




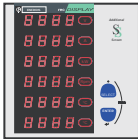






## Energy management and power analysis

### ■ Power monitors DIN 96 and 144













































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# Managing

Selection table	recdigit NODUS		recdigit POWER			recDISPLAY
	DIN 96 power monitor		DIN 144 power monitor			DIN 144 multi-display
						
	Energy  Display	Energy  Quality	Energy  Display	Energy  Quality	Energy  Management	Additional  Screen
Mainly suited for networks:	LV	LV	MV/LV	MV/LV	MV/LV	MV/LV





## Local display\*

3 x U and 3 x V						Multi-display ModBus/JBus  up to 6 parameters chosen on the associated products.
3 x I						
3 x P	via RS485	via RS485				
3 x Q	via RS485	via RS485				
3 x S	via RS485	via RS485				
P total						
Q total						
S total						
3 x PF (inductance - capacitance)	via RS485	via RS485		via RS485	via RS485	
PF total (inductance - capacitance)						
Frequency						





## Metering and energy management\*

E active positive					
E active negative		via RS485			
E reactive positive					
E reactive negative	via RS485	via RS485			
E apparent positive					
E apparent negative		via RS485			
Load curve					
Synchronising input					
Hour meter (h, 1/10, 1/100)					













## Power quality

THD-V et THD-I (max)					
3 x THD-V and 3 x THD-I (inst, min, max)		via RS485			
In (I neutral)					





## Communication

Alarm threshold relay output					
ModBus/JBus link	via RS485	via RS485		via RS485	via RS485

## Options

1 • 2 metering-pulse outputs (Ea & Er)					
2 • 2 analogue outputs					
3 • option 1 + 2					
4 • 4 metering-pulse outputs (Ea+, Ea-, Er+, Er-)					

-  Instantaneous values
-  Instantaneous and maximum values
-  Instantaneous, maximum/minimum and average values (programmable  $\Delta t$  from 1 to 99 minutes)

-  Recording of 1200 active and reactive power values, average over a programmable  $\Delta t$  (i.e: recording of 8 days with a  $\Delta t$  of 10 min).
-  **ALARM** - monitoring of min. and max. values on V, U, I, P, Q, S, F, PF, THD-V, THD-I or **PULSE** - on active, reactive or apparent energy.
-  Recording of the 3 latest overthresholds (date, time, duration, max. value, average value of overshoot) on 3 U, 3 I, P total and PF via digital RS485 link.
-  Analogue output programmable on front panel among the following parameters : V, U, I, P, Q, S (by phase and global), PF and F : 0...20 mA or 4...20 mA.

\* These parameters are also accessible via the digital RS485 link.

