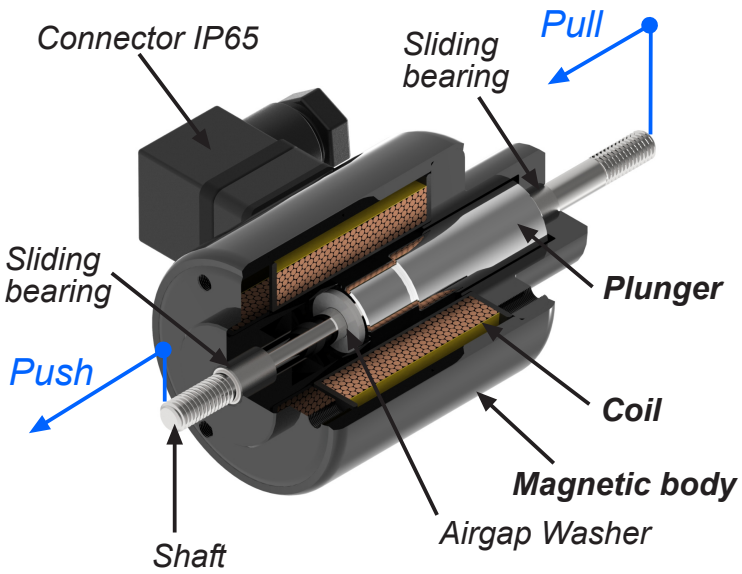
• ECH SERIES

ECH serie electromagnets are simple effect linear solenoids, where the stroke movement from initial to final position is made by the electromagnetic forces, the return to the initial position is made by external forces or by a spring which is incorporated to the solenoid (see specification sheet for each type).



Structure, main basic elements:

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

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**.

• Datasheet values rated 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 nominal one.
Solenoid working in horizontal position.

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

1)When the solenoid pulls upwards:

Effective force = Magnetic force - Plunger weight

2)When the solenoid pulls downwards:

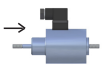
Effective force = Magnetic force + Plunger weight

3)When the solenoid pulls in horizontal position:

Effective force = Magnetic force

1) 

2) 

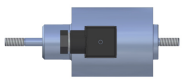
3) 

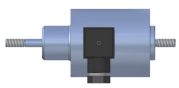
-For the units with return spring incorporated:

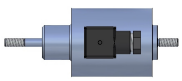
Effective force = Magnetic force -Spring force ± Plunger weight

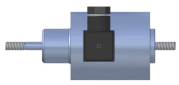
NOTE: When working position 3) sliding bearings abrassion is bigger than working positions 1) and 2)

Disposition of the connector every 90º, available to be changed by the user: under demand the connectors can be replaced by flying leads.

A 

B 

C 

D 

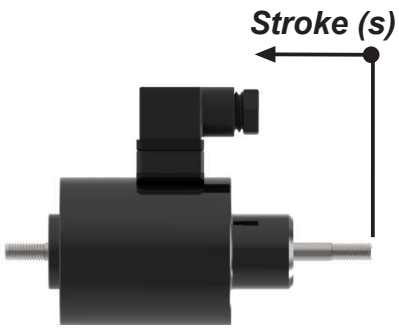
Electrical conection: DIN43650A connector (2 poles + Earth) ; For details see Pages 110 to 117

• ECH series: Force-stroke Chart

Type	Stroke (mm)		Duty-cycle 100%	40%	25%	15%	5%	Return Spring force (N)
ECH40-10	Beginning of stroke s_1=10	Magnetic force "Fm" (N)	9.5	18	23	30	50	2
	End of stroke s_0=0		10.4	16	19.5	27	43	4.4
ECH50-16	Beginning of stroke s_1=16		18.5	30	41	56	92	2.7
	End of stroke s_0=0		44	84	104	133	193	4.4
ECH65-15	Beginning of stroke s_1=15		46	73	91	118	177	5.4
	End of stroke s_0=0		152	199	252	303	385	21.7
ECH75-20	Beginning of stroke s_1=20		57	93	114	150	258	7
	End of stroke s_0=0		159	245	298	363	524	37
ECH90-25	Beginning of stroke s_1=25		85	126	163	205	341	18
	End of stroke s_0=0		265	379	501	578	837	48.5
ECH110-45	Beginning of stroke s_1=45		75	150	165	240	460	
	End of stroke s_0=0		550	730	800	940	1300	
ECH150-40	Beginning of stroke s_1=40		250	480	580	780	1300	
	End of stroke s_0=0		1100	1500	1850	2200	2800	

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)

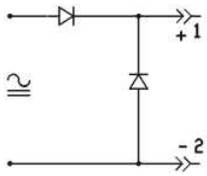
• ECH SERIES

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.

