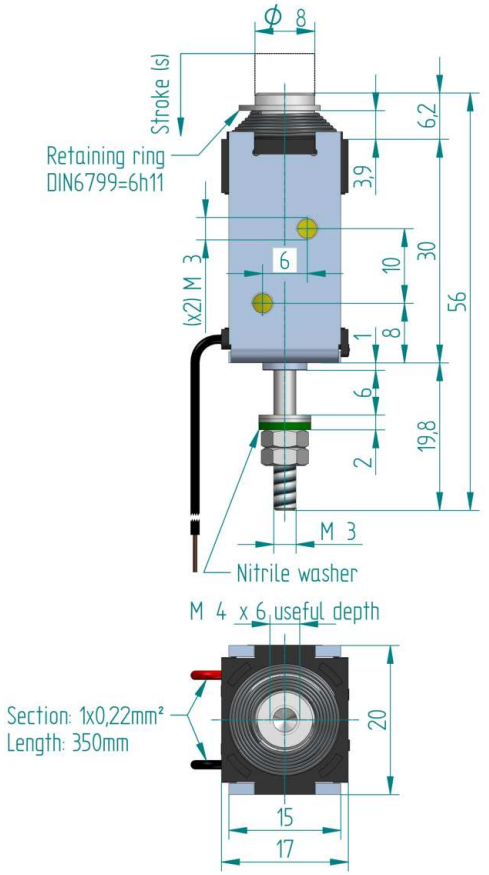


Protection rate: **IP00**
Insulation class: **Y (90ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **8 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring will be incorporated by defect

Standard spring force:
Fs(s=0mm) = 2.7N
Fs(s=8mm) = 1.1N

Solenoid locked (s=0mm position)

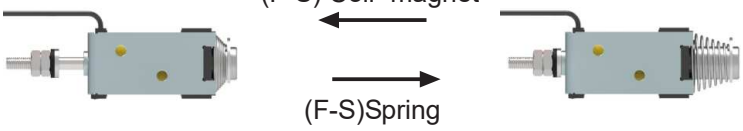


(Un) Standard voltage (Vdc)	24
(ED) Duty-cycle ED(%)	20
(P20) Power at 20ºC (W)	10
Available voltage (Vdc)	from 5 to 24
Available voltage (Vac)	NOT AVAILABLE
Max time under voltage(s)	30
Plunger weight (Kg)	0.011
Solenoid weight (Kg)	0.047

Work depending on feeding mode:

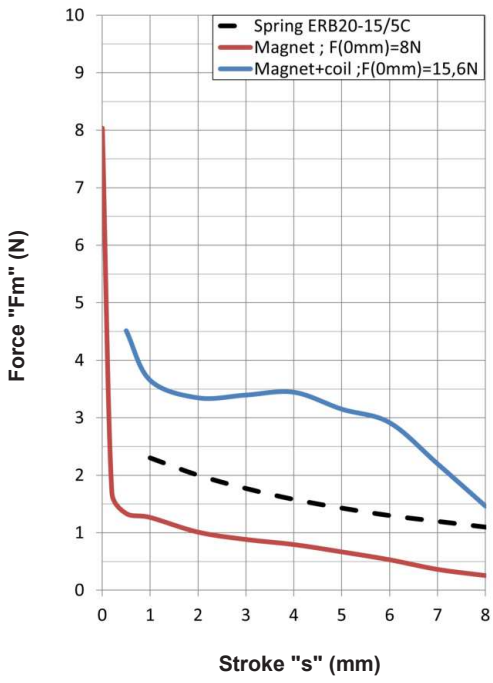
Locked postion
Red cable: +Vdc
Black cable: -Vdc

Unlocked position
Red cable: -Vdc
Black cable: +Vdc



F-S:Force-stroke

Force-stroke curve



- Voltage under demand:

They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- If any customization from the original is needed, please ask us.

- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ERB20-15-06/C --V ED25%* - Spring

Voltage: 24Vdc; Duty cycle: ED25%; With spring:
ERB20-15-06/C 24Vdc ED25% RS

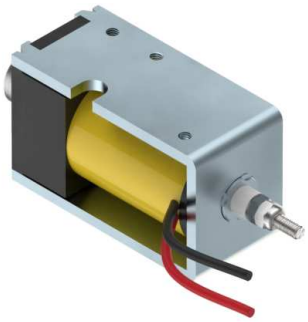
Voltage: 12Vdc; Duty cycle: ED25%; Without spring:
ERB20-15-06/C 12Vdc ED25% RN

Spring yes: RS ; Spring no: RN

Calculation of the effective force:
see pages 1 and 81

For fixation and mounting positions: see page 81

• ERB 35-05/NC TYPE



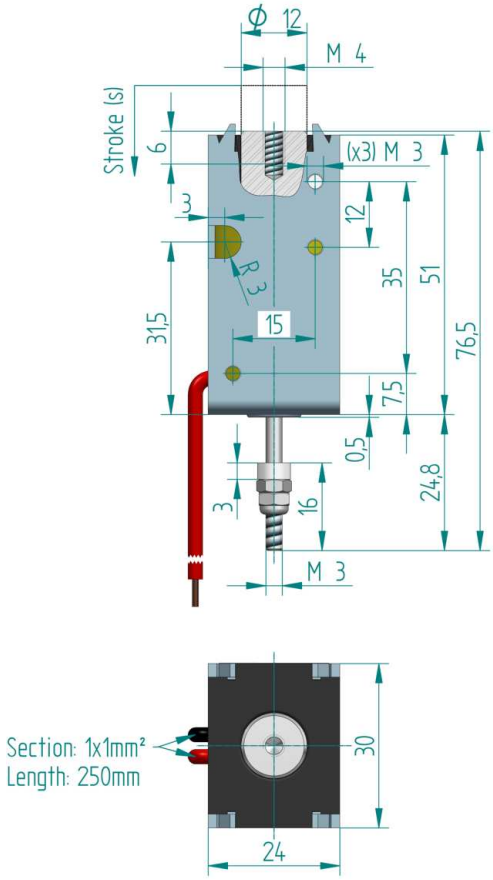
Protection rate: **IP00**
Insulation class: **Y (90ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **8 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring will be incorporated by defect

Standard spring force:
Fs(s=0mm) = 12.3N
Fs(s=8mm) = 8.7N

(Un) Standard voltage (Vdc)	24
(ED) Duty-cycle ED(%)	20
(P20) Power at 20ºC (W)	35
Available voltage (Vdc)	from 6 to 205
Available voltage (Vac)	NOT AVAILABLE
Max time under voltage(s)	30
Plunger weight (Kg)	0.040
Solenoid weight (Kg)	0.165

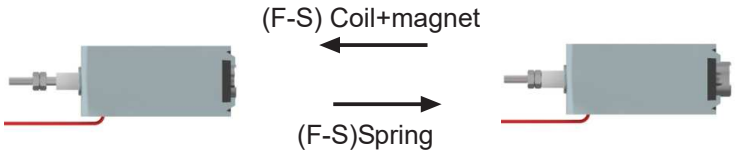
Solenoid locked (s=0mm position)



Work depending on feeding mode:

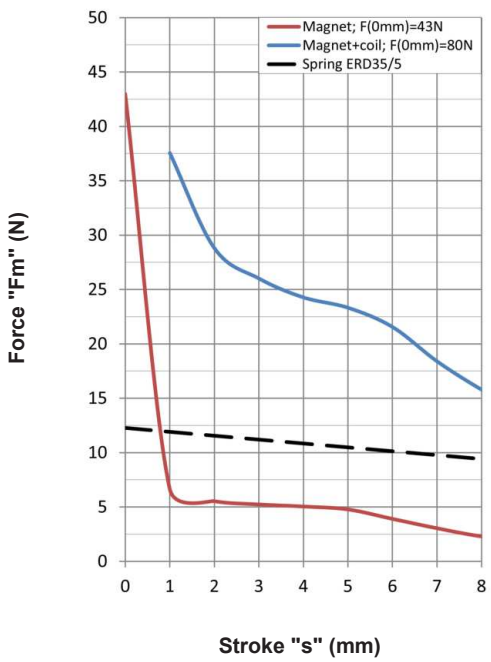
Locked postion
Red cable: +Vdc
Black cable: -Vdc

Unlocked position
Red cable: -Vdc
Black cable: +Vdc



F-S:Force-stroke

Force-stroke curve



- Voltage under demand:

They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- If any customization from the original is needed, please ask us.

- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ERB35-05/NC --V ED20%* - Spring

Voltage: 24Vdc; Duty cycle: ED25%; With spring:
ERB35-05/NC 24Vdc ED20% RS

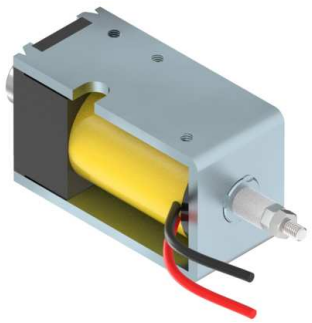
Voltage: 12Vdc; Duty cycle: ED20%; Without spring:
ERB35-05/NC 12Vdc ED20% RN

Spring yes: RS ; Spring no: RN

Calculation of the effective force:
see pages 1 and 81

For fixation and mounting positions: see page 81

• ERB 35/N TYPE



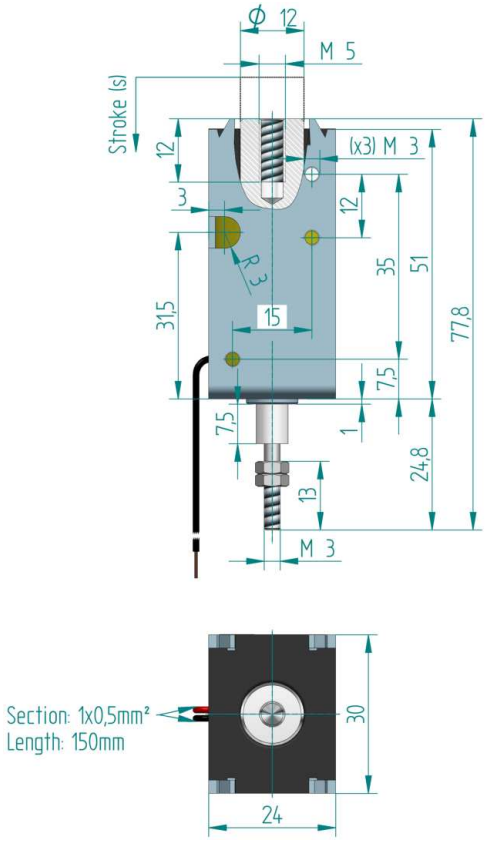
Protection rate: **IP00**
Insulation class: **Y (90ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **5 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring will be incorporated by defect

Standard spring force:
Fs(s=0mm) = 12.3N
Fs(s=5mm) = 10.5N

(Un) Standard voltage (Vdc)	24
(ED) Duty-cycle ED(%)	20
(P20) Power at 20ºC (W)	35
Available voltage (Vdc)	from 6 to 205
Available voltage (Vac)	NOT AVAILABLE
Max time under voltage(s)	30
Plunger weight (Kg)	0.040
Solenoid weight (Kg)	0.165

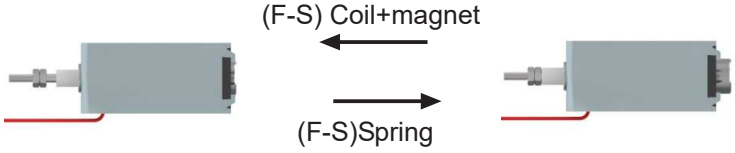
Solenoid locked (s=0mm position)



Work depending on feeding mode:

