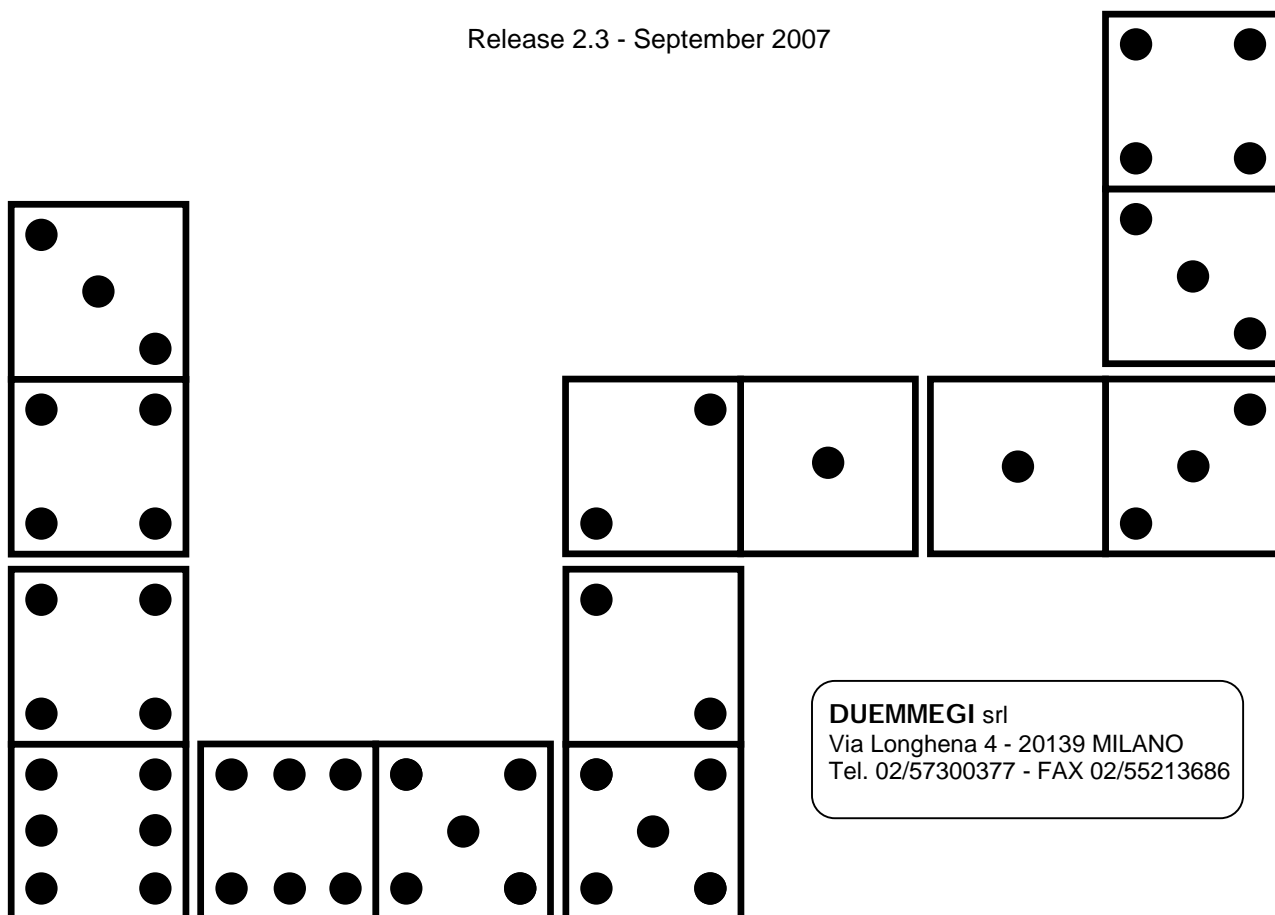


Domino

Communication Interface DFTS User's Manual

Release 2.3 - September 2007



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Index

1- INTRODUCTION	3
2- SETTING UP.....	4
3- RAM MAP	6
3.1- Reading and editing of DFCK setting.....	8
3.2- Reading and editing of DFCKII setting.....	10
3.3- Reading and editing of DFCL setting	14
4- COMMUNICATION PROTOCOLS	17
5- SETTING UP.....	18
5.1- Connections.....	18
5.2- Monitor LEDs.....	18
5.3- RS485 line termination	19
6- TECHNICAL CHARACTERISTICS.....	19
7- DIMENSIONS	19

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
- operation monitor by a three-color LED on the front panel
- monitoring of the activity on the serial ports by LEDs on the front panel
- firmware can be upgraded
- 24Vdc or 12Vca 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 connected together through their own RS485 ports in order to control more **Domino** systems from the same supervisor; as example, think to a palace where each apartment is handled by a separate **Domino** system, but all them are reported to the same supervisor, located, e.g., at the reception.

Thanks to the integrated MODBUS RTU protocol, it is possible the interfacing to any SCADA supervision software and to any video-terminal provided with the driver for this protocol.

DFTS interface also allows to read and change the operation parameters of some special **Domino** modules as DFCK, DFCKII and DFCL.

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.

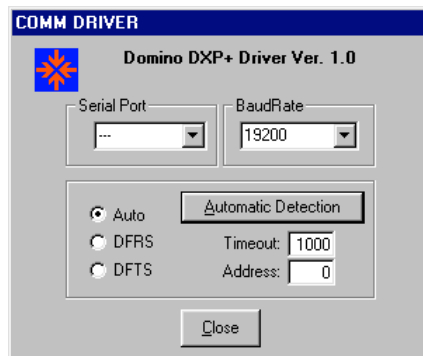
Note: this manual refers to DFTS interface with firmware version 2.0 or higher.