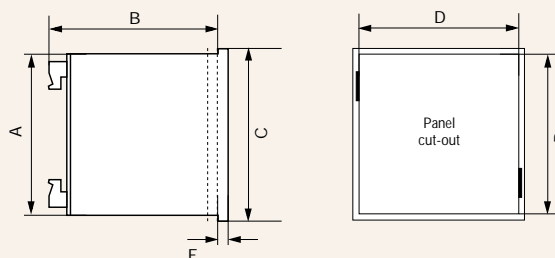
## General specifications

	recdigit NODUS		recdigit POWER
Technical characteristics	Nodus ED	Nodus EQ	all models
Display	Black LCD on light background (size 10 mm)	Amber LCD on back -lit black background (size 10 mm)	Red LED on black background (size 12 mm)
	Display refresh period: 1 s (10 s on THD-I and THD-V)		
Current inputs	3-phase uninsulated	3-phase insulated	
secondary primary consumption	In: 1 A and 5 A (selection when programming) Programmable from 1 to 5000 A < 1 VA to 1.2 Vn		In: 1 A or 5 A (selection when ordering) Programmable from 1 or 5 to 19999 A < 2 VA to 1.2 In
Voltage inputs	3-phases + neutral		
ratings VT ratio consumption per phase	Un = 230 Vac P/N / 400 Vac P/P Programmable from 1.00 to 20 < 1 VA to 1.2 Vn		Un : 57.7 Vac P/N / 100 Vac P/P or 230 Vac P/N / 400 Vac P/P Programmable from 1.0000 to 9999.9999 < 0.5 VA to Un
Frequency	45 to 65 Hz		
Type of network	3 or 4-wire, balanced or not - 1, 2 or 3 CT mounting		3 or 4-wire, balanced or not - 2 or 3 CT mounting
Power supply	110 / 127 / 230 / 400 Vac ±15% or 24 to 110 Vdc ±20% or 125 to 230 Vdc ±20%		20...90 Vdc / 20...70 Vac or 90...360 Vdc / 70...260 Vac or 190...460 Vac
Digital output	RS485 (2-wire + shielding) half duplex, ModBus/JBus™ protocol RTU mode		
rate parity	1200 to 19200 bauds Even or odd or no parity		300 to 19200 bauds Even or no parity
Alarm output	-	Potential-free contact	
Pulse output	-	Time delay adjustable from 1 to 99 s (steps: 1 s) Hysteresis: 5% (adjustable via JBus from 1 to 10%)	
	or		Polarised transistorised transmitter, DIN SO 43864 standard
	Pulse weight: 1 or 10 or 100 (kWh or kvarh or kVAh) Pulse width: 300 ms		Pulse weight: 0.1 to 9999.9 (kWh or kvarh) Pulse width: 100 or 500 ms
Analogue output	-		Permitted load: 500 Ω max, response time: 400 ms
Data storage	10 years (25°C)		
Environmental conditions	Operating temperature: 0 to +55°C Storage temperature: -20 to +60°C		Operating temperature: -10 to +55°C Storage temperature: -25 to +70°C
Basic metrological characteristics			
V, U, I	0.5% R		0.2% R
P, Q, S	1% R		0.5% R
PF / Frequency	0.01 / 0.1 Hz		
E active / E reactive / E apparent	Class 1 according to IEC 61036 / Class 2 according to IEC 61268 / 1% R		
Hour meter	-	250 ppm	-
THD-U and THD-I	-	2%	
Analogue output	-		0.5% FS *
Mechanical characteristics			
Connection: current circuit	• Terminal strip with double headed screws for 6 mm² wires		• Locking and plug-in terminal for 2.5 mm² wires  • Plug-in terminal with screws for 2.5 mm² wires
voltage circuit	• Plug-in terminal for 2.5 mm² wires		
other (RS, relay...)	• Plug-in terminal for 2.5 mm² wires		
Weight	600 g	800 g	835 g
Fastening	By metal strips for panels between 1 and 5 mm		

\* The analogue outputs add an error of 0.5 % of the FS, full scale.

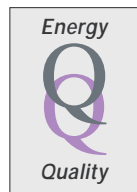
## Dimension diagrams

Dim. (mm)	A	B	C	E	D
recdigit NODUS	89,5	126	96	8,2	92 x 92
recdigit POWER	135,8	92,5	144	9,2	138 x 138



## recdigit NODUS

*The recdigit NODUS™, in a compact housing 96 x 96, possesses all the necessary functions for supervising low-voltage network applications. Simplicity of use, design and high-level performance ensure perfect integration into your LV cabinets and panel switchboards.*



