● ERC SERIES

ERC serie electromagnets are simple effect linear solenoids where the stroke movement from initial to final position is made by electromagnetic forces, the return to initial position is made by external force or by a spring incorporated to the solenoid. They are similar to ER series but with a higher life expressed in number of cycle due to its guide made in friction bearing with teflon layer.
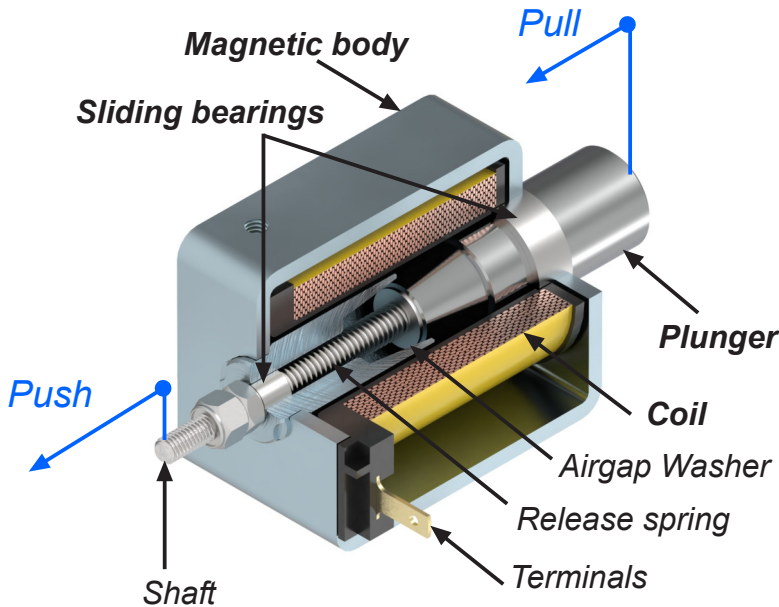
Structure, main basic elements:

Magnetic body:
It is the metal **carcase** containing the **coil**, the core and the fixing holes of the solenoid and the sliding bearings.

Coil:
It receives the electric energy to create the magnetic field.

Plunger:
It is the piece that moves inside the **coil**, and it has a non-magnetic **shaft** fixed to it.
To work pulling, the element to activate must be fixed to the **plunger**. To work pushing, the element to activate must be fixed to the **shaft**.

Sliding bearings:
They are the components which guide the plunger.

● **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.

Effective force (Fh) is obtained from magnetic force (Fm).

-When the solenoid pulls upwards:

Effective force = Magnetic force - Plunger weight

-When the solenoid pulls downwards:

Effective force = Magnetic force + Plunger weight
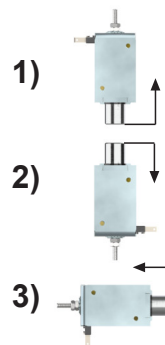
-When the solenoid pulls in horizontal position:

Effective force = Magnetic force

-For the units with incorporated return spring:

Effective force = Magnetic force - Spring force ± Plunger weight

NOTE: When mounting position 3) slide bearings abrassion is bigger than mounting options 1) and 2)

● **Terminals placement with fixing holes as reference:**

● **Important:**
The fixation screws do not have to exceed the wall of the magnetic body not to damage the coil


Assembly panel

The mounting of the specification sheets is the standard one, under demand they can be mounted in the different positions shown above. It must be specified in the order. Under demand, terminals can be replaced by flying leads.

● ERC series: Force-stroke Chart

Type	Stroke (mm)		Duty-cycle					Return Spring force (N)
			100%	40%	25%	15%	5%	
ERC25-04/CC	**Beginning of stroke s_1=4**		4.4	8.2	10.6	14	23	2
	End of stroke s_0=0		12.4	17.6	20.6	25.4	36.8	3.6
ERC30/C	**Beginning of stroke s_1=8**		3	6	9	12	21	0.6
	End of stroke s_0=0		10	15	19	24	35	1.6
ERC35/C	**Beginning of stroke s_1=12**		2.6	5.8	7.9	10.5	21	0.8
	End of stroke s_0=0		5.6	9.5	12.9	18	27.7	2
ERC45-50-15/C	**Beginning of stroke s_1=15**		4.5	9.3	12	16	32	1.8
	End of stroke s_0=0		16	33	42	50	83	3.6
ERC50-15/C	**Beginning of stroke s_1=15**		6.8	12.8	17	23	43	1.8
	End of stroke s_0=0		20	34	42	52	76	3.6
ERC60-10/C	**Beginning of stroke s_1=10**		19	33	43	56	94	3.2
	End of stroke s_0=0		81	119	140	160	191	4.3
ERC60-20/C	**Beginning of stroke s_1=20**		11	19	24	32	57	2.1
	End of stroke s_0=0		56	86	106	124	160	4.3

The values of force-stroke and the return spring are in Newton (N), solenoid in horizontal position and without return spring.

Beginning of stroke (s_1)
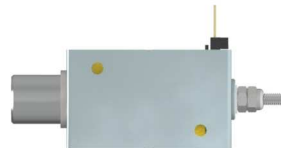
End of stroke (s_0)

● CUSTOMIZATION ERC 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.
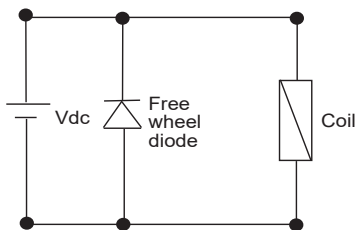
1. ELECTRICAL CUSTOMIZATION:
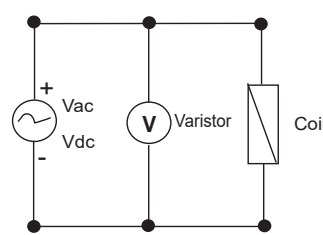
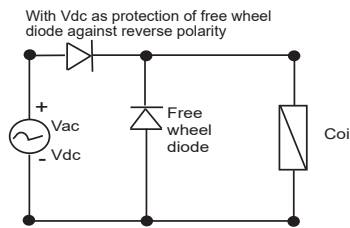### a) Integrated electronics over the coil:

**a.1) For peak supression**
Examples:

*Free wheel diode

*Varistor

a.2) Thermal protection
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.