2- SETTING UP

A PC equipped with the service program *BD-Tools* (**release 4.0.3** or higher), provided by **DUEMMEGI**, is needed for the setting up of DFTS interface.

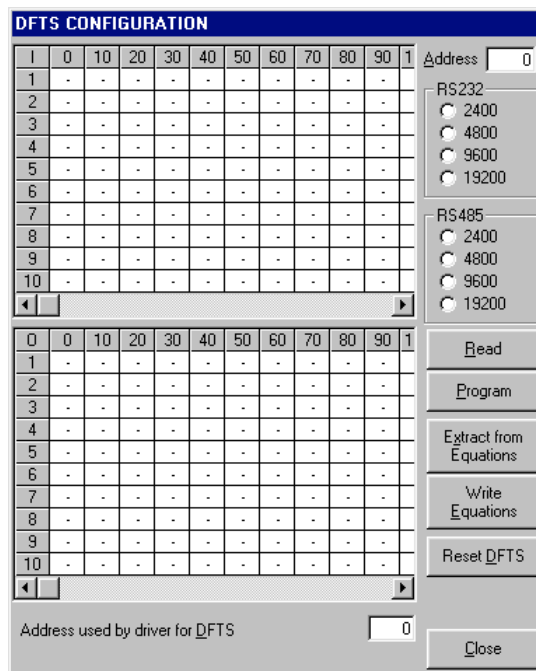
After having launched the program and connected the PC to the RS232 serial port of DFTS interface (using the cable shipped together it), switch on the power supply and establish the communication selecting from *BD-Tools* menu **Communication** and then **Enable Communication**.

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 **Programming** 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 **I** (input modules) and **O** (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 occurs 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. The address related to the virtual points specified in the configuration equation is not the base address of the module: it is the specific address of a single virtual section of the same module. Trying to assign a not allowed address to a virtual section, the *BDTools* compiler will show an error message.

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.

Note: the Words not specified in all the following tables are reserved or not used. All address and values, unless otherwise specified, are in decimal format.

Word	Meaning	Notes
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	
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)
586	DFCK or DFCKII address	Address of DFCK module to be read/modified (Note 5)
588	DFCL address	Address of DFCL module to be read/modified (Note 5)
640	Day of the week	Beginning of the Date and Time map of DFCK bus module (Note 6)
641	Hour	(Note 6)
642	Minutes	(Note 6)
643	Date	(Note 6)
644	Month	(Note 6)
645	Year	(Note 6)
648	DFCC1 Connected loads	Current status of the 8 loads controlled by DFCC1 (Note 7)
649	DFCC1 instantaneous active power	Measuring unit: Watt
650	DFCC1 instantaneous reactive power	Measuring unit: VAR
651	DFCC1 instantaneous apparent power	Measuring unit: VA
652	DFCC1 Cosfi	Dimensionless number; the read value is multiplied by 1000
653	DFCC1 average active power	Measuring unit: Watt
654	DFCC1 average reactive power	Measuring unit: VAR
655	Not used	
Follows on next page....		

Word	Meaning	Notes
656	DFCC2 Connected loads	Current status of the 8 loads controlled by DFCC2 (Note 7)
657	DFCC2 instantaneous active power	Measuring unit: Watt
658	DFCC2 instantaneous reactive power	Measuring unit: VAR
659	DFCC2 instantaneous apparent power	Measuring unit: VA
660	DFCC2 Cosfi	Dimensionless number; the read value is multiplied by 1000
661	DFCC2 average active power	Measuring unit: Watt
662	DFCC2 average reactive power	Measuring unit: VAR
663	Not used	
664	DFCC3 Connected loads	Current status of the 8 loads controlled by DFCC3 (Note 7)
665	DFCC3 instantaneous active power	Measuring unit: Watt
666	DFCC3 instantaneous reactive power	Measuring unit: VAR
667	DFCC3 instantaneous apparent power	Measuring unit: VA
668	DFCC3 Cosfi	Dimensionless number; the read value is multiplied by 1000
669	DFCC3 average active power	Measuring unit: Watt
670	DFCC3 average reactive power	Measuring unit: VAR

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 least 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 most significant byte of the Word contains the status related to the lower addresses, the least significant byte contains the status related to the higher addresses. For instance:

Word 512 – configuration of inputs: I7 I6 I5 I4 I3 I2 I1 I0 I15 I14 I13 I12 I11 I10 I9 I8

Word 513 – configuration of inputs: I23 I22 I21 I20 I19 I18 I17 I16 I31 I30 I29 I28 I27 I26 I25 I24

The meaning of each bit is: bit=1: configured modulo, 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 3: The map of fault input and output modules provides the information about the modules that are not answering to the polling of DFTS interface. Each Word is coded according to the binary code; the most significant byte of the Word contains the status related to the lower addresses, the least significant byte contains the status related to the higher addresses. For instance:

Word 544 – fault input modules: I7 I6 I5 I4 I3 I2 I1 I0 I15 I14 I13 I12 I11 I10 I9 I8

Word 545 – fault input modules: I23 I22 I21 I20 I19 I18 I17 I16 I31 I30 I29 I28 I27 I26 I25 I24

The meaning of each bit is: bit=1: fault module, bit=0: module OK. The Words in the fault modules map are read-only.

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: Words 586 and 588 must be used to set the address (or better the identification number) of DFCK and DFCL module to be read or modified. For more details refer to the following paragraphs.

Note 6: The Words from 640 to 645 contains a copy of the current date and time of DFCK or DFCKII module (if connected and if its ID is set to 1); these Words may be also written, and in this case the clock of DFCK or DFCKII 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 or DFCKII module. The day of the week is coded as number in the range 0 to 6, where 0=Sunday, 1=Monday and so on. The Words related to Hour, Minutes, Date, Month and Year are coded in BCD format.

