

Installation and instruction manual

DTS 2390.dcf distributor Redundant DCF 77 DC distributor

Please read these instructions carefully before installing the device.



Certification of the Producer

STANDARDS



The Euro Time Center ETC was developed and produced in accordance with the EU Guidelines:
2004 / 108 / EC

References to the Instruction Manual

1. The information in this Instruction Manual can be changed at any time without notice.
The current version is available for download on www.mobatime.com.
2. This Instruction Manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Should you, nevertheless, have questions or discover errors in this Manual, please contact us.
3. We do not answer for direct or indirect damages, which could occur, when using this Manual.
4. Please read the instructions carefully and only start setting-up the product, after you have correctly understood all the information for the installation and operation.
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References to the installation and handling



1. This device must only be transported in the original packaging and must be kept dry.

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1. Introduction

The DTS 2390.dcf-distributor is a DCF signal distributor. The unmodulated DCF input signal can be distributed to five current loop output signals.

This device is a redundant system containing two identical systems. In the event of an error, the monitoring system switches the outputs from system 1 to system 2. Once the error has been resolved, the system either remains on system 2 or switches back to system 1, depending on the mode of operation.

In order for the system to be truly redundant, each system requires an independent time source (DCF) and an independent power supply.

This device is available with the option of five additional optical outputs.

2. Dimensions

The DTS 2390.dcf-distributor has the following dimensions in millimetres:



3. Description of operation

The DTS 2390.dcf-distributor contains two independent systems, each of them can distribute an incoming signal to five output signals. This device's monitoring function monitors the inputs and outputs for both systems and will switch between the systems under certain circumstances in order to obtain the best available output signal.

3.1 Monitoring the signal

This device's monitoring function monitors the input signal, the output signal and the power supply for each system. The status of both systems is indicated by a red alarm LED for each system on the front of the device.

Switch 6 on the back of the device determines the length of time the system can tolerate a deficient input signal before this is recognized as an error. Thus, brief disturbances in the input signal do not immediately trigger a switch to the other system. When **switch 6** is in the **ON** position, the **time-out** period before the input error is acted upon is **24 hours**. In the OFF position, the error will be acted upon after just approximately 3 minutes. Only errors in both input signals are delayed. All other errors are acted upon without delay once they are detected.

Each channel's output monitoring function can be switched on or off independently. The monitoring function for any unused output channels must be switched off using the corresponding switches 1 through 5 so that the output monitoring will function properly. For channels not being monitored, the monitor LED for the corresponding current loop output will remain on to notify the user of this setting. The corresponding output will, if available, continue to transmit an output signal.

3.2 Mode of operation

With the operation mode switch, the function of the device and the available input signals can be defined.

3.2.1 Operation with a fixed-system option

The operation of this device with a fix defined option is not affected by any detected errors or signal malfunctions. The chosen system remains active. When the switch is in the system 1 position, the five output signals will always correspond to the input signal of system 1, and when it is in the system 2 position, the output signals will always correspond to the input signal of system 2.

3.2.2 Automatic operation

As soon as the mode of operation switch is in the **auto** position, the monitoring function will attempt to establish the greatest possible availability of the output signal.

The automatic mode always starts with system 1 as the active system.

As soon as the monitoring function detects an error in the input or the outputs for system 1, the device will switch to the output signals from system 2, provided no errors have been detected in system 2.

Switch 7 on the back of the device turns the **switch back** option on and off. When the switch back option is turned on, after switching systems the device will switch back to system 1 as soon as the error in system 1 is no longer present. When the switch back option is turned off, system 2 will continue to be the active system until the device is manually changed to the fixed-system option and back to the automatic mode using the mode of operation switch.

During the first 120 seconds that the device is in automatic mode, switching between systems is disabled so that the monitoring function has sufficient time to assess the signals. **For at least 120 seconds, therefore, system 1 will be the active system following a switch to automatic mode.**

3.3 Bridging the systems

Using switch 8 on the back of the device, the input signal from system 1 can be bridged internally to system 2. This bridging is only possible from system 1 to system 2. It is not possible to route a signal from system 2 to system 1. For system 2, the bridged signal takes priority over its own input signal. When the bridging function is switched on, even if system 2 has its own independent input signal, it will use the bridged input signal.

