Coils for Operating Solenoids of Valves

C*

Size 03, 04, 06, 10



Technical Features

- Wide range of coil voltages
- Wide range of connectors and electrical connection options
- Easy replacement of coil solenoids
- The coils can be rotated and the required connector direction can be adjusted
- High resistance of coils against mechanical damage
- Coils supplied with AC current, fitted with integrated rectifier
- Coils with protection against possible damage due to induced voltage (Transil)

Technical Data

Quantity	Unit	Value
Nominal voltage (U_n)	V	see the list of voltages
Allowable voltage fluctuation		U_n ±10 %, if not stated otherwise in the valve data sheet
Coil current at U_n and 20 °C	A	see the table of coil types
Winding resistance at 20 °C	Ω	by calculation R = U_n/I
Input power of coil at 20 °C	W	by calculation P = U_n x I
Max. ambient temperature	°C (°F)	50 (122), if not stated otherwise in the data sheet
Operation conditions		see the data sheets of individual types of valves
Max. winding temperature	°C (°F)	155 (311)

	Datasheet	Type
General information	GI_0060	products and general conditions
Connectors	K_8008	connectors EN 175301-803-A

Product Description

Valves designed for a change of fluid direction, such as directional control valves and poppet-type valves, are often solenoid operated. Proportional valves are another large group controlling continuously parameters in the circuit within the defined interval. Electric current flowing through the coil winding creates a magnetic field. This field acts on the armature of the solenoid part and allows its shift which is then transferred to the valve control element (spool, poppet). The excitation winding made of copper wire placed on a plastic core is the basis. The coil is inserted into the steel housing amplifying the magnetic field and to protect it against mechanical damage. Moreover, the coil is molded into the housing by plastic material.
The connector part coupled with the coil is also made of the same plastic. A silicone seal protects the coil space against moisture and dust.

Coil Electrical Parameters

Standard control voltages are given in the table in the ordering code and coil currents are stated in the table of types. Electrical coil resistance is determined by the coil winding parameters. These along with input power of the coil can be calculated from the previous parameters. The coils are designed to be DC powered. When AC powered, it is necessary to use a coil with integrated rectifier or a connector plug with integrated rectifier.

In operation, the output power of coils is influenced both by keeping the given values of power supply and the operation conditions. Temperature rise of the winding causes an increase in its electrical resistance when exceeding operation conditions. This reduces both current flowing through the winding and generated magnetomotive force, thus magnetic field strength is also decreased. Hydraulic power of the solenoid operated valve is also decreased in an appropriate manner.

Protection of Control Electronics

A coil is an inductive load in an electrical circuit. Any change in the current flowing through a coil (e.g. when switching off the coil circuit), voltage is induced according to Lenz's law and opposes the change that produced it. This poses a damage risk to the control electronics. Especially for proportional valves, it is appropriate to use a coil with an integrated quenching diode - or transient-voltage-suppression diode (e.g. Transil). Transil is a proven and reliable semiconductor element connected in parallel to the coil. If the threshold voltage is exceeded, electric current starts to flow through it, thereby converting overvoltage energy to heat.

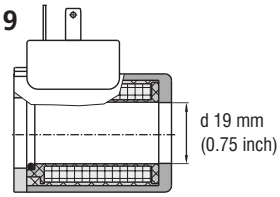
Quick disconnect

Induced voltage originating from a quick disconnect of the coil has according to Lenz's law a negative effect on OFF switching time regarding the solenoid armature. Special electronic circuit suppresses this unwanted phenomenon.

Coil sizes

Coil size	Diameter d [mm (inch)]	Valve size	Directional valves with housing		Cartridge valves		Proportional valves		
			High performance	Lightline	High performance	Lightline	Directional valves		Pressure
C14	13.4 (0.53)	Dn 03	RPEK1-03	RPEL1-04		SD2E-Ax/L SD3E-A2/L		SD3P-A2/H	SP4P1-B4
C19	19,0 (0.75)	Dn 04	RPE2-04 RPE3-04	RPEL1-06	SD2E-Ax/H SD3E-A2/H SD1E-A2 SD1E-A3 ROE3 SR1E2-A2 SR4E2-B2 SP4E1-B3	SD2E-B*/L SD3E-B2/L	PRM2-04 PRM7-04	SD3P-B2/H	SR1P2-A2 SRN1P1-A2 SR4P2-B2 SRN4P1-B2 SP4P2-B3 SPN4P1-B3 PVRM1-063
C22	22,0 (0.87)	Dn 06	RPE3-06 RPEA3-06 RPEW4-06		SD2E-B*/H SD3E-B2/H SD3E-C2/H		PRM2-06 PRMR2-06 PRM7-06 PRM8-06	SD2P-B4/H SF32P-C3/H	PVRM3-10
C31	31,0 (1.22)	Dn 10	RPE4-10 RPEW4-10				PRM6-10 PRM7-10		

Example: **C19**



For different sizes and versions of the valves, the appropriate coil sizes are used.
Size designation corresponds approximately to the inner diameter of the coil.

