CONTROLLERS DATASHEET

DF126

DCN I/O Foundation Fieldbus Gateway

O-PAS™

FOUNDATION HART COMMUNICATION PROTOCOL Modbus

smar
Technology Company

DF126 DCN I/O FOUNDATION fieldbus Gateway with 2 ports Ethernet 100 Mbps and 4 H1 channels

TECHNICAL INFORMATION

Product Description

The O-PAS Architecture allows the construction of reliable, secure and scalable process automation systems, which do not require process shutdown to perform updates and extensions, and which can be applied in existing plants and in new constructions.

The main elements of this architecture are the DCNs, Distributed Control Nodes, which can be physical or virtual. The DCNs are responsible for performing I/O acquisition, control and gateway function applications for integration with existing devices and systems.

The DF126 is a NovaDCN that allows the integration of the O-PAS network with other networks, through System302, such as legacy systems networks, wireless gateways, digital field, I/O and DCS or PLC system controllers.

Main Features

Features

- Allows integration of the O-PAS network with Foundation fieldbus, Modbus, HART, and conventional I/O signal networks. Integration of the O-PAS network with the Profibus network is possible through the Smar Profibus controller, via HSE links;
- Provides access to legacy systems through O-PAS Signal, based on the FDI-defined information model for process automation signals (PA-DIM);
- AML description file.

Technical Characteristics

- Two 10/100 Mbps Ethernet ports;
- Four H1 channels (Foundation fieldbus);
- 128 parameters can be linked externally via HSE and H1 (any ratio between HSE and H1 links totaling 128 links);
- Dynamic function blocks instantiation;
- Instantiates up to 100 function blocks;
- It supports up to 16 HART modules (DF116/DF117).

Available Memory

Volatile Memory	512 Mbytes
Non-Volatile Memory	4 Gbytes Flash
EEPROM	256 Bytes EEPROM 32 Mbytes Serial Flash

Continuous Control with Foundation Fieldbus

The DF126 controller acts as a bridge to the main HSE bus. It performs four functions:

- Message forwarding using Client/Server relationships
- Data republishing using Publisher/subscriber relationships
- Report forwarding using Report source/sink relationships
- Application clock time distribution

Characteristics and H1 Communication Limits

- Four H1 Channels
- It supports up to 32 field devices (maximum of 8 devices per channel). However, more devices can be used (up to 16 per H1 channel) under performance evaluation according to each application;
- Limit of 128 linked parameters (16 VCRs publishers and 16 VCRs subscriber in H1 channel)
- LAS function ("Link Active Scheduler")
- For external controller/H1 equipment links there is a limit of 16 Publisher links and 16 Subscriber links for each H1 port;
- Limit of 16 H1 bridge links (links between H1 ports on the same controller). This limit is shared by all ports, with no per-port limit.

Discrete Control

The DF126 module also can access I/O cards through the IMB (Inter-Module Bus) interface, present on the backplane where the DF126 is mounted. Through this interface, up to 16 racks can be interconnected, each with up to 4 cards.

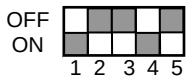
DF Line of I/O modules that can be used:

Digital inputs and outputs
Analog inputs and outputs
Temperature
Pulse counting

Internal Battery

The DF126 Real Time Clock (RTC) is maintained by a non-rechargeable battery when there is no external power supply. This battery can be activated or deactivated depending on the position of switch 1 on the back of the DF126.

To enable the battery, set the switch to 1 as shown in the following figure:



1) Battery ON
2) Keep in this position
3) Simulate
4) Watchdog ON
5) Keep in this position

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	Panasonic BR-2/3AE2SP Lithium Battery
Capacity	1200 mAh
Devices maintained by the battery	RTC
Minimum life span (estimated) (1)(2)	10 years (typical) Variable with operating temperature. It is important to disconnect the battery when the module is not installed.
Voltage	3 V (subject to revision when below 2.5 V)

(1) The battery only comes into operation when the DF126 is de-energized. In this condition, the lifespan of the battery in relation to its charge is estimated to be at least 10 years, for ambient temperatures up to 25°C,
(2) For this reason, it is important to keep the battery switch off when the module is not installed for operation (key 1 of the rear dip switch).

Capacitor

Type of capacitor (1)	GLL1493 (super capacitor)
Capacity	6 s hold (minimum)
Devices maintained	Processor, during shutdown.
Minimum life span (estimated)(2)	10 years (typical) Variable with operating temperature.
Voltage	5.4 V (maximum)

(1) Consult technical assistance if replacement is necessary.
(2) The lifespan of the capacitor is theoretical data, considering operation at fixed temperatures: 18 years, operating at 50°C, 11 years, operating at 55°C and 7 years, operating at 60°C.

Ports and Communication Channels

Ethernet Port

Communication rate	10/100Mbits
Standard	IEEE 802.3u
Isolation	1500 Vrms
Operation Mode	Full-duplex
Connector	RJ45 with shield*

* Grounded to the rail used for fixing the rack in which the DF126 is installed.

H1 Channels

Number of H1 Channels	4
Communication Rate	31.25 kbps
Standard	EN 61158 EN 50170
Physical Layer	ISA-S50.02-1992
MAU Type	Passive (not bus powered)
Isolation	500 Vac
Bus Current	40mA

Modbus Port

Communication Rate (Maximum)*	57600 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 DF126 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	Not available. It must be provided externally
Normal Operation	Open contacts
Failure Condition	Closed contacts
Maximum cable length connected to the relay	30m

Note: 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 Signal	Yes

Typical start-up time, from power-up to H1 start-up

Total start-up time	90 s

Module Features

Controller

CPU	2x ARM Cortex™-A9, 1 GHz
Bus	32 bits
Architecture	RISC
Performance	2000 DMIPS
CPU Cache	L1 Instruction Cache: 32K L1 Data Cache; 32K L2 Cache: 512K
Clock	1 GHz
DMA	-
Ethernet	MAC 10/100 Automated polarity detection and correction
Watchdog	Yes (30s of cycle)
Operation Voltage	33V

Module

Operation Voltage	5V (± 5% of tolerance)
Typical Current	566 mA
Real Consumption	2.83 W
Environment Air Temperature (Operation)	0 to 60º C (IEC 1131)
Storage Temperature	-20 to 80º C (IEC 1131)
Relative Air Humidity (Operation)	5% to 95% (non-condensing)
Cooling Mode	Air Convection
Dimensions (HxWxD, mm)	149x40x138 (without package)

Firmware Update with FBTools

Batch Download	File extension: 7k and txt

Electrical Certification

DF126 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

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

Note: For most recent updates, please consult Smar website https://www.smar.com.br/en

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