



HANDBOOK
SOLENOID VALVES

Ed. 2017

 **Castel**[®]
Italian technology

CHAPTER 11 ■

COILS AND CONNECTORS

CERTIFIED BY UNDERWRITERS LABORATORIES INC.



APPLICATION

For normally-closed solenoid valves approved by the American certification authority Underwriters Laboratories Inc. (valves with an “UL” suffix presented in Chapter 7), Castel provides its customers with the following types of coils:

- **Series 9105** (coil type HM2), with connection type DIN 43650
- **Series 9125** (coil type HM3), with connection type DIN 43650
- **Series 9115** (coil type CM2-N2), with connection type “Junction Box NEMA 2”.
- **Series 9116** (coil type CM2-N4), with connection type “Conduit Hub NEMA 4”.
- **Series 9185** (coil type CM3-N2), with connection type “Junction Box NEMA 2”.
- **Series 9186** (coil type CM3-N4), with connection type “Conduit Hub NEMA 4”.

Coils in series 9105 and 9125 must be coupled with connector type 9150UL/R02. The protection rating of the coil + connector system is IP65 according to the EN 60529 standard.

The coils in series 9115 and 9185 are complete with a connection system and a metal sheath. The protection rating guaranteed by the “Junction Box” connection system is similar to IP12-32 according to the EN 60529 standard.

The coils in series 9116 and 9186 are complete with a connection system and a metal sheath. The protection rating guaranteed by the “Conduit Hub” connection system is similar to IP54 according to the EN 60529 standard.

CONSTRUCTION

In compliance with IEC standard 85, the coils in series 9105, 9125, 9115, 9116, 9185 and 9186 have Class F encapsulation and their production is compliant with standards EN 60730-1 and EN 60730-2-8. The windings are made of copper wire, with insulation class H (155°C), in

compliance with IEC standard 85. The outer casing is made of waterproof, dielectric resins that guarantee reinforced insulation and allow any type of assembly.

All coils have Class I protection ratings against electric contacts. Consequently, their safety requires an efficient ground system. Rubber gaskets assembled on the upper and lower ends of the coils complete the protection of the windings from humidity.

The coils in series 9105 and 9125 are equipped with three flat terminals, two Faston connections in line plus a Faston ground connection.

The coils in series 9115 and 9185 are equipped with two cables, at least 153 mm long, and ground screws incorporated in the body of the metal casing. The body of the casing is screwed onto the metal reinforcement of the coil and there are two semi-sheared slots to screw on a metal sheath. A metal cover screwed on the body closes the casing and encloses the joints between the power cable and the coil wires.

Coils in series 9116 and 9186 are equipped with two wires, at least 457 mm long. The flange of the inlet plug is screwed to the metal reinforcement of the coil. The inlet plug is threaded in order to screw on a metal sheath.

All coils in this chapter are designed for continuous use. The solid construction of these coils makes them suitable for use in refrigeration systems operating in heavy-duty environments

APPROVALS

Coils in series 9105, 9125, 9115, 9116, 9185, and 9186 have been approved by the American certification authority Underwriters Laboratories Inc. These coils are certified UL-CSA Recognized for the USA and Canada with file E243604, in compliance with American standard UL 429 and Canadian standard C22.2 No. 139-13.

Only when a coil in series 9115, 9116, 9185 or 9186 is used with a coil-less valve in Chapter 7 (valve with a “UL” suffix) is a solenoid valve obtained that is UL Listed

certified according to file MH50005, in compliance with American standard UL 429 and Canadian standard C22.2 No. 139-13.

Note: coupling a coil in series 9105 or 9125 with the same valve with “UL” suffix does not result in a “UL Listed” certified valve; rather, you obtain a “UL Recognized” certified valve.

The coils in series 9015, 9125, 9115, 9116, 9185, and 9186 with voltages of 120 VAC, 208 VAC, 220/230 VAC, 240 VAC comply with the Low Voltage Directive (2006/95/EC). All coils in this chapter comply with the Electromagnetic Compatibility (EMC) Directive (2004/108/EC).

CONNECTOR

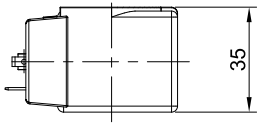
Connector 9150UL/R02 has been approved by the American certification authority Underwriters Laboratories Inc. This

connector is certified **UL-CSA Recognized** for the USA and Canada with file E333724, in compliance with American standard UL 1977 and Canadian standard C22.2 No. 182.3. The DIN 43650 standardized connector 9150UL/R02 represents an effective system for the connection of the coil to the power system, thus ensuring safety also in the presence of moisture. Based on the assembly requirements, this connector allows you to choose the orientation of the outer casing with respect to the inner terminal block. The gland nut of the outer casing is suitable for receiving cables with an external diameter of 6 to 9 mm and is equipped with a self-locking device. Three-pole cables with a cross-section greater than or equal to 0.75 mm² are recommended.

