Open Frame Solenoids

OPEN FRAME SOLENOIDS

1. Design and Features

The open frame solenoid is the simplest form of construction of all the types of solenoids manufactured, and is shown in Fig. 1. Though the design is simple in construction, obtaining maximum performance requires the use of high permeable steel, and good quality manufacturing technology to assure the minimizing of air gaps in the metal frame assembly. Additionally, high quality coil winding techniques are used to maximize the number of coil windings that are housed in the allowable space.

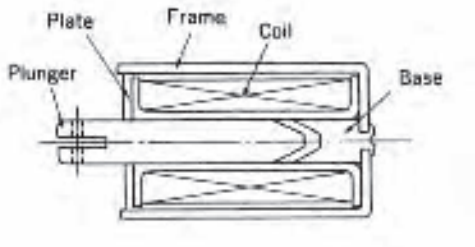


Fig. 1

2. Stroke and Force

The open frame solenoid is designed for long strokes. As such, the pole piece designs are conical to maximize performance over longer strokes. To improve efficiency, the solenoid stroke should be minimized in the application.

3. Operational Considerations

A) Temperature

The coil data for the open frame solenoids shows the values at ambient temperature 20° C and with a standard heat sink. If a solenoid is used at a rating shown in the coil data, it is designed so that the coil temperature rises and reaches equilibrium at approximately 65° C. In applications where the ambient temperature is higher than 40° C, possible thermal damage can occur. Temperature rise tests should be performed by the customer to assure that the coil does not reach 105° C. Coils can be constructed to operate at temperatures higher than 105° C without thermal damage. Please consult the factory for details.

B) Return Spring

The open frame solenoid does not include a return spring. Therefore, the application must include a return spring.

C) Plunger and Shaft Modifications

It is not recommended that customer modify the plunger or shaft, as the shafts are manufactured and plated at the factory. Any special configurations can be supplied. Please consult the factory for details.

D) Installation of Solenoid

The open frame solenoid uses tapped holes for mounting in the frame.

Caution needs to be observed that the mounting screws used to attach these solenoids are the correct length so as not to damage the coil.

4. General Characteristics

Insulation class	Class A (105° C) Lead wire class A (105° C)
Dielectric strength	AC 1000V 50/60 Hz 1 min. (at normal temperature and normal humidity)
Insulation resistance	More than 100 Mohm at DC 500V megger (at normal temperature and normal humidity)
Expected life	300,000 cycles

(Solenoid cycle life is very dependent upon side load, frequency of use, and environmental conditions. Cycle life tests should be performed by the customer.)

5. How to Select a Solenoid

Before selecting an open frame solenoid, the following information must be determined :

A) Force

The actual force required in the application should be increased using a safety factor multiplier of 1.3 to arrive at the force value that should be used in your specification.

B) Duty Cycle

Use the aforementioned formula to calculate duty cycle. Also note the maximum on time. (See page2)

C) Stroke

Stroke is determined by application requirements.

D) Operating Voltage
Operating DC voltage is determined by the application and voltage available.

After determining these specifications, one can find the correct size solerioid for the application, using the force-stroke characteristic tables and graphs. The coil data is also shown for different sizes of magnet wire. If the exact operating voltages is not in the coil data table, please consult the factory for details.
To determine the force output of the solenoid after temperature rise, please use the amp-turn force graphs (page 100) after calculating the amp-turns.

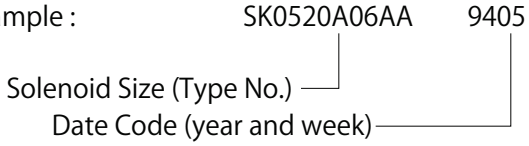
6. Ordering Information

- When ordering an open frame solenoid, the correct part number needs to be determined, from the catalog information,
- Example of a complete part number :
  SK0520A06AA

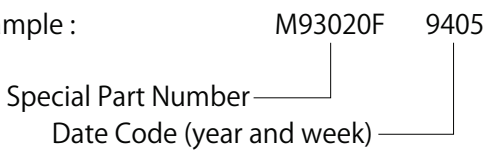
7. Labeling

For open frame solenoids the part number labeling is as follows :

A) Standard Solenoid (no modifications).
The solenoid label will have the part number and the date code (which identifies the year and week of manufacture).

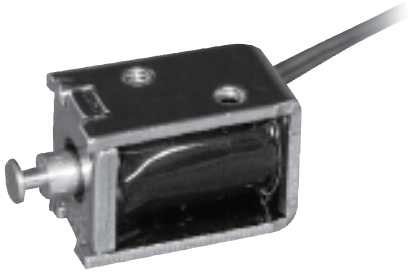


B) Special Configuration (required for any modification to a standard design)
Any change from the standard catalog design requires that a custom part number be assigned, which will also include the date code of manufacture.

