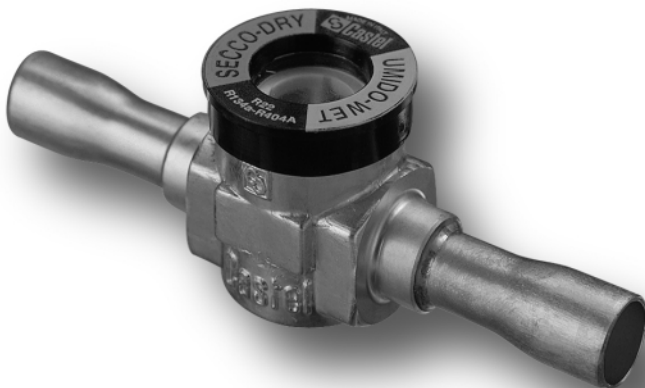




LIQUID INDICATORS & MOISTURE-LIQUID INDICATORS



element from green fade to yellow, “green Chartreuse”, working conditions of the system could become difficult. When the sensitive element becomes “yellow”, it’s time to substitute the dehydrator filter. If the charge and working condition are normal, the refrigerant fluid appears perfectly liquid underneath the “lens” of the indicator. The presence of bubbles indicates that the refrigerant fluid is partial evaporating along the liquid line.

APPLICATIONS

The indicators, shown in this chapter, are classified “Pressure accessories” in the sense of the Pressure Equipment Directive 97/23/EC, Article 1, Section 2.1.4 and are subject of Article 3, Section 1.3 of the same Directive.

The indicators series 3780 are excluded from the scope of Directive 97/23/EC, as specified in the Guidelines 1/8 and 1/9, because they are piping components.

They are designed for installation on commercial refrigerating systems and on civil and industrial conditioning plants, which use refrigerant fluids proper to the Group II (as defined in Article 9, Section 2.2 of Directive 97/23/EC and referred to in Directive 67/548/EEC).

Liquid indicators and moisture liquid indicators ensure a fast and safe inspection of the conditions of the refrigerant fluid in the circuit concerning regular flow and moisture. Liquid indicators also ensure inspection of the regular return of oil to the compressor crankcase.

OPERATION

The moisture/liquid indicators consist of a sensitive element as a ring, which changes color passing from green to yellow according to the percentage of moisture in the system.

The data of moisture content, shown in table 1 with the “green” color, can be considered admissible for the proper working of the system. When the sensitive

TABLE 1: Moisture contained in the fluid [p.p.m.]

Colour	Refrigerant fluid				
	R22	R134a	R404A	R407C	R507
Green	<60	<75	<30	<30	<30
Green “Chartreuse”	60	75	30	30	30
Yellow	>60	>75	>30	>30	>30

CONSTRUCTION

Castel liquid indicators and liquid/moisture indicators are manufactured with the glass “lens” which has been fused onto the metallic ring. This construction permits the total elimination of sealing gasket between the glass disc and the metallic structure with the consequent elimination of possible refrigerant leaks.

The main parts of the indicators are made with the following materials:

- hot forged brass EN 12420 – CW 617N for body;
- copper tube EN 12449 – Cu-DHP for solder connections;
- steel, with proper surface protection, for the ring;
- chloroprene rubber (CR) for outlet seal gaskets;
- elastomer polyester for cap that covers the ring.

