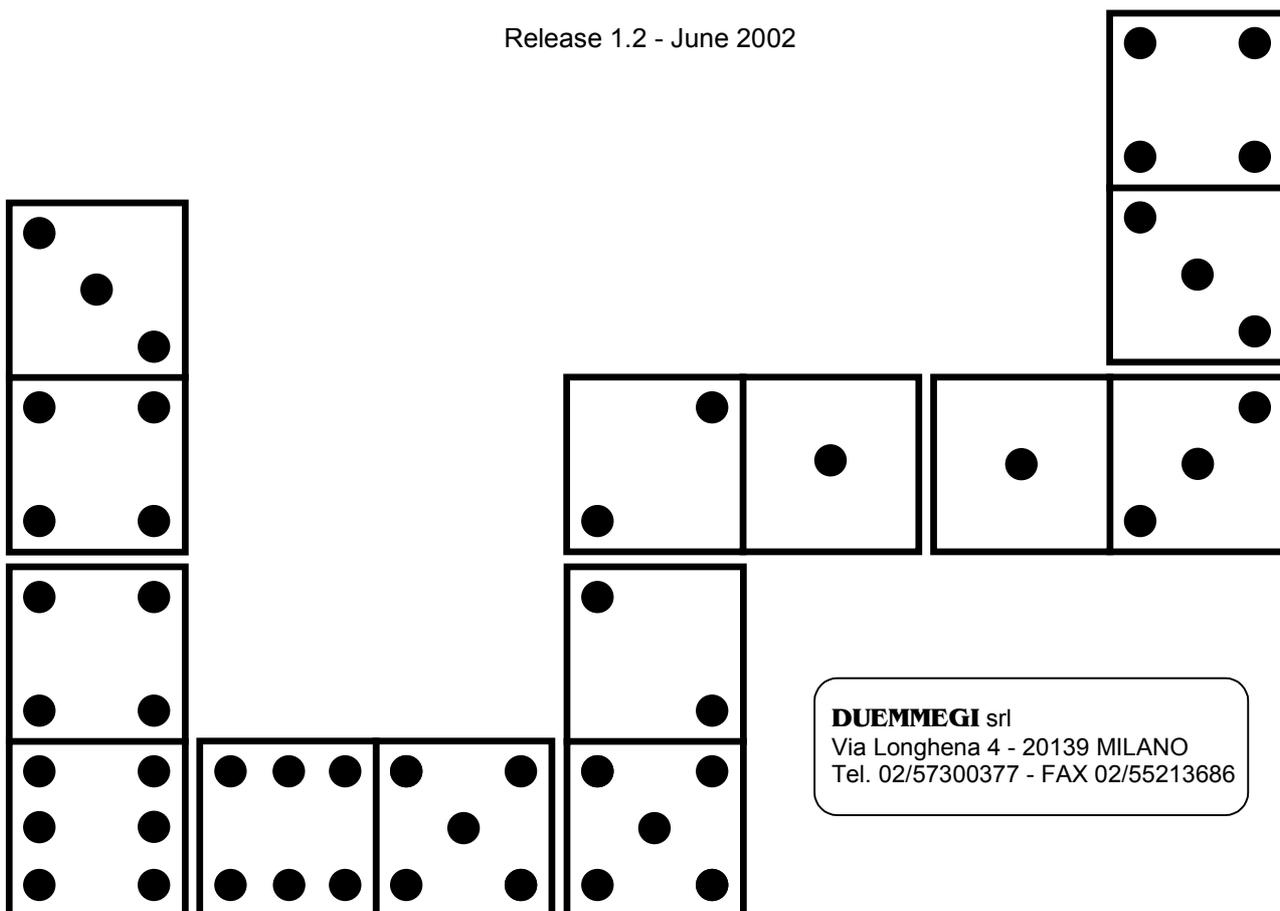


# Domino

## Communication Interface DFTS User's Manual

Release 1.2 - June 2002



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## 1- INTRODUCTION

DFTS is a communication interface allowing to exchange information between one or more **Domino** systems and several supervisors (PC, video-terminals "touch screen", PLC, etc.).

DFTS module provides the following main features:

- one serial RS232 communication port
- one serial RS485 communication port (which operation is fully independent from the previous one)
- optical insulation from the serial ports to **Domino** bus
- standard communication protocol MODBUS RTU allowable on both serial ports
- proprietary communication protocol DXP+ allowable on both serial ports
- bus monitoring by a LED
- monitoring of the activity on the serial ports by LEDs
- 24Vdc power supply
- standard DIN 6M housing

DFTS module allows all programming and setup features of **Domino** bus by a PC equipped with service program *BD-Tools* provided by **DUEMMEGI**.

