

ELECTRONIC TIME DISTRIBUTING DEVICE (MASTER CLOCK) TYPE MC-21

- Operation in any time zone.
- Control of analog clocks with indication of minutes.
- Time synchronization for singular PC computers, computer networks or for other devices.
- Synchronization with the atomic time standard by means of GPS or DCF signal, or from the external device through RS-485 input or through impulse input ± 24 V.
- Two relay outputs for synchronization or for controlling external devices such as school bells, lighting systems, alarms etc.
- Simple adjustment during normal operation setting the parameters and programming is possible by means of keyboard the device is equipped with, or from the external PC computer through the RS-232 or RS-485 link using relevant software
- Modular housing with 9M width for mounting directly on DIN-rail.
- Compact size.
- Parameters in line with individual needs and requirements.



Electronic **master clock type MC-21** is designed to control secondary clocks in such places as railway stations, banks, hotels, radio and TV studios etc. This central clock enables:

Controlling a **time network** including **secondary analog** minute **clocks** with **dial-plate** of diameters from **250 mm to 1000 mm** and operating voltage 24 V (data of the clocks are available on the separate catalogue cards). The controlling is based on sending every minute, by means of two-conductor line, the polarized impulse of one-second duration, shifting analog clocks one minute forward. The current capacity of the output is 1 A, which enables to control more than **150 clocks connected to the time network**.

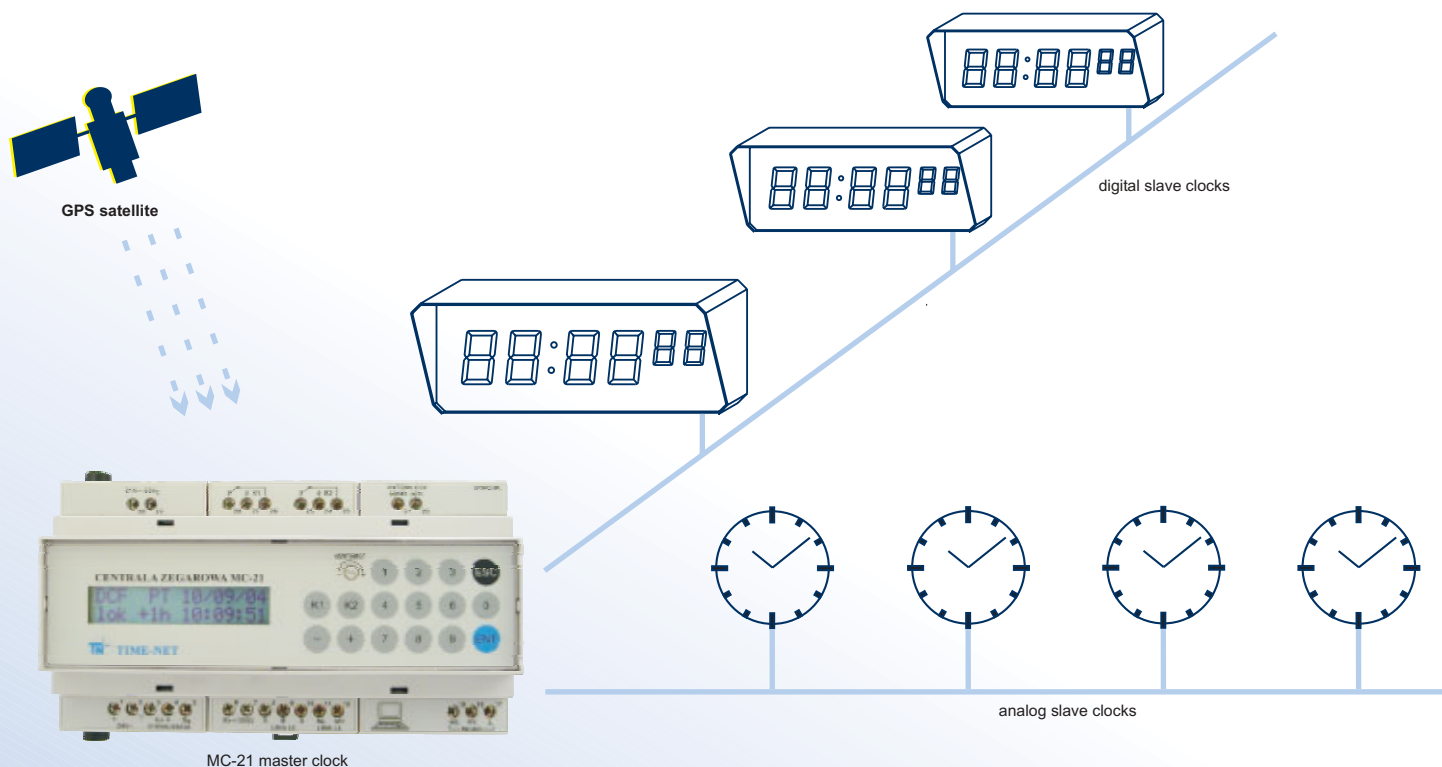
Controlling a **time network** including **secondary digital clocks** of **digits 14 mm to 125 mm high**, equipped with synchronizing input type RS485 with voltaic separation (data of the clocks are available on the separate catalogue cards). The controlling is based on sending every second, by means of two-conductor line, the coded information on the current time. The RS485 input enables **direct controlling of up to 32 clocks**. More clocks can be synchronized using additional standard devices processing the signal sent in RS485 standard.