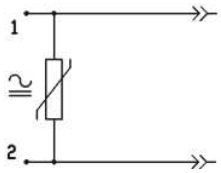
1. ELECTRICAL CUSTOMIZATION:

a) Integrated electronics only in versions with DIN43650A connector:

a.1) For peak suppression
Examples:

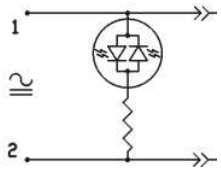


Free wheel diode+second diode to protect the free wheel diode against reverse polarity.

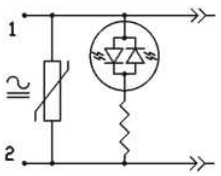


Varistor

a.2) Power display
Examples:

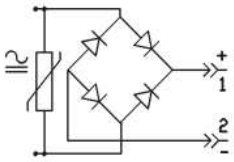


Connector under voltage display by LED

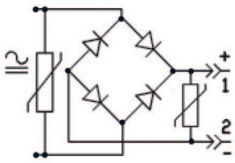


Varistor+LED display

a.3) For rectification
Examples:



4 diodes with varistor at the input



4 diodes with doble varistor.

b) DIN43650A connectors replacement by supply cables

Example1:
ECH40-10 M

Example 2:
ECH50-16 CCB

Example 3:
ECH65-18 P

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 .

2. INSULATION CLASS CUSTOMIZATION:

Depending on the model, insulation class can be increased until H (180ºC), this change is limited to voltages less than 48VDC, this usually involves DIN43650A connectors replacement by cables, cable glands or another type of connectors. For any special requeriment, please ask NAFSA .

3. PROTECTION RATE CUSTOMIZATION IP (EN60529):

Standard models are IP40, but protecting the shaft and its guides IP54 can be obtained.

Example 4:
ECH150-40 F

Example 5:
ECH65-15 F

4. MECHANICAL CUSTOMIZATIÓN

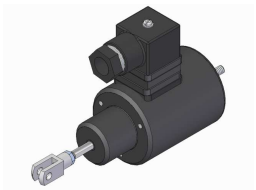
a) Shaft modifications:

Example 6:
ECH75-20E
Modification of ECH75-20, the shaft has been plucked, from ø 12 to ø14, and one of the thread has been removed

b) Stroke modifications:

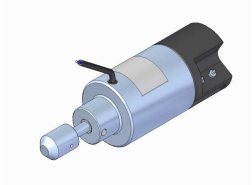
Example 7:
ECH50-20
Modification of ECH50-16, stroke has been increased from 16mm to 20mm

c) Fastening element added as Fork joints DIN71752



Example 8:
ECH50-16+Fork joints
Modification of ECH50-16, DIN71752 fork joint has been added

d) Detection system added



Example 9:
ECH40-10 BD
One lid that includes final position detection microswicht has been added.

• ECH 40-10 TYPE

Protection rate: **IP40**
Insulation class: **B (130ºC)**
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) = 4.4N
Fs(s=10mm) = 2N

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	13	30	45	75	210
(Fm) Solenoid force (N) 1)	9	14	17	23	38
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	117	95	84	79	77
Release time (ms) 3)	70	57	51	48	46
Plunger weight (Kg)	0.047				
Solenoid weight (Kg)	0.416				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	o	o	o	4	250	18	230
40	o	o	o	o	o	o	o	o	o	6	250	43	230
25	x	o	o	o	o	o	o	o	o	9	250	65	230
15	x	o	o	o	o	o	o	o	o	10	250	105	230
5	x	o	o	o	o	o	o	x	x	12	250	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 connector.

- 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.

