X9011

PTT Modem

Auto-dial plug-in modem with tone dial, for EXOflex controllers.

- **Hayes compatible**
- **CE-marked according to the European R&TTE Directive**

- **Requires that EP7408, EP8101 or EP8102 is installed**
- **Safe and reliable dial-up communication**

Modem 9011 is a high performance, 2400 bit/s intelligent modem for use in dial-up telephone network applications in EXO installations.

Main functions

- X9011 has a V.22bis/V.22/V.21 and BELL 212A/103 compatible design with automatic detection of data communication standard.
- Operates in character asynchronous mode.
- Includes non-volatile memory to store user configurations.
- Adaptive equalization for optimum performance over all lines.
- Call progress, carrier and answer tone detectors providing intelligent dialing functions.
- Built-in speaker for easier error detection.
- DTMF and CCITT guard tone generators.

The modem includes a complete "AT" command and feature set compatible with industry standard products. Its operating modes are compatible with CCITT V.22bis, V.22 and V.21 as well as BELL 212A and 103 data communication standards. The modem may only be used in EXO Processor controllers.

High reliability in real life operation

X9011 has been designed for high reliability in real life operation surrounded by noise, interfering equipment and sometimes even thunderstorms generating high voltages and transients. This has been accomplished by a careful component selection and by good layout practice. Critical components in the line interface are chosen to withstand 4 kV isolation voltage between the line and the internal logic. Surge arrestors and a gas discharge tube positioned on the motherboard close to the line inlet takes care of both fast transients and high voltages with a high energy content.

Function

The EXOflex series etc. have an internal slot for optional functions like the X9011 card. The modem is controlled from the EXOreal Processor and its Port 3.

In EXOflex the modem is normally positioned in the lower Option position in section 1 together with a Basic or Dual Basic Serial PIFA like EP8101 or EP8102 and a Processor.

When commanded from an EXO Processor controller the modem will automatically perform a complete handshake as defined by the V.22bis, V.22, V21 or BELL 212A/103 standards to connect with a remote modem.

"AT" command interpreter

The modem includes an advanced "AT" command interpreter compatible with 2400 bit/s industry standard products. It is compatible with the Hayes 2400 Smartmodem command set.

The modem includes internal non-volatile memory to store the current "AT" command configuration etc.

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THE CHALLENGER IN BUILDING AUTOMATION

Settings of speed and format

Settings for speed and format are carried out automatically. The modem corrects itself for speed, number of data bits and parity each time an AT command is sent.

Hardware preparations and installation

Normally no preparations are necessary, but the following steps may be considered.

For installation and removal of the modem, see the instruction EH11...41 / EH10...40 / ECX1.

If no speaker function is desired, disconnect jumper J4. See the figure below.
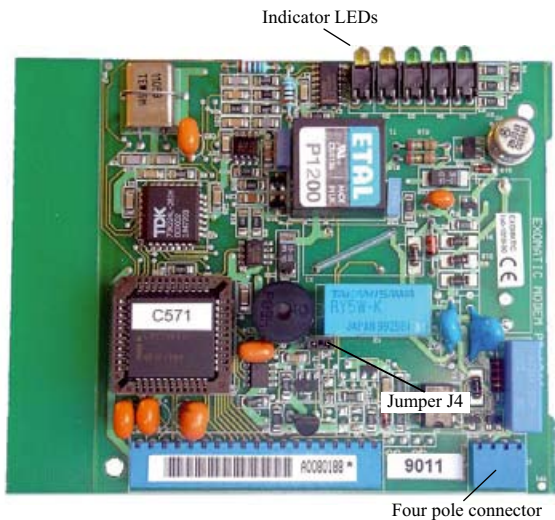
Modem 9011 with cut-off edges

Jumper J4	Description
Jumper off	Speaker is electrically disconnected
Jumper on	Speaker is electrically connected

1 = Connected jumper

Insert the Modem 9011 PCB in the Option slot.

Observe that Modem 9011 with cut-off edges only fits into EXOflex. For other models, the cut-off edges must be cut before mounting.

Hayes commands

The modem is controlled with AT commands according to Extended Hayes. All commands are preceded by AT, with a few exceptions. The modem has an input buffer of 40 characters for these commands.

Some commands have parameters associated with them. If you use one of those commands without parameter, this will be similar to a parameter of 0. For example ATE is equivalent to ATE0.

After a command sequence of 40 characters (or less), the sequence is executed with [Return]. When the modem has executed the response, it sends an OK response. Note that the EXO modem is set up to not respond. See the Q1 command.

The escape sequence +++ is used to control the modem in data mode without disconnecting the line. When in command mode the modem can be reconfigurated as desired. After reconfiguration you type ATO to go back to data mode.

Technical data

Power supply	Internal
Internal cower consumption	
5 V	140 mA
12 V	10 mA
-12 V	10 mA
CE	This product conforms with the requirements of European EMC standards CENELEC EN 61000-6-1, EN 61000-6-3 and TBR21, and carries the CE-mark.
Modulation	CCITT V.22bis, V.22, and V.21 Bell 212A and 103
Dial-up	Tone signals, DTMF
Transmission	Asynchronous
Insulation between line and internal circuits	4 kV
Settings	AT commands
Line	two-wire dial-up
Line Interface	plug-in screw connector
transmit level	-13 dBm
impedance	600 Ohm
reception level	down to -43 dBm

Connections and wiring

Connect the incoming telephone line to terminal R (Ring) and T (Tip) on the controller. If for any reason the modem does not react to ring signals, outputs A and A1 can further connect the telephone line to a telephone etc, if desired. Connector marked with earth symbol (⏚) must be connected to a nearby ground bar or similar with a heavy gauge wire in order to bypass transients.

The table below also shows which pins to connect to in a standard 6 pole RJ12 plug.

Modem 9011 Connector	Function	Connect to	RJ12 plug	UK
R	Ring	Analog PSTN	3 (or 4)	2 (or 5)
T	Tip	Analog PSTN	4 (or 3)	5 (or 2)
A	Secondary Ring	Phone		
A1	Secondary Tip	Phone		
⏚	Transient ground	Ground bar		

The Modem 9011 connector symbols, R, T, A and A1, correspond to the ones on the serial ports on e.g. EP8101 and EP8102.