### ■ Universal

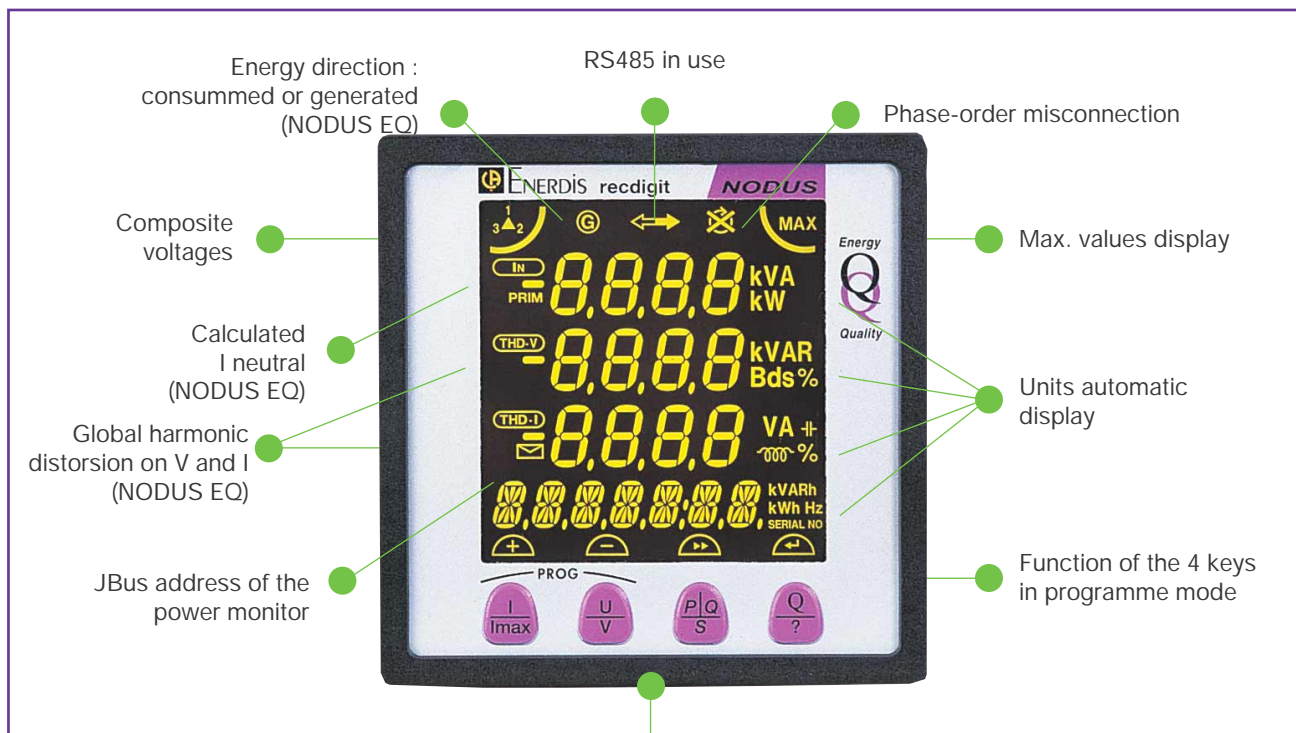
- Measurement of all electrical parameters necessary for supervising a LV feeder.
- Connection on 1 A and 5 A current transformer with the same model.
- Measurement of THD-V, THD-I and calculation of I neutral to monitor the electrical supply quality (Nodus EQ).
- RS485 ModBus/JBus™ protocol for all supervision applications via computer or PLC.
- Metering in the 4 quadrants for cogeneration needs (Nodus EQ).
- Pulse output (programmable) or alarm (Nodus EQ).
- Reduced depth for integration into all types of LV cabinets.
- 230/400 V direct network connection. LV network connection > 500 V via voltage ratio (690/100 for example).

### ■ User-friendly

- Simultaneous display of four parameters with units.
- Automatic setting of display ranges and units (W, kW, var, kvar...).
- High-readability LCD display. Back-lit on Nodus EQ.
- 4 direct-access keys to select the parameter to be displayed.
- Programming (CT ratio, voltage ratio, digital link,...) very simple by scrolling menus available in French, German, English and Spanish.