Connector Types

Basic connectors used to connect the power supply of the coils:

- Connector EN 175301-803-A (IP65)
- Connector AMP JUNIOR TIMER (IP67)
- Connector DEUTSCH DT04-2P (IP67 / IP69K)
- Special 2-pin connector EW designed to be slipped into the wirebox
- Loose conductors of standard length 300 mm (11.8 in)
- Loose conductors equipped with the connector at the end

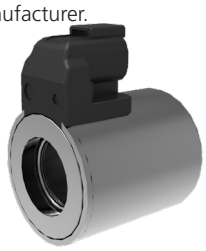
Other connector types available upon agreement with the manufacturer.



EN 175301-803-A



AMP JUNIOR TIMER



DEUTSCH DT04-2P



Connector EW

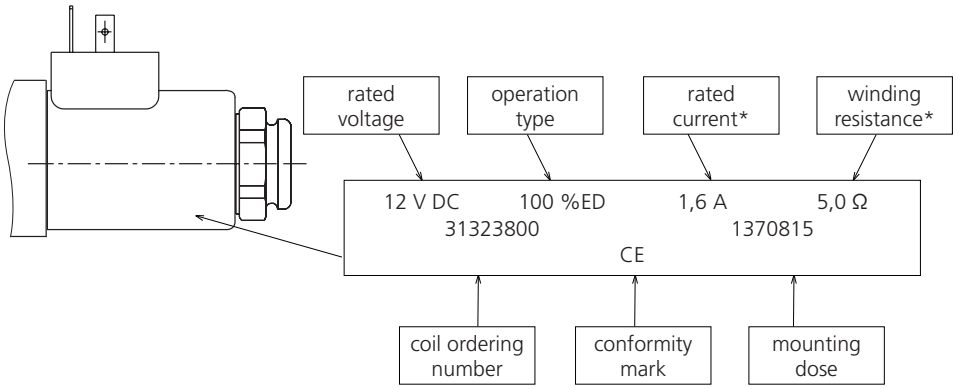


Loose Conductors

Identification of Coils

The CE conformity mark placed on the coil steel housing indicates that the product is in accordance with the following directives:

- 2014/30/ES for electromagnetic compatibility
- 2014/35/ES for low voltage equipment with rated voltage higher than 50 VAC and 75 VDC, respectively.



*Winding resistance is given only for coils used in proportional solenoids. Limit (maximum) current, which is allowed to flow continuously through the coil winding, is also stated for these coils instead of rated current.

Ordering Code

C □□-□□□-□□□□□/M

Solenoid coil

Coil size
inner diameter of coil
Ø 13.4 mm (0.53 in) **14**
Ø 19.0 mm (0.75 in) **19**
Ø 22.0 mm (0.87 in) **22**
Ø 31.0 mm (1.22 in) **31**

Coil housing design version
cold rolled housing **A**
drawn housing **B**
long drawn housing **C**

Rated voltage (on the coil terminals)
12 V DC **01200**
14 V DC **01400**
24 V DC **02400**
27 V DC **02700**
48 V DC **04800**
106 V DC **10600**
205 V DC **20500**
115 V AC 50 Hz **11550**
120 V AC 60 Hz **12060**
230 V AC 50 Hz **23050**

Connector type
see the table

Additional protection of conductors (only for loose conductors)
N non-braided
B braided

Length of loose conductors
300 standard length 300 mm (11.8 in)
xxx other length in mm (in)

Electrical winding resistance [Ω] at 20 °C (68 °F)

Coil detent type (for type C31 only)
N without detent
F with detent (by pin)

Housing surface treatment
A zinc coated, 240 h salt spray test acc. to ISO 9227
B zinc coated, 520 h salt spray test acc. to ISO 9227

Type of insulating material
no designation standard
H for valves with CSA certification

Coil for
no designation switching valves
P proportional valves

Special coil design

Not all possible combinations of parameters are produced as actual coils. If the required coil is not included in the table of the standard types, please contact our technical department to verify feasibility and identification of the specific type.