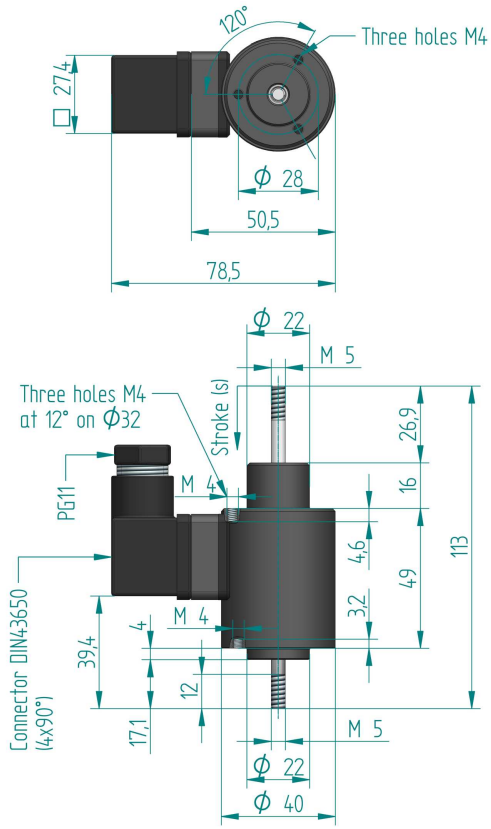
Ordering code: *ECH40-10 --V ED---% - Spring*

Voltage: 24Vdc; Duty cycle: ED100%; With spring:
ECH40-10 24Vdc ED100% RS

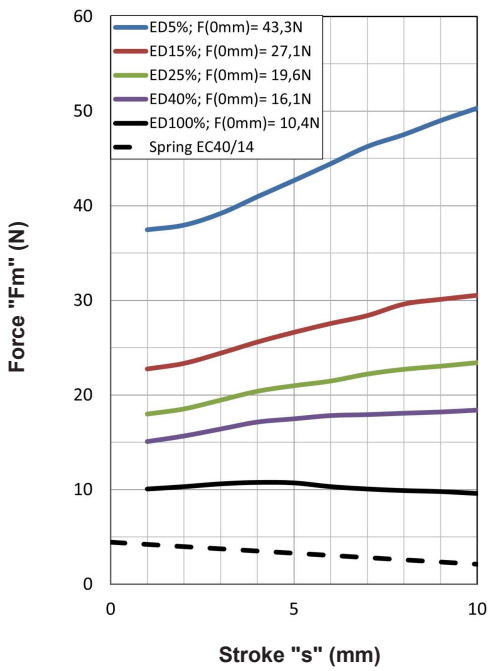
Voltage: 48Vdc; Duty cycle: ED15%; Without spring:
ECH40-10 48Vdc ED15% RN

Spring yes: RS ; Spring no: RN

Solenoid without voltage (s=10mm position)



Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42

• ECH 50-16 TYPE

Protection rate: **IP40**
Insulation class: **B (130ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **16 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) = 4.4N
Fs(s=16mm) = 2.7N

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	19	45	68	120	325
(Fm) Solenoid force (N) 1)	13	18	26	41	72
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	203	160	137	127	116
Release time (ms) 3)	131	106	92	86	80
Plunger weight (Kg)	0.120				
Solenoid weight (Kg)	0.750				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	o	o	o	o	o	o	o	o	o	6	250	25	230
40	x	o	o	o	o	o	o	o	o	10	250	59	230
25	x	o	o	o	o	o	o	o	o	12	250	90	230
15	x	x	o	o	o	o	o	x	o	16	250	156	230
5	x	x	o	o	o	o	o	x	x	24	250	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 connector.

- 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.

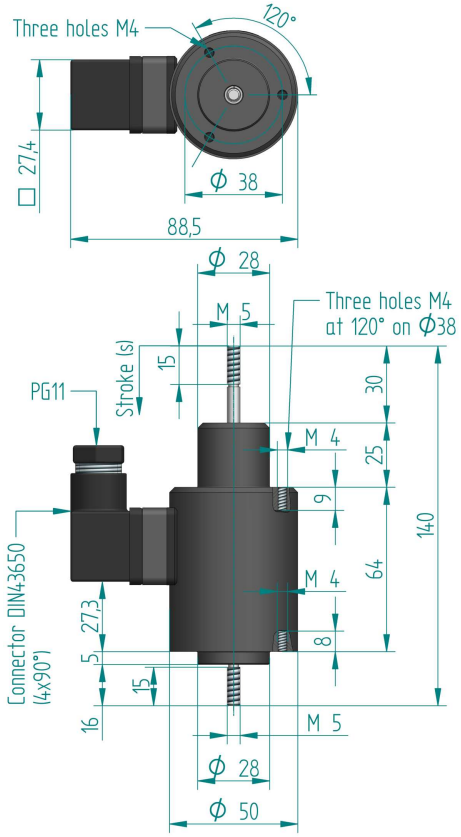
Ordering code: *ECH50-16 --V ED---% - Spring*