### ■ High-performance

- 32 parameters displayable (22 on Nodus ED) and 98 parameters measured (75 on Nodus ED), accessible using the RS485 link.
- Metrological characteristics: class 0.5 for measurement, class 1 for metering (IEC 61036).
- Detection of phase-order misconnection, CT secondary inversion.
- Compliance with EN 50081-2, EN 50082-2, IEC 61010 standards...

**Front face : simplicity and readability****Direct access to measurement**

4 lines of characters and a large number of pictograms accessible using the 4 front keys.

**Display 1**

I1 (A)  
I2 (A)  
I3 (A)  
U1-2 (V)

**Display 2**

I1max (A)  
I2max (A)  
I3max (A)  
Max total active power (kW)

**Display 3**

U1-2 (V)  
U2-3 (V)  
U3-1 (V)  
Frequency (Hz)

**Display 4**

V1-N (V)  
V2-N (V)  
V3-N (V)  
Frequency (Hz)

**Display 5**

Total active power (kW)  
Total reactive power (kvar)  
Power factor  
Total active energy (kWh)

**Display 6**

Total active power (kW)  
Total reactive power (kvar)  
Power factor  
Total reactive energy (kvarh)

**Display 7**

Total apparent power (kVA)  
Total reactive power (kvar)  
Power factor  
Total apparent energy (kVAh)

**Display 8**

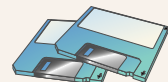
Neutral current (A)  
Voltage THD (%)  
Current THD (%)  
Hour meter (1, 1/10, 1/100)

**Display 9**

CT x voltage ratio  
Transmission rate (bds)  
ModBus/JBus adress  
Machine serial number

**Product codes**

Model	Auxiliary supply	Reference
recdigit NODUS ED	230/400 Vac	NODD 1001
recdigit NODUS ED	110/127/230 Vac	NODD 1002
recdigit NODUS ED	125/220 Vdc	NODD 1003
recdigit NODUS ED	24/110 Vdc	NODD 1004
recdigit NODUS EQ	110/127/230/400 Vac	NODQ 2001
recdigit NODUS EQ	24/48/110 Vdc	NODQ 2002
recdigit NODUS EQ	125/220 Vdc	NODQ 2003

**WINTHOR software**

Supervision and remote reading software for use with recdigit NODUS™ (see page 74)



## recdigit POWER



*The recdigit POWER displays up to 35 electrical parameters for LV, MV or HV networks, on three high-readability LED displays.*

*Only three models for all types of applications : displaying, monitoring and energy managing. The recdigit POWER can be connected to any system (PC, PLC...) by using the analogue outputs, the pulse outputs or the digital link (RS485 ModBus/JBus™).*

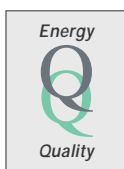
*The recdigit POWER line is achieved with 3 models.*



## recdigit POWER - Energy Display

*Displaying*

- Measurement of parameters of main or sub-electrical panel switchboard.
- Energy metering (active, reactive, apparent) in the two quadrants.



## recdigit POWER - Energy Quality

*Supervision, Supply quality*

Similar functions as previous, plus:

- "4-quadrants" energy metering
- Monitoring of the supply quality; THD-V and THD-I on each phase.
- Dating and recording of overthresholds on U, I, P and cos φ.
- Equipped in standard with an RS485 digital link (protocol ModBus/JBus™ RTU mode).



## recdigit POWER - Energy Management

*Energy management*

Similar functions as previous, plus:

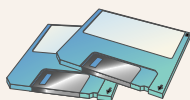
- RS232 link socket on front face for a local reading on a personal computer.
- Recording of load curves in active and reactive power for energy management (submetering, optimisation, billing...).

*Main points*

- High level metrological characteristics (measurement class 0.2; metering class 1 according to IEC 61036).
- Displays 35 electrical parameters, as instantaneous, maximum and average values.
- Automatic setting of display.
- Alarm relay, metering-pulse outputs in standard.
- Digital link RS485 protocol ModBus/JBus™ with a memory size designed for optimal integration in any supervision system.