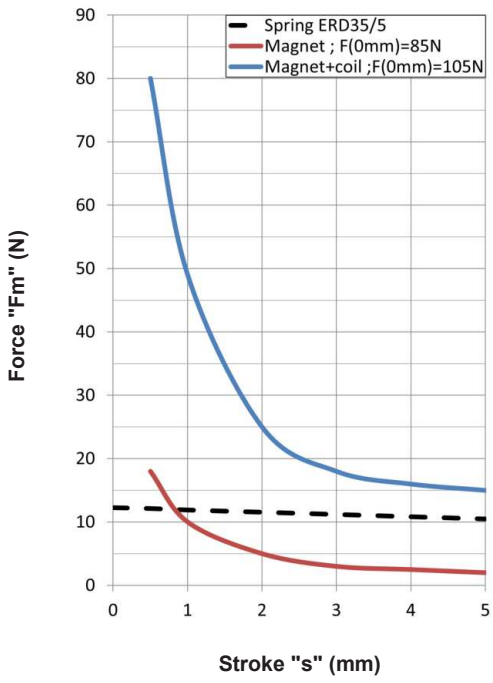
Locked postion
Red cable: +Vdc
Black cable: -Vdc

Unlocked position
Red cable: -Vdc
Black cable: +Vdc



F-S:Force-stroke

Force-stroke curve



- Voltage under demand:

They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- If any customization from the original is needed, please ask us.

- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ERB35/N --V ED25%* - Spring

Voltage: 24Vdc; Duty cycle: ED20%; With spring:
ERB35/N 24Vdc ED20% RS

Voltage: 12Vdc; Duty cycle: ED20%; Without spring:
ERB35/N 12Vdc ED20% RN

Spring yes: RS ; Spring no: RN

Calculation of the effective force:
see pages 1 and 81

For fixation and mounting positions: see page 81

• ERB 50/N TYPE

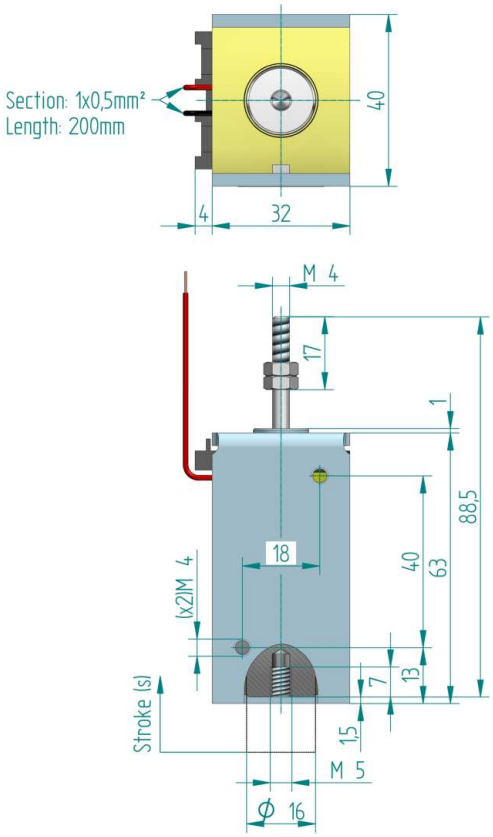
Protection rate: **IP00**
Insulation class: **Y (90ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **10 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring will be incorporated by defect

Standard spring force:
Fs(s=0mm) = 29.4N
Fs(s=10mm) = 10N

(Un) Standard voltage (Vdc)	24
(ED) Duty-cycle ED(%)	20
(P20) Power at 20ºC (W)	67
Available voltage (Vdc)	from 12 to 205
Available voltage (Vac)	NOT AVAILABLE
Max time under voltage(s)	30
Plunger weight (Kg)	0.071
Solenoid weight (Kg)	0.365

Solenoid locked (s=0mm position)