3.4 Optical outputs

The DTS 2390.dcf-distributor is also available with the option of five additional optical outputs. The optical system always transmits the same signal as the active current loop system. So that the signal can be properly monitored and a choice of system can be made, at least one current loop output must be connected and monitored. If only the optical outputs are required, one of the current loop outputs can be operated with the DC out power supply from either one of the systems. To this end, one of the current loop outputs can be wired as follows:

Current loop pin	Operation from system 1	Operation from system 2
+	DC out system 1 (pin 9)	DC out system 2 (pin 3)
-	GND system 1 (pin 10)	GND system 1 (pin 4)

Should an error be detected in the optical outputs, this will be indicated to the user with the alarm LEDs for both systems flashing at the rate **1 second ON / 1 second OFF**.

3.5 Auxiliary output

On the back of the DTS 2390.dcf-distributor is an auxiliary output. This output provides access to both input signals, an indicator for the active signal, and a collective alarm as a voltage signal with TTL levels.

3.6 System test

This device regularly conducts a system test, which checks, among other things, whether the chosen system can be switched to the output of the device. The auxiliary output is also checked to determine whether it is functioning properly.

If the monitoring function detects an error during the system test, this will be indicated to the user with the alarm LEDs for both systems flashing at the rate **0.5 seconds ON / 0.5 seconds OFF**.

3.7 Alarm relay

The DTS 2390.dcf-distributor comes with a relay, which is activated whenever an error is detected. The contacts can be accessed on the back of the device. When the device is first turned on, the activation of the relay is disabled for the first 120 seconds.

4. Display and configuration

On the front of the device, the DTS 2390.dcf-distributor has a mode of operation switch and a display of the system status. On the back there are twelve DIP switches for configuring the operation of the device, as well as monitor LEDs for the individual outputs.



4.1 Selecting the mode of operation

The mode of operation switch on the front of the device can be used to determine which input signal is to be converted to output.

Position	Meaning
system 2	System 2 is permanently active.
system 1	System 1 is permanently active.
auto	System 1 is active as long as no error is detected in it. In the event of an error, the device will switch to system 2 as long as this has no detected errors. If the switch back option is activated, the device will switch back to system 1 as soon as system 1 is again error-free.

4.2 Status display

The DTS 2391.dcf-distributor displays its status with the following LEDs on the front of the casing:

LED	Status	Meaning	
auto	On	Automatic operation mode has been selected	
	Off	System 1 or system 2 has been permanently selected	
System 1	active	On	System 1 is active
		Off	System 1 is inactive
	power	On	Power supply to system 1 is available
		Off	Power supply to system 1 is unavailable
	signal	On ²⁾	Input signal to system 1 is available
		Off ²⁾	No input signal to system 1
	alarm	On ¹⁾	Error in system 1
		Off	System 1 is functioning error-free
System 2	active	On	System 2 is active
		Off	System 2 is inactive
	power	On	Power supply to system 2 is available
		Off	Power supply to system 2 is unavailable
	signal	On ²⁾	Input signal to system 2 is available
		Off ²⁾	No input signal to system 2
	alarm	On ¹⁾	Error in system 2
		Off	System 2 is functioning error-free.

1) The “alarm” LED can display three different types of alarm. Should more than one alarm be activated at a time, the one with the highest priority will be displayed.

Priority	LED	Meaning
1 (highest)	Flashes at 1 Hz	System error
2	Flashes at 0.5 Hz	Error in the optic outputs (if these are being used)
3	Permanently on	Error in the respective system (in, out, or power)

2) The input signal for each respective system can be determined by looking at the signal LED. To indicate normal operation, the LED will flash on briefly in one-second intervals. If the LED is permanently off, this means there is no input signal. If the LED is permanently on, there is a short circuit in the system input.