**New !**

Sesame Software

**For "Energy Quality" and  
"Energy Management" models**

WinThor Software

**for supervising and remote-reading the  
recdigit POWER measurement systems  
(see page 74)****Configuration and programming**

- Date, hour, VT and CT ratios, synchronisation, thresholds and alarms delays, analogue outputs...
- Reset of meters, min. and max. values, stream-recorded...

**Displaying**

- instantaneous, average and maximum values ;
- over-thresholds ;
- energy meters.

**Product codes**

Model	Designation	Reference
Energy Display	recdigit POWER D-2-400-5-0	POWD 1001
Energy Display	recdigit POWER D-2-100-5-0	POWD 1002
Energy Display	recdigit POWER D-2-100-1-0	POWD 1003
Energy Quality	recdigit POWER Q-2-400-5-0	POWQ 1001
Energy Quality	recdigit POWER Q-2-100-5-0	POWQ 1002
Energy Quality	recdigit POWER Q-2-100-1-0	POWQ 1003
Energy Management	recdigit POWER M-2-400-5-0	POWM 1001
Energy Management	recdigit POWER M-2-100-5-0	POWM 1002
Energy Management	recdigit POWER M-2-100-1-0	POWM 1003
Sesame	Configuration software	LOGG 2001

**How to order**

recdigit POWER

**Model**

- D - Energy Display
- Q - Energy Quality
- M - Energy Management

**Auxiliary supply**

- 1 - 20...90 Vdc / 20...70 Vac
- 2 - 90...360 Vdc / 70...260 Vac\*
- 3 - 190...460 Vac

\* Standard value

**Options**

- 1 - 2 pulse outputs
- 2 - 2 analogue outputs
- 3 - 2 pulse outputs + 2 analogue outputs
- 4 - 4 pulse outputs

**Input I**

- 1 - 1 A
- 5 - 5 A

**Input U**

- 100 - 100 V
- 400 - 400 V

## Multi-display

Additional



Screen

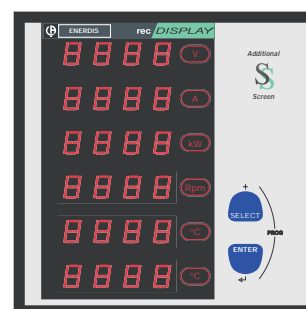
**recDISPLAY - Additional Screen**

The recDISPLAY "Additional Screen" is a programmable multi-display unit for switchboards, that indicates up to 6 parameters issued for one or more instruments communicating using ModBus/JBus™ protocol, RTU mode .

The recDISPLAY incorporates 2 digital RS485 links :

- one is used for connecting the master apparatus,
- the second for connecting to the main ModBus/JBus™ networks..

The recDISPLAY is invisible for the JBus™ network, so the supervisor can communicate directly with the master apparatus connected to it.

**Product codes**

Model	Auxiliary supply	Reference
recDISPLAY	110/220 Vac or Vdc	REDI 2000
recDISPLAY	24/48 Vac or Vdc	REDI 2100

## WinThor

*WinThor is a remote-reading, energy management software designed for use with our recdigit measurement systems, our CDT remote-operated electronic meters, as well as the CCT pulse receiver. Two versions exist to meet your needs: the TELE 2000 module and the GEST 2000 module for system configuration and recorded parameter display. As a plus, the GEST 2000 module is equipped with an Analysis menu for energy consumption.*

### TELE 2000

Remote meter-reading pack for remote data transmission.