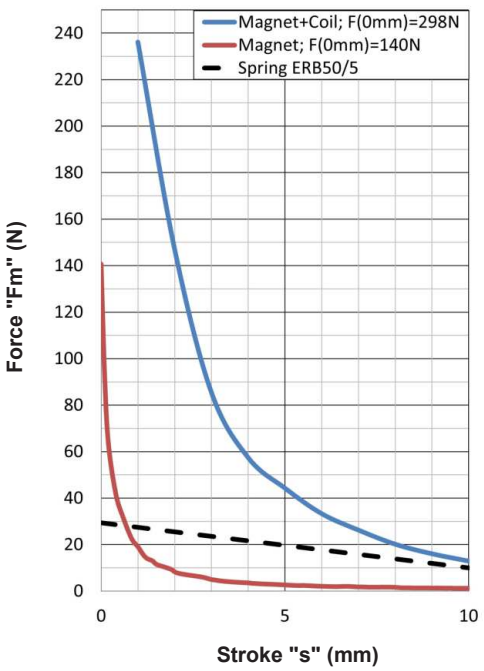
Work depending on feeding mode:

Locked postion
Red cable: +Vdc
Black cable: -Vdc

Unlocked position
Red cable: -Vdc
Black cable: +Vdc

F-S:Force-stroke

Force-stroke curve



- Voltage under demand:

They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- If any customization from the original is needed, please ask us.

- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ERB50/N --V ED20%* - Spring

Voltage: 24Vdc; Duty cycle: ED20%; With spring:
ERB50/N 24Vdc ED20% RS

Voltage: 12Vdc; Duty cycle: ED20%; Without spring:
ERB50/N 12Vdc ED20% RN

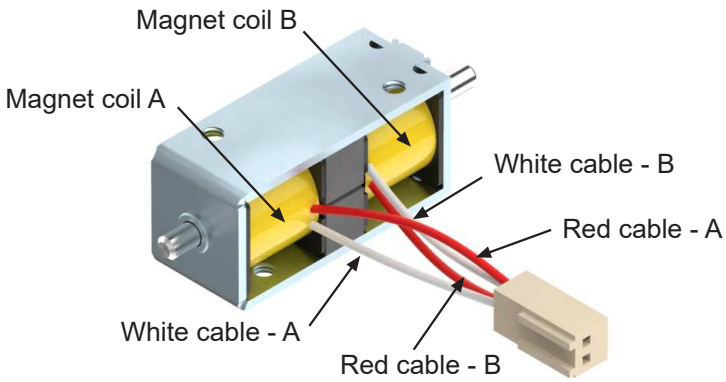
Spring yes: RS ; Spring no: RN

Calculation of the effective force:
see pages 1 and 81

For fixation and mounting positions: see page 81

• ERDI 15 TYPE

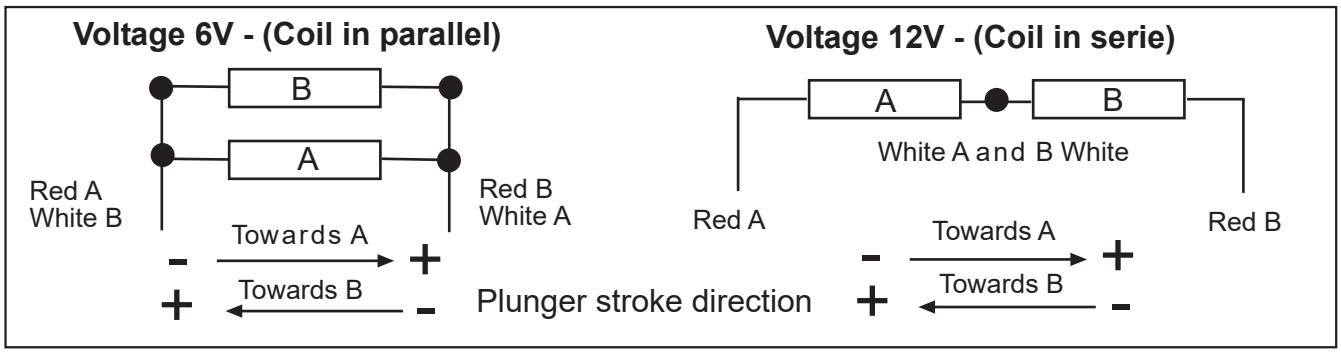
This solenoid has two resting positions, the stroke movement "s" from a position to the other one is made by a polarized electric signal, the plunger is retained in each end of stroke position using permanent magnets.