In respect to the basic interface DFRS, DFTS allows to implement a true graphic supervisor system to watch the operating conditions of the installation and to send commands to the outputs.

More DFTS modules may be connected together through their own RS485 ports in order to control more **Domino** systems from the same supervisor; as an example, think of a palace where each apartment is handled by a separate **Domino** system, but all of them are reported to the same supervisor, located, e.g., at the reception.

Thanks to the integrated MODBUS RTU protocol, it is virtually possible to interface to any SCADA supervision software and to any video-terminal on the market.

For more details about the programming and the setup procedures of **Domino** system, refer to the programming manual; the operations to be executed are the same as when using DFRS basic interface.

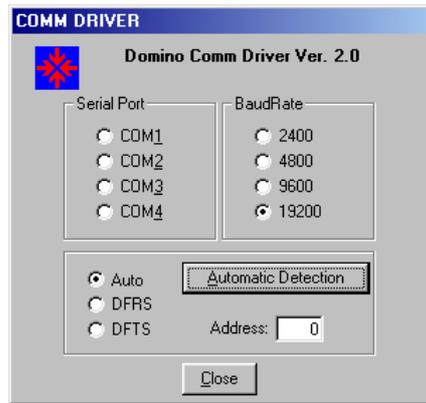
This manual will describe the setup of DFTS interface, assuming that the user has a minimum of practice with **Domino** bus system and with *BD-Tools* service program.

## 2- SETTING UP

A PC equipped with the service program *BD-Tools* (**release 3.0.0** or higher), provided by **DUEMMEGI**, is needed for the setting up of DFTS interface.

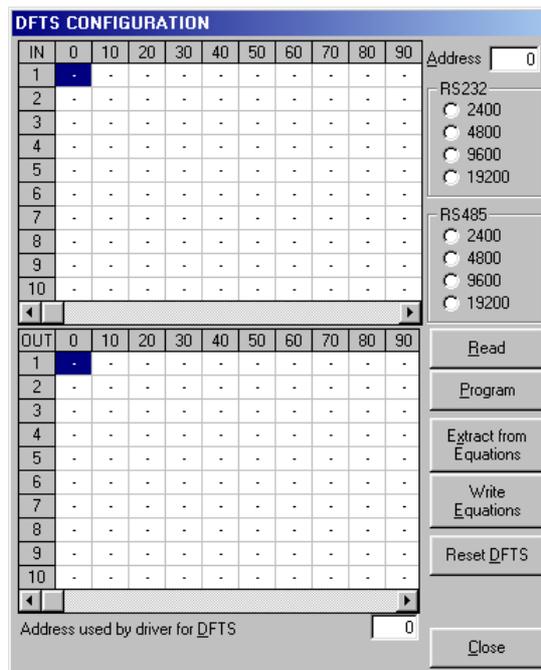
After having launched the program and connected the PC to the RS232 serial port of DFTS interface (using the cable shipped together with it), switch on the 24Vdc power supply and establish the communication selecting from *BD-Tools* menu **Communication** and then **Enable Communication**.

The following window will be shown:



Press the **Automatic Detection** button to enable the communication; the program will automatically search for the serial port of the PC to which DFTS interface is connected at the current baud rate. Close the window COMM DRIVER.

Select **Communication** and then **DFTS Configuration** from the menu. The following window will be shown:



The following parameters as to be entered for the proper setting of DFTS interface:

1. Setting of input and output modules connected to the bus: click by the mouse in the related cells of the grids IN (input modules) and OUT (output modules); selected modules will be added to the polling cycle of DFTS interface during normal operation
2. Interface address: choose a number in the range 1 to 255 to be assigned as address of DFTS interface; the address is mandatory in a MODBUS network
3. Baud rate of the two serial ports: may be different for RS232 port and RS485 port
4. The cell named as "Address used by driver for DFTS" allows to choose the address used by *BD-Tools* to communicate with DFTS interface. Address 0 (zero) is the "jolly address" and it is recognized by DFTS regardless of the address assigned at point 2

The button **Read** downloads from DFTS interface the current configuration. The button **Program** allows to upload to DFTS the settings currently shown in the window.

The button **Extract from Equations** builds the configuration map of the modules from the equations currently loaded in the editor window of *BD-Tools*; this button is useful because it allows creating the map of the modules to be polled by DFTS during the normal operation.

The system configuration (or the modules connected to **Domino** bus) may be normally deduced from the equations written in the editor window. According to input and output addresses used in the loaded program, *BD-Tools* can build the map of the modules to be polled by DFTS interface.

It may occur that the system have some modules that are not involved in any equation, e.g. input modules used for the alarm monitoring by a supervisor. In this case, however it is needed to add these modules to the polling cycle of DFTS in order to enable the status reading and the diagnostic functions.