### GEST 2000

Same functionalities plus:

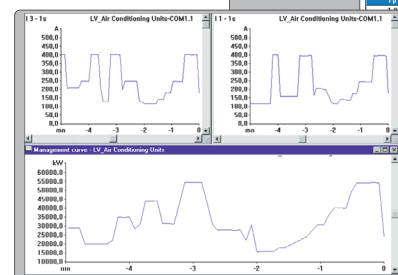
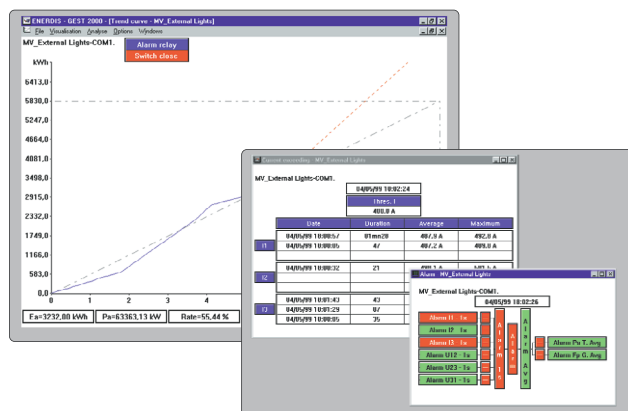
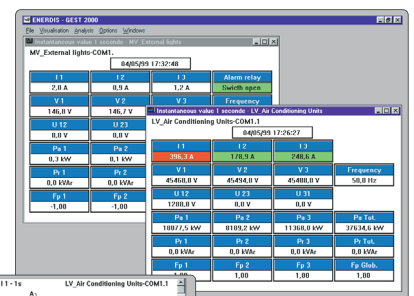
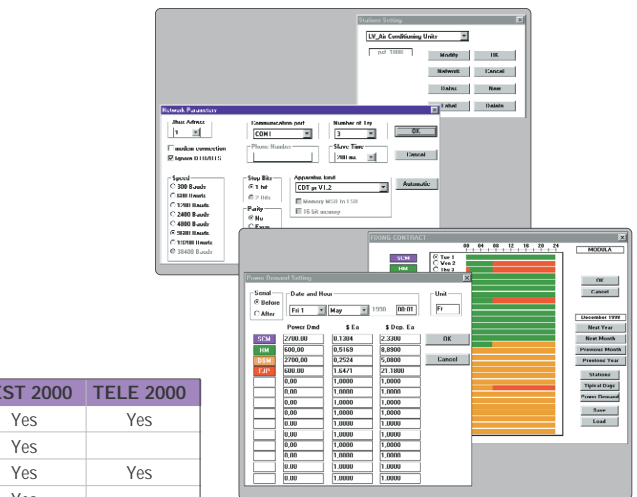
- recording of load curves
- breakdown of consumption
- tariff simulation

#### Technical specifications:

Configuration menu	GEST 2000	TELE 2000
Automatic configuration of communication parameters	Yes	Yes
Creation of virtual meter (addition or subtraction of several measurement points)	Yes	
Programming of automatic remote-metering sessions of meter indices	Yes	Yes
Programming of automatic remote-metering sessions of load curves	Yes	
Programming of automatic remote-metering sessions of overshoots and extremes	Yes	
Definition of your tariff contracts (pricing and subscribed power)	Yes	
Display menu	GEST 2000	TELE 2000
Display of instantaneous and mean values per phase and overall	Yes	Yes
Display of minimum and maximum values*	Yes	
Display of stream-recording of the active and reactive power values*	Yes	
Display of indices from the meters (per phase, time slots...)*	Yes	Yes
Recording of the values of your choice in curve and/or file form	Yes	
Display of pages entirely configured by the user	Yes	Yes
Monitoring of trends in energy consumption*	Yes	
Remote action on an overload relay (power cut-off)	Yes	
Programming of overload thresholds	Yes	
Display of alarm status	Yes	
* data available on certain products		

\* data available on certain products

Menu Analysis (see opposite)





## ANALYSIS menu (GEST 2000 only)

This menu enables you to carry out :

- quantitative and qualitative ANALYSIS of your energy consumption in several forms (tables, graphs...) ;
- optimisation of your consumption with