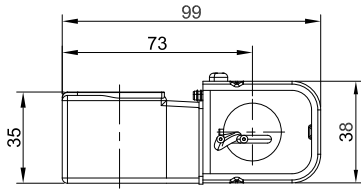
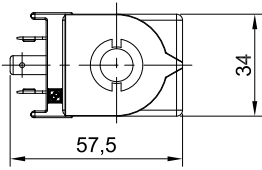
As long as it is used with the gaskets provided, connector 9150UL/R02 ensures IP65 protection rating according to the EN 60529 standard.

TABLE 36: General characteristics of coils, UL Recognized approved

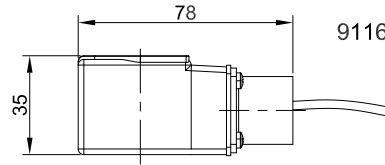
Catalogue Number	Coil Type	Voltage [V]	Voltage tolerance [%]	Frequency [Hz]	Insulation class EN 60730	TA [°C]		Connection	Connectors	Protection Degree
						min.	max.			
9105/RA2	HM2	24 A.C.	+10 / -10	60	F	-20	+50	Terminal block for DIN 43650/A	9150UL/R02	IP 65 (with connector)
9105/RA4		120 A.C.								
9105/RA5		208 A.C.								
9105/RA6		220/230 A.C.	+6 / -10							
9105/RA7		240 A.C.	+10 / -10							
9115/RA2	CM2-N2	24 A.C.	+10 / -10	60	F	-20	+50	Junction box NEMA 2	-	~ IP 12-32
9115/RA4		120 A.C.								
9115/RA5		208 A.C.								
9115/RA6		220/230 A.C.	+6 / -10							
9115/RA7		240 A.C.	+10 / -10							
9116/RA2	CM2-N4	24 A.C.	+10 / -10	60	F	-20	+50	Conduit hub NEMA 4	-	~ IP 54
9116/RA4		120 A.C.								
9116/RA5		208 A.C.								
9116/RA6		220/230 A.C.	+6 / -10							
9116/RA7		240 A.C.	+10 / -10							
9125/RD1	HM3	12 D.C.	+10 / -5	-	F	-20	+50	Terminal block for DIN 43650/A	9150UL/R02	IP 65 (with connector)
9125/RD2		24 D.C.								
9125/RA2		24 A.C.								
9125/RA4		120 A.C.	+10 / -10							
9125/RA5		208 A.C.								
9125/RA6		220/230 A.C.	+6 / -10							
9125/RA7		240 A.C.	+10 / -10							
9185/RD1	CM3-N2	12 D.C.	+10 / -5	-	F	-20	+50	Junction box NEMA 2	-	~ IP 12-32
9185/RD2		24 D.C.								
9185/RA2		24 A.C.								
9185/RA4		120 A.C.	+10 / -10							
9185/RA5		208 A.C.								
9185/RA6		220/230 A.C.	+6 / -10							
9185/RA7		240 A.C.	+10 / -10							
9186/RD1	CM3-N4	12 D.C.	+10 / -5	-	F	-20	+50	Conduit hub NEMA 4	-	~ IP 54
9186/RD2		24 D.C.								
9186/RA2		24 A.C.								
9186/RA4		120 A.C.	+10 / -10							
9186/RA5		208 A.C.								
9186/RA6		220/230 A.C.	+6 / -10							
9186/RA7		240 A.C.	+10 / -10							



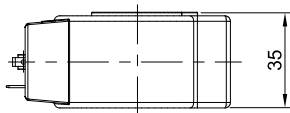
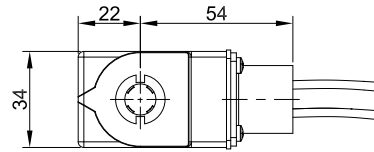
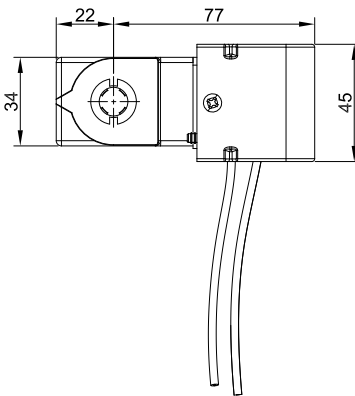
9105 (Type HM2)



