

HANDBOOK  
**EXPANSION VALVES**

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 **Castel**<sup>®</sup>  
Italian technology

# CHAPTER 8 ■ STANDARD COILS AND CONNECTORS



## APPLICATIONS

For the solenoid expansion valves presented in Chapters 3 (series 2028), 5 (series 2028R), and 6 (series 2028N), the coils in series 9160 (coils type HM4) and the coils in series 9320 (coils type HF3) are available.

For the solenoid expansion valves presented in Chapter 7 (series 2028E) the coils in series 9320 (coils type HF3) are available.

The coils in series 9320 must be coupled only with connectors 9150/R02 or 9900/X66. The protection rating guaranteed by the coil + connector system is IP65 according to the EN 60529 standard.

Coils in series 9160 must be used preferably with connector type 9155 / R01 and 9155/R02. The protection rating of the coil + connector 9155/R01 system is IP65/IP68 according to the EN 60529 standard. Alternatively, these coils can be coupled with connectors in series 9150/R02 or 9900/X66. In this case, the protection rating of this system is IP65 according to the EN 60529 standard.

## CONSTRUCTION

In compliance with IEC 85 standard, the coils in series 9160 and 9320 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 (180 °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 (only on the lower end for coils in series 9320) complete the protection of the windings from humidity.

The terminals of the coils in series 9160 and 9320 consist

of two Faston connectors plus a Faston ground connector. 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.

## CERTIFICATIONS

Coils in series 9160 with 110 VAC, 220/230 VAC and 240 VAC power supply, and coils in series 9320 with 220/230 VAC power supply are manufactured according to the Low Voltage (LV) Directive (2006/95/EC). All coils in this chapter comply with the Electromagnetic Compatibility (EMC) Directive (2004/108/EC).

## CONNECTORS

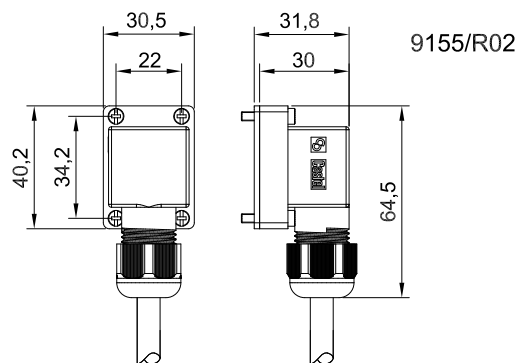
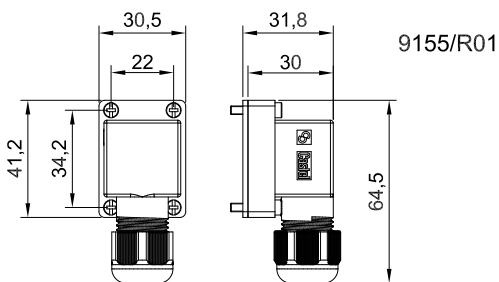
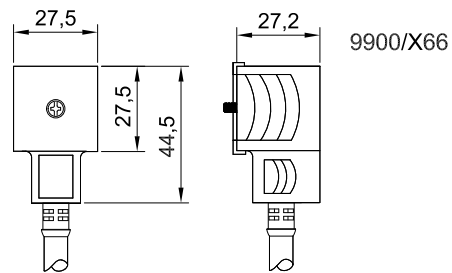
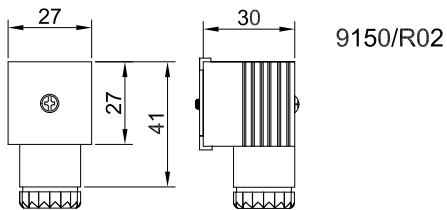
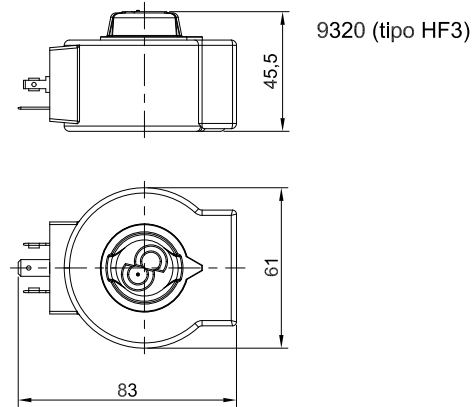
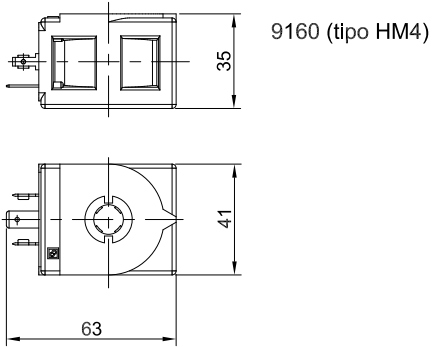
DIN 43650 standardized connectors 9150/R02 represent an effective system for the connection of the coil to the power system, thus ensuring safety also in the presence of moisture. Based on the assembly requirements, these connectors allow you to choose the orientation of the outer casing with respect 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 mm<sup>2</sup> are recommended. The connectors in series 9900/X66 are available with co-moulded cables, 1 m long. In this version, the orientation of the casing cannot be changed with respect to the terminal block.