Note 7: The Word 648 reports the current ON/OFF status of the 8 loads controlled by a DFCC module (if installed). The higher byte is always zero, the lower byte reports the load status (1=ON, 0=OFF) with LSB = load 1 and MSB = load 8.

3.1- Reading and editing of DFCK setting

DFTS interface allows to read and modify the setting of DFCK module (if installed). This allows to display and edit on a touch screen (or any other SCADA system), through the MODBUS protocol or DXP+, the settings ON, OFF and AUTO for each one of the 4 controlled zones, the names assigned to each zone and the scheduled times.

Warning:

- To enable the reading/editing of the settings of installed DFCK, *the value 1 must be written to the Word 586; no other value than 1 are allowed for DFCK.*
- In all cases, only 1 Word at a time must be written.
- If DFCK module is not operating or it is not connected, then DFTS *does not answer (timeout) to the reading and writing commands sent to that DFCK.*

Operating mode setting and name of the zones for DFCK:

Note 1: 2 ASCII characters for each Word. First 4 Words refer to the text on the first line of DFCK display, the next 4 Words refer to the text on the second line.

Word	Meaning	Notes
6019	Operating mode of the zones	1 Word, the higher byte is not used. The lower byte contains, each 2 bits, the setting of the 4 zones as follows: 0=AUTO, 1=ON, 2=OFF. The 2 least significant bits refer to zone 1, those most significant bits to zone 4
-	Reset command to DFCK	Non allowed for DFCK
6024..6031	Name of zone 1 DFCK	Note 1
6032..6039	Name of zone 2 DFCK	Note 1
6040..6047	Name of zone 3 DFCK	Note 1
6048..6055	Name of zone 4 DFCK	Note 1

Scheduling times DFCK:

Note: Each Word in the following table contains the amount of minutes of the week for each timing/zone; a switch ON and a switch OFF timing is specified for each timing/zone.

The bit 14 (the second bit on the left) of the Words **related to the ON timing** for each zone means:

- Ø Bit14 = 0: the related timing applies to all days of the week (daily scheduling, DFCK shows the symbol ** on the display at the day of the week position)
- Ø Bit14 = 1: the related timing applies to a well defined day of the week (weekly scheduling, 0=Sunday....6=Saturday)

The bit 14 of the Words referred to the OFF timing is instead always zero. If a Word contains the value 65535, then no more timings for that zone have been specified.

Said WordON and WordOFF the values referred to the ON and OFF timings, to change the timing from amount of minutes of the week format to the Day/Hour/Minute format, proceed as follows:

ON Timing:

```
IF WordON>16383 THEN VAR1=WordON-16384 ELSE VAR1=WordON
DAYON=INT(VAR1 / (60x24))
HHON=INT((VAR1 - (DAYONx60x24)) / 60)
MMON=VAR1 - (DAYONx60x24) - (HHONx60)
IF WordON<16384 THEN DAYON=7
```

(Supposing to assign the value DAYON = 7 to indicate "each day").

OFF Timing:

```
VAR2=WordOFF
DAYOFF=INT(VAR2 / (60x24))
HHOFF=INT((VAR2 - (DAYOFFx60x24)) / 60)
MMOFF=VAR2 - (DAYOFFx60x24) - (HHOFFx60)
IF WordON<16384 THEN DAYOFF=7
```

(Supposing to assign the value DAYON = 7 to indicate "each day").

Said DAYON, HHON, MMON, DAYOFF, HHOFF and MMOFF the values referred to ON and OFF timing, to change the timing in the format Day/Hour/Minute to the format amount of minutes of the week (or of the day in the case of "each day") proceed as follows:


```
VAR1=DAYON
IF VAR1 = 7 THEN
    WordON=0
    VAR1=0
ELSE
    WordON=16384
ENDIF
WordON = WordON + MMON + (HHONx60) + (VAR1x60x24)
WordOFF = MMOFF + (HHOFFx60) + (VAR1x60x24)
```

(Supposing in this case too to have assigned the value DAYON = 7 to indicate "each day").

Timing	Zone 1 ON	Zone 1 OFF	Zone 2 ON	Zone 2 OFF	Zone 3 ON	Zone 3 OFF	Zone 4 ON	Zone 4 OFF
1	6056	6057	6078	6079	6100	6101	6122	6123
2	6058	6059	6080	6081	6102	6103	6124	6125
3	6060	6061	6082	6083	6104	6105	6126	6127
4	6062	6063	6084	6085	6106	6107	6128	6129
5	6064	6065	6086	6087	6108	6109	6130	6131
6	6066	6067	6088	6089	6110	6111	6132	6133
7	6068	6069	6090	6091	6112	6113	6134	6135
8	6070	6071	6092	6093	6114	6115	6136	6137
9	6072	6073	6094	6095	6116	6117	6138	6139
10	6074	6075	6096	6097	6118	6119	6140	6141

3.2- Reading and editing of DFCKII setting

DFTS interface allows to read and modify the setting of one or more DFCKII modules (up to 8, if installed). This allows to display and edit on a touch screen (or any other SCADA system), through the MODBUS protocol or DXP+, the settings ON, OFF and AUTO for each one of the 20 controlled zones, the names assigned to each zone and the scheduled times.

Warning:

- To enable the reading/editing of the settings of installed DFCKII, *the related identification number must be written to the Word 586*; allowed values are in the range 1 to 8.
- In all cases, only 1 Word at a time must be written.
- If DFCKII module is not operating or it is not connected, then DFTS *does not answer* (timeout) to the reading and writing commands sent to that DFCKII itself.
- To make operating the modifications made on the parameters or timings of DFCKII, the reset command must be sent to the module.