Voltage: 24Vdc; Duty cycle: ED100%; With spring:
ECH50-16 24Vdc ED100% RS

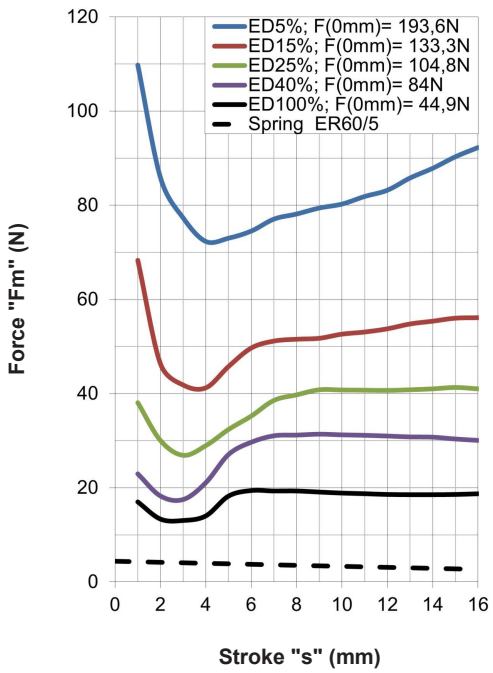
Voltage: 48Vdc; Duty cycle: ED15%; Without spring:
ECH50-16 48Vdc ED15% RN

Spring yes: RS ; Spring no: RN

Solenoid without voltage (s=16mm position)



Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42

• ECH 65-15 TYPE

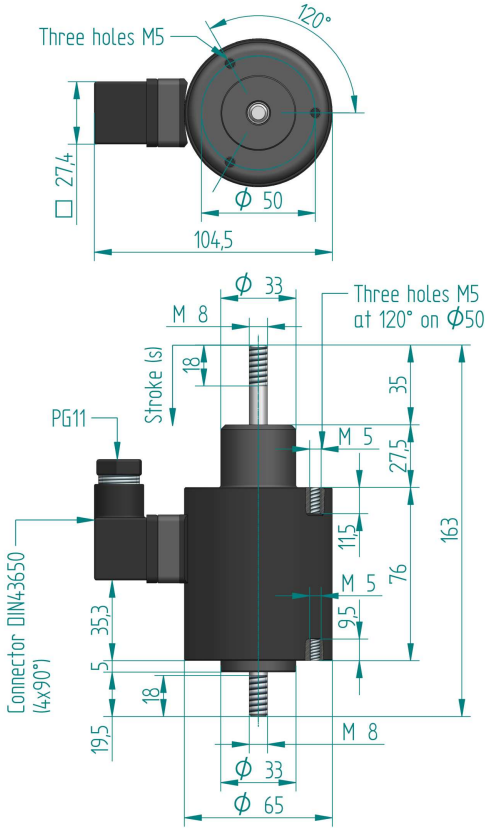
Protection rate: **IP40**
Insulation class: **B (130ºC)**
Reference cycle: **3 minutes**
Standard stroke (s): **15 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

With spring:
•ECH65-15/RS

Optional spring force:
Fs(s=0mm) = 21.7N
Fs(s=15mm) = 5.4N

Release spring NOT incorporated in standard product.

Solenoid without voltage (s=15mm position)



(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	30	75	110	185	545
(Fm) Solenoid force (N) 1)	38	64	80	99	162
Max time under voltage(s)	Inf	72	45	27	9
Opening time (ms) 2)	291	228	198	196	181
Release time (ms) 3)	181	143	125	124	115
Plunger weight (Kg)	0.190				
Solenoid weight (Kg)	1.7				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	o	o	o	o	o	o	o	o	8	250	39	230
40	x	o	o	o	o	o	o	o	o	12	250	98	230
25	x	x	o	o	o	o	o	x	o	15	250	143	230
15	x	x	o	o	o	o	o	x	o	19	250	185	230
5	x	x	o	o	o	o	o	x	x	24	250	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 connector.

- 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.