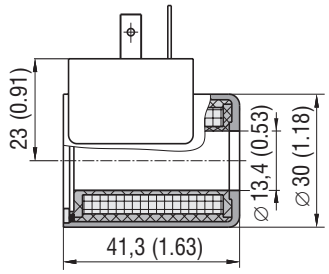
Note explaining usage of coils:
Coils with supply voltage 21 V DC are intended for rectified supply voltage 24 V AC / 50 Hz.
Coils with supply voltage 106 V DC are intended for rectified supply voltage 120 V AC / 60 Hz.
Coils with supply voltage 205 V DC are intended for rectified supply voltage 230 V AC / 50 Hz.
Coils 115 V AC / 50 Hz have a built-in rectifier and can be also used for supply voltage 120 V AC / 50 Hz or 60 Hz.
Coils 230 V AC / 50 Hz have a built-in rectifier.

Overview of connector types and electrical connections of coils

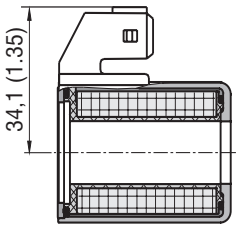
Connector	Designation	Description
EN 175301-803-A	E1	Connector EN 175301-803-A
	E2	Connector EN 175301-803-A + quenching diode
	E5	Connector EN 175301-803-A + integrated rectifier
	E51	Connector EN 175301-803-A + integrated rectifier + quick disconnect
AMP Junior Timer	E3	Connector AMP Junior Timer (2 pins)
	E4	Connector AMP Junior Timer (2 pins) + quenching diode
AMP Junior Timer axially oriented	E3A	Axial connector AMP Junior Timer (2 pins)
	E4A	Axial connector AMP Junior Timer (2 pins) + quenching diode
Deutsch DT04-2P axially oriented	E12A	Axial connector Deutsch DT04-2P (2 pins)
	E13A	Axial connector Deutsch DT04-2P (2 pins) + quenching diode
Loose conductors	E8	Loose conductors
	E9	Loose conductors + quenching diode
Loose conductors with connector	E10	Loose conductors with connector DT04-2P (2 pins)
	E11	Loose conductors with connector DT04-2P (2 pins) + quenching diode
	E16	Loose conductors with Metri-Pack connector, series 150 (2 pins)
	E17	Loose conductors with Metri-Pack connector, series 150 (2 pins) + quenching diode
	E18	Loose conductors with Weather-Pack connector (2 pins)
	E19	Loose conductors with Weather-Pack connector (2 pins) + quenching diode
	E20	Loose conductors with Weather-Pack connector (2 jacks)
	E21	Loose conductors with Weather-Pack connector (2 jacks) + quenching diode
	E22	Loose conductors with Econoseal connector (2 pins)
	E23	Loose conductors with Econoseal connector (2 pins) + quenching diode
	E24	Loose conductors with connector AMP Junior Timer (2 pins)
	E25	Loose conductors with connector AMP Junior Timer (2 pins) + quenching diode
Special connector for wirebox	EW1	Special connector for wirebox
	EW2	Special connector for wirebox + quenching diode