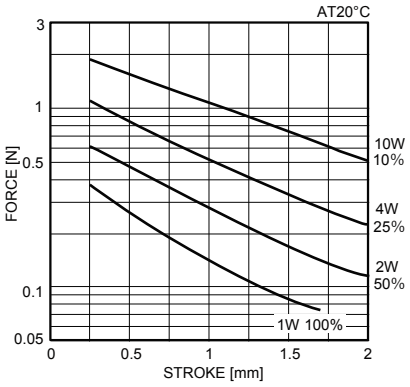


SK0315A OPEN FRAME SOLENOID

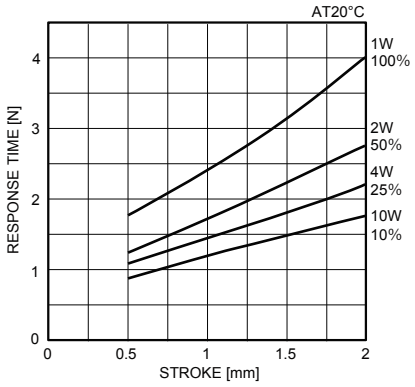
UNIT : mm
SHOWN ENERGIZED



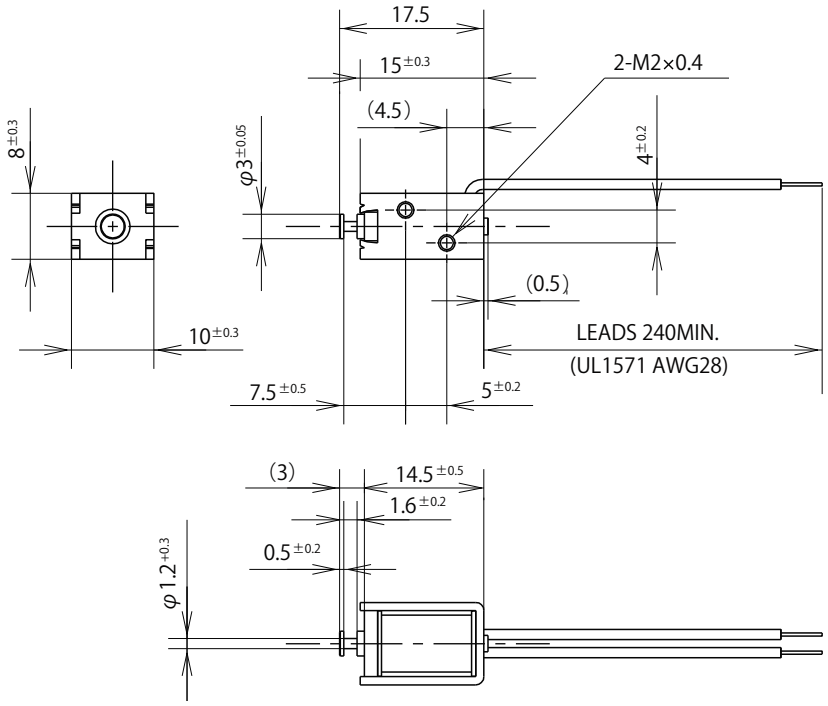
WEIGHT : 5g
PLUNGER: 1g



STROKE-FORCE



STROKE-RESPONSE TIME

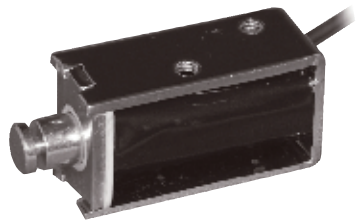


FRAME THK. 1.0mm POSSIBLE EXTRUSION:LESS THAN 0.3mm

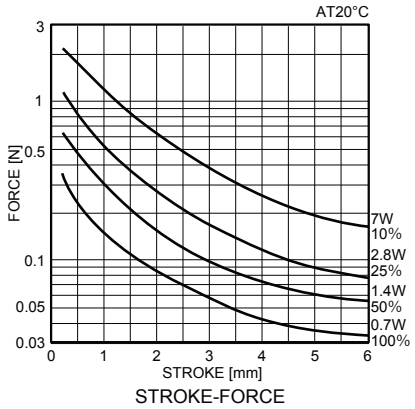
COIL DATA

without heat sink

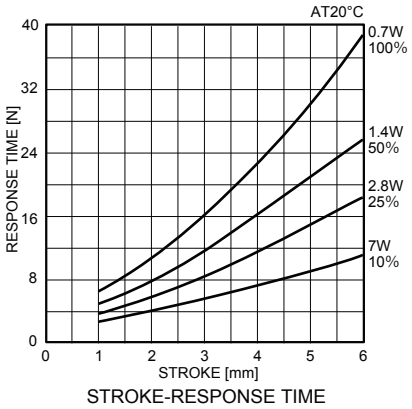
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	50	18	2
	watts at 20℃		1.0	2.0	4.0	10.0
	ampere-turns at 20℃		140	198	280	442
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0315A06AA	36	920	6	8.5	12	19
SK0315A12AA	144	1750	12	17	24	38
SK0315A24AA	576	3370	24	34	48	76
SK0315A48AA	2304	6700	48	68	96	152



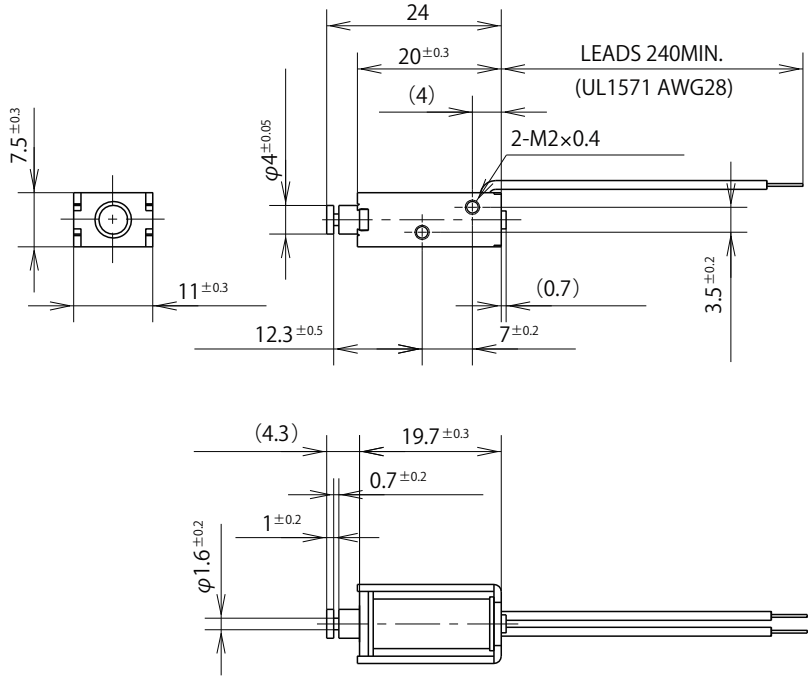
WEIGHT : 8g
PLUNGER: 2g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 1.0mm POSSIBLE EXTRUSION:LESS THAN 0.3mm

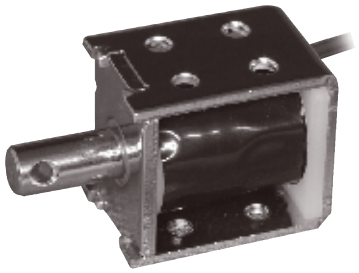
COIL DATA

without heat sink

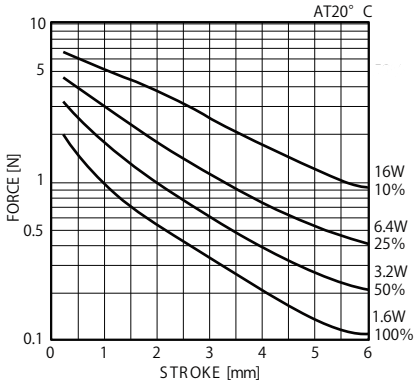
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	50	18	2
	watts at 20℃		0.7	1.4	2.8	7.0
	ampere-turns at 20℃		119	168	238	376
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0420F06AA	51	1100	6	8.5	12	19
SK0420F12AA	205	2120	12	17	24	38
SK0420F24AA	823	4100	24	34	48	76
SK0420F48AA	3291	8100	48	68	96	152

SK0520A OPEN FRAME SOLENOID

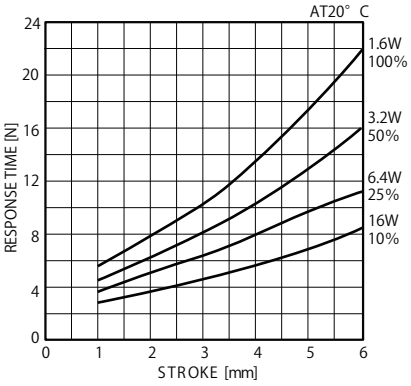
UNIT : mm
SHOWN ENERGIZED



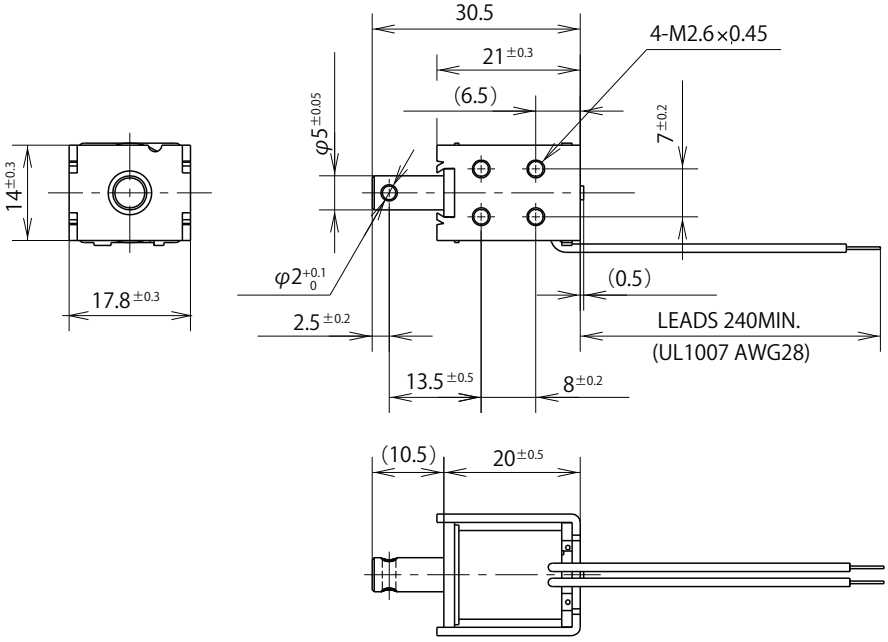
WEIGHT : 22g
PLUNGER: 4g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 1.2mm POSSIBLE EXTRUSION:LESS THAN 0.3mm

