



CONTROLLERS DATASHEET

DF73

HSE/Profibus DP Controller



DF73 HSE/Profibus DP Controller with 2 Ethernet ports e 1 Profibus DP channel

TECHNICAL INFORMATION

Product Description

DF73 module is the Smar solution for Profibus applications. Its main feature is working as Profibus DP-HSE gateway to provide power to the connectivity and flexibility to the system application. It allows wide communication between the Profibus DP and PA field devices. Through the HSE network and other DF1302 modules, it is possible the communication between field devices and other industrial protocols, providing greater flexibility to the control strategy projects. Through the I/O cards, it is also possible to execute discrete control via relay diagram logic ("Ladder Diagram"), allowing a single and integrated system. The module DF73 also can act as Modbus gateway (slave), allowing the interconnection of modules that are not fieldbus or HSE.



Main Characteristics

Functionalities

- HSE Field Device
- Modbus Gateway (serial and TCP/IP)
- Ethernet connectivity
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Technical Characteristics

- One Profibus DP channel supporting up to 12 Mbps;
- It supports up to 124 Profibus field devices;
- It supports up to 3584 bytes of input and 3584 bytes of output during the data interchange process;
- Limit of 64 external links by the HSE network;
- Up to 16 server sessions and 16 client sessions;
- Maximum of 250 function blocks per DF73;
- One (1) Flexible Function Block (counted into the 250 allowed blocks), with 242 linked parameter to interface between the discrete and continuous control.
- It supports up to 16 HART modules (DF116/DF117).

Available Memory

Volatile Memory	8 Mbytes
Non Volatile Memory *	4 Mbytes
EEPROM	1 kbyte
Flash to the program	4 Mbytes
Flash to monitor	2 Mbytes
Flash to EC1 (Profibus)	4 Mbytes

Continuous Control with Profibus

DF73 is a complete Profibus HSE controller with capacity to execute function blocks. Through the available System302, Studio302 and Syscon configuration tools is possible to configure the DF73 totally.

HSE Communication:

- . Maximum of 512 link objects;
- . Up to 50 requests for non-connected services can be pendent per connection;
- . Supervision up to 2000 points per second;
- . Configurable Views.

Discrete Control

DF73 module also has the capability of access I/O cards through the IMB (Inter-Module Bus), present in the backplane where the DF73 is mounted. Through the IMB, up to 16 racks DF1A or DF93 can be interconnected, each one having up to 4 cards. If there is a redundant controller is necessary the use of rack DF78 or DF92. If DF78 is used plus 16 racks DF1A can be added. If DF92 is used plus 16 racks DF93 can be used. Additional power supplies in other racks can be necessary depending on the load of the cards.

DF Line of I/O cards that can be used

Digital inputs and outputs
Analog inputs and outputs
Temperature
Pulse counting

The user program is developed using relay diagrams (IEC-61131-3), through the LogicView for FFB tool, available inside the System302. The LogicView for FFB is a complete development environment, allowing the user to create, edit, simulate and supervise the developed application. The interconnection with fieldbus is made through a flexible function block.

General Characteristics of the discrete control in the DF73

I/O Points*	1024 discrete points or 512 analog (maximum)
Ladder Function Blocks	2000 blocks (maximum)
Configuration File	120 Kbytes(maximum)**
Program Execution Cycle for 1000 boolean operations (without redundancy)	50 ms (minimum)*** 90 ms (typical)****
Program Execution Cycle with redundancy	Increment of 10ms (typical)***** up to 50 ms (maximum) to execution cycle
Execution Average Time	5.8 ms/Kbytes of program (minimum) 10.5 ms/Kbytes of program (typical)

* The whole number of points includes inputs and outputs, analog or digitals. Maximum may change according I/O type used.

** 120 Kbytes are available in firmware version 2.x and later. Earlier versions limit is 60 Kbytes.

*** 1131 Flexible Function Block adjusted to One (High Priority). Each 1000 boolean operations allocate 8.6 Kbytes.

**** Total execution time will change depending on the adjusted priority of FFB1131. The adjustment should be compatible with the quantity of function blocks and HSE links.