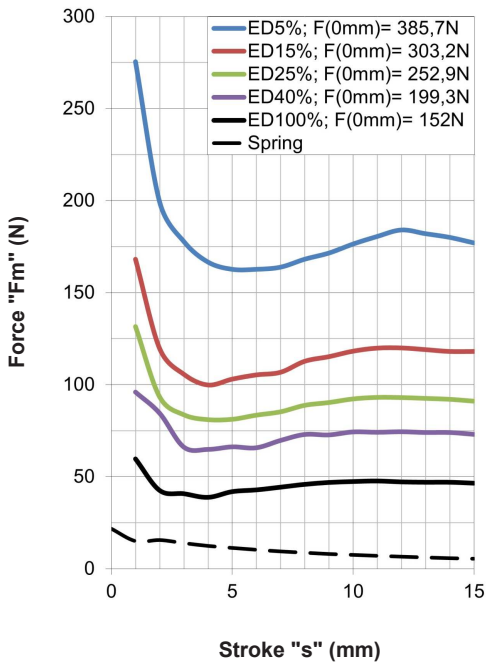
Ordering code: *ECH65-15 --V ED---% - Spring*

Voltage: 24Vdc; Duty cycle: ED100%; With spring:
ECH65-15 24Vdc ED100% RS

Voltage: 48Vdc; Duty cycle: ED15%; Without spring:
ECH65-15 48Vdc ED15% RN

Spring yes: RS ; Spring no: RN

Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42

• ECH 75-20 TYPE

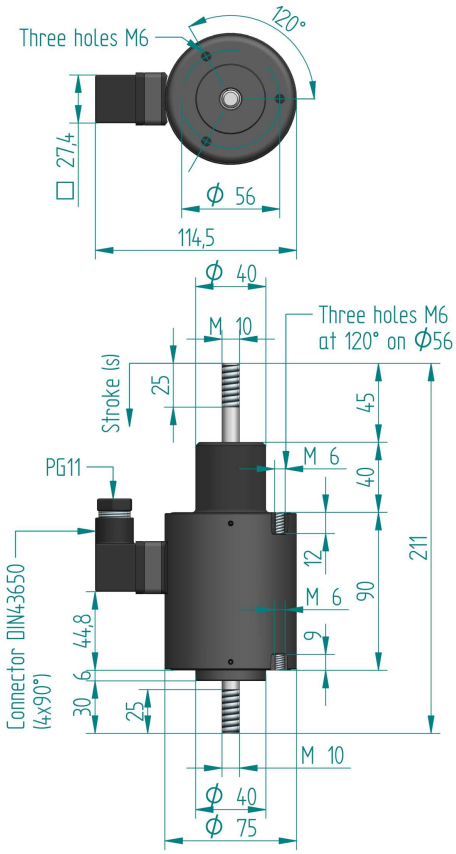
Protection rate: **IP40**
Insulation class: **B (130ºC)**
Reference cycle: **5 minutes**
Standard stroke (s): **20 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

With spring:
•ECH75-20/RS

Optional spring force:
Fs(s=0mm) = 37N
Fs(s=20mm) = 7N

Release spring NOT incorporated in standard product.

Solenoid without voltage (s=20mm position)



(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	48	110	165	265	755
(Fm) Solenoid force (N) 1)	57	93	114	150	258
Max time under voltage(s)	Inf	120	75	45	15
Opening time (ms) 2)	410	352	284	269	241
Release time (ms) 3)	256	222	181	172	156
Plunger weight (Kg)	0.375				
Solenoid weight (Kg)	3				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	o	o	o	o	o	o	o	o	12	250	30	230
40	x	x	o	o	o	o	o	o	o	17	250	70	230
25	x	x	o	o	o	o	o	o	o	21	250	105	230
15	x	x	o	o	o	o	o	x	o	24	250	170	230
5	x	x	x	o	o	o	o	x	x	37	250	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 connector.

- 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.