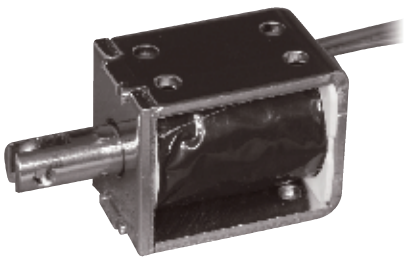
COIL DATA

without heat sink

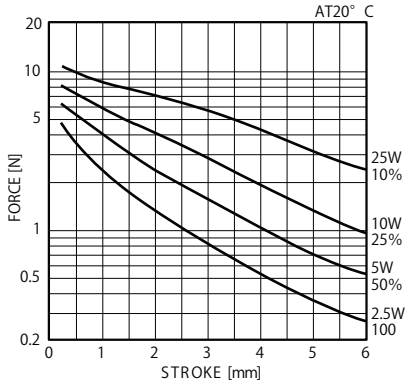
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	55	19	3
	watts at 20℃		1.6	3.2	6.4	16.0
	ampere-turns at 20℃		300	424	600	948
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0520A06AA	23	1150	6	8.5	12	19
SK0520A12AA	90	2290	12	17	24	38
SK0520A24AA	360	4500	24	34	48	76
SK0520A48AA	1440	8600	48	68	96	152

SK0626A OPEN FRAME SOLENOID

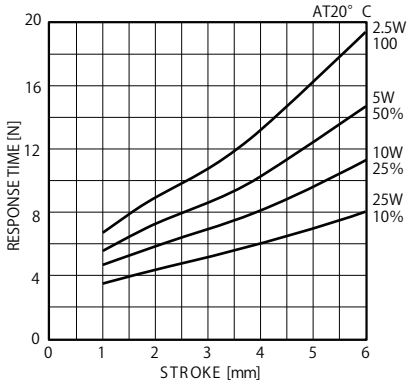
UNIT : mm
SHOWN ENERGIZED



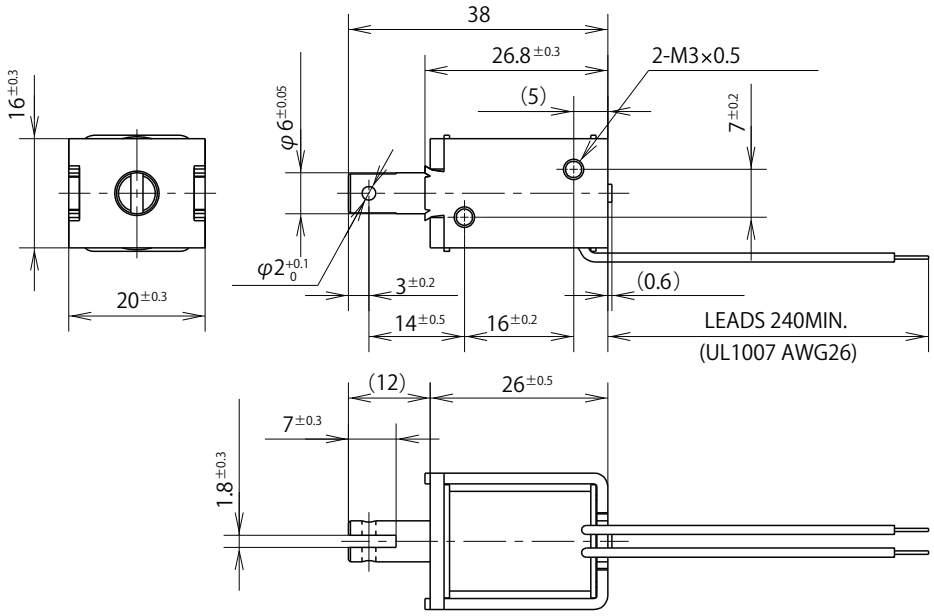
WEIGHT : 43g
PLUNGER: 7g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 1.6mm POSSIBLE EXTRUSION:LESS THAN 0.5mm

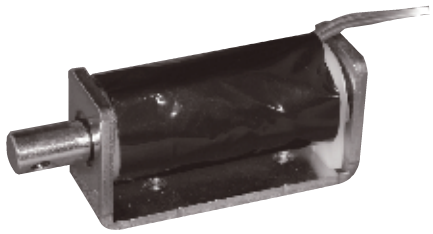
COIL DATA

without heat sink

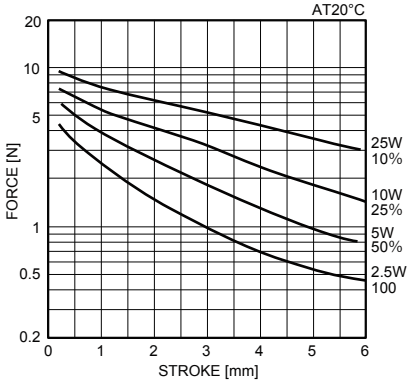
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		2.5	5.0	10.0	25.0
	ampere-turns at 20℃		428	605	856	1353
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0626A06AA	14	1090	6	8.5	12	19
SK0626A12AA	58	2090	12	17	24	38
SK0626A24AA	230	4110	24	34	48	76
SK0626A48AA	922	8200	48	68	96	152

SK0640C OPEN FRAME SOLENOID

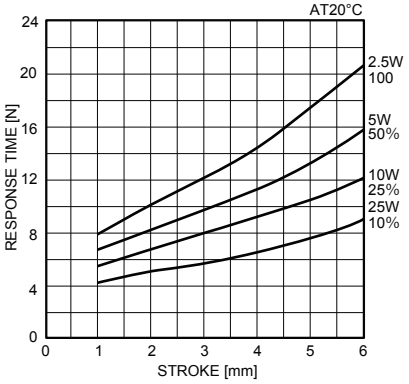
UNIT : mm
SHOWN ENERGIZED



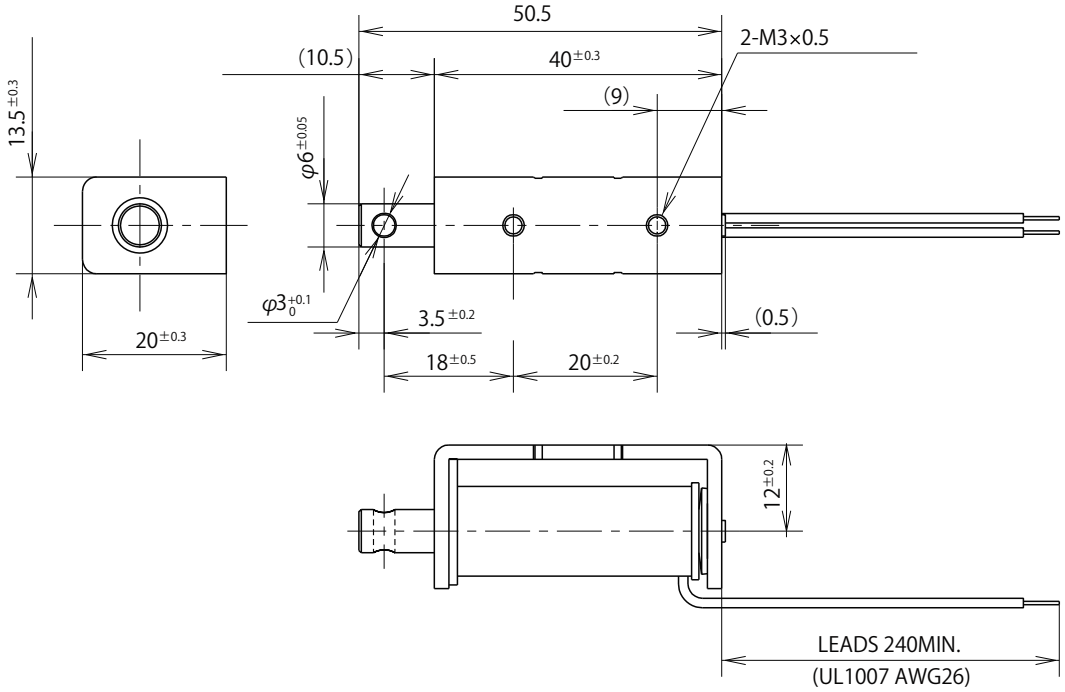
WEIGHT : 48g
PLUNGER: 9g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 2.0mm POSSIBLE EXTRUSION:LESS THAN 1.0mm