TABLE 2: General Characteristics

Catalogue Number		Connections								TS [°C]		PS [bar]	Risk Category according to PED
Liquid Indicators	Moisture Liquid Indicators	Type	SAE Flare	ODS		ODM		for pipe		min.	max.		
				Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]				
3610/22	3710/22	male	1/4"	-	-	-	-	-	-	- 30	+110	42	Art. 3.3
3610/33	3710/33		3/8"	-	-	-	-	-	-				
3610/44	3710/44		1/2"	-	-	-	-	-	-				
3610/55	3710/55		5/8"	-	-	-	-	-	-				
3610/66	3710/66		3/4"	-	-	-	-	-	-				
3640/2	3740/2	soldering	-	1/4"	-	-	-	-	-				
3640/3	3740/3		-	3/8"	-	-	-	-	-				
3640/M10	3740/M10		-	-	10	-	-	-	-				
3640/M12	3740/M12		-	-	12	-	-	-	-				
3640/4	3740/4		-	1/2"	-	-	-	-	-				
3640/5	3740/5		-	5/8"	16	-	-	-	-				
3640/M18	3740/M18		-	-	18	-	-	-	-				
3640/6	3740/6		-	3/4"	-	-	-	-	-				
3640/7	3740/7		-	7/8"	22	-	-	-	-				
3640/9	3740/9		-	1.1/8"	-	-	-	-	-				
3650/22	3750/22	male	1/4"	-	-	-	-	-	-				
3650/33	3750/33		3/8"	-	-	-	-	-	-				
3650/44	3750/44		1/2"	-	-	-	-	-	-				
3650/55	3750/55		5/8"	-	-	-	-	-	-				
3650/66	3750/66		3/4"	-	-	-	-	-	-				
-	3770/11	soldering	-	-	-	1.3/8"	35	-	-	35		I	
	3770/13		-	-	-	1.5/8"	-	-	-				
	3770/M42		-	-	-	-	42	-	-				
	3780/5	saddle tyoe	-	-	18	-	-	5/8"	16				
	3780/M18		-	3/4"	-	-	-	-	18				
	3780/7		-	7/8"	22	-	-	7/8"	22				
	3780/9		-	-	10	-	-	1.1/8"	28				
3780/11	-		-	12	-	-	1.3/8"	35					

INSTALLATION

At the start-up the color of the sensitive element may be yellow, due to exposure to air humidity and to moisture in the circuit. When the moisture of the refrigerant is brought back to acceptable levels with the dehydrator, the indicator color is once again green. This is evidence that equilibrium has been re-established. In case of persisting yellow, measures have to be taken to eliminate moisture. Only when the sensitive element comes back to green, there is evidence that adopted measures were effective. About 12 hours of system operation are required to achieve equilibrium. However, the moisture indication is given normally when the plant is in function and the fluid is flowing

The brazing of indicators with solder connections should be carried out with care, using a low melting point filler material. Before starting to braze, it's necessary to disassemble the ring of indicators series 3780, while this operation is not necessary with solder connection indicators. In any case, avoid direct contact between the torch flame and the indicator body or ring, which could be damaged and compromise the proper functioning of the indicator.



TABLE 3: Dimensions and Weights

Catalogue Number		Dimensions [mm]					Weight [g]	
Liquid Indicators	Moisture Liquid Indicators	Ø D	H	H ₁	L	Ch		
3610/22	3710/22	34,5	28,5	22,0	71,5	12,0	130	
3610/33	3710/33		31,5	22,5	77,5	17,0	165	
3610/44	3710/44		36,0	24,5	81,5	22,0	210	
3610/55	3710/55		38,5	26,0	89,5	24,0	255	
3610/66	3710/66		46,5	27,5	93,0	28,0	315	
3640/2	3740/2		28,5	22,0	133,0		135	
3640/3	3740/3						195	
3640/M10	3740/M10					117,0		
3640/M12	3740/M12			38,5	26,0		200	
3640/4	3740/4						-	
3640/5	3740/5						210	
3640/M18	3740/M18					131,0		
3640/6	3740/6			40,0	27,5		215	
3640/7	3740/7			46,5		151,0	295	
3640/9	3740/9			53,5	36,0	186,0	580	
3650/22	3750/22			31,5	22,5	68,0	12,0	165
3650/33	3750/33			36,0	24,5	74,0	17,0	205
3650/44	3750/44			38,5	26,0	77,0	22,0	235
3650/55	3750/55			46,5	27,5	84,0	24,0	300
3650/66	3750/66			53,5	36,0	92,0	28,0	525
-	3770/11				41,5	160,0		300
-	3770/13				45,0	170,0		480
-	3770/M42							
-	3780/5			-	30,0		-	
-	3780/M18				31,0			
-	3780/7				33,0		-	
-	3780/9				36,0			90
-	3780/11				39,5			