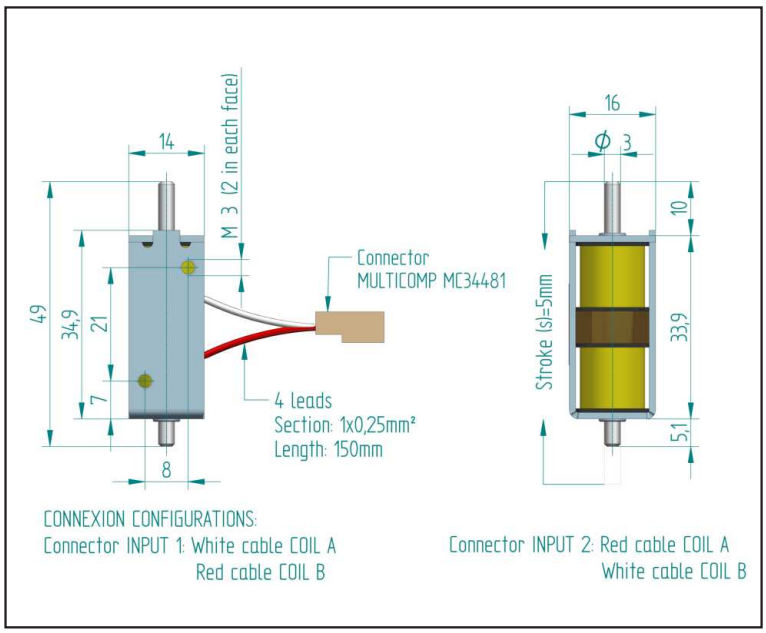
Protection rate: **IP00**
Insulation class: **E (120ºC)**
Standard voltage: **from 6 to 12Vdc**
Under demand voltage: **Ask NAFSA**
Standard stroke "s": **5mm**
Duty cycle ED: **33%**
Coil resistance at 20ºC: **8Ohm**
Initial force: **1.5N**
Holding force: **6N**
Plunger weight: **0.005Kg**
Solenoid weight: **0.040Kg**

*Compulsory earthing if the metallic parts are accessible.

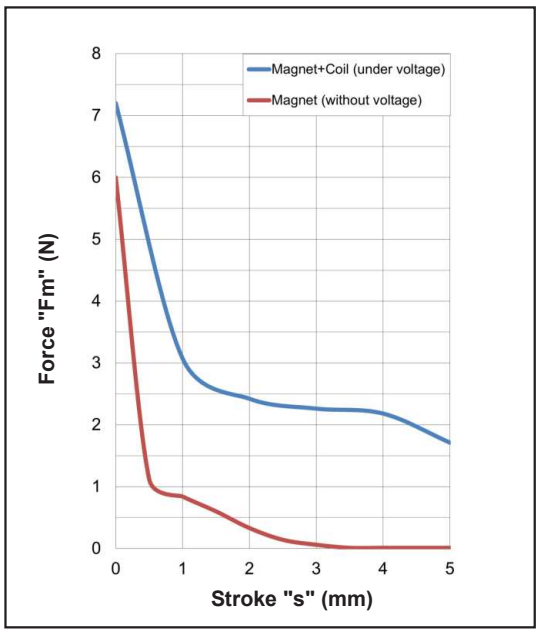
Connection scheme: Coil in parallel will be the standard configuration.



Dimensional drawing:



Force-stroke Curve (F-S)

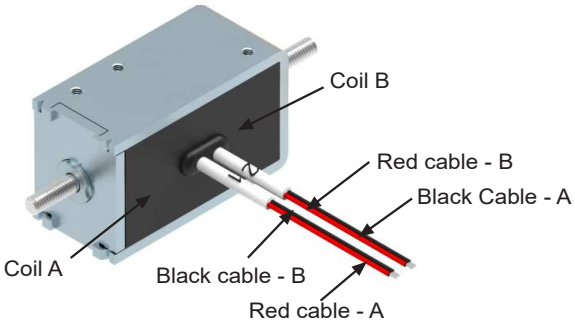


ASSEMBLY: the screw does not have to exceed the wall of the magnetic circuit

Ordering code:
Coil in parallel: ERDI15 6V 33%, (standard configuration)
Coil in serie: ERDI15 12V 33%, (special configuration)