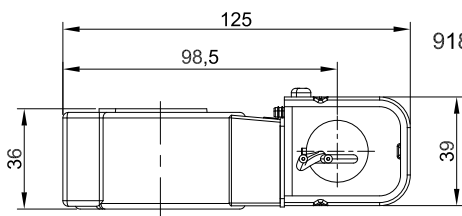
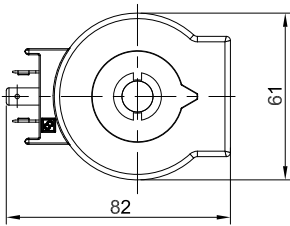
9115 (Type CM2-N2)



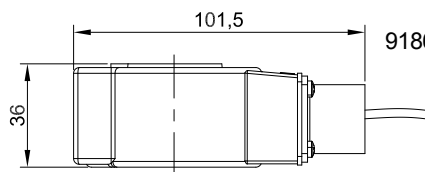
9116 (Type CM2-N4)



9125 (Type HM3)



9185 (Type CM3-N2)



9186 (Type CM3-N4)

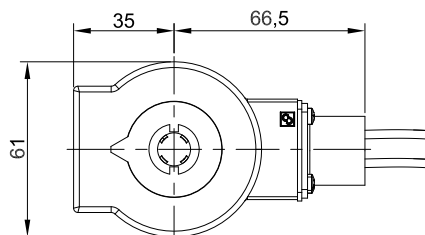
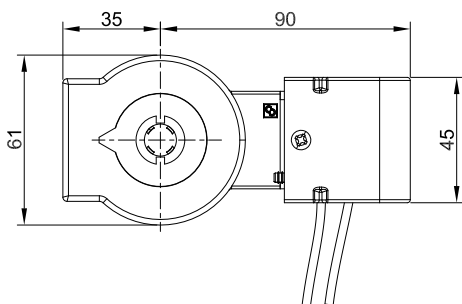


TABLE 37: Coils consumptions and weights

Catalogue Number	Coil Type	Voltage [V]	Power [W]	Consumption at 20 °C [mA]				Weight [g]
				Start		Working		
				60 [Hz]	D.C.	60 [Hz]	D.C.	
9105/RA2	HM2	24 A.C.	11	1746	-	725	-	170
9105/RA4		120 A.C.		353		154		
9105/RA5		208 A.C.		195		84		
9105/RA6		220/230 A.C.		140		63		
9105/RA7		240 A.C.		140		63		
9115/RA2	CM2-N2	24 A.C.	11	1746	-	725	-	310
9115/RA4		120 A.C.		353		154		
9115/RA5		208 A.C.		195		84		
9115/RA6		220/230 A.C.		140		63		
9115/RA7		240 A.C.		140		63		
9116/RA2	CM2-N4	24 A.C.	11	1746	-	725	-	240
9116/RA4		120 A.C.		353		154		
9116/RA5		208 A.C.		195		84		
9116/RA6		220/230 A.C.		140		63		
9116/RA7		240 A.C.		140		63		
9125/RD1	HM3	12 D.C.	24	-	1720	-	1720	470
9125/RD2		24 D.C.		-	895	-	895	
9125/RA2		24 A.C.	20	2060	-	1015	-	
9125/RA4		120 A.C.		506		261		
9125/RA5		208 A.C.		286		152		
9125/RA6		220/230 A.C.		260		133		
9125/RA7		240 A.C.		235		122		
9185/RD1	CM3-N2	12 D.C.	24	-	1720	-	1720	590
9185/RD2		24 D.C.		-	895	-	895	
9185/RA2		24 A.C.	20	2060	-	1015	-	
9185/RA4		120 A.C.		506		261		
9185/RA5		208 A.C.		286		152		
9185/RA6		220/230 A.C.		260		133		
9185/RA7		240 A.C.		235		122		
9186/RD1	CM3-N4	12 D.C.	24	-	1720	-	1720	530
9186/RD2		24 D.C.		-	895	-	895	
9186/RA2		24 A.C.	20	2060	-	1015	-	
9186/RA4		120 A.C.		506		261		
9186/RA5		208 A.C.		286		152		
9186/RA6		220/230 A.C.		260		133		
9186/RA7		240 A.C.		235		122		

TABLE 38: General characteristics of connectors, UL Recognized approved

Catalogue Number	Standard	Degree of protection	Class of insulation	Approval
9150UL/R02	DIN 43650	IP65 EN 60529	Group C VDE 0110-1 / 89	UL Recognized

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