Operating mode setting and name of the zones for DFCKII:

Note 1: Higher byte: odd zone (1,3,5, or 7); lower byte: even zone(2,4,6, or 8). The setting are coded as follows: 0=AUTO, 1=ON, 2=OFF.

Note 2: 2 ASCII characters for each Word. First 4 Words refer to the text on the first line of DFCKII display, the next 4 Words refer to the text on the second line.

Word	Meaning	Notes
6023	Reset command to DFCKII	Write the value 4005 to this Word to reset DFCKII module
6046	Operating mode of zones 1 and 2	Note 1
6047	Operating mode of zones 3 and 3	Note 1
6048	Operating mode of zones 5 and 6	Note 1
6049	Operating mode of zones 7 and 8	Note 1
6050	Operating mode of zones 9 and 10	Note 1
6051	Operating mode of zones 11 and 12	Note 1
6052	Operating mode of zones 13 and 14	Note 1
6053	Operating mode of zones 15 and 16	Note 1
6054	Operating mode of zones 17 and 18	Note 1
6055	Operating mode of zones 19 and 20	Note 1
6144..6151	Name of zone 1 DFCKII	Note 2
6152..6159	Name of zone 2 DFCKII	Note 2
6160..6167	Name of zone 3 DFCKII	Note 2
6168..6175	Name of zone 4 DFCKII	Note 2
6176..6183	Name of zone 5 DFCKII	Note 2
6184..6191	Name of zone 6 DFCKII	Note 2
6192..6199	Name of zone 7 DFCKII	Note 2
6200..6207	Name of zone 8 DFCKII	Note 2
6208..6215	Name of zone 9 DFCKII	Note 2
6216..6223	Name of zone 10 DFCKII	Note 2
6224..6231	Name of zone 11 DFCKII	Note 2
6232..6239	Name of zone 12 DFCKII	Note 2
6240..6247	Name of zone 13 DFCKII	Note 2
6248..6255	Name of zone 14 DFCKII	Note 2
6256..6263	Name of zone 15 DFCKII	Note 2
6264..6271	Name of zone 16 DFCKII	Note 2
6272..6279	Name of zone 17 DFCKII	Note 2
6280..6287	Name of zone 18 DFCKII	Note 2
6288..6295	Name of zone 19 DFCKII	Note 2
6296..6303	Name of zone 20 DFCKII	Note 2

Scheduling times DFCKII:

Note: Each Word in the following table contains the amount of minutes of the week for each timing/zone; a switch ON and a switch OFF timing is specified for each timing/zone.

The bit 14 (the second bit on the left) of the Words **related to the ON timing** for each zone means:

- Ø Bit14 = 0: the related timing applies to all days of the week (daily scheduling, DFCK shows the symbol ** on the display at the day of the week position)
- Ø Bit14 = 1: the related timing applies to a well defined day of the week (weekly scheduling, 0=Sunday....6=Saturday)

The bit 14 of the Words related to the OFF timing is instead always zero. If a Word contains the value 65535, then no more timings for that zone have been specified.

Said WordON and WordOFF the values referred to the ON and OFF timings, to change the timing from amount of minutes of the week format to the Day/Hour/Minute format, proceed as follows:

ON Timing:

```
IF WordON>16383 THEN VAR1=WordON-16384 ELSE VAR1=WordON
DAYON=INT(VAR1 / (60x24))
HHON=INT((VAR1 - (DAYONx60x24)) / 60)
MMON=VAR1 - (DAYONx60x24) - (HHONx60)
IF WordON<16384 THEN DAYON=7
```

(Supposing to assign the value DAYON = 7 to indicate "each day").

OFF Timing:

```
VAR2=WordOFF
DAYOFF=INT(VAR2 / (60x24))
HHOFF=INT((VAR2 - (DAYOFFx60x24)) / 60)
MMOFF=VAR2 - (DAYOFFx60x24) - (HHOFFx60)
IF WordON<16384 THEN DAYOFF=7
```

(Supposing to assign the value DAYON = 7 to indicate "each day").

Said DAYON, HHON, MMON, DAYOFF, HHOFF and MMOFF the values referred to ON and OFF timing, to change the timing in the format Day/Hour/Minute to the format amount of minutes of the week (or of the day in the case of "each day") proceed as follows:

```
VAR1=DAYON
IF VAR1 = 7 THEN
    WordON=0
    VAR1=0
ELSE
    WordON=16384
ENDIF
WordON = WordON + MMON + (HHONx60) + (VAR1x60x24)
WordOFF = MMOFF + (HHOFFx60) + (VAR1x60x24)
```

(Supposing in this case too to have assigned the value DAYON = 7 to indicate "each day").