*Free wheel diode+second diode to protect the free wheel diode against reverse polarity

With Vdc as protection of free wheel diode against reverse polarity
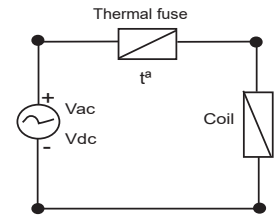
a.3) For rectification
Examples:
*Half wave rectification, with free wheel diode and varistor input protection.

With Vdc as protection of free wheel diode against reverse polarity

Varistor to protect the diodes against reverse polarity
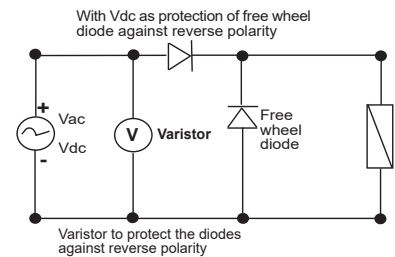
a.4) PWM electronics integration:

It consists on feeding the electromagnet through an electronic PWM (Pulse width modulation). This device will iniattially provide the solenoid with its nominal voltage and after a while, which will be higher than the one needed to complete it´s stroke, the voltage entering to the solenoid will be reduced by the PWD to the selected ratio. For instance, the most common reduction ratio values are 1:2 or 1:3. Once the voltage is reduced it will be maintained in it´s value untill the supply to the solenoid is off, once off, the system resets and when the solenoid works again, the cycle is repeated.

The idea is to make the solenoid to be 100% duty-cycle, but with a big force when the stroke has to be done, the force of a reduced duty cycle, as per example 25%, so it can be feeded long as required but without the risk of burning.

The solution is used when the initial stroke force in a 100% duty-cycle solenoid isn't enough or in those cases where a lower heating of the solenoid is required. For example, a 12Vdc and ED100% solenoid can be feeded at 24VDC throught an PWM electronic and if it has 1:2 ratio, the solenoid will first see the 24VDC so it will complete the stroke with 4 times more power, so with the force of a 25% duty cycle, then when the voltage is reduced to 12VDC the duty cycle will be 100%.

*PWD over coil

Example 1:

*PWD over the cables

Example 2:

b) Cable length modification and terminal or connector mounted over cables:
In all ERC models terminals can be replaced by supply cables. The standard length of cables is 250mm, this dimension can be modified to customer requirement.
Likewise, many different kind of terminals or connectors may be added to tha cables.

Example 3:

c) Intermediate duty-cycle manufacturing:

NAFSA can manufacture any intermediate duty-cycle from 0 to 100, but the viability depends on the model and the voltage associated with it. For any special requeriment, please ask NAFSA .

Example 4:

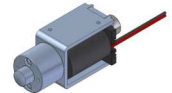### 2. INSULATION CLASS CUSTOMIZATION:
In the ER serie maximum insulation class can be obtained is F (155ºC),

3. PROTECTION RATE IP (EN60529) CUSTOMIZATION:
Standard models are IP00, but IP40 can be obtained to the mechanical part and IP65 to the electrical part by coil overmolding process.
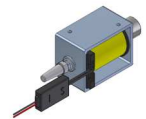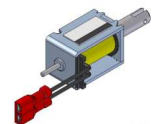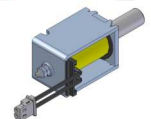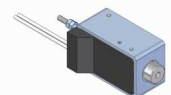
Example 5:

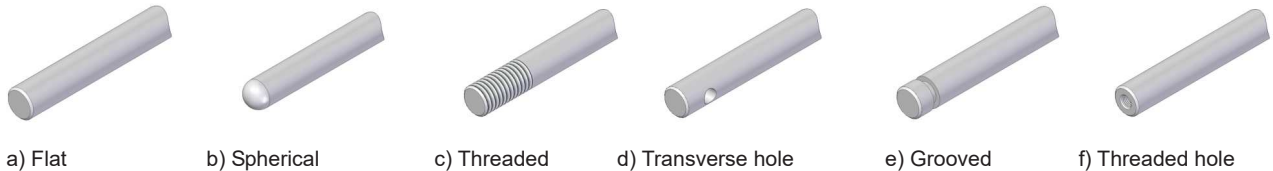NOTE: All this customizations cannot be applied to all models, ask NAFSA for each case.

● CUSTOMIZATION ERC 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.
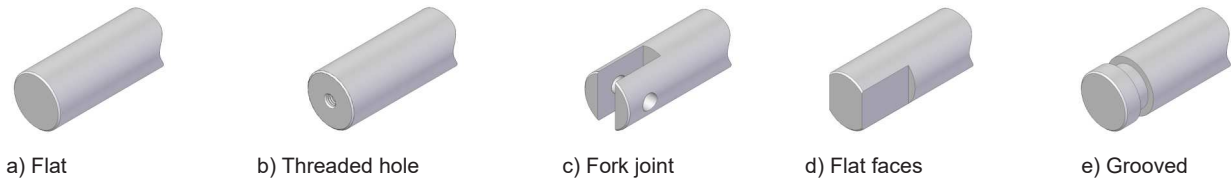
If any modification is needed, please ask NAFSA about the possibility and the minimum manufacturing batch required.
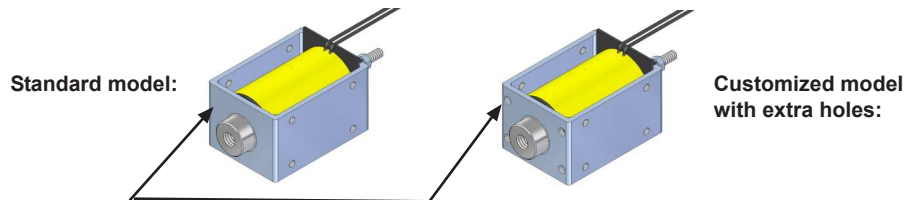
4. MECHANICAL CUSTOMIZATION:

4.1) Shaft modifications: Length and shape can be modified. If it has not any function, it can be removed depending on the model, this would mean use exterior springs instead of internal ones.