Additional functions of the MC-21 master clock (detailed description of ordering procedure for the appropriate type can be found on the next page):

Controlling operation of various external devices in daily, weekly or annual cycle is possible after additionally selecting one or two relay outputs with bistable contacts. These outputs also enable time **synchronization for industrial and measuring devices**.

Time **synchronization for computer networks** or for singular PC computers is possible after additionally selecting one of the two optional communication links, enabling connection of the master clock to the PC computer: RS232 or RS485. For this option software is delivered together with the master clock, enabling remote setting of all master clock functions and the easy input of the program of operation for relay outputs, e.g. for controlling school bells, lighting systems etc.

The master clock MC-21 consist of: autonomous clock operating with high precision, 100year calendar, control clock of analog line, LCD display, keyboard, analog line amplifier with current capacity 1 A equipped with electronic protection against overload or short-circuit, digital line transmitter, synchronizing signal receiver, checking and alarm signaling system, feeder and additionally one or two relays and communication link to connection to the PC computer.



The MC-21 master clock **operates autonomously together with one of the four optional synchronizing signal receivers** (selection of the optional receiver should be done at the ordering stage):

External antenna for receiving the DCF-77 signal.

External antenna and build-in GPS receiver.

RS485 input for synchronizing the master clock by a signal from other master clock or by a signal from other external devices e.g. GPS receiver located outside the master clock housing.

Synchronizing input adapted for receiving impulses 24 V e.g. from the MC-20 master clock.

The MC-21 master clock is **synchronized** with the received signal in up-to-date mode, therefore it **does not require setting or adjusting**. At the first start of the control clock one should only input the relevant time zone in 24 hours range in relation to GMT (Greenwich) time, and define the key (way) for changing from summer to winter time and from winter to summer time. Preliminarily in the production process the key data which are used in country of destination of the device are input, (in Poland: the shift in relation to Greenwich time +1 hour and the seasonal time change to take place at 2.00 a.m. to 3.00 a.m. on the last Sunday of March when changing to summer time, and at 03.00 a.m. to 02.00 a.m. last Sunday of October when changing to winter time).

Built-in **control clock** for the analog line is a great convenience for the network servicing. This clock, set at the first start of the central clock to the time which is indicated by analog clocks installed in the network, after starting the line **automatically sets clocks** connected to the network in accordance with the data from the internal clock.