Fascia	Z1 ON	Z1 OFF	Z2 ON	Z2 OFF	Z3 ON	Z3 OFF	Z4 ON	Z4 OFF	Z5 ON	Z5 OFF
1	6304	6305	6346	6347	6388	6389	6430	6431	6472	6473
2	6306	6307	6348	6349	6390	6391	6432	6433	6474	6475
3	6308	6309	6350	6351	6392	6393	6434	6435	6476	6477
4	6310	6311	6352	6353	6394	6395	6436	6437	6478	6479
5	6312	6313	6354	6355	6396	6397	6438	6439	6480	6481
6	6314	6315	6356	6357	6398	6399	6440	6441	6482	6483
7	6316	6317	6358	6359	6400	6401	6442	6443	6484	6485
8	6318	6319	6360	6361	6402	6403	6444	6445	6486	6487
9	6320	6321	6362	6363	6404	6405	6446	6447	6488	6489
10	6322	6323	6364	6365	6406	6407	6448	6449	6490	6491
11	6324	6325	6366	6367	6408	6409	6450	6451	6492	6493
12	6326	6327	6368	6369	6410	6411	6452	6453	6494	6495
13	6328	6329	6370	6371	6412	6413	6454	6455	6496	6497
14	6330	6331	6372	6373	6414	6415	6456	6457	6498	6499
15	6332	6333	6374	6375	6416	6417	6458	6459	6500	6501
16	6334	6335	6376	6377	6418	6419	6460	6461	6502	6503
17	6336	6337	6378	6379	6420	6421	6462	6463	6504	6505
18	6338	6339	6380	6381	6422	6423	6464	6465	6506	6507
19	6340	6341	6382	6383	6424	6425	6466	6467	6508	6509
20	6342	6343	6384	6385	6426	6427	6468	6469	6510	6511
21	6344	6345	6386	6387	6428	6429	6470	6471	6512	6513

Fascia	Z6 ON	Z6 OFF	Z7 ON	Z7 OFF	Z8 ON	Z8 OFF	Z9 ON	Z9 OFF	Z10 ON	Z10 OFF
1	6514	6515	6556	6557	6598	6599	6640	6641	6682	6683
2	6516	6517	6558	6559	6600	6601	6642	6643	6684	6685
3	6518	6519	6560	6561	6602	6603	6644	6645	6686	6687
4	6520	6521	6562	6563	6604	6605	6646	6647	6688	6689
5	6522	6523	6564	6565	6606	6607	6648	6649	6690	6691
6	6524	6525	6566	6567	6608	6609	6650	6651	6692	6693
7	6526	6527	6568	6569	6610	6611	6652	6653	6694	6695
8	6528	6529	6570	6571	6612	6613	6654	6655	6696	6697
9	6530	6531	6572	6573	6614	6615	6656	6657	6698	6699
10	6532	6533	6574	6575	6616	6617	6658	6659	6700	6701
11	6534	6535	6576	6577	6618	6619	6660	6661	6702	6703
12	6536	6537	6578	6579	6620	6621	6662	6663	6704	6705
13	6538	6539	6580	6581	6622	6623	6664	6665	6706	6707
14	6540	6541	6582	6583	6624	6625	6666	6667	6708	6709
15	6542	6543	6584	6585	6626	6627	6668	6669	6710	6711
16	6544	6545	6586	6587	6628	6629	6670	6671	6712	6713
17	6546	6547	6588	6589	6630	6631	6672	6673	6714	6715
18	6548	6549	6590	6591	6632	6633	6674	6675	6716	6717
19	6550	6551	6592	6593	6634	6635	6676	6677	6718	6719
20	6552	6553	6594	6595	6636	6637	6678	6679	6720	6721
21	6554	6555	6596	6597	6638	6639	6680	6681	6722	6723

Fascia	Z11 ON	Z11 OFF	Z12 ON	Z12 OFF	Z13 ON	Z13 OFF	Z14 ON	Z14 OFF	Z15 ON	Z15 OFF
1	6724	6725	6766	6767	6808	6809	6850	6851	6892	6893
2	6726	6727	6768	6769	6810	6811	6852	6853	6894	6895
3	6728	6729	6770	6771	6812	6813	6854	6855	6896	6897
4	6730	6731	6772	6773	6814	6815	6856	6857	6898	6899
5	6732	6733	6774	6775	6816	6817	6858	6859	6900	6901
6	6734	6735	6776	6777	6818	6819	6860	6861	6902	6903
7	6736	6737	6778	6779	6820	6821	6862	6863	6904	6905
8	6738	6739	6780	6781	6822	6823	6864	6865	6906	6907
9	6740	6741	6782	6783	6824	6825	6866	6867	6908	6909
10	6742	6743	6784	6785	6826	6827	6868	6869	6910	6911
11	6744	6745	6786	6787	6828	6829	6870	6871	6912	6913
12	6746	6747	6788	6789	6830	6831	6872	6873	6914	6915
13	6748	6749	6790	6791	6832	6833	6874	6875	6916	6917
14	6750	6751	6792	6793	6834	6835	6876	6877	6918	6919
15	6752	6753	6794	6795	6836	6837	6878	6879	6920	6921
16	6754	6755	6796	6797	6838	6839	6880	6881	6922	6923
17	6756	6757	6798	6799	6840	6841	6882	6883	6924	6925
18	6758	6759	6800	6801	6842	6843	6884	6885	6926	6927
19	6760	6761	6802	6803	6844	6845	6886	6887	6928	6929
20	6762	6763	6804	6805	6846	6847	6888	6889	6930	6931
21	6764	6765	6806	6807	6848	6849	6890	6891	6932	6933