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:

Standard model: Customized model with extra holes:

4.4) Return spring force modification:
ER serie electromagnets are linear simple effect solenoids, where the stroke movement from initial to the final position is made by electromagnetic forces, and the return to initial position takes place because of external forces or an incorporated spring (depending on the type). The force of the spring is limited to returning the plunger to the initial position. If more force is required, spring can be modified but we will have to take in mind the duty-cycle. Each duty-cycle has a limitation to increase the spring force, as this force will be deducted to the solenoid push/pull force.

In the cases that spring is not required, solenoid can be ordered without spring or it can be removed manually.

4.5) Stroke modifications:
The standard stroke is limited by the usefull length of shaft, in some cases the stroke can be modified: decreasing or increasing it in case that solenoid has enough ativation force. These modifications can be made by customer or NAFSA.

Example:
Stroke decrease: Inserting a plastic bearing, this can be made by NAFSA or the customer
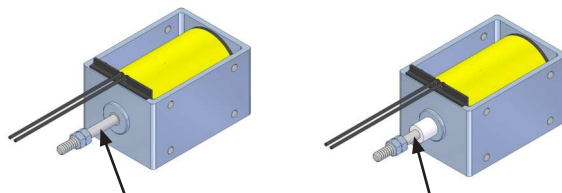
Example:
Stroke increase: Shaft has been enlarged to increase the stroke, This modifcation only can be made by NAFSA.
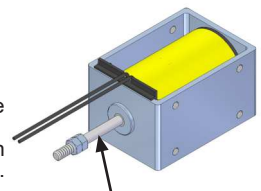
4.6) Position detection system integration:

Example:
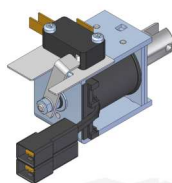
4.7) Fastening element added as Fork joints DIN71752:

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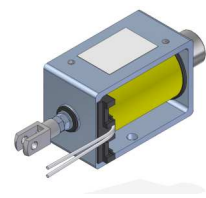
NOTE: All this customizations cannot be applied to all models, ask NAFSA for each case.

● ERC 25-04/CC TYPE

Outer spring version:
● ERC25-04/CC RS

Fs(s=0mm) = 3.6 N
Fs(s=4mm) = 2N

Protection rate: **IP00**
Insulation class: **B (130ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **4 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Inner spring version:
● ERC25-04/CC RSI
Standard spring force:
Fs(s=0mm) = 0.85N
Fs(s=4mm) = 0.55N

Solenoid under voltage (s=0mm position)

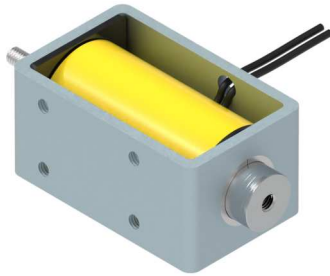| (ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	6.3	15	25	40	123
(Fm) Solenoid force (N) 1)	4.3	8.2	10.6	14	23
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	43	35	33	30	28
Release time (ms) 3)	25	20	19	17	16
Plunger weight (Kg)	0.020				
Solenoid weight (Kg)	0.110				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	o	o	o	3	200	24	230
40	o	o	o	o	o	o	o	o	o	3	230	50	230
25	o	o	o	o	o	o	o	o	o	3	230	75	230
15	o	o	o	o	o	o	o	o	o	3	230	125	230
5	x	o	o	o	o	o	o	o	o	9	230	x	x

Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

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

- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ERC25-04/CC --V ED---% - Spring*

Voltage: 24Vdc; Duty cycle: ED100%; With spring:
ERC25-04/CC 24Vdc ED100% RS **or** *ERC25-04/CC 24VDC ED100% RSI*

Voltage: 48Vdc; Duty cycle: ED15%; Without spring:
ERC25-04/CC 48Vdc ED15% RN

Outer spring yes: RS ;   Inner spring yes: RSI ;   Spring no: RN
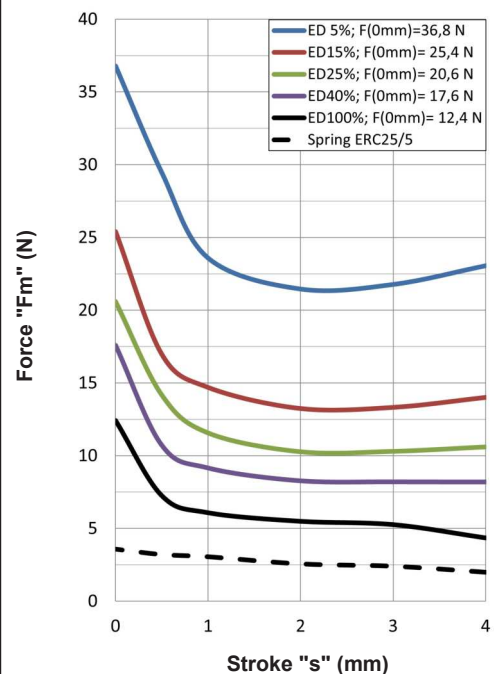
Force-stroke curve