C14B

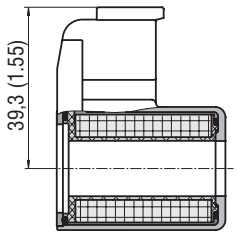
E1, E2 IP65



E3A, E4A IP67

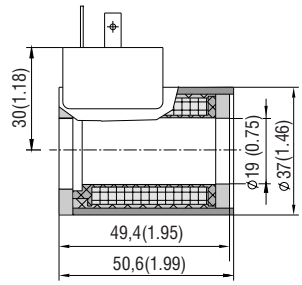


E12A , E13A IP67 / IP69K

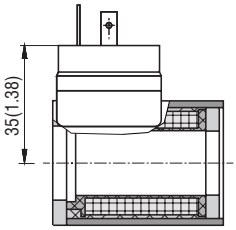


C19A

E1, E2 IP65

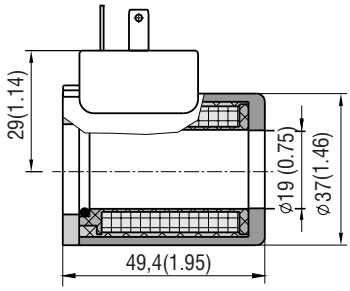


E5 IP65

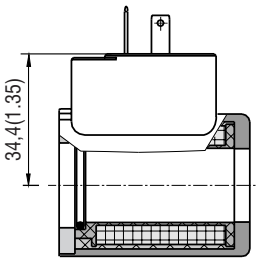


C19B

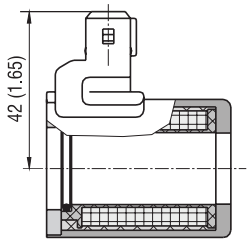
E1, E2 IP65



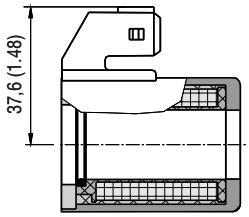
E5, E51 IP65



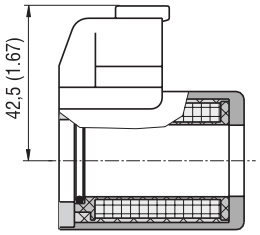
E3, E4 IP67



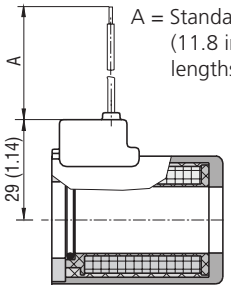
E3A , EA4 IP67



E12A , E13A IP67 / IP69K



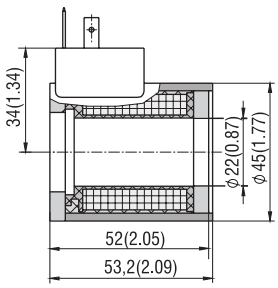
E8, E9



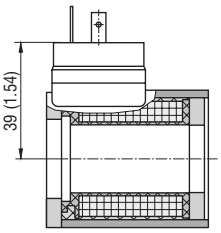
A = Standard 300 mm (11.8 inch), other lengths on demand

C22A

E1, E2 IP65

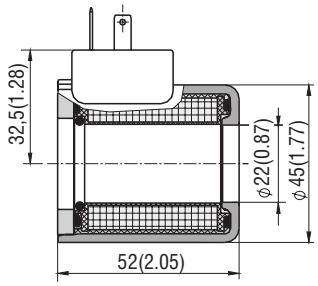


E5 IP65

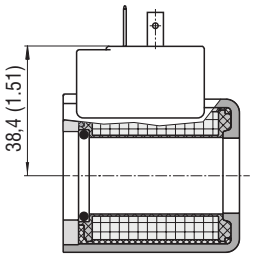


C22B

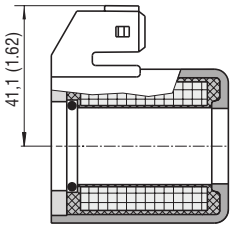
E1, E2 IP65



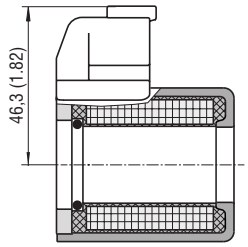
E5, E51 IP65



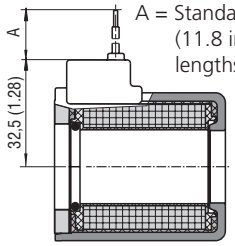
E3A , E4A IP67



E12A , E13A IP67 / IP69K

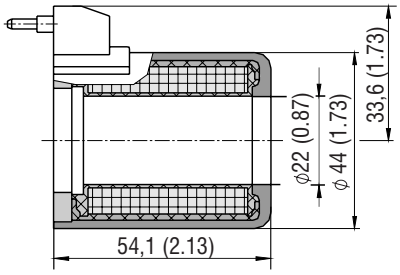


E8, E9



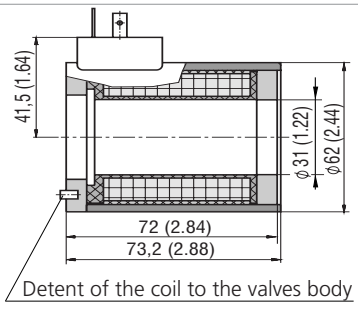
C22C

EW1, EW2 IP65

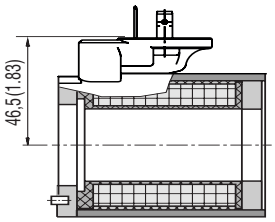


C31A

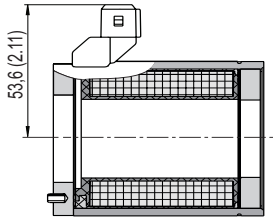
E1, E2 IP65



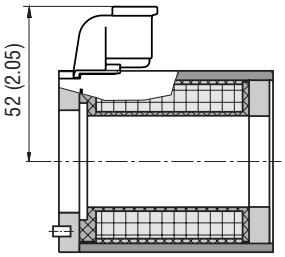
E5, E51 IP65



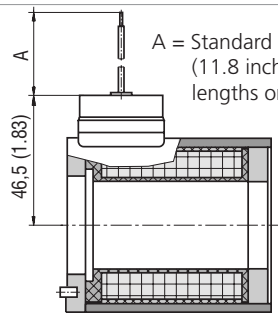
E3, E4 IP67



E12A , E13A IP67 / IP69K



E8, E9



EW1 IP65