The **100-year calendar** enables the correct switching from summer to winter time and from winter to summer time, and also it enables inputting the relevant program for the annual cycle.

The **basic supply** source for the master clock is the 21 AC/50 Hz voltage, provided from the external transformer of 50 VA. The manufacturer offers also the optional transformer supplied from the mains 230 VAC / 50 Hz, located in the modular housing for mounting directly on the DIN-rail of 4M width.

Due to the possibility of temporary breaks of the supplying mains voltage, the central clock can have **additionally a reserve supply** from the 24 VDC battery with the minimum capacity 1,2 Ah, equipped with the charging system. In case of a break in the basic supply, such capacity of the battery ensures **supporting operation of all 150 analog clocks connected to the network** for the time of at least **15 hours**.

Technical data of MC-21 master clock:

Display	LCD, 2x16 characters/digits in each row.
Time zone programming	Yes, by inputting time shift in relation to GMT time.
Programming of summer / winter time change	Yes, by defining the way (date and time for each change).
Time indication precision:	
- when operating with DFC-77 antenna or GPS receiver	Equal to atomic time standard precision.
- when operating with other synchronizing devices	Equal to synchronizing device precision.
- when operating autonomously	$\pm 1.1 \times 10^{-5}$ (below $\pm 1s/ 24h$)
Basic supply voltage	21V~ $\pm 10\%$, 50Hz $\pm 2\%$
Auxiliary supply voltage	External accumulator 24 VDC, with capacity at least 1,2 Ah, with its own recharging system.
Power consumption with loaded / idle lines	Basic supply: max 40VA/3,5VA ; Auxiliary supply: max 34W/2W
Time of operation when supplied from accumulator battery of 1,2 Ah capacity	Minimum. 15h* with supporting operation of analog clocks.
Reserve supply voltage for time standard	Internal accumulator 3,6V, 60mAh
Duration of time standard operation when supplied from reserve accumulator	Approximately 1 year.
Duration of full charging for reserve supply accumulator of time standard	Minimum 24 hours.
Automatic switch-off for analog line controlling	
- when supplied with basic voltage	$U_p < 18,5 \text{ VAC}$
- when supplied with auxiliary voltage	$U_d < 20,5 \text{ VDC}$
Number of lines	2 (one analog and one digital)
Maximum line length	1200 m
Amplitude of voltage impulses for analog line	24 V
Rated load capacity of analog line	1 A (more then 150 analog clock connected to the line)
Load capacity for digital line	For standard RS485 output: - maximum 32 receivers.
Alarm signaling	Sg output of „open collector” type.
Maximum cross-section of wires connected to terminal block	4 mm ²
Weight	0,5 KG
Allowed ambient conditions:	
- temperature	From 0 C to 40 C
- humidity	From 20% to 80%
- pressure	From 70 kPa to 106 kPa
- atmosphere pollution	No aggressive gases and vapors.
Protection class of housing	IP20 acc. to EN 60529 standard.

*) Taken into account the summer/winter time change in case of basic supply voltage break (continuous operation of all analog clocks for approximately 15 minutes).