• ERDI 35-06/CC TYPE

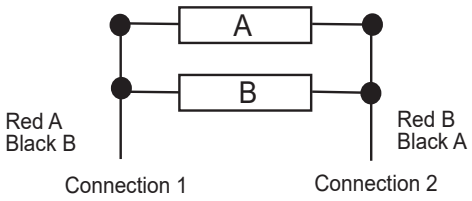
This solenoid has two stable positions, the stroke movement "s" from a position to the other one is made by a polarized electric signal, the plunger is retained in each end of stroke position using permanent magnets.



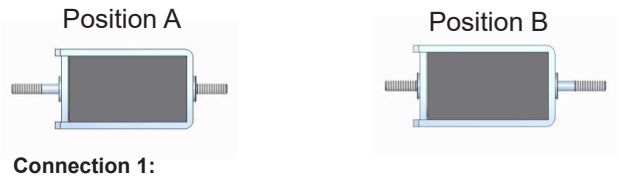
Protection rate: I**P40 EN60529**
Insulation class: **Y (90ºC)**
Standard voltage: **24Vdc**
Voltages under demand: **from 6VDC to 250Vdc**
Standard stroke "s": **6mm**
Duty-cycle ED: **20%**
Abs. power at 20ºC: **28W (14W each coil)**
Plunger weight: **0.028Kg**
Solenoid weight: **0.175Kg**
Holding force at stroke 0mm: **20N**

*Obligatory earthing if the metallic parts are acessible.

Connection scheme

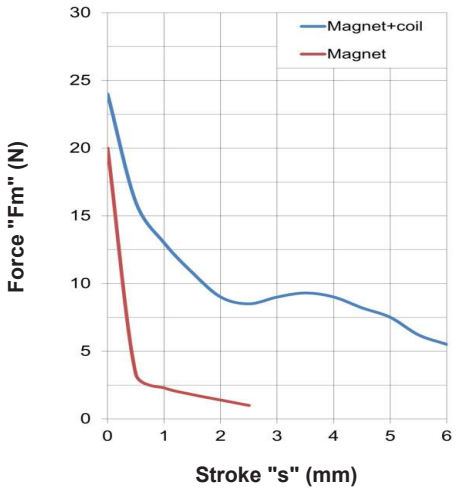


Work depending on the feeding mode:

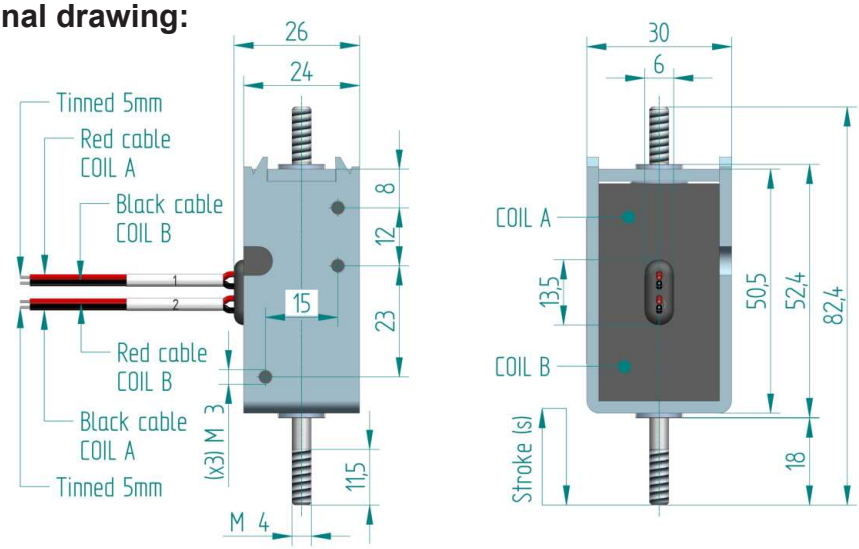


Connection 1:
+VDC and Connection 2: -VDC. The shaft will go to B position
Connection 2:
+VDC and Connection 1: -VDC. The shaft will go to A position

