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 x I x k

A = Area [mm^2]
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

WESTERSTRAND URFABRIK AB
P.O. Box 133 Tel. +46 506 48000 Internet:: http://www.westerstrand.se
SE-545 23 TÖREBODA Fax. +46 506 48051 E-mail: info@westerstrand.se

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 x 7,5 = 300 mA = 0,3A.
Cable length is 100 metres.

A = 100 x 0,3 x 0,015 = 0,45 mm^2

Choose a cable with an area of at least 0,45 mm^2.

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Fax. +46 506 48051

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E-mail: info@westerstrand.se