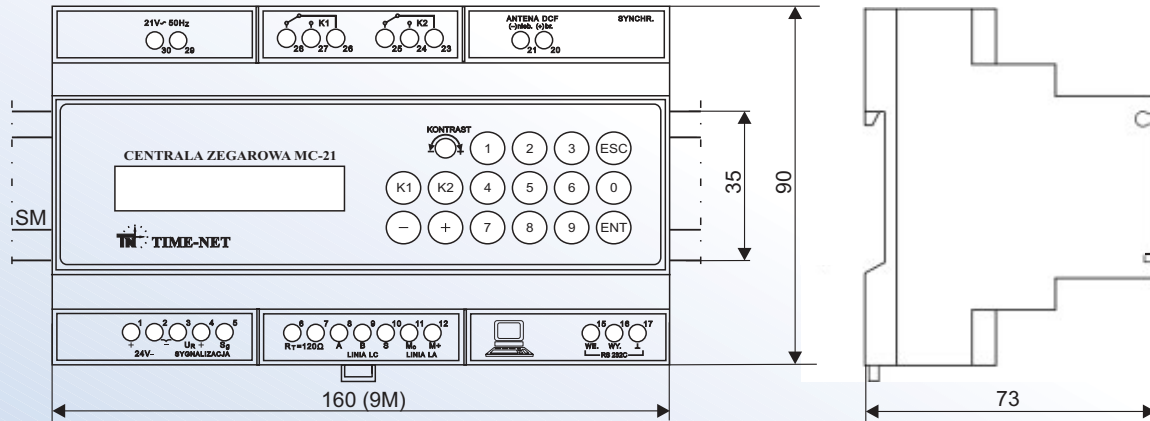
For building the analog line can be used any two-conductor installation cable (most often there is used one pair of unscreened telephone-type stranded cable). One should only ensure, that the voltage drop does not exceed 4 V in any point of the line. For building the digital line can be used one pair of unscreened or screened telephone-type stranded cable.

Technical data of GPS antenna:

- Weight: 40g
- Measurements: 38x43x13
- Protection class IP 65 acc. to EN 60529
- Standard antenna cable length: 5m
(concentric cable type RG174U)
- Supply: 3V-, 30mA
- Operating frequency: 1575,42MHz
- Operating temperature range: -40C to +100C

Technical data of DCF antenna:

- Measurements: 28 x 115
- Protection class: IP 54 acc. EN 60529
- Supply: 10 mA DC
- Operating frequency: 77.5 kHz
- Operating temperature range: -20C to +60C
- Standard antenna cable length 2m (OMY 2x0,75mm²)



Drg.1 : Overall dimensions of master clock :
 M- module of max. 18mm width SM- mounting bus TS (TH) - 35

Determining type of master clock when ordering:

MC-21/A/B/C e.g.: MC-21/GPS/2/485+transformer230V/21V

where subsequent fields **A, B** and **C** mean:

A - type of output synchronizing central clock time:

- GPS - build-in GPS receiver;
- DCF - input for connecting DCF antenna;

RS - input of RS485 for synchronizing master clock time from other devices,
 e.g. from GPS receiver located outside the master clock housing;

LIN - synchronizing input with ±24V impulses.

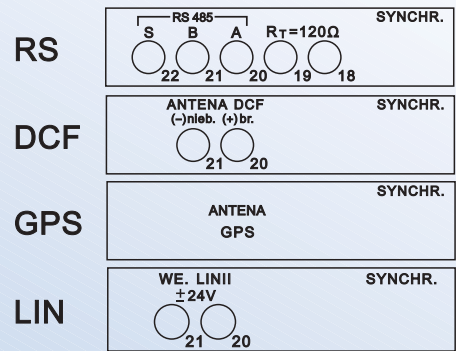
B - number of installed relay outputs: 0, 1 or 2 (number of available channels)

C - communication link with the PC computer:

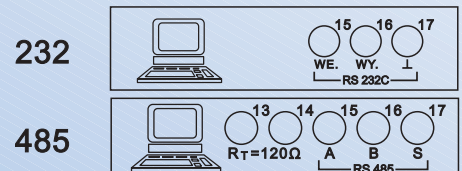
- 000 - no link
- 232 - link of RS-232 type
- 485 - link of RS-485 type

Remarks:

Together with the master clock one can order the 50 VA mains transformer 230 VAC/ 21 VAC located in the modular housing of 4M width for direct mounting on DIN-rail.
 It is possible to apply additional GPS-antenna high frequency cable extension with maximum length 15m.
 The DCF-77 antenna cable can be extended by maximum 25m with cable (2x0,75mm²) without need for any additional actions or equipment.
 The manufacturer reserves the right for introducing changes in construction of this product.



Description of synchronizing input type



Description of communication link type