Fascia	Z16 ON	Z16 OFF	Z17 ON	Z17 OFF	Z18 ON	Z18 OFF	Z19 ON	Z19 OFF	Z20 ON	Z20 OFF
1	6934	6935	6976	6977	7018	7019	7060	7061	7102	7103
2	6936	6937	6978	6979	7020	7021	7062	7063	7104	7105
3	6938	6939	6980	6981	7022	7023	7064	7065	7106	7107
4	6940	6941	6982	6983	7024	7025	7066	7067	7108	7109
5	6942	6943	6984	6985	7026	7027	7068	7069	7110	7111
6	6944	6945	6986	6987	7028	7029	7070	7071	7112	7113
7	6946	6947	6988	6989	7030	7031	7072	7073	7114	7115
8	6948	6949	6990	6991	7032	7033	7074	7075	7116	7117
9	6950	6951	6992	6993	7034	7035	7076	7077	7118	7119
10	6952	6953	6994	6995	7036	7037	7078	7079	7120	7121
11	6954	6955	6996	6997	7038	7039	7080	7081	7122	7123
12	6956	6957	6998	6999	7040	7041	7082	7083	7124	7125
13	6958	6959	7000	7001	7042	7043	7084	7085	7126	7127
14	6960	6961	7002	7003	7044	7045	7086	7087	7128	7129
15	6962	6963	7004	7005	7046	7047	7088	7089	7130	7131
16	6964	6965	7006	7007	7048	7049	7090	7091	7132	7133
17	6966	6967	7008	7009	7050	7051	7092	7093	7134	7135
18	6968	6969	7010	7011	7052	7053	7094	7095	7136	7137
19	6970	6971	7012	7013	7054	7055	7096	7097	7138	7139
20	6972	6973	7014	7015	7056	7057	7098	7099	7140	7141
21	6974	6975	7016	7017	7058	7059	7100	7101	7142	7143

3.3- Reading and editing of DFCL setting

DFTS interface allows to read and modify the setting of one or more DFCL modules (up to 15, if installed). This allows to display and edit on a touch screen (or any other SCADA system), through the MODBUS protocol or DXP+, the general setting and the scheduled times.

Warning:

- To enable the reading/editing of the settings of installed DFCL, *the related identification number must be written to the Word 588*; allowed values are in the range 1 to 15.
- In all cases, only 1 Word at a time must be written.
- If DFCL module is not operating or it is not connected, then DFTS *does not answer* (timeout) to the reading and writing commands sent to that DFCL itself.
- To make operating the modifications made on the parameters or timings of DFCL, the reset command must be sent to the module.

General setting:

Note 1: The temperature is given as Kelvin degrees multiplied by 10. To change from the value in Celsius degrees to this format, multiply the Celsius value by 10 and then add 2730:

$$^{\circ}\text{K} \times 10 = (^{\circ}\text{C} \times 10) + 2730$$

To change from the Kelvin value multiplied by 10 to the Celsius value, subtract 2730 and then divide by 10:

$$^{\circ}\text{C} = ((^{\circ}\text{K} \times 10) - 2730) / 10$$

Word	Meaning	Notes
8065	Language/Season	Higher byte: language coded 0=IT, 1=EN, 2=FR, 3=DE Lower byte: season coded 0=Winter, 1=Summer
8071	Reset command to DFCL	Write to this Word the value 12197 to reset DFCL module
8072	Winter set point T1	Note 1
8073	Winter set point T2	Note 1
8074	Winter set point T3	Note 1
8075	Winter set point T4	Note 1
8076	Winter set point T5	Note 1
8077	Winter set point To	Note 1
8080	Summer set point T1	Note 1
8081	Summer set point T2	Note 1
8082	Summer set point T3	Note 1
8083	Summer set point T4	Note 1
8084	Summer set point T5	Note 1
8085	Summer set point To	Note 1
8148	Operating mode zones 1 and 2	Higher byte alto: zone 1, lower byte: zone 2. The setting of each zone are coded as follows: 1=Manual, 2=Auto.
8149	Operating mode zones 3 and 4	Higher byte alto: zone 3, lower byte: zone 4. The setting of each zone are coded as follows: 1=Manual, 2=Auto

Timing and set point setting of the zones:

Note 1: Each Word contains the timing coded as amount of minutes of the day; therefore, the content of each timing Word is in the range 0 (0:00) to 1439 (23:59). Each timing n of a day recalls the set point specified by the related byte named "set point for timing n" in the following table; as example, for the zone 1, the timing 1 of Sunday (Word 8192) will activate the set point specified in the higher byte of the Word 8200 (set point for timing 1). See also Note 2.

Note 2: Higher byte: set point recalled by the odd timing (1,3,5 or 7), lower byte: set point recalled by the even timing (2,4,6 or 8); each byte contains the set point number (1, 2, 3, 4, 5 and 6 corresponding to T1, T2, T3, T4, T5 and To) recalled by the related timing (1..8). If the set point number is zero, then no scheduling point has been defined in that position.

Warning: following tables apply exclusively to DFCL with firmware 4.0 or higher.