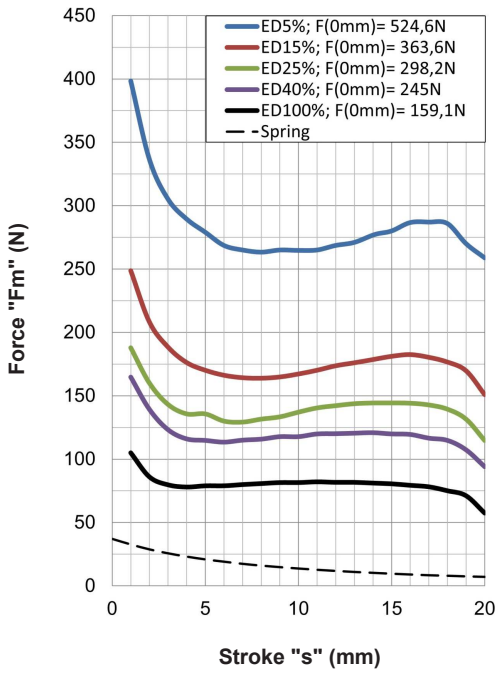
Ordering code: *ECH75-20 --V ED---% - Spring*

Voltage: 24Vdc; Duty cycle: ED100%; With spring:
ECH75-20 24Vdc ED100% RS

Voltage: 48Vdc; Duty cycle: ED15%; Without spring:
ECH75-20 48Vdc ED15% RN

Spring yes: RS ; Spring no: RN

Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42

● ECH 90-25 TYPE

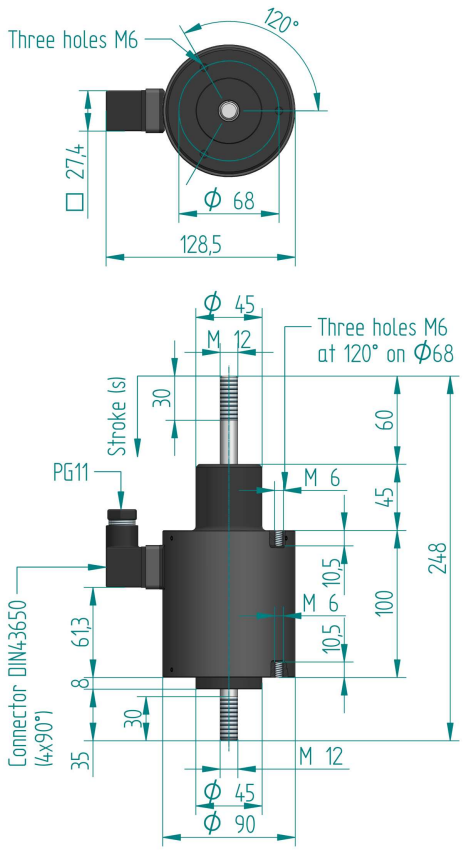
Protection rate: **IP40**
Insulation class: **B (130ºC)**
Reference cycle: **5 minutes**
Standard stroke (s): **25 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

With spring:
● ECH90-25/RS

Optional spring force:
Fs(s=0mm) = 48.5N
Fs(s=25mm) = 18N

Release spring NOT incorporated in standard product.

Solenoid without voltage (s=25mm position)



(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	55	125	190	300	900
(Fm) Solenoid force (N) 1)	72	110	150	190	300
Max time under voltage(s)	Inf	120	75	45	15
Opening time (ms) 2)	651	488	417	332	307
Release time (ms) 3)	399	301	259	208	193
Plunger weight (Kg)	0.650				
Solenoid weight (Kg)	5.2				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	o	o	o	o	o	o	o	o	12	250	28	230
40	x	x	o	o	o	o	o	o	o	18	250	60	230
25	x	x	o	o	o	o	o	o	o	22	250	95	230
15	x	x	o	o	o	o	o	x	o	24	250	150	230
5	x	x	o	o	o	o	o	x	x	24	250	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 connector.

- 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.

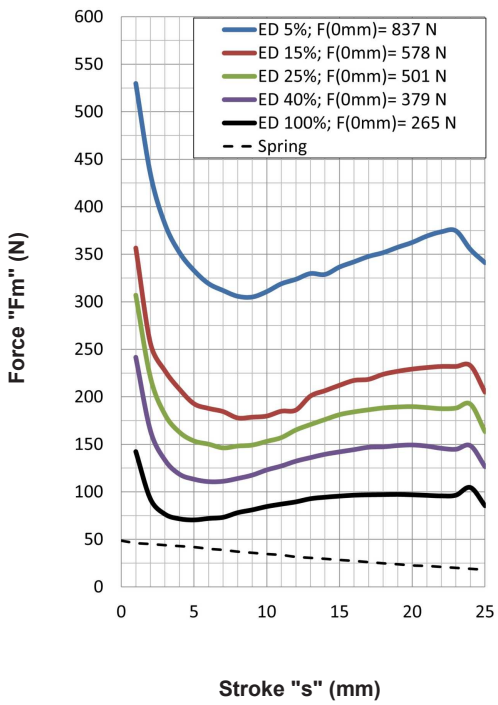
Ordering code: *ECH90-25 --V ED---% - Spring*