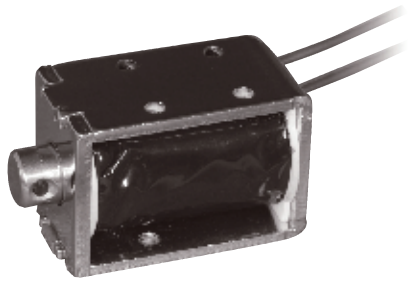
COIL DATA

without heat sink

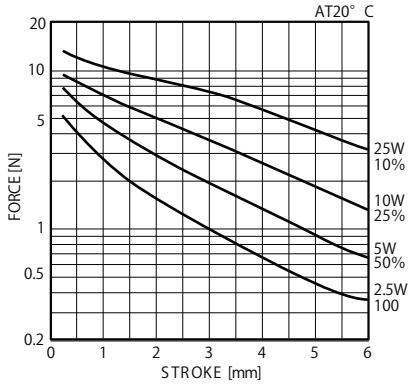
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		2.5	5.0	10.0	25.0
	ampere-turns at 20℃		504	712	1008	1593
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0640C06AA	14	1185	6	8.5	12	19
SK0640C12AA	58	2480	12	17	24	38
SK0640C24AA	230	4830	24	34	48	76
SK0640C48AA	922	9460	48	68	96	152

SK0730A OPEN FRAME SOLENOID

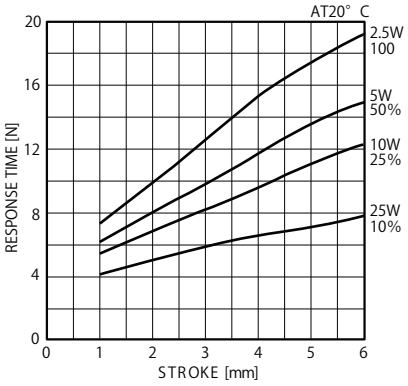
UNIT : mm
SHOWN ENERGIZED



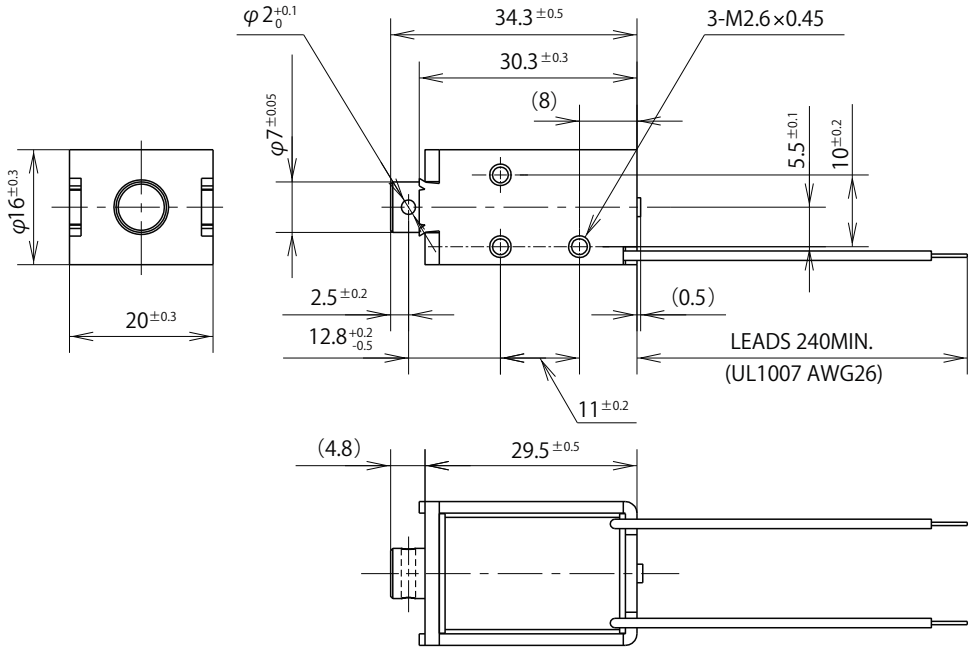
WEIGHT : 48g
PLUNGER: 8g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 1.6mm POSSIBLE EXTRUSION:LESS THAN 0.5mm

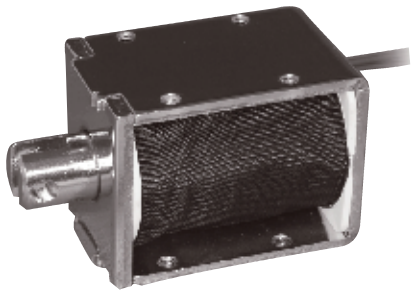
COIL DATA

without heat sink

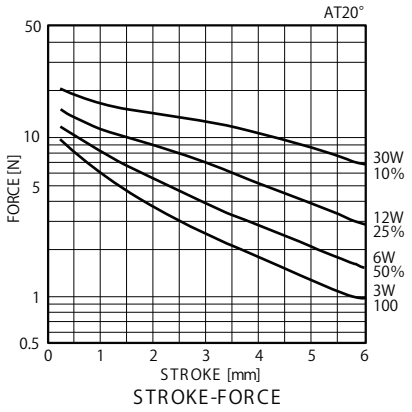
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		2.5	5.0	10.0	25.0
	ampere-turns at 20℃		389	550	778	1230
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0730C06AA	14	990	6	8.5	12	19
SK0730C12AA	58	1925	12	17	24	38
SK0730C24AA	230	3730	24	34	48	76
SK0730C48AA	922	7300	48	68	96	152

SK0832A OPEN FRAME SOLENOID

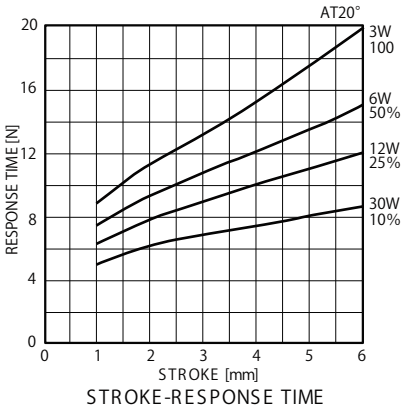
UNIT : mm
SHOWN ENERGIZED



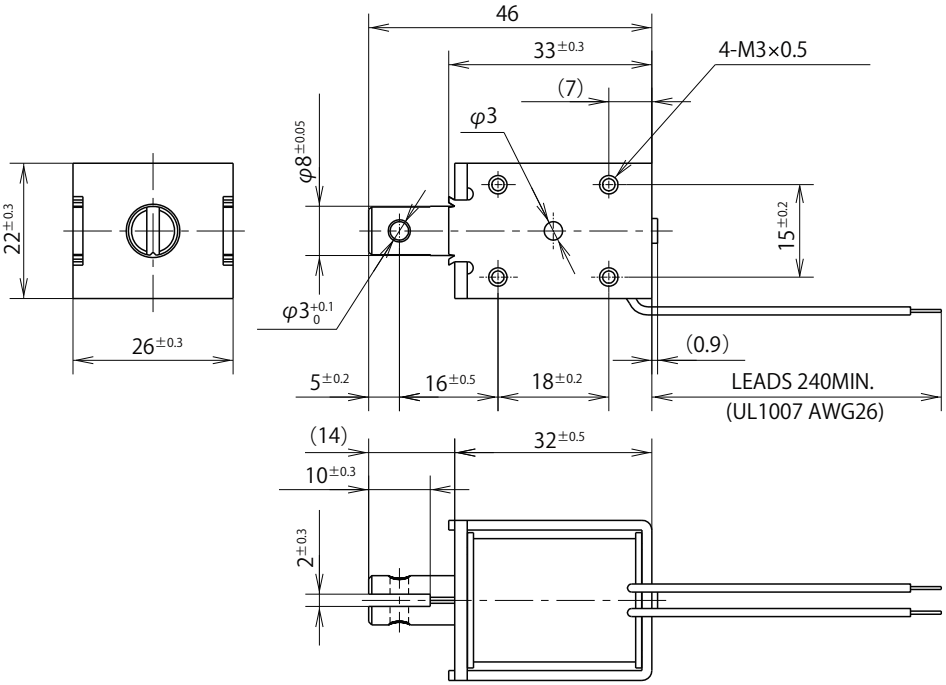
WEIGHT : 82g
PLUNGER: 14g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 1.6mm POSSIBLE EXTRUSION:LESS THAN 0.5mm