Legend:
- ED 5%; F(0mm)=36,8 N
- ED15%; F(0mm)= 25,4 N
- ED25%; F(0mm)= 20,6 N
- ED40%; F(0mm)= 17,6 N
- ED100%; F(0mm)= 12,4 N
- Spring ERC25/5

Force "Fm" (N)
Stroke "s" (mm)

Calculation of the effective force:
see pages 1 and 31

For fixation and mounting positions: see page 31

● ERC 30/C TYPE

Cables version:
● ERC30/CC

s= 1x0.5mm²
L= 250mm

Solenoid under voltage (s=0mm position)

Protection rate: **IP00**
Insulation class: **B (130ºC)**
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) = 1.6N
Fs(s=8mm) = 0.6N

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	8	20	30	50	120
(Fm) Solenoid force (N) 1)	3	6	9	12	21
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	61	48	45	43	43
Release time (ms) 3)	41	33	32	30	30
Plunger weight (Kg)	0.025				
Solenoid weight (Kg)	0.130				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: Standard spring ; without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	x	o	o	3	230	24	230
40	o	o	o	o	o	o	o	o	o	5	230	50	230
25	o	o	o	o	o	o	o	o	o	6	230	75	230
15	o	o	o	o	o	o	o	x	o	6	230	125	230
5	x	o	o	o	o	o	o	x	o	9	230	x	x

Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

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

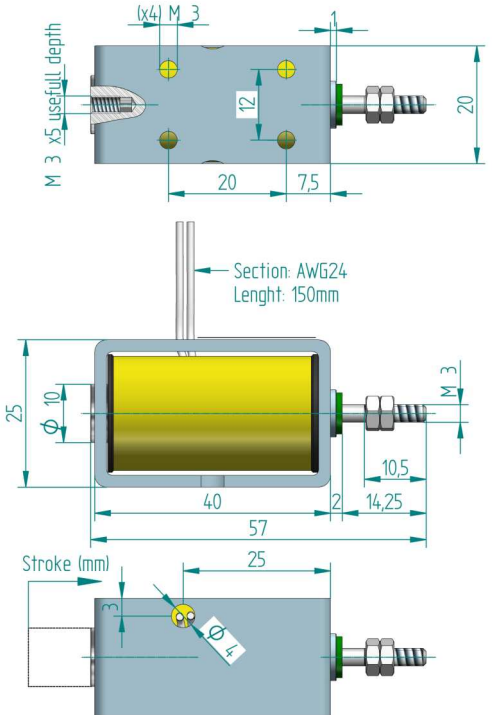- Earthing is recommended if the metallic parts are accessible.

Ordering code:	*ERC30/C --V ED---% - Mounting position - Spring*
A	Voltage: 24Vdc; Duty cycle: ED100%; Position A; With spring: *ERC30/C 24Vdc ED100% A RS*
B	Voltage: 48Vdc; Duty cycle: ED15%; Position B; Without spring: *ERC30/C 12Vdc ED15% B RN*

Spring yes: RS   ;   Spring no: RN

Force-stroke curve

- ED 5%; F(0mm)= 35 N
- ED15%; F(0mm)= 24 N
- ED25%; F(0mm)= 19 N
- ED40%; F(0mm)= 15 N
- ED100%; F(0mm)= 10 N
- Spring ER30/5

Force "Fm" (N)

Stroke "s" (mm)

Calculation of the effective force:
see pages 1 and 31

For fixation and mounting positions: see page 31

NAFSA

SMALL COMPONENTS ● BIG SOLUTIONS

● ERC 35/C TYPE

Cables version:
●ERC35/CC

s= 1x0.5mm²
L= 250mm

Protection rate: **IP00**
Insulation class: **B (130ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **12 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) = 1.9N
Fs(s=12mm) = 0.8N

Solenoid under voltage (s=0mm position)

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	9	20	35	60	150
(Fm) Solenoid force (N) 1)	2.6	5.4	7.3	9.6	17.7
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	64	52	52	49	46
Release time (ms) 3)	45	37	37	36	34
Plunger weight (Kg)	0.035				
Solenoid weight (Kg)	0.150				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: Standard spring ; without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	x	o	o	4	230	36	230
40	o	o	o	o	o	o	o	o	o	5	230	75	230
25	o	o	o	o	o	o	o	o	o	6	230	105	230
15	x	o	o	o	o	o	o	x	o	8	230	180	230
5	x	o	o	o	o	o	o	x	o	12	230	x	x

Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

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

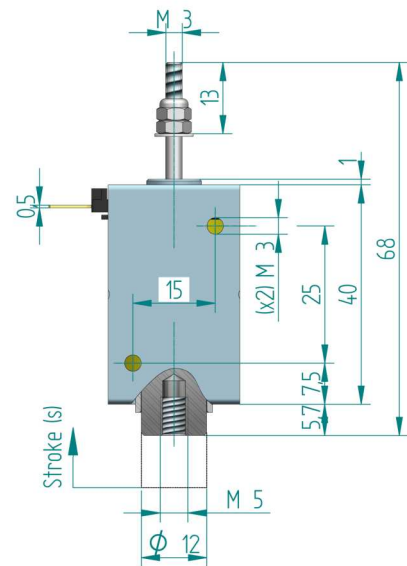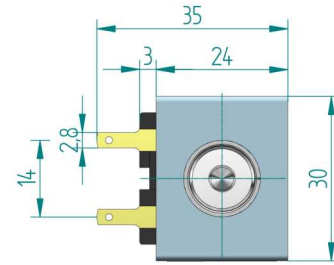- Earthing is recommended if the metallic parts are accessible.