For this reason, it is possible to include in the program the following configuration equation:

$$DFTS = ( I_m, \dots, I_n, O_i, \dots, O_j, V_x, \dots, V_y )$$

where  $I_m$  is the input module  $m$ ,  $I_n$  is the input module  $n$ , etc. Note that only the input and output addresses have to be specified, without taking any care to the module type (e.g. the rolling shutter module and the dimmer module are both output modules).

Concerning the virtual points, remember that they get both one input and one output addresses.

**NOTE:** The configuration equation is not needed for **ALL** the connected modules, but it is recommended to specify **AT LEAST** the modules not involved in the other equations.

The button **Write Equations** writes in the editor window the configuration equation derived from the current module settings as reported in the IN and OUT grids.

The button **Reset DFTS** allows to force a soft reset of DFTS module; in this way DFTS will execute the reading of the modules specified in its polling map and it will restart.

### 3- RAM MAP

DFTS interface has a RAM memory organized in 16-bit registers (Word). Each Word contains information about the status of **Domino** bus modules that are connected to DFTS interface. Following table resumes the map of available information and the related meanings.

Word (dec)	Meaning	Note
0001	Status or value of input module 1	Beginning of the map of input modules (Word Address = module Address) (Note 1)
0002	Status or value of input module 2	
.....		
255	Status or value of input module 255	
256	Not used	
257	Status or value of output module 1	Beginning of the map of output input modules (Word Address = Module Address+256) (Note 1)
258	Status or value of output module 2	
.....		
511	Status or value of output module 255	
512	Config. of input modules 0..15	Beginning of the configuration map of input modules (Note 2)
513	Config. of input modules 16..31	
...		
527	Config. of input modules 240..255	
528	Config. of output modules 0..15	Beginning of the configuration map of output modules (Note 2)
529	Config. of output modules 16..30	
...		
543	Config. of output modules 240..255	
544	Fault input modules 0..15	Beginning of the map of fault input modules (Note 3)
545	Fault input modules 16..30	
...		
559	Fault input modules 240..255	
560	Fault output modules 0..15	Beginning of the map of fault output modules (Note 3)
561	Fault output modules 16..130	
...		
575	Fault output modules 240..255	
576	System diagnostics	Cumulative diagnostic Word (bus failure/ module failure) (Note 4)
577..639	Not used	
640	Day of the week	Beginning of the Date and Time map of DFCK bus module (Note 5)
641	Hour	
642	Minutes	
643	Date	
644	Month	
645	Year	

**Note 1:** The status of DIGITAL input and output modules is coded according to the binary code (bit=1: activated, bit=0: de-activated). The less significant bit of the Word is related to the input (or output) point 1, the most significant bit is related to the input (or output) point 16. In the case of ANALOG input and output modules, the Word contains the value.

**Note 2:** The configuration map of input and output modules contains the information about the bus modules inserted in the polling cycle of DFTS interface. Information are coded according to the binary code; the less significant bit of each Word of the configuration map is related to the lower address module, the most significant bit is related to the higher address module (bit=1: configured module, bit=0: not configured module). The Words of the configuration map may be read and written (in this last case the polling cycle will be updated according to the new information).

**Note 4:** bit0=module failure, bit 1=bus failure, bit2=bus is locked low, bit3=bus is locked high, bit4=EEPROM configuration is invalid.

**Note 5:** The Words from 640 to 645 contains a copy of the current date and time of DFCK module (if connected); these Words may be written, and in this case the clock of DFCK module will be updated according to the new parameters. This feature allows the reading and the writing of the clock using the reading and writing functions of the RAM registers. The change of each one of these parameters will reset the field of the seconds of DFCK module.

## 4- COMMUNICATION PROTOCOLS

The following communication protocols have been implemented into DFTS interface:

- proprietary protocol DXP+
- standard protocol MODBUS RTU

*BD-Tools* uses DXP+ protocol for any programming and setting up procedure.

MODBUS RTU is a standard protocol standard allowing to exchange information with many PLCs, SCADA supervision softwares, video-terminals "touch screen", etc.

DFTS module, for both protocols, is a SLAVE device. The activation of the protocols do not need any specific procedure, because they are always and simultaneously enabled; in other words, DFTS module answers to an inquiry according to the same protocol.

The two serial ports (RS485 and RS3232) are completely independent each one from the other, both from the physical and the logic point of view; therefore, one or the other port may be used for the system programming, for the communication with a supervisor, etc.

Some application notes about the configuration of third party devices (e.g. video-terminal) are available; for more details, contact **DUEMMEGI** offices.