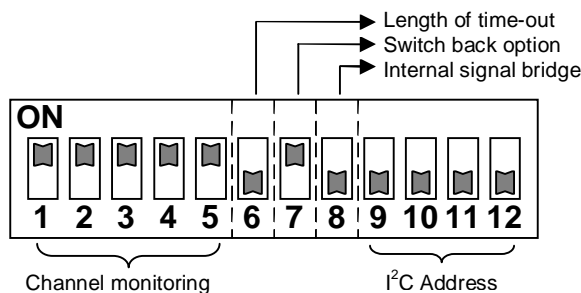
4.3 Signal-monitoring LEDs

On the back of the device there is a monitor LED for each current loop output and optical output that displays the signal that is being routed to each output.

The monitor LED for any current loop outputs not being monitored remains permanently on.

4.4 Configuring the DIP switches

The operation of the DTS 2391.dcf-distributor can be configured using the twelve DIP switches on the back of the device.



Switches 1 through 5 – channel monitoring

These five switches can be used to select which current loop outputs to monitor.

Switch	Position	Meaning
1	ON	Output channel 1 is being monitored.
	OFF	Monitoring of channel 1 has been switched off.
2	ON	Output channel 2 is being monitored.
	OFF	Monitoring of channel 2 has been switched off.
3	ON	Output channel 3 is being monitored.
	OFF	Monitoring of channel 3 has been switched off.
4	ON	Output channel 4 is being monitored.
	OFF	Monitoring of channel 4 has been switched off.
5	ON	Output channel 5 is being monitored.
	OFF	Monitoring of channel 5 has been switched off.

The monitoring of any unused outputs must be **switched off**.

Switch 6 – Length of time-out

Switch 6 can be used to select how long an error must be present in the DCF inputs before it is acted upon by the system.

- ON: Long time-out (approx. 24 hours)
- OFF: Short time-out (approx. 3 minutes)

Switch 7 – Switch back option

Switch 7 can be used to turn the **switch back** option on and off. The switch back option is only applicable when the device is functioning in the automatic mode. If the option is switched on, after the device has switched to system 2 because of an error in system 1, it will switch back to system 1 once this begins to function properly again. If the option is turned off, after switching to system 2 because of an error in system 1, the device will continue to operate on system 2 until the mode of operation switch is adjusted.

- ON: Switch back option active.
- OFF: Switch back option turned off.

Switch 8 – Internal signal bridge

The internal signal bridge can be used to internally transfer the input signal from system 1 to system 2. If system 2 is receiving its own input signal and the internal signal bridge is activated, the transferred input signal from system 1 takes priority for system 2.

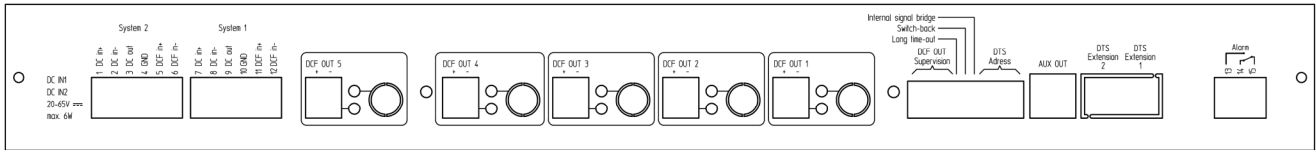
- ON: Signal bridge is active.
- OFF: Signal bridge is inactive.

Switches 9 through 12 - I²C address

Using the switches 9 through 12, the I²C address can be configured for communication with a superordinate DTS unit. The I²C address will not be necessary at this time because communication with a superordinate DTS unit has not been implemented.

5. Connections on the back of the device

On the back side of the device, the DTS 2390.dcf-distributor has the following connections:



5.1 System connectors

The system connectors are laid out as follows:

Terminal	Connection	Description	
System 2	1	DC in+	Input for external DC power supply, system 2, 20...65V
	2	DC in-	Input for external DC power supply, system 2, ground
	3	DC out	24VDC output for power supply to a DCF source
	4	GND	Ground output for power supply to a DCF source
	5	DCF in+	Input + for an unmodulated DCF signal (current loop)
	6	DCF in -	Input – for an unmodulated DCF signal (current loop)
System 1	7	DC in+	Input for external DC power supply, system 1, 20...65V
	8	DC in-	Input for external DC power supply, system 1, ground
	9	DC out	24VDC output for power supply to a DCF source
	10	GND	Ground output for power supply to a DCF source
	11	DCF in+	Input + for an unmodulated DCF signal (current loop)
	12	DCF in -	Input – for an unmodulated DCF signal (current loop)

5.2 Current loop outputs

The DTS 2390.dcf-distributor has five current loop outputs.