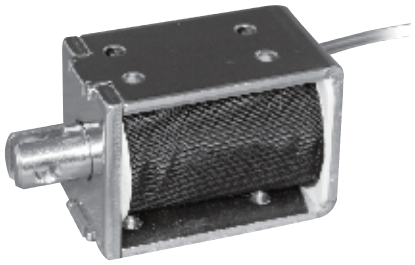
COIL DATA

without heat sink

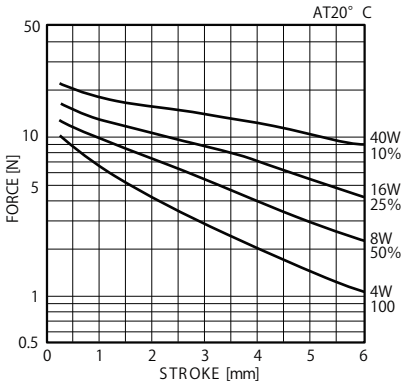
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		3.0	6.0	12.0	30.0
	ampere-turns at 20℃		571	807	1142	1805
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0832A06AA	12	1150	6	8.5	12	19
SK0832A12AA	46	2300	12	17	24	38
SK0832A24AA	186	4430	24	34	48	76
SK0832A48AA	743	8410	48	68	96	152

SK0836W OPEN FRAME SOLENOID

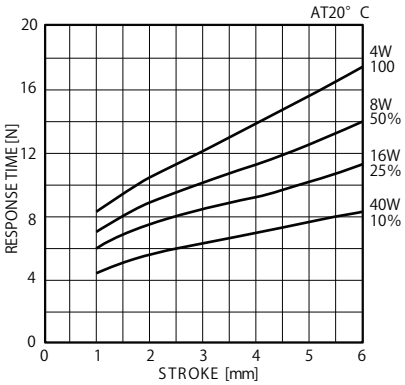
UNIT : mm
SHOWN ENERGIZED



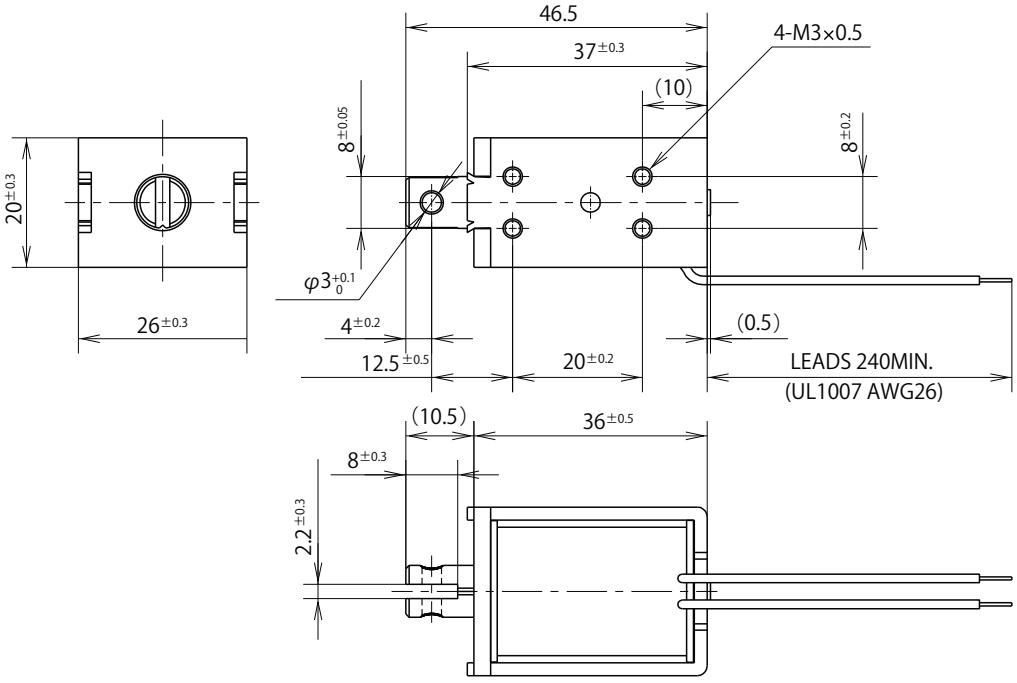
WEIGHT : 100g
PLUNGER: 14g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 2.0mm POSSIBLE EXTRUSION:LESS THAN 0.5mm

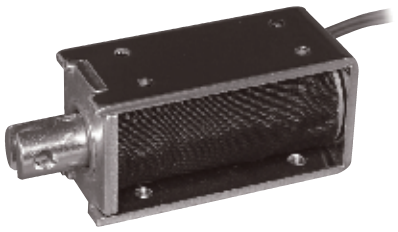
COIL DATA

without heat sink

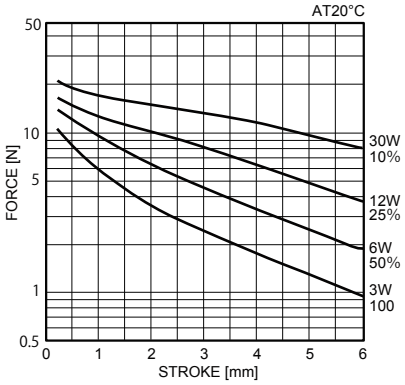
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		4.0	8.0	16.0	40.0
	ampere-turns at 20℃		666	941	1332	2106
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0836W06AA	9	1000	6	8.5	12	19
SK0836W12AA	36	2000	12	17	24	38
SK0836W24AA	144	4000	24	34	48	76
SK0836W48AA	576	7540	48	68	96	152

