

Calculation of cable area in time systems

General

To make a time system with impulse operated analogue and digital slave clocks perform satisfactory, the cable from the Master Clock to the Slave Clocks need to be dimensioned correctly.

A 10% voltage drop is allowed in the cable.

The length and area of the cable and also the current (load) on the cable affect the voltage drop.

Formula

$$A = l \times I \times k$$

A = Area [mm²]

l = cable length [m]

I = current [A]

k = 0,015 [constant]

Power consumption

Impulse Slave Clocks

Analogue clocks minute ≤ 400 mm: 7,5 mA

Analogue clocks minute ≤ 900 mm: 15 mA

Analogue clocks minute + sweep seconds hand ≤ 400 mm: 25 mA

Analogue clocks minute 3-wire F/R ≤ 400 mm: 10 mA

Digital Clocks: 5 mA

Time-Code (TC) Slave Clocks

Analogue clocks minute ≤ 400 mm: 14 mA (version with movement 113160-00)

Analogue clocks minute ≤ 400 mm: 12 mA (version with movement 21634-00)

Analogue clocks minute ≤ 400 mm: 4 mA (version with movement 43473-00)

Analogue clocks minute ≤ 400 mm: 10 mA (version with movement 22742-00)

Analogue clocks minute ≤ 900 mm: 20 mA

Analogue clocks minute + stepping seconds hand ≤ 400 mm, indoor: 4 mA (version with movement 43473-00)

Analogue clocks minute + sweep seconds hand ≤ 400 mm, indoor: 10 mA (version with movement 22742-00)

Analogue clocks minute + sweep seconds hand ≤ 400 mm, indoor: 12 mA

Analogue clocks minute + sweep seconds hand ≤ 400 mm, outdoor: 20 mA

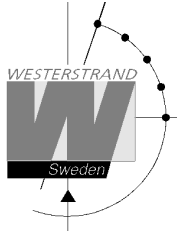
Analogue clocks minute + sweep seconds hand ≤ 900 mm: 27 mA

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Time-Code Marine (TCM) Slave Clocks

Analogue clocks minute ≤ 400 mm: 20 mA

Analogue clocks minute ≤ 900 mm: 20 mA

Analogue clocks minute + sweep seconds hand ≤ 400 mm, outdoor: 27 mA

Analogue clocks minute + sweep seconds hand ≤ 900 mm: 27 mA

Example

A time system consists of 40 pcs. analogue clocks with diameter 300 mm.

The power consumption will then be $40 \times 7,5 = 300 \text{ mA} = 0,3\text{A}$.

Cable length is 100 metres.

$$A = 100 \times 0,3 \times 0,015 = 0,45 \text{ mm}^2$$

Choose a cable with an area of at least $0,45 \text{ mm}^2$.