Terminal	Description
+	Current loop output +
-	Current loop output -

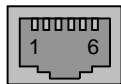
5.3 Optical outputs

The DTS 2390.dcf-distributor has the option of adding five optical outputs with the following specifications:

Specification	Value
Connection type	ST jack bayonet, BFOC/2.5 according to IEC-874-10
Wavelength	820nm

5.4 Auxiliary output

On the back of the DTS 2390.dcf-distributor is an auxiliary TTL output. This output provides access through an RJ-12 jack to both input signals, information regarding the active system, and a general alarm for the device.



Pin	Allocation	Meaning	Signal / limit	Distribution
1	5V	5V power supply	100mA	-
2	DCF in 1	Input signal for system 1	5V TTL	0V: Pulse active
3	DCF in 2	Input signal for system 2	5V TTL	0V: Pulse active
4	System	Active system	Open collector	0V: System 2
5	Alarm	General alarm	3V3 TTL	0V: Alarm
6	GND	Ground	-	

5.5 I²C communication

Systems 1 and 2 each have a separate I²C port for communicating with a superordinate DTS unit. At this time, this function has not been implemented.

5.6 Alarm relay

The contacts for the alarm relay are laid out as follows:

Terminal	Connection	Description
13	Alarm relay: opening contact	Opens with alarm
14	Alarm relay: closing contact	Closes with alarm
15	Alarm relay: common contact	Common connection

The relay contacts can tolerate the following load:
 30W (60 VDC or 1A) or 60VA (30 VAC or 1A)

6. Maintenance

To ensure that the device is switching properly between systems, it is recommended that you adjust the mode of operation switch at least once a year from **auto** to system 2 and back again.

7. Technical data

The technical data regarding the DTS 2390.dcf-distributor are as follows:

Specification	DTS 2390. DCF-distr. DC	DTS 2390.DCF-distr. DC + Opto
Order no. (A/N)	204454	204455
Power supply	20VDC...65VDC	
Power consumption	< 6 watt	
Input signal	DCF current loop	
Output signals	5x DCF current loop, 1x AuxiliaryTTL	5x DCF current loop, 5x DCF optical, 1x AuxiliaryTTL
Ambient temperature	0...50°C, 10-90% relative humidity, without condensation	
Dimensions	19" Rack, 1HE (H x W x D = 483mm x 44mm x 53mm)	
Weight	1.4 kg	1.5 kg
Alarm contact	Load DC: 30W (60 VDC or 1A), Load AC: 60VA (30 VAC or 1A)	
Norms	EN 61000-6-2; EN 61000-6-4	

HEADQUARTERS / PRODUCTION

MOSER-BAER AG
Spitalstrasse 7, CH-3454 Sumiswald
Tel. +41 34 432 46 46 / Fax +41 34 432 46 99
moserbaer@mobatime.com / www.mobatime.com

SALES WORLDWIDE

MOSER-BAER SA EXPORT DIVISION
19 ch. du Champ-des-Filles, CH-1228 Plan-les-Ouates
Tel. +41 22 884 96 11 / Fax + 41 22 884 96 90
export@mobatime.com / www.mobatime.com

SALES SWITZERLAND

MOBATIME AG
Stettbachstrasse 5, CH-8600 Dübendorf
Tel. +41 44 802 75 75 / Fax +41 44 802 75 65
info-d@mobatime.ch / www.mobatime.ch

MOBATIME SA
En Budron H 20, CH-1052 Le Mont-sur-Lausanne
Tél. +41 21 654 33 50 / Fax +41 21 654 33 69
info-f@mobatime.ch / www.mobatime.ch

SALES GERMANY, AUSTRIA

BÜRK MOBATIME GmbH
Postfach 3760, D-78026 VS-Schwenningen
Steinkirchring 46, D-78056 VS-Schwenningen
Tel. +49 7720 8535 0 / Fax +49 7720 8535 11
buerk@buerk-mobatime.de / www.buerk-mobatime.de