SK0946A OPEN FRAME SOLENOID

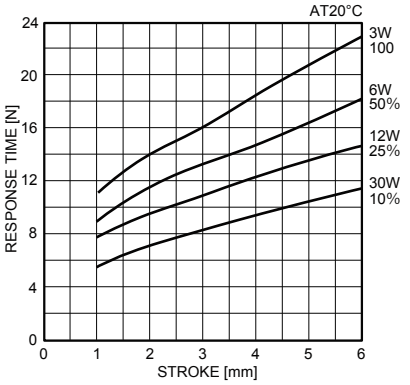
UNIT : mm
SHOWN ENERGIZED



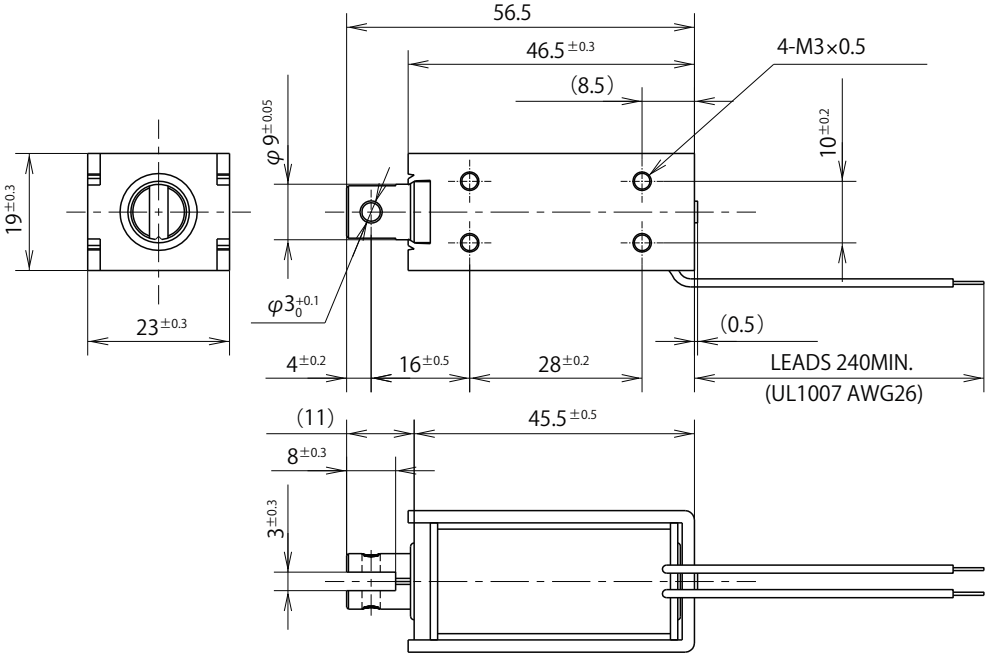
WEIGHT : 96g
PLUNGER: 20g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 1.6mm POSSIBLE EXTRUSION:LESS THAN 0.8mm

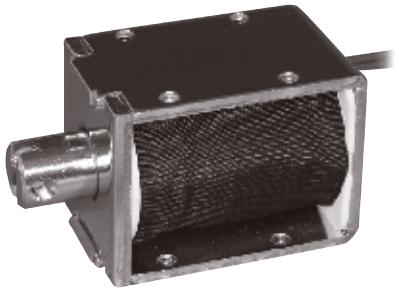
COIL DATA

without heat sink

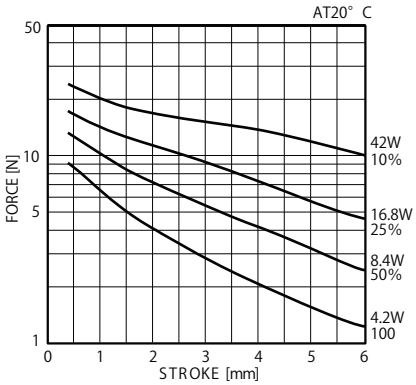
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		3.0	6.0	12.0	30.0
	ampere-turns at 20℃		585	827	1170	1849
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK0946A06AA	12	1120	6	8.5	12	19
SK0946A12AA	48	2320	12	17	24	38
SK0946A24AA	192	4680	24	34	48	76
SK0946A48AA	768	9000	48	68	96	152

SK1040A OPEN FRAME SOLENOID

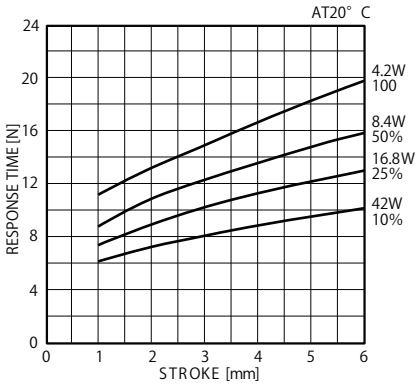
UNIT : mm
SHOWN ENERGIZED



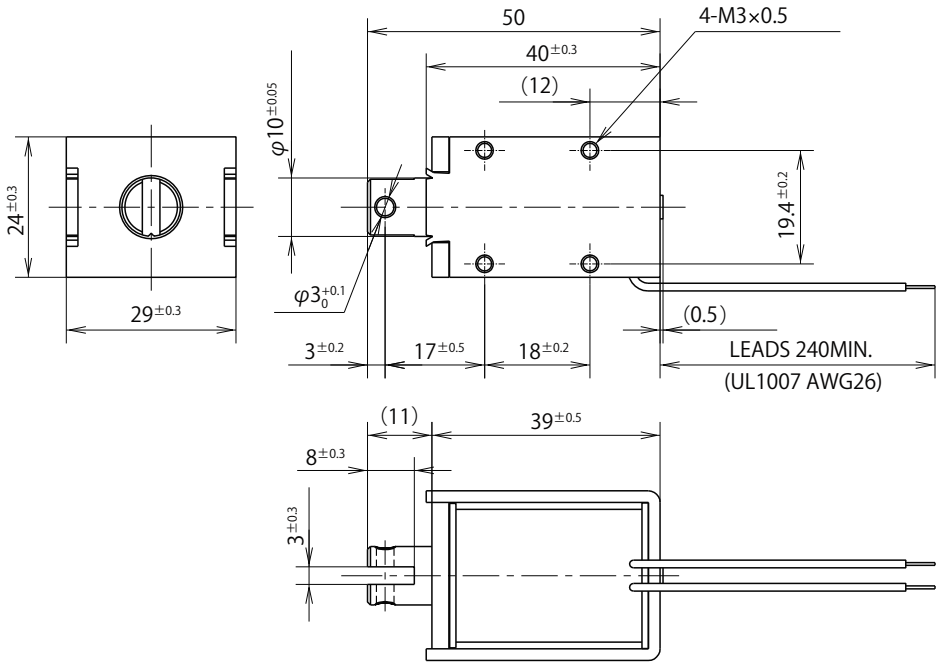
WEIGHT : 136g
PLUNGER: 23g



STROKE-FORCE



STROKE-RESPONSE TIME



FRAME THK. 2.0mm POSSIBLE EXTRUSION:LESS THAN 1.0mm

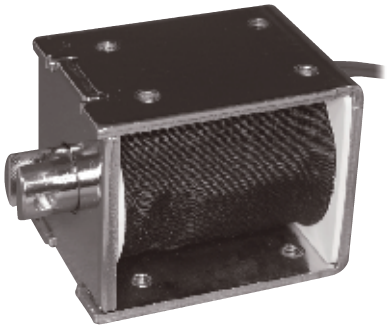
COIL DATA

without heat sink

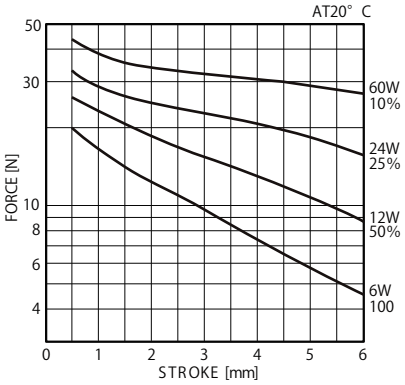
	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	100	36	7
	watts at 20℃		4.2	8.4	16.8	42.0
	ampere-turns at 20℃		635	898	1270	2008
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK1040A06AA	9	1020	6	8.5	12	19
SK1040A12AA	34	2000	12	17	24	38
SK1040A24AA	137	3625	24	34	48	76
SK1040A48AA	549	7420	48	68	96	152

