

# Information and Installation Instructions

## for UL and CSA cables

UL/CSA cables must be protected against mechanical, thermal and chemical damages.

### Installation in switchboards and control boards

- Inside switchboards, flexible single core cables must be installed in cable channels of plastics
- As American cables are not so flexible, the minimum bending radius must be taken into consideration during flexible installation.

### For connections on machinery and equipment

- Permissible tube and conduit- $\varnothing$ :  
minimum- $\varnothing = 1/2''$  (inch)  
maximum- $\varnothing = 4''$  (inch)  
Minimum wall-thickness of the conduit = 1,9 mm
- Normal steel armoured tubes with transition socket PG-NPT is used. Further metal cable channels must also be used.
- The cables are permitted to be filled with only max. 50% cross-section of the cable channel.
- Flexible single cores must be installed in PVC tubes inside the conduits.
- If connectors are used, both the main and the control cables should be installed separately.

### Delivery program:

- PVC tubes
- Metal tubes and glands
- Fixing material
- Steel armoured tubes.

### Cable Channels

- Cable channels in switchboards must be made out of a flame resistant PVC and must have enough spare space.
- Cable channels on machineries and equipment must be made out of metal. They must also be closed and oil resistant.

### Cable identification

- Cable identification is achieved through continuous numbers, letters or number/letter combination. The beginning and end of the cable have the same identification system.

### Cable connections to apparatus

#### ● Main and Control cables

It is depending on the type of connection to the apparatus if screw or press clamps are used.

- In USA, it is normal to install cables without using cable lugs or cable crushing socket. The connection is only possible with the UL-wires sizes. These sizes are not designed with fine wire stranding make-up.

### Conductor cross-section

#### General rules

#### minimum cross-section for

- |                           |        |
|---------------------------|--------|
| ● Motor Cables            | AWG 14 |
| ● Control Cables          |        |
| – in switchboards         | AWG 18 |
| – in the installed system | AWG 16 |

This rule does not apply to electronic devices and systems.

In case, the electronic cables and other circuits are installed together, all cables must be set for maximum voltage.

### Colour identification

#### ● Black

For main circuits, control- and subcircuits, direct connected to main voltage.

#### ● Blue

For direct voltage- (d.c.), control- and subcircuits, which are connected to the main circuit.

#### ● Red

For alternating voltage (a.c.), control and subcircuits.

#### ● Yellow or brown

For interlock circuits from an external power source.

#### ● White or grey

For current conveying earthed conductors at main, control and subcircuits.

#### ● Green or green-yellow

For insulated earth-connectors as protective conductor.

### Motor-driving voltages

200 / 230 / 460 / 575 V, 60 Hz

### Driving voltage

Normally the driving voltage is 120 V, 60 Hz or lower. Transformers must be operated with separate windings.