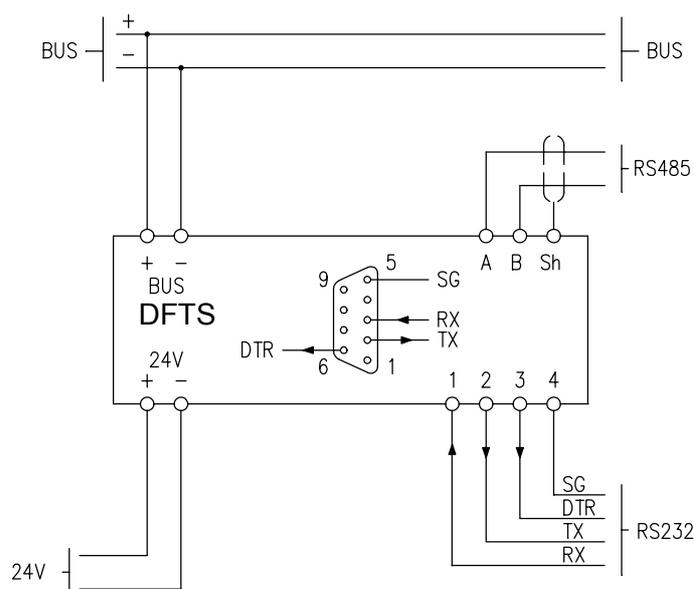
## 5- INSTALLATION

### 5.1- Connections

DFTS module has a serial RS232 DB9 connector on the front panel. The signals of this connector are replied on a 4-way terminal block (terminals 1 to 4); this is useful when the installation requires a permanent connection to the supervisor system and the front panel connector, for this application, is not suitable.

The RS485 serial port is available at terminals A, B and Sh. Other two terminal block allow the connection of the 24Vdc power supply and the **Domino** bus.

Following schematic diagram shows the connections to be made.



## 5.2- Monitor LEDs

DFTS interface features some LEDs with the following functions:

- **ON** (green): lights when 24V  $\overline{\text{---}}$  power supply is applied
- **TX** (yellow) and **RX** (red) on RS232 side: monitor the communication on the serial RS232 port
- **TX** (yellow) and **RX** (red) on RS485 side: monitor the communication on the serial RS485 port
- **MON** (red): reports information about the **Domino** bus activity as here bottom explained:
  - fixed lighting during 10 seconds about at the system power-up: initialization procedure during which DFTS reads the type of the modules connected to **Domino** bus and enclosed in the configuration
  - continuous fixed lighting: DFTS configuration is wrong
  - continuous quick blinking (0.2 seconds ON, 0.2 seconds OFF): **Domino** bus failure (loss of the power supply, short circuit on the bus, wrong connection)
  - continuous slow blinking (0.5 seconds ON, 0.5 seconds OFF): failure of one or more **Domino**
  - short flash every constant time interval: normal condition; the short flash of the LED occurs every time DFTS restarts the polling cycle of the modules enclosed in its configuration map

## 5.3- RS485 line termination

The serial RS485 interface of DFTS module was specifically designed for multi-drop application (for max 32 devices). Avoid "star" connections of RS485 line because, on the contrary, many communication errors may occur due to the reflections in the cable (particularly in the case of very long line).

RS485 networks require a termination resistor at the beginning and at the end of the line; DFTS module allows to insert/remove a termination resistor by the dip-switch SW3, placed under the cover of the RS 485 terminal block.

**Warning:** the termination resistors can be placed only at the beginning and at the end of the RS485 network.

Dip-switches SW1 and SW2 allow to insert a pull-up resistor from line A to internal +5V and a pull-down resistor from line B to internal 0V; these two resistors fixes the line in a "fail-safe" status when the communication is stopped or during the transitions from TX to RX. Il dip-switch SW4 non è utilizzato.

**Warning:** the "fail-safe" resistors can be inserted on one device only among those connected to the same RS485 network; on the contrary the signal amplitude may decrease.

## 6- TECHNICAL CHARACTERISTICS

Supply voltage	24V $\pm$ 25% SELV
MAX current consumption	120mA @ 24V
Interface 1	EIA RS232-C, SUB-D 9-way female connector, signals replied on screw terminal block, DCE, full duplex
Interface 2	EIA RS485 2-wire half duplex
MAX length RS485 cable	1200m twisted and shielded pair, max cable capacitance: 42pF/m
Short circuit protection on RS 485 line	internal with current limiting and auto-restoring thermal fuses
Termination resistor on RS485 line	120 $\Omega$ by dip switch
"Fail-safe" protection on RS485	220 $\Omega$ pull-up/down by dip switches
Baud rate RS232 side	1.2 to 19.2 Kbit/s
Baud rate RS485 side	1.2 to 19.2 Kbit/s
Insulation	RS232-RS485 from other circuits: 1000V
Operating temperature	-5 +50°C
Storage temperature	-20 +70°C
Protection degree	IP20

## 7- DIMENSIONS