Word Zone 1		Word Zone 2		Word Zone 3		Word Zone 4		Meaning	Notes
Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer		
8192	8704	8320	8832	8448	8960	8576	9088	Sunday: timing 1	Note 1
8193	8705	8321	8833	8449	8961	8577	9089	Sunday: timing 2	Note 1
8194	8706	8322	8834	8450	8962	8578	9090	Sunday: timing 3	Note 1
8195	8707	8323	8835	8451	8963	8579	9091	Sunday: timing 4	Note 1
8196	8708	8324	8836	8452	8964	8580	9092	Sunday: timing 5	Note 1
8197	8709	8325	8837	8453	8965	8581	9093	Sunday: timing 6	Note 1
8198	8710	8326	8838	8454	8966	8582	9094	Sunday: timing 7	Note 1
8199	8711	8327	8839	8455	8967	8583	9095	Sunday: timing 8	Note 1
8200	8712	8328	8840	8456	8968	8584	9096	Sunday: set point timing 1-2	Note 2
8201	8713	8329	8841	8457	8969	8585	9097	Sunday: set point timing 3-4	Note 2
8202	8714	8330	8842	8458	8970	8586	9098	Sunday: set point timing 5-6	Note 2
8203	8715	8331	8843	8459	8971	8587	9099	Sunday: set point timing 7-8	Note 2
8208	8720	8336	8848	8464	8976	8592	9104	Monday: timing 1	Note 1
8209	8721	8337	8849	8465	8977	8593	9105	Monday: timing 2	Note 1
8210	8722	8338	8850	8466	8978	8594	9106	Monday: timing 3	Note 1
8211	8723	8339	8851	8467	8979	8595	9107	Monday: timing 4	Note 1
8212	8724	8340	8852	8468	8980	8596	9108	Monday: timing 5	Note 1
8213	8725	8341	8853	8469	8981	8597	9109	Monday: timing 6	Note 1
8214	8726	8342	8854	8470	8982	8598	9110	Monday: timing 7	Note 1
8215	8727	8343	8855	8471	8983	8599	9111	Monday: timing 8	Note 1
8216	8728	8344	8856	8472	8984	8600	9112	Monday: set point timing 1-2	Note 2
8217	8729	8345	8857	8473	8985	8601	9113	Monday: set point timing 3-4	Note 2
8218	8730	8346	8858	8474	8986	8602	9114	Monday: set point timing 5-6	Note 2
8219	8731	8347	8859	8475	8987	8603	9115	Monday: set point timing 7-8	Note 2
8224	8736	8352	8864	8480	8992	8608	9120	Tuesday: timing 1	Note 1
8225	8737	8353	8865	8481	8993	8609	9121	Tuesday: timing 2	Note 1
8226	8738	8354	8866	8482	8994	8610	9122	Tuesday: timing 3	Note 1
8227	8739	8355	8867	8483	8995	8611	9123	Tuesday: timing 4	Note 1
8228	8740	8356	8868	8484	8996	8612	9124	Tuesday: timing 5	Note 1
8229	8741	8357	8869	8485	8997	8613	9125	Tuesday: timing 6	Note 1
8230	8742	8358	8870	8486	8998	8614	9126	Tuesday: timing 7	Note 1
8231	8743	8359	8871	8487	8999	8615	9127	Tuesday: timing 8	Note 1
8232	8744	8360	8872	8488	9000	8616	9128	Tuesday: set point timing 1-2	Note 2
8233	8745	8361	8873	8489	9001	8617	9129	Tuesday: set point timing 3-4	Note 2
8234	8746	8362	8874	8490	9002	8918	9130	Tuesday: set point timing 5-6	Note 2
8235	8747	8363	8875	8491	9003	8619	9131	Tuesday: set point timing 7-8	Note 2

Word Zone 1		Word Zone 2		Word Zone 3		Word Zone 4		Meaning	Notes
Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer		
8240	8752	8368	8880	8496	9008	8624	9136	Wednesday: timing 1	Note 1
8241	8753	8369	8881	8497	9009	8625	9137	Wednesday: timing 2	Note 1
8242	8754	8370	8882	8498	9010	8626	9138	Wednesday: timing 3	Note 1
8243	8755	8371	8883	8499	9011	8627	9139	Wednesday: timing 4	Note 1
8244	8756	8372	8884	8500	9012	8628	9140	Wednesday: timing 5	Note 1
8245	8757	8373	8885	8501	9013	8629	9141	Wednesday: timing 6	Note 1
8246	8758	8374	8886	8502	9014	8630	9142	Wednesday: timing 7	Note 1
8247	8759	8375	8887	8503	9015	8631	9143	Wednesday: timing 8	Note 1
8248	8760	8376	8888	8504	9016	8632	9144	Wednesday: set point timing 1-2	Note 2
8249	8761	8377	8889	8505	9017	8633	9145	Wednesday: set point timing 3-4	Note 2
8250	8762	8378	8890	8506	9018	8634	9146	Wednesday: set point timing 5-6	Note 2
8251	8763	8379	8891	8507	9019	8635	9147	Wednesday: set point timing 7-8	Note 2
8256	8768	8384	8896	8512	9024	8640	9152	Thursday: timing 1	Note 1
8257	8769	8385	8897	8513	9025	8641	9153	Thursday: timing 2	Note 1
8258	8770	8386	8898	8514	9026	8642	9154	Thursday: timing 3	Note 1
8259	8771	8387	8899	8515	9027	8643	9155	Thursday: timing 4	Note 1
8260	8772	8388	8900	8516	9028	8644	9156	Thursday: timing 5	Note 1
8261	8773	8389	8901	8517	9029	8645	9157	Thursday: timing 6	Note 1
8262	8774	8390	8902	8518	9030	8646	9158	Thursday: timing 7	Note 1
8263	8775	8391	8903	8519	9031	8647	9159	Thursday: timing 8	Note 1
8264	8776	8392	8904	8520	9032	8648	9160	Thursday: set point timing 1-2	Note 2
8265	8777	8393	8905	8521	9033	8649	9161	Thursday: set point timing 3-4	Note 2
8266	8778	8394	8906	8522	9034	8650	9162	Thursday: set point timing 5-6	Note 2
8267	8779	8395	8907	8523	9035	8651	9163	Thursday: set point timing 7-8	Note 2
8272	8784	8400	8912	8528	9040	8656	9168	Friday: timing 1	Note 1
8273	8785	8401	8913	8529	9041	8657	9169	Friday: timing 2	Note 1
8274	8786	8402	8914	8530	9042	8658	9170	Friday: timing 3	Note 1
8275	8787	8403	8915	8531	9043	8659	9171	Friday: timing 4	Note 1
8276	8788	8404	8916	8532	9044	8660	9172	Friday: timing 5	Note 1
8277	8789	8405	8917	8533	9045	8661	9173	Friday: timing 6	Note 1
8278	8790	8406	8918	8534	9046	8662	9174	Friday: timing 7	Note 1
8279	8791	8407	8919	8535	9047	8663	9175	Friday: timing 8	Note 1
8280	8792	8408	8920	8536	9048	8664	9176	Friday: set point timing 1-2	Note 2
8281	8793	8409	8921	8537	9049	8665	9177	Friday: set point timing 3-4	Note 2
8282	8794	8410	8922	8538	9050	8666	9178	Friday: set point timing 5-6	Note 2
8283	8795	8411	8923	8539	9051	8667	9179	Friday: set point timing 7-8	Note 2
8288	8800	8416	8928	8544	9056	8672	9184	Saturday: timing 1	Note 1
8289	8801	8417	8929	8545	9057	8673	9185	Saturday: timing 2	Note 1
8290	8802	8418	8930	8546	9058	8674	9186	Saturday: timing 3	Note 1
8291	8803	8419	8931	8547	9059	8675	9187	Saturday: timing 4	Note 1
8292	8804	8420	8932	8548	9060	8676	9188	Saturday: timing 5	Note 1
8293	8805	8421	8933	8549	9061	8677	9189	Saturday: timing 6	Note 1
8294	8806	8422	8934	8550	9062	8678	9190	Saturday: timing 7	Note 1
8295	8807	8423	8935	8551	9063	8679	9191	Saturday: timing 8	Note 1
8296	8808	8424	8936	8552	9064	8680	9192	Saturday: set point timing 1-2	Note 2
8297	8809	8425	8937	8553	9065	8681	9193	Saturday: set point timing 3-4	Note 2
8298	8810	8426	8938	8554	9066	8682	9194	Saturday: set point timing 5-6	Note 2
8299	8811	8427	8939	8555	9067	8683	9195	Saturday: set point timing 7-8	Note 2

Name of the zones for DFCL:

Word	Meaning	Notes
8704..8711	Name of regulated zone 1 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8712..8719	Name of regulated zone 2 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8720..8727	Name of regulated zone 3 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8728..8735	Name of regulated zone 4 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8736..8743	Name of external zone 1 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8744..8751	Name of external zone 2 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8752..8759	Name of external zone 3 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8760..8767	Name of external zone 4 DFCL	2 ASCII characters for each Word. Last 2 Words are not used.
8768..8775	Name of global zone DFCL	2 ASCII characters for each Word. Last 2 Words are not used.

4- COMMUNICATION PROTOCOLS

The following communication protocols have been implemented into DFTS interface:

- Ø proprietary protocol DXP+
- Ø 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.

The baud rate can be independently set for each communication port in the range 2400 to 19200 bit/s; the other communication parameters are fixed to N,8,1 (No parity, 8 data bits, 1 stop bit).

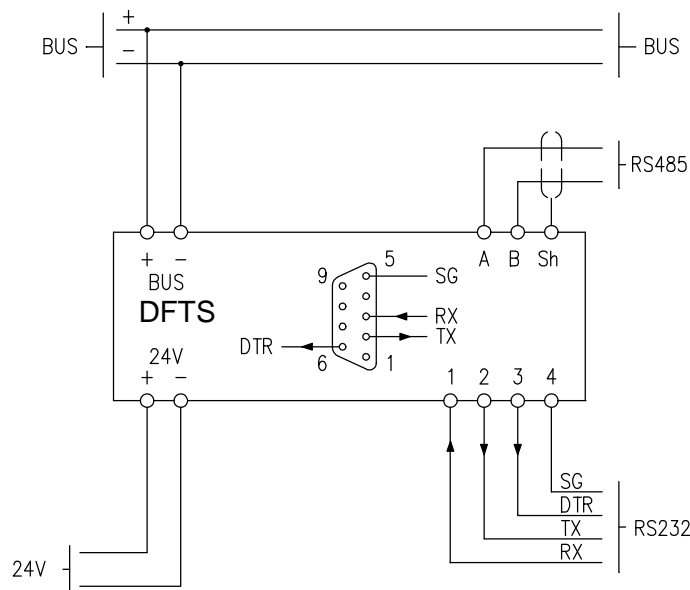
Some application notes about the configuration of third party devices (e.g. video-terminal) are available; for more details, contact **DUEMMEGI** offices.

5- SETTING UP

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 (or 12Vac) 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:

- Ø **ON** (green): lights when 24V $\overline{\overline{\text{---}}}$ power supply is applied
- Ø **TX** (yellow) and **RX** (red) on RS232 side: monitor the communication on the serial RS232 port
- Ø **TX** (yellow) and **RX** (red) on RS485 side: monitor the communication on the serial RS485 port
- Ø **MON** (three colors): reports information about the **Domino** bus activity as here bottom explained:
 - § **ORANGE fixed** lighting (for some seconds at the power up of DFTS module): initialization procedure during which DFTS reads the type of the modules connected to **Domino** bus and enclosed in the configuration
 - § **ORANGE blinking** (short flash at the begin of each polling cycle): failure of one or more **Domino** modules
 - § **RED fixed** lighting: DFTS configuration is wrong
 - § **RED blinking** (0.3 seconds ON and 0.3 seconds OFF): **Domino** bus failure (loss of the power supply, short circuit on the bus, wrong connection)
 - § **GREEN blinking** (short flash at the begin of each polling cycle): normal condition
 - § **RED/GREEN blinking**: firmware download in progress or the donwloaded firmware is not correct

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 electrical 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	18÷24V $\overline{\text{---}}$ SELV or 12÷18V~ SELV
MAX current consumption	100mA @ 24V $\overline{\text{---}}$, 200mA @ 12V~
Interface 1	RS232-C, SUB-D 9-way female connector, signals replied on screw terminal block, DCE, full duplex
Interface 2	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	120Ω by dip switch
"Fail-safe" protection on RS485	220Ω pull-up/down by dip switches
Baud rate RS232 side	2.4 to 19.2 Kbit/s
Baud rate RS485 side	2.4 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