Voltage: 24Vdc; Duty cycle: ED100%; With spring:
ECH90-25 24Vdc ED100% RS

Voltage: 48Vdc; Duty cycle: ED15%; Without spring:
ECH90-25 48Vdc ED15% RN

Spring yes: RS ; Spring no: RN

Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42

• ECH 110-45 TYPE

Protection rate: **IP40**
Insulation class: **B (130ºC)**
Reference cycle: **5 minutes**
Standard stroke (s): **45 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring NOT incorporated in standard product.

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	76	175	260	420	1260
(Fm) Solenoid force (N) 1)	75	150	165	240	460
Max time under voltage(s)	Inf	120	75	45	15
Opening time (ms) 2)	784	592	517	504	456
Release time (ms) 3)	485	371	326	318	290
Plunger weight (Kg)	1.1				
Solenoid weight (Kg)	7.3				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	o	o	o	o	o	o	o	o	12	250	45	230
40	x	x	o	o	o	o	o	o	o	19	250	105	230
25	x	x	o	o	o	o	o	x	o	23	250	155	230
15	x	x	x	o	o	o	o	x	o	29	250	230	230
5	x	x	x	o	o	o	o	x	x	48	250	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 connector.

- 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.

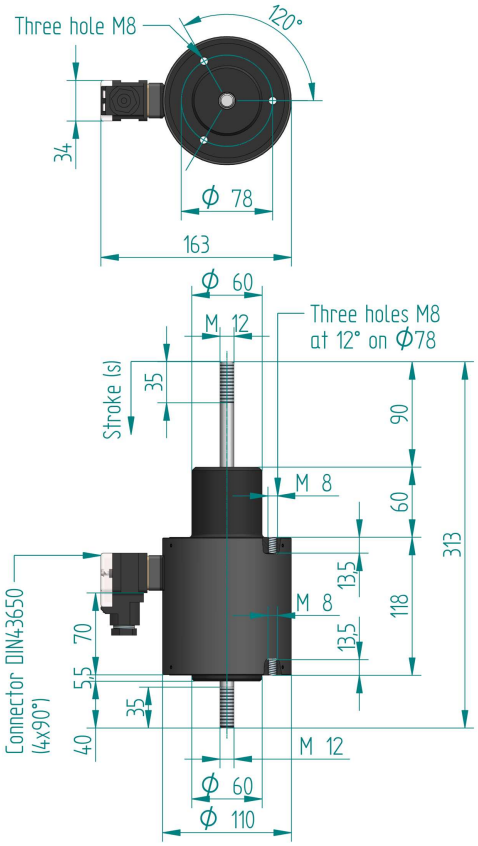
- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ECH110-45 --V ED---%*

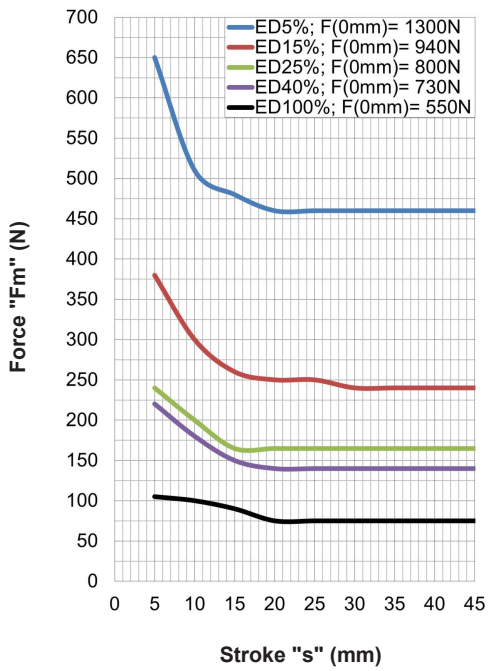
Voltage: 24Vdc; Duty cycle: ED100%;
ECH110-45 24Vdc ED100%

Voltage: 48Vdc; Duty cycle: ED15%;
ECH110-45 48Vdc ED15%

Solenoid without voltage (s=45mm position)



Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42

• ECH 150-40 TYPE

Protection rate: **IP40**
Insulation class: **B (130ºC)**
Reference cycle: **5 minutes**
Standard stroke (s): **40 mm**
Temperature rise "ΔV_{31}": **70ºC**
Working temperature: **-10 to 45ºC**
Work: **Push / Pull**

Release spring NOT incorporated in standard product.