SK1250W OPEN FRAME SOLENOID

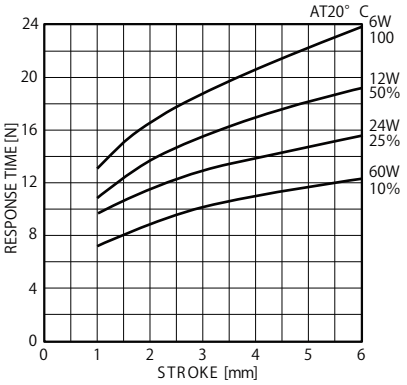
UNIT : mm
SHOWN ENERGIZED



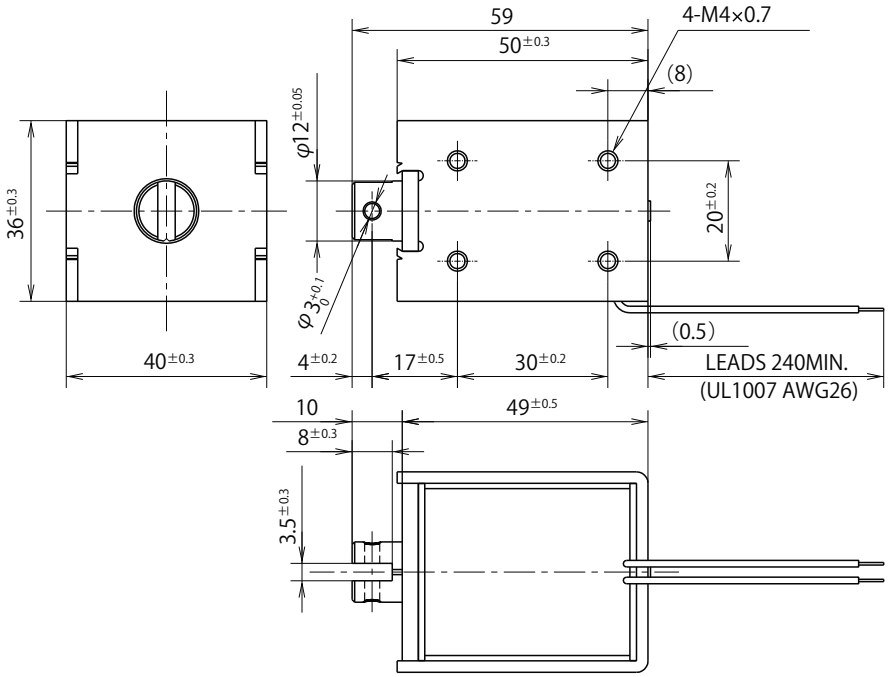
WEIGHT : 362g
PLUNGER: 40g



STROKE-FORCE



STROKE-RESPONSE TIME



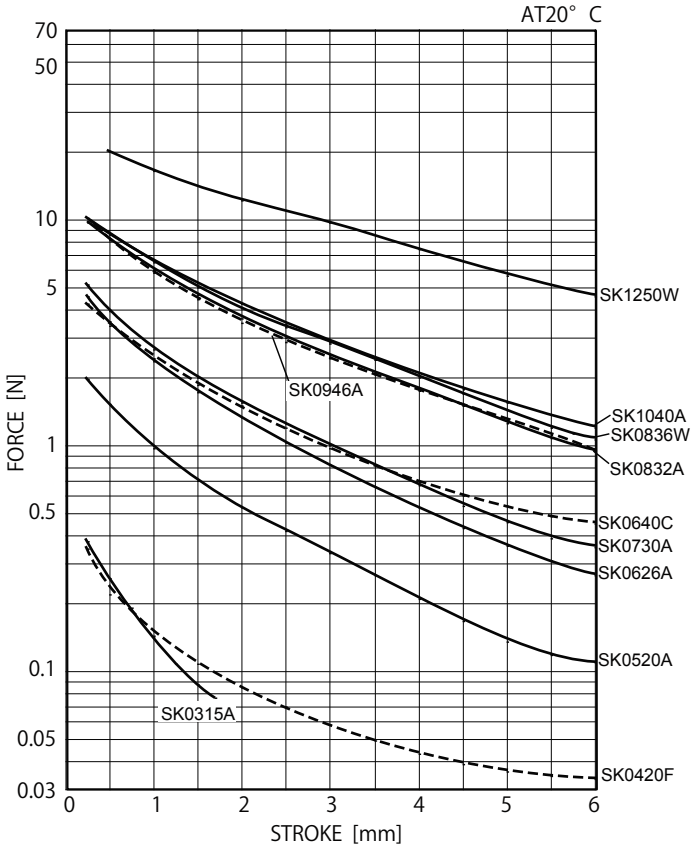
FRAME THK. 2.3mm POSSIBLE EXTRUSION:LESS THAN 1.0mm

COIL DATA

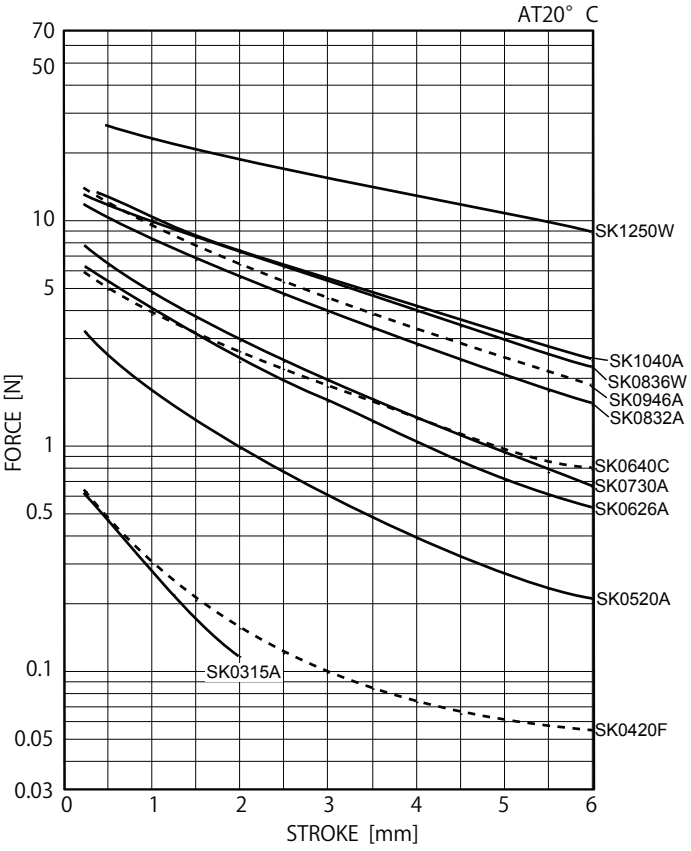
without heat sink

	duty cycle = "on" time / ("on" time + "off" time) ×100%		100% continuous	50% or less	25% or less	10% or less
	MAX. "on" time in seconds		∞	140	50	9
	watts at 20℃		6.0	12.0	24.0	60.0
	ampere-turns at 20℃		1150	1626	2300	3636
type no.	resistance Ω±10%(at 20°C)	no. turns	volts DC			
SK1250W06AA	6	1100	6	8.5	12	19
SK1250W12AA	24	2370	12	17	24	38
SK1250W24AA	96	4600	24	34	48	76
SK1250W48AA	384	8640	48	68	96	152

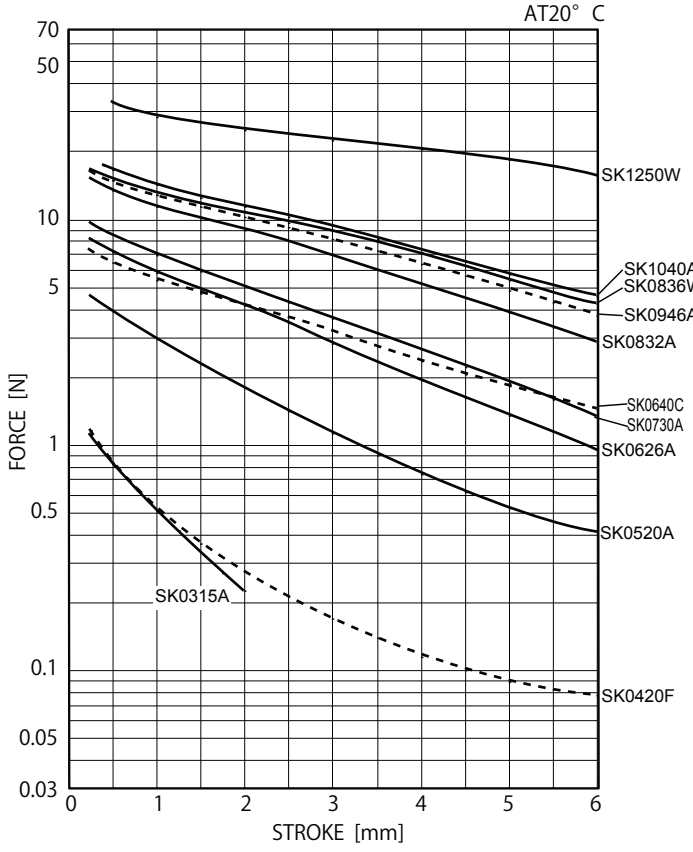
CHARACTERISTICS TABLES FOR OPEN FRAME SOLENOID