Force-stroke curve

Calculation of the effective force:
see pages 1 and 31

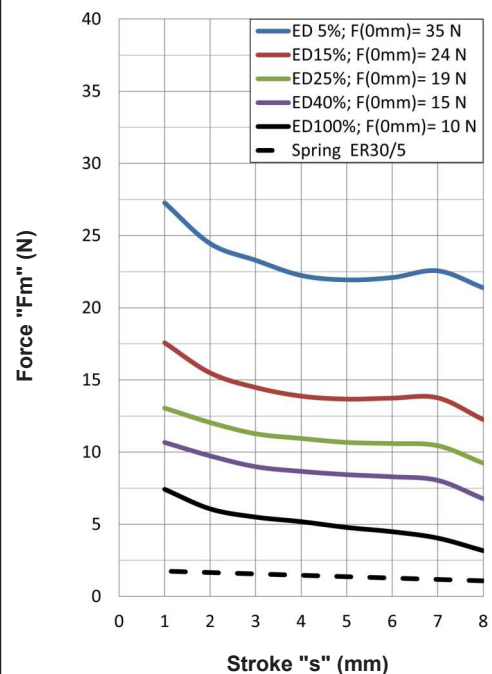| Ordering code:	*ERC35/C --V ED---% - Mounting position - Spring*
A	Voltage: 24Vdc; Duty cycle: ED100%; Position A; With spring: *ERC35/C 24Vdc ED100% A RS*
B	Voltage: 48Vdc; Duty cycle: ED15%; Position B; Without spring: *ERC35/C 12Vdc ED15% B RN*

Spring yes: RS ; Spring no: RN
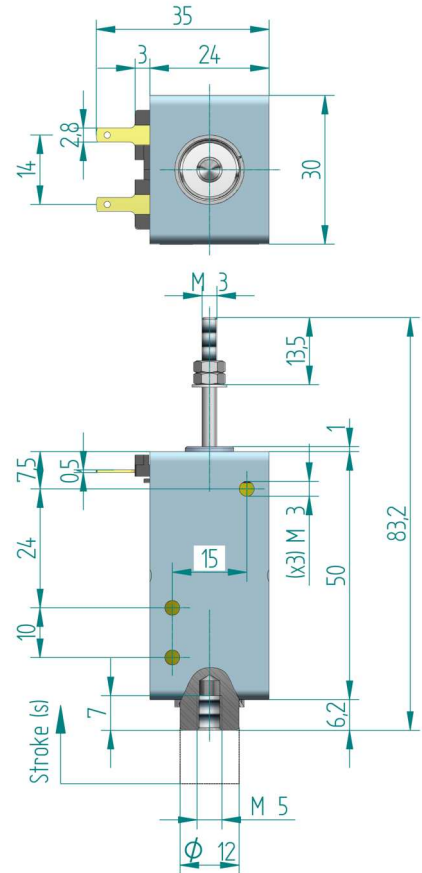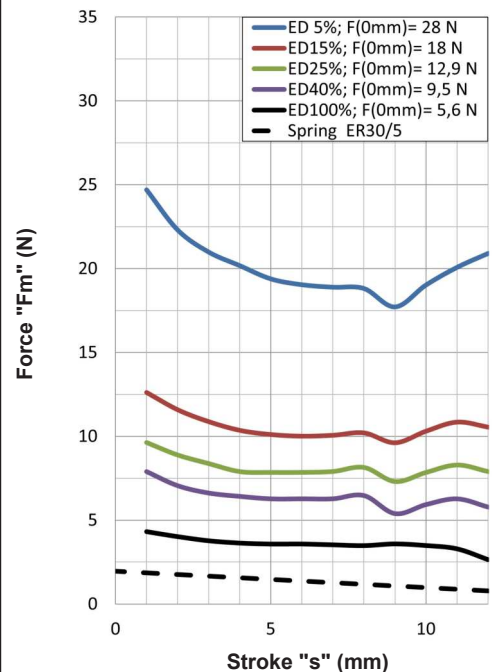
For fixation and mounting positions: see page 31

● ERC 45-50-15/C TYPE

Protection rate: **IP00**
Insulation class: **B (130ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **15 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) = 3.6N
Fs(s=15mm) = 1.7N

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	12	29	46	77	228
(Fm) Solenoid force (N) 1)	4.5	9.3	12	16	32
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	110	84	81	73	72
Release time (ms) 3)	68	53	52	50	47
Plunger weight (Kg)	0.052				
Solenoid weight (Kg)	0.297				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: Standard spring ; without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	o	o	o	6	230	30	230
40	x	o	o	o	o	o	o	o	o	8	230	76	230
25	x	o	o	o	o	o	o	x	o	9	230	120	230
15	x	o	o	o	o	o	o	x	o	12	230	202	230
5	x	x	o	o	o	o	o	x	x	20	230	x	x

   Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages   between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

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

- Earthing is recommended if the metallic parts are accessible.

Ordering code:	*ERC45-50-15/C --V ED---% - Spring*
	Voltage: 24Vdc; Duty cycle: ED100%; With spring: *ERC45-50-15/C 24Vdc ED100% RS*
	Voltage: 48Vdc; Duty cycle: ED15%; Without spring: *ERC45-50-15/C 12Vdc ED15% RN*

Spring yes: RS ;   Spring no: RN
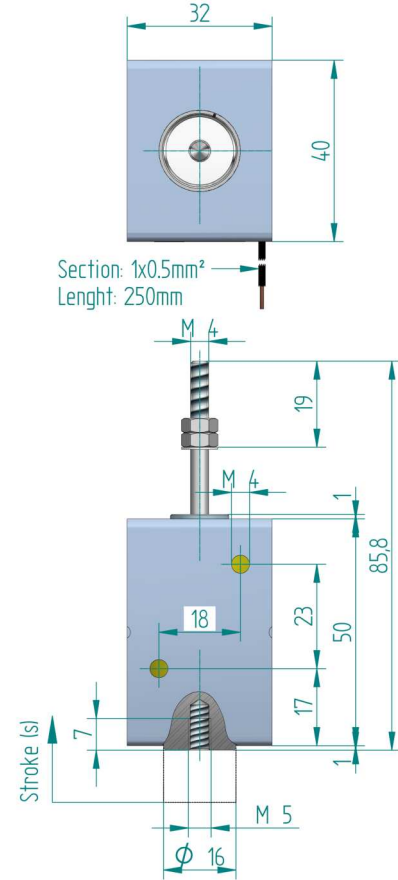
Solenoid under voltage (s=0mm position)