Castel developed specific connectors, series 9155/R01, suitable for use in refrigeration systems operating in heavy-duty environments, for example:

- exposure to the atmospheric conditions
- rooms with high degree of moisture
- cyclic condensing / evaporation on the valve
- cyclic icing / defrosting on the valve

Based on the assembly requirements, these connectors allow you to choose the side orientation of the outer casing with respect to the inner terminal block. It is not possible to point the exit of the cable upwards. 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. It is again recommended that three-pole cables with a cross-section greater than or equal to 0.75 mm<sup>2</sup> be used. The connectors in series 9155/R02 are available with co-moulded cables, 1 m long. In this version, the orientation of the casing cannot be changed with respect to the terminal block.



**TABLE 40: General characteristics of coils**

Catalogue Number	Coil Type	Voltage [V]	Voltage tolerance [%]	Frequency [Hz]	Insulation class EN 60730	TA [°C]		Connection	Connectors	Protection Degree
						min.	max.			
9160/RA2	HM4	24 A.C.	+10 / -10	50 / 60	F	-20	+50	Terminal block for DIN 43650/A	9150/R02 9155/R01 9155/R02 9900/X##	IP 65 (with connectors 9150 , 9900)  IP 65 / IP 68 (with connector 9155)
9160/RA4		110 A.C.								
9160/RA6		220/230 A.C.								
9160/RA7		240 A.C.	+10 / -10							
9160/RD1		12 D.C.		-						
9160/RD2		24 D.C.								
9320/RA6	HF3	220/230 A.C.	+6 / -10		50 / 60	F	-20	+50	Terminal block for DIN 43650/A	9150/R02 9900/X##
9320/RD1		12 D.C.	+10 / -5	-						
9320/RD2		24 D.C.								

**TABLE 41: Consumptions and weights of coils**

Catalogue Number	Coil Type	Voltage [V]	Power [W]	Consumption at 20 °C [mA]						Weight [g]
				Start			Working			
				50 [Hz]	60 [Hz]	D.C.	50 [Hz]	60 [Hz]	D.C.	
9160/RA2	HM4	24 A.C.	8	1490	1320	-	700	530	-	220
9160/RA4		110 A.C.		330	300		156	118		
9160/RA6		220/230 A.C.		162	142		76	57		
9160/RA7		240 A.C.		147	130		70	53		
9160/RD1		12 D.C.	17	-	-	1300	-	-	1300	
9160/RD2		24 D.C.	15,5	-	-	650	-	-	650	
9320/RA6	HF3	220/230 A.C.	12	190	160	-	110	80	-	500
9320/RD1		12 D.C.	20	-	-	1720	-	-	1720	
9320/RD2		24 D.C.	20	-	-	895	-	-	895	

**TABLE 42: General characteristics of connectors**

Catalogue Number	Cable length [m]	Cable thickness [mm <sup>2</sup> ]	Standard	Degree of protection	Class of insulation	Approval
9150/R02	-	-	DIN 43650	IP65 EN 60529	Group C VDE 0110-1 / 89	-
9900/X66	1	3 x 0,75				-
9155/R01	-	-	-	IP65/IP68 EN 60529		-
9155/R02	1	3 x 0,75				-

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