(ED) Duty-cycle ED(%)	100	40	25	15	5
(P20) Power at 20ºC (W)	120	290	460	750	2200
(Fm) Solenoid force (N) 1)	250	480	580	780	1300
Max time under voltage(s)	Inf	120	75	45	15
Opening time (ms) 2)	1272	985	877	829	773
Release time (ms) 3)	781	610	545	517	484
Plunger weight (Kg)	4.6				
Solenoid weight (Kg)	21				

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 ED%	Standard voltages									Under demand			
	VDC							VAC		VDC		VAC	
	6	12	24	48	100	125	205	110	230	Min	Max	Min	Max
100	x	x	o	o	o	o	o	o	o	20	250	72	230
40	x	x	x	o	o	o	o	x	o	29	250	175	230
25	x	x	x	o	o	o	o	x	o	36	250	230	230
15	x	x	x	o	o	o	o	x	x	46	250	x	x
5	x	x	x	x	o	o	o	x	x	80	250	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 connector.

- 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.

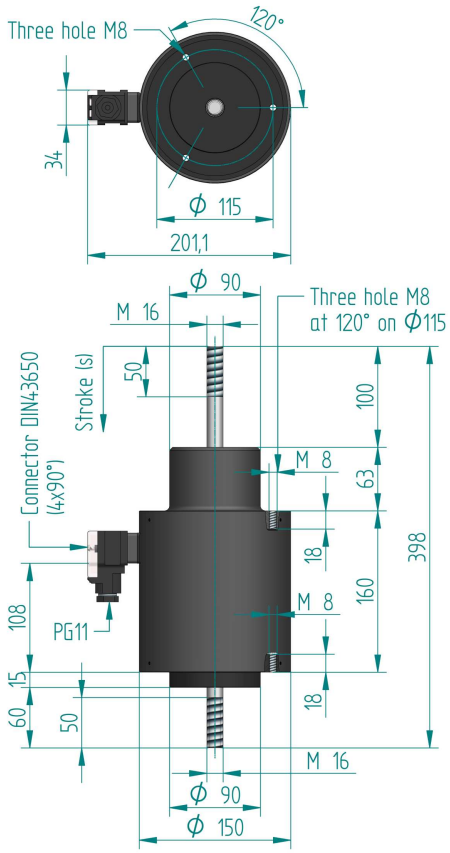
- Earthing is recommended if the metallic parts are accessible.

Ordering code: *ECH110-45 --V ED---%*

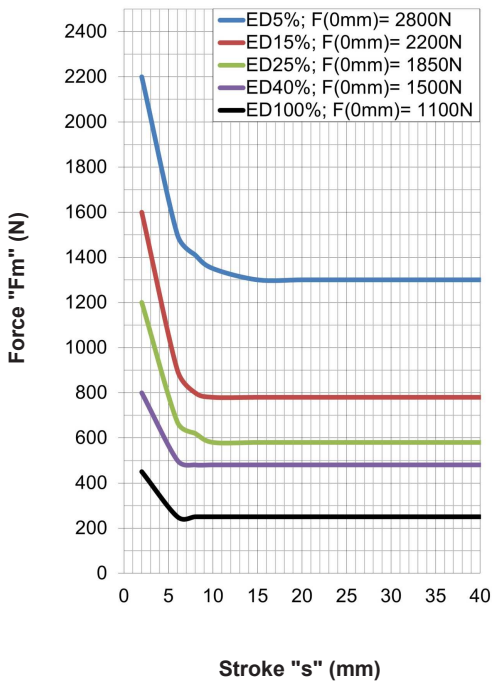
Voltage: 24Vdc; Duty cycle: ED100%;
ECH110-45 24Vdc ED100%

Voltage: 48Vdc; Duty cycle: ED15%;
ECH110-45 48Vdc ED15%

Solenoid without voltage (s=40mm position)



Force-stroke curve



Calculation of the effective force:
see pages 1 and 42

For fixation and mounting positions: see page 42