***** The whole execution time may change depending of the configuration file size.

The extensive library of LogicView for FFB function blocks allow the implementation of discrete and/or continuous control.

The complete list can be seen in the LogicView for FFB manual available on the Smar website.

The size of the configuration file and its time of execution can be estimated through a simple addition of the elements that compose the program. The total execution time will be given by the configuration execution time plus the program execution cycle, that is 10ms.

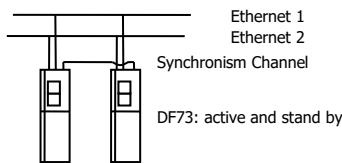
Redundant Operation

DF73 can operate in stand alone (one DF73) or redundant (two DF73) mode. In redundant mode, the two DF73s are capable to communicate through a proprietary channel and change information about configuration and operation status.

Some DF73 elements are redundant:

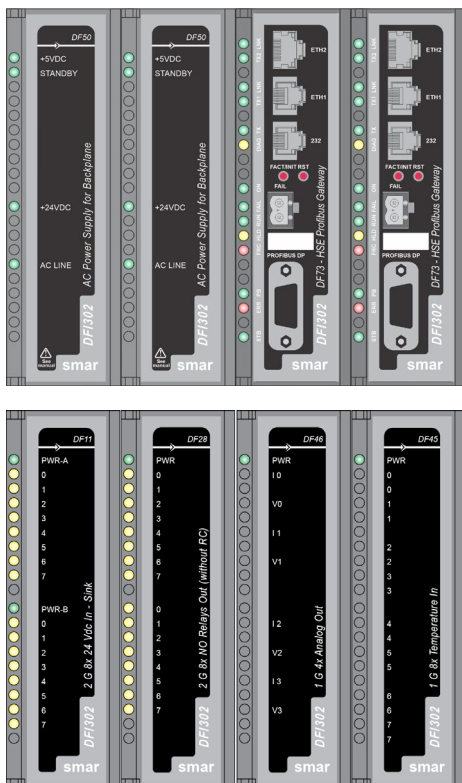
- HSE Block Redundancy
- HSE link Redundancy
- Ladder Redundancy
- Supervision Redundancy
- Ethernet Media Redundancy

Topology to interconnection of DF73s in redundancy:



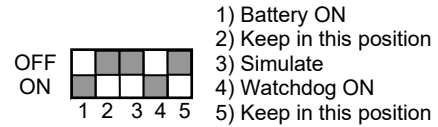
Redundancy General Characteristics:

For redundancy of access in I/O cards, it is necessary the use of a special rack (DF78 or DF92). The two power supply and the two DF73 must be mounted on this rack, in that order. The remaining modules can be interconnected as usually.



Internal Battery

The DF73 has an internal battery that keeps the Real Time Clock (RTC) and its non volatile RAM (NVRAM) when there is lack of external supply. This battery can be either enabled or disabled, depending on the position of the switch 1, in the back part of the DF73. To enable the battery, set the switch to 1 as shown in the following figure:



In this configuration, when there is lack of energy, the RTC and the NVRAM will be supplied by the battery, allowing the retention of all configuration data. In case of equipment storage, it is recommended that the battery is turned off (switch 1 in position OFF).

Battery features:

Type of battery	Battery Panasonic BR-2/3AE2SP - Lithium
Capacity	1200 mAh
Devices maintained by the battery	RTC and NVRAM
Minimum life span	8 years (typical charge of 17uA)
Maximum life span	49 years (typical charge of 2,8uA)
Voltage	3 V (subject to revision when below 2.5 V)

Ports and Communication Channels

Ethernet Port:

Rate	10/100Mbps
Standard	IEEE 802.3u
Isolation	150Vrms
Operation Mode	Full-duplex
Connector	RJ45 with shield*

* Grounded to the rail used for fixing the rack in which the DF73 is installed.