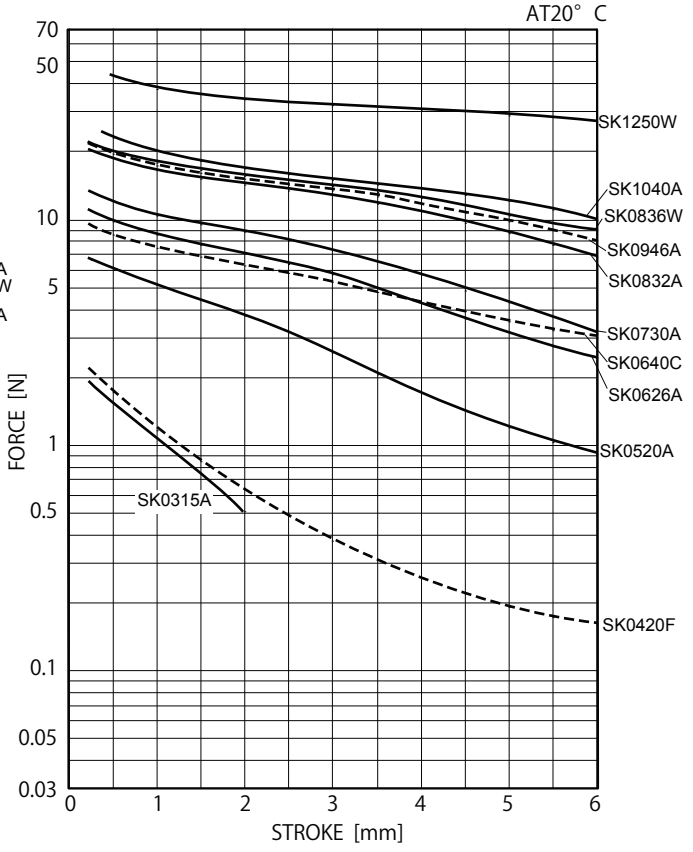
DUTY CYCLE100%



DUTY CYCLE 50%



DUTY CYCLE 25%

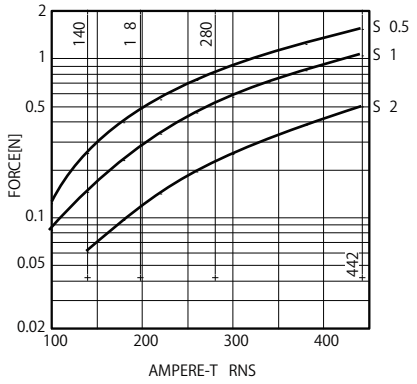


DUTY CYCLE 10%

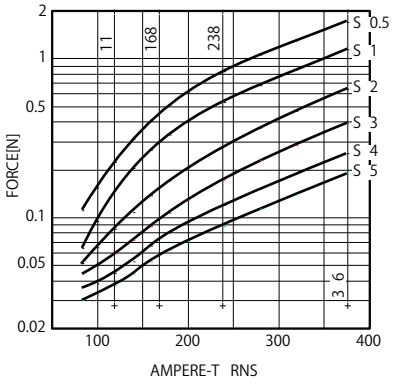
OPEN FRAME SOLENOID AMPERE-TURN V.S. FORCE

PERFORMANCE CURVES ARE AT 20˚C

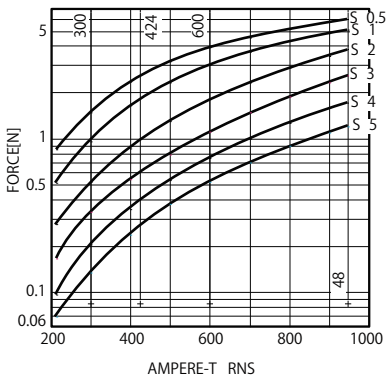
SK0315A



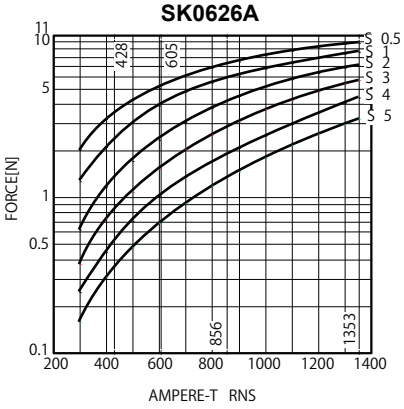
SK0420F



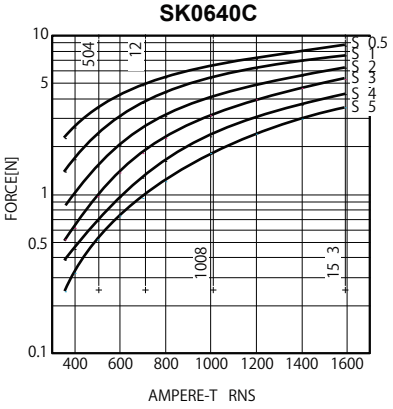
SK0520A



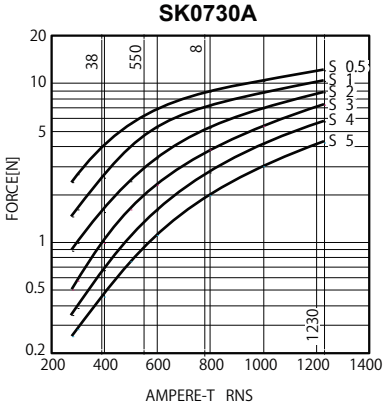
SK0626A



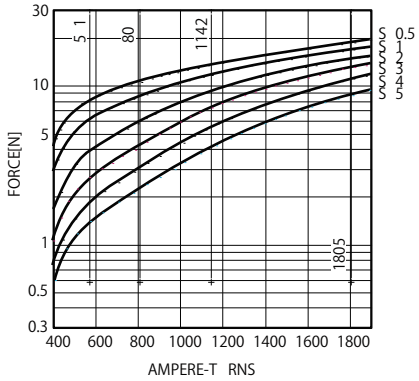
SK0640C



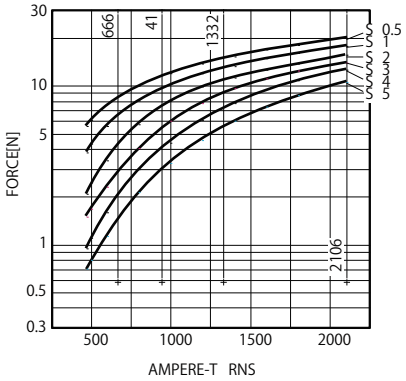
SK0730A



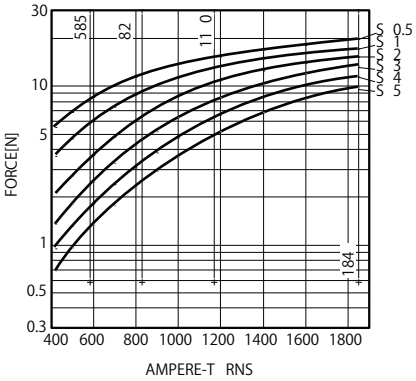
SK0832A



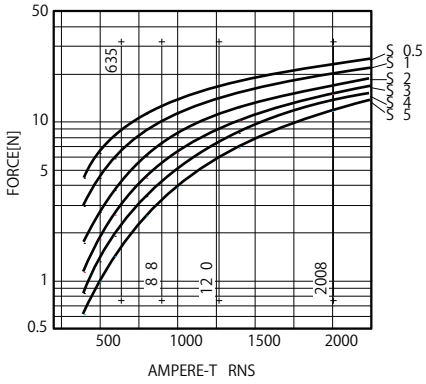
SK0836W



SK0946A



SK1040A



SK1250W