Force-stroke curve



Dimensional drawing:



ASSEMBLY: the screw does not have to exceed the wall of the magnetic circuit

Ordering code: *ERDI35-06/CC--V ED20%*

Voltage: 6Vdc: *ERDI35-06/CC Vdc ED20%*
Voltage: 24Vdc: *ERDI35-06/CC 24Vdc ED20%*

• ECI 35/C TYPE

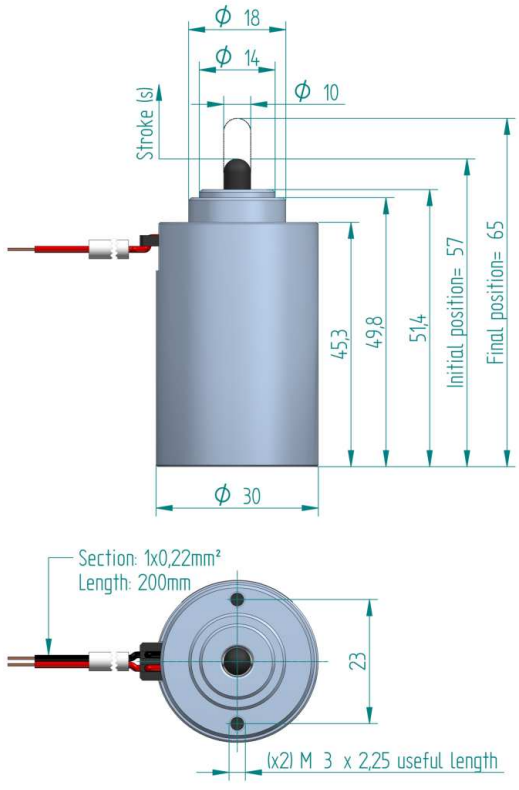
ECI serie electromagnets are bistable linear electromagnet, where the stroke movement from initial to final position is made by a incorporated spring.

When solenoid is in final position after been under voltage (See drawings bellow), the mechanical reset to the initial position has to be made by external forces acting on the mobile core.

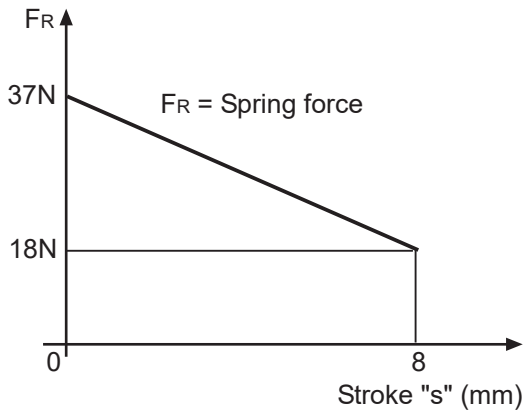
The plunger is retened in the initial postion by permanent magnets.To release the plunger is necessary feed the electromagnet with a low power polarized voltage signal.

Solenoid protection rate: **IP40**
Insulation class: **Y (90ºC)**
Minimun release voltage: **6V**
Duty-cycle ED: **100%**
Standard stroke "s": **8mm**
Work: **Push**
Magnetic retention force (Frm): **44N**
Initial force (Fe): **37N**
Useful magnetic force (Fru=Frm-Fe): **7N**
Final force (Fa): **18N**
Mechanical response time: **5ms**
Minimun energy of release: **30mJ**
Minimun duration of the electrical impulse: **20ms**
Solenoid weight: **0.190Kg**

Solenoid with compressed spring



Force-stroke curve



Working

Position A (Initial position): Repose status (compressed spring) , when the electromagnet is feeded it passes to position B.

Position B (Final position): After voltage status (spring free). To return to position A, will be necessary to apply an external force

Ordering code: *ECI35/C 6Vdc ED100%*