Section: 1x0.5mm²
Lenght: 250mm

Force-stroke curve

Calculation of the effective force: see pages 1 and 31

For fixation and mounting positions: see page 31

NAFSA
SMALL COMPONENTS ● BIG SOLUTIONS

● ERC 50-15/C TYPE
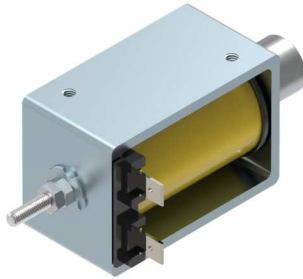
Cables version:
● **ERC50-15/CC**

s= 1x0.5mm²
L= 250mm

Release spring will be incorporated by defect

Standard spring force:
Fs(s=0mm) = 3.6N
Fs(s=15mm) = 1.7N

Solenoid under voltage (s=0mm position)

Protection rate: **IP00**
Insulation class: **B (130ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **15 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	14	35	56	93	280
(Fm) Solenoid force (N) 1)	6.8	12.8	17	23	43
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	122	91	76	73	71
Release time (ms) 3)	80	62	53	51	50
Plunger weight (Kg)	0.070				
Solenoid weight (Kg)	0.335				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: Standard spring ; without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	o	o	o	6	230	41	230
40	x	o	o	o	o	o	o	o	o	9	230	100	230
25	x	o	o	o	o	o	o	x	o	11	230	160	230
15	x	x	o	o	o	o	o	x	o	15	230	230	230
5	x	x	o	o	o	o	o	x	x	24	230	x	x

Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

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

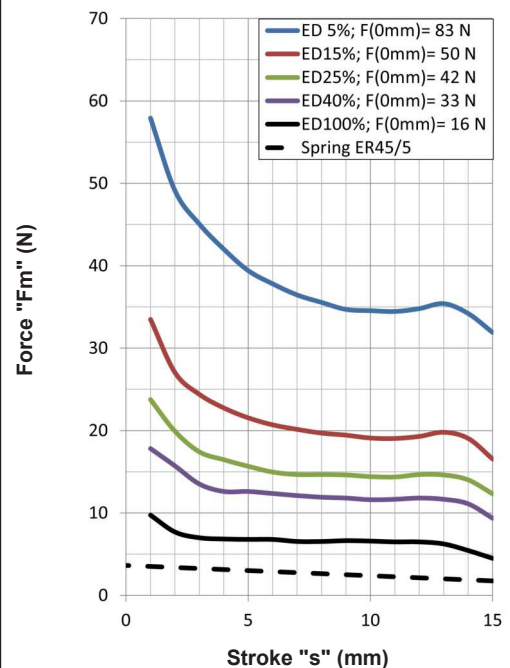- Earthing is recommended if the metallic parts are accessible.

Ordering code:	*ERC50-15/C --V ED---% - Spring*
	Voltage: 24Vdc; Duty cycle: ED100%; With spring: *ERC50-15/C 24Vdc ED100% RS*
	Voltage: 48Vdc; Duty cycle: ED15%; Without spring: *ERC50-15/C 48Vdc ED15% RN*

Spring yes: RS   ;   Spring no: RN

Force-stroke curve

Force "Fm" (N)

- ED 5%; F(0mm)= 76 N
- ED15%; F(0mm)= 52 N
- ED25%; F(0mm)= 42 N
- ED40%; F(0mm)= 34 N
- ED100%; F(0mm)= 20 N
- Spring ER45/5

Stroke "s" (mm)

Calculation of the effective force:
see pages 1 and 31

For fixation and mounting positions: see page 31

NAFSA
SMALL COMPONENTS ● **BIG** SOLUTIONS

● ERC 60-10/C TYPE

Protection rate: **IP00**
Insulation class: **B (130ºC)**
Reference cycle: **5 minutes**
Standard stroke (s): **10 mm**
Temperature rise "ΔV₃₁": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring will be incorporated by defect

Standard spring force:
Fs(s=0mm) = 4.3N
Fs(s=10mm) = 3.2N

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	18	45	70	110	280
(Fm) Solenoid force (N) 1)	19	33	43	56	94
Max time under voltage(s)	Inf	120	75	45	15
Opening time (ms) 2)	182	130	122	107	104
Release time (ms) 3)	117	85	81	72	70
Plunger weight (Kg)	0.120				
Solenoid weight (Kg)	0.660				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: Standard spring ; without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	o	o	o	o	o	o	o	o	7	230	48	230
40	x	o	o	o	o	o	o	x	o	11	230	125	230
25	x	x	o	o	o	o	o	x	o	13	230	200	230
15	x	x	o	o	o	o	o	x	x	16	230	x	x
5	x	x	o	o	o	o	o	x	x	24	230	x	x

Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

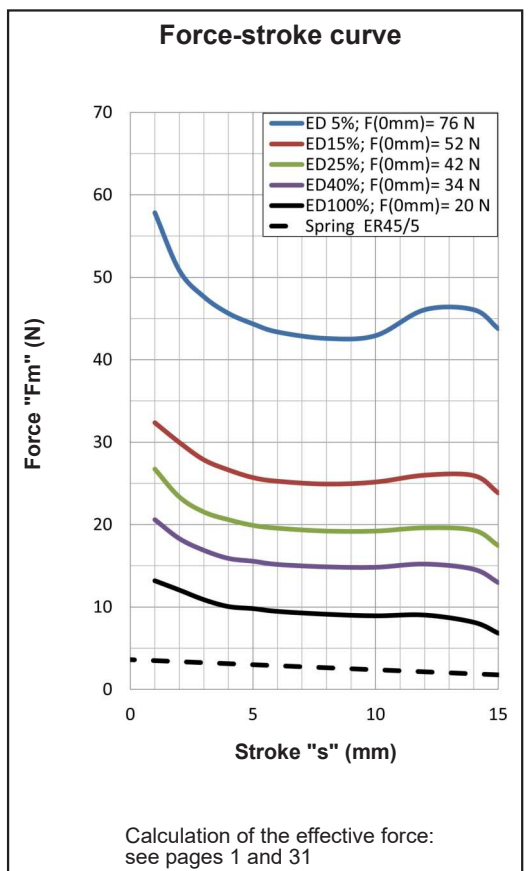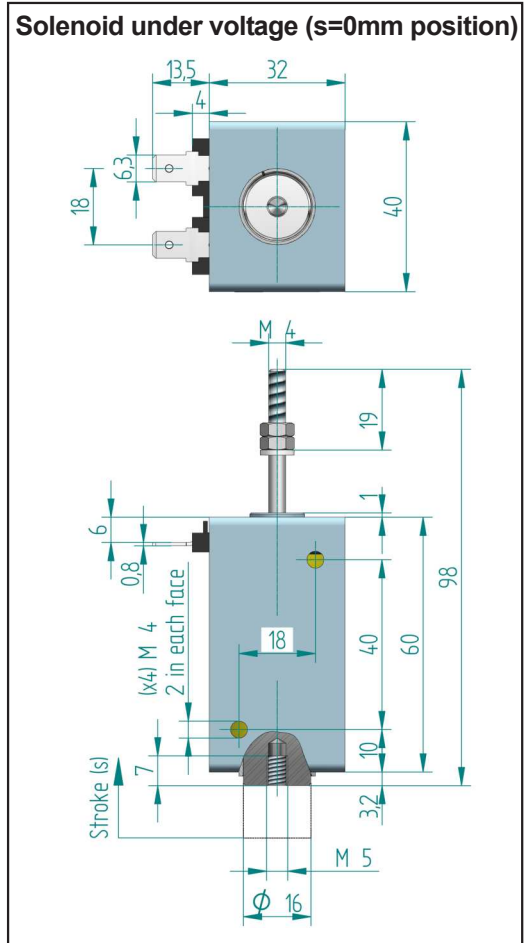- If any customization from the original is needed, please ask us.

- Earthing is recommended if the metallic parts are accessible.
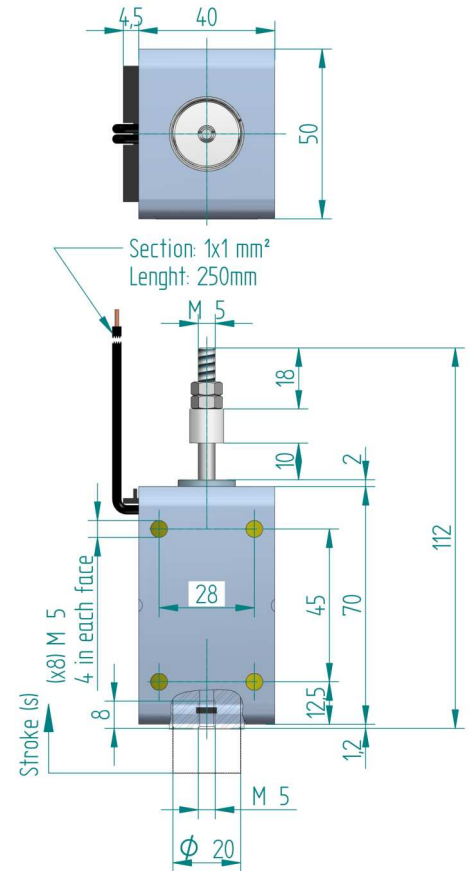
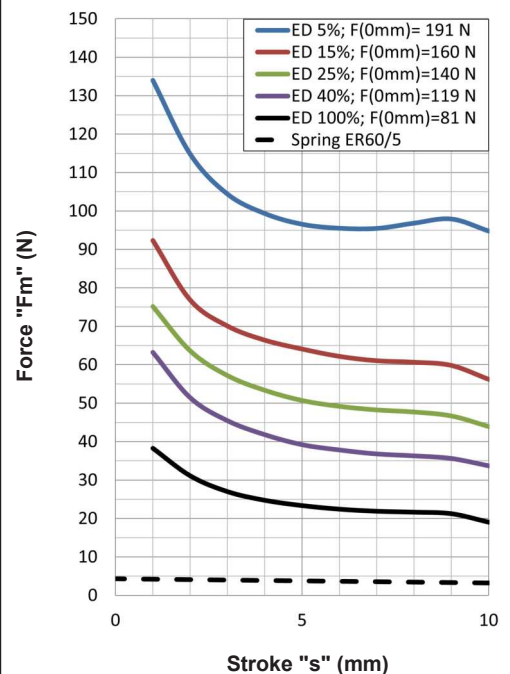| Ordering code:	*ERC60-10/C --V ED---% - Spring*
	Voltage: 24Vdc; Duty cycle: ED100%; With spring: *ERC60-10/C 24Vdc ED100% RS*
	Voltage: 48Vdc; Duty cycle: ED15%; Without spring: *ERC60-10/C 48Vdc ED15% RN*

Spring yes: RS   ;   Spring no: RN

Solenoid under voltage (s=0mm position)

Section: 1x1 mm²
Lenght: 250mm

Force-stroke curve

— ED 5%; F(0mm)= 191 N
— ED 15%; F(0mm)= 160 N
— ED 25%; F(0mm)= 140 N
— ED 40%; F(0mm)= 119 N
— ED 100%; F(0mm)= 81 N
-- Spring ER60/5

