# Safety precautions\*

# Safety precautions against electrical shock

cf. DIN VDE 0 100-410 (2003-06)

#### Protection against direct and indirect contact

Protection by:

- Safety Extra Low Voltage (SELV)
- Protective Extra Low Voltage (PELV)
- Functional Extra Low Voltage FELV

Protection against electric shock under normal conditions: against direct contact

### Protection by:

- protective insulation of active parts, e.g. cable
- coating as insulation, e.g. housings on electr. devices
- distance, e.g. protective hoods, housings of machine screen
- barriers, e.g. protective screen, enclosure

Protection against electric shock under fault conditions: for indirect contact

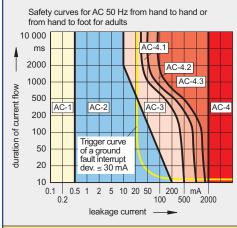
#### Protection by:

- automatic disconnect or warning,
  e.g. residual current protective device
- potential equalization
- non-conductive areas;
  e.g. by insulating coverings
- protective insulation, e.g. housings encapsulated with insulating material

Additional protection by residual current circuit breaker GFI's: Ground Fault Interrupter

## Effects of alternating current

vgl. IEC 60479-1 (1994)



Zone	Physical effects
AC-1	normally no effect
AC-2	normally no damaging physical effects
AC-3	usually no organic damage, difficulty breathing (> 2 s), muscle cramps
AC-4.1	5% probability of ventricular fibrillation
AC-4.2	up to 50% probability of ventricular fibrillation
AC-4.3	over 50% probability of ventricular fibrillation
AC-4	cardiac arrest, cessation of breathing, and extreme burns (increasing with exposure

#### Automatic fuses and wire cross-sectional areas

cf. DIN VDE 0 1000-430 (1991-11)

Rated cur- rent of fuse		Color code of	Minimum cross-sectional area in mm <sup>2</sup> for Cu wires by method of installation								Rated cur-	Color	Minimum cross-sectional area in mm <sup>2</sup> for Cu wires by method of installation							
			A1		В	B1		B2		С	rent of fuse	code of	A1		B1		B2		С	
<i>I</i> n i	n A	fuse	and number of loaded strands						I <sub>n</sub> in A	fuse		and number of loaded strands								
			2	3	3	3	2	3	2	3			2	3	3	3	2	3	2	3
10	(13)	red	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	25	yellow	4	4	2.5	4	4	4	2.5	2.5
1	6	gray	1.5	2.5	1.5	1.5	1.5	1.5	1.5	1.5	35	black	6	6	6	6	6	6	4	4
2	20	blue	2.5	2.5	2.5	2.5	2.5	2.5	1.5	2.5	50	white	10	16	10	10	10	10	10	10

## Method of installation of cables and insulated wires

f DIN VDF 0 298-4 (2003-08)

Ivietnod	of installation	cf. DIN VDE 0 298-4 (2003-08)					
A1		Installation in thermally insulated walls, in electrical conduit	B2		Installation in electrical con- duit or in the wall, in cable channels or behind base boards		
B1		Installation in electrical conduit or in the wall or in cable channels	С	<b>8</b>	Installation directly on or in the wall		

<sup>\*)</sup> According to European Standards

Α