Profibus DP Channel

Rate	From 9.6 Kbit/s to 12 Mbits/s
Standard	EN 50170 and EN 50254
Physical Layer	EIA RS-485
Profibus Modem	EC1 (Hilscher)
Connector	DB9

Modbus Port:

Maximum Rate*	115200 bps
Standard	EIA-232
Connector**	RJ12 with shield
Maximum Current ***	0,5A @ 3.3V

*There is an increase in error rate as we increase the communication rate over 19200 bps. In many situations these errors can be acceptable and they are not noticed by supervision.

** Grounded to the rail used for fixing the rack in which the DF73 is installed

*** Internally protected by solid state fuse.

Redundant Port

Maximum Communication Rate	115200 bps
Standard	EIA-232
Connector*	RJ12 with shield
Maximum Current**	0.5A @ 3.3V

* Grounded to the rail used for fixing the rack in which the DF73 is installed

** Internally protected by solid state fuse.

Failure Relay

Output type	Solid state relay, normally closed (NC), isolated
Maximum Voltage	30 VDC
Maximum Current	200 mA
Overload Protection	Does not have. Must be provided externally
Normal Operation	Open contacts
Failure Condition	Closed contacts
Maximum cable length connected to the relay	30m

Observation: The power supply for the load must not be from an external network (outside the panel).

IMB Bus

Voltage	5 VDC
Bus	8 bits
Failure indication	Yes
Hot Swap	Yes

Module Features:

Controller

CPU	Family ARM7TDMI
Bus	32bits
Architecture	RISC
Performance	40 MIPS
CPU Cache	8kbytes
Clock	40 MHz
DMA	10 channels
Ethernet	MAC 10/100 integrated
Watchdog	Yes (200ms of cycle)
Power Supply Voltage	3.3 V for I/O and 2.5V for core (552 mW)

Card

Operation Voltage	5V (\pm 5% of tolerance)
Typical Current	620 mA
Real Consumption	2,75 W
Environment Air Temperature (Operation)	0 to 60° C according to the IEC 1131 standard
Storage Temperature	-20 to 80° C according to the IEC 1131 standard
Relative Air Humidity (Operation)	5% to 95% (non-condensing)
Cooling Mode	Air Convection
Weight	0.318 kg
Dimensions (HxWxD, mm)	149x40x138 (without package)

Electrical Certification

DF73 follows the immunity test specification to equipment to industrial installation, as IEC61326:2002 standard.

Enclose:

Electrostatic discharge (IEC61000-4-2)	4 kV/8 kV contact/air
EM field (IEC61000-4-3)	10 V/m
Rated power frequency magnet field (IEC61000-4-8)	30 A/m

AC power:

Voltage dip/short interruptions (IEC61000-4-11)	0,5 cycle, each polarity/100%
Burst (IEC61000-4-4)	2 kV
Surge (IEC61000-4-5)	1 kV/2 kV
Conducted RF (IEC61000-4-6)	3 V

DC power

Burst (IEC61000-4-4)	2 kV
Surge (IEC61000-4-5)	1 kV/2 kV
Conducted RF (IEC61000-4-6)	3 V

I/O signal/control

Burst (IEC61000-4-4)	1 kV
Surge (IEC61000-4-5)	1 kV
Conducted RF (IEC61000-4-6)	3 V

I/O signal/control connected directly to power supply network:

Burst (IEC61000-4-4)	2 kV
Surge (IEC61000-4-5)	1 kV/2 kV
Conducted RF (IEC61000-4-6)	3 V

Emission Rate:

Enclose:

30 to 230 MHz (CISPR 16-1, CISPR 16-2)	40 dB (uV/m) quasi peak, measured at 10m distance
239 to 1000 MHz (CISPR 16-1, CISPR 16-2)	40 dB (uV/m) quasi peak, measured at 10m distance

AC mains:

0.15 to 0,5 MHz (CISPR 16-1, CISPR 16-2)	79 dB (uV) quasi peak 66 dB (uV) average
0.5 to 5 MHz (CISPR 16-1, CISPR 16-2)	73 dB (uV) quasi peak 60 dB (uV) average
5 to 30 MHz (CISPR 16-1, CISPR 16-2)	73 dB (uV) quasi peak 60 dB (uV) average

Note: For most recent updates, please consult Smar website www.smar.com

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