Calculation of the effective force:
see pages 1 and 31

For fixation and mounting positions: see page 31

● ERC 60-20/C TYPE

Protection rate: **IP00**
Insulation class: **B (130ºC)**
Reference cycle: **5 minutes**
Standard stroke (s): **20 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) = 4.3N
Fs(s=20mm) = 2.1N

Solenoid under voltage (s=0mm position)

Section: 1x1 mm²
Lenght: 250mm

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	18	45	70	110	280
(Fm) Solenoid force (N) 1)	11	19	24	32	57
Max time under voltage(s)	Inf	120	75	45	15
Opening time (ms) 2)	190	137	129	114	112
Release time (ms) 3)	124	93	88	79	78
Plunger weight (Kg)	0.110				
Solenoid weight (Kg)	0.660				

1) Fm Solenoid force is given acording to VDE0580 without deducting the spring force or the plunger weight if vertical mounting.

2) Time is given on these conditions: Coil supplied under nominal voltage ; Stabilized in it´s working temperature ; Load 70% of the solenoid force ; Horizontal assembly ; Standard stroke initial position; 20ºC ambient temperature.

3) Time is given on these conditions: Standard spring ; without load on shaft ; Horizontal assembly ; Standard stroke initial position.

Duty-cycle	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
ED%	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	o	o	o	o	o	o	o	o	7	230	48	230
40	x	o	o	o	o	o	o	x	o	11	230	125	230
25	x	x	o	o	o	o	o	x	o	13	230	200	230
15	x	x	o	o	o	o	o	x	x	16	230	x	x
5	x	x	o	o	o	o	o	x	x	24	230	x	x

Layout: o = Available   ;   x = Unavailable

- Voltage under demand:
They can be manufactured at voltages between the maximum and minimum voltage values shown in the chart.

- To feed in alterning current the solenoid will have a rectifier incorporated in the coil.

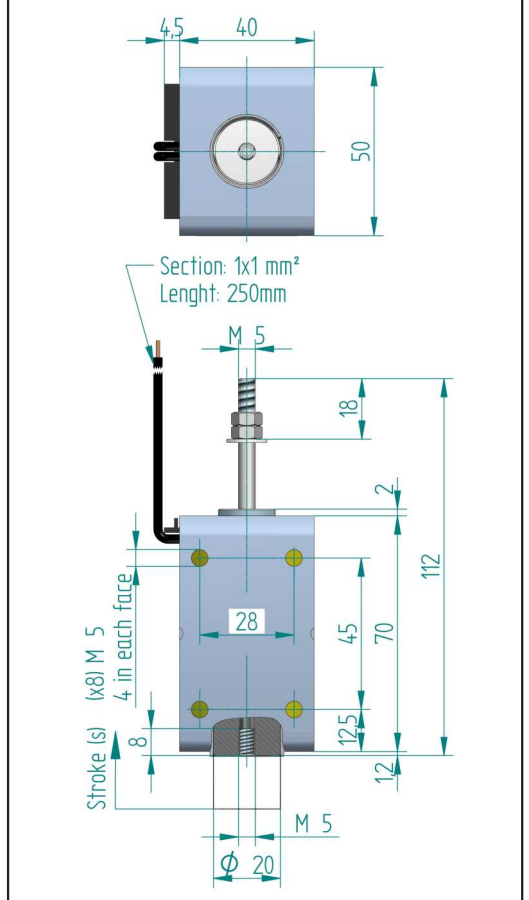- The duty cycles described in the chart are standard, they can be manufactured in any intermediate value.

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

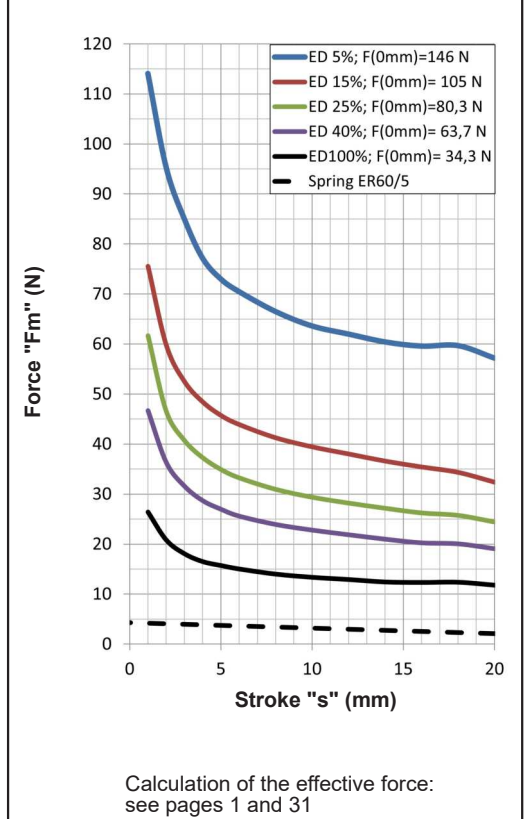- Earthing is recommended if the metallic parts are accessible.

Ordering code:	*ERC60-20/C --V ED---% - Spring*
	Voltage: 24Vdc; Duty cycle: ED100%; With spring: *ERC60-20/C 24Vdc ED100% RS*
	Voltage: 48Vdc; Duty cycle: ED15%; Without spring: *ERC60-20/C 48Vdc ED15% RN*

Spring yes: RS   ;   Spring no: RN

Force-stroke curve

ED 5%; F(0mm)=146 N
ED 15%; F(0mm)= 105 N
ED 25%; F(0mm)=80,3 N
ED 40%; F(0mm)= 63,7 N
ED100%; F(0mm)= 34,3 N
Spring ER60/5

Calculation of the effective force:
see pages 1 and 31

For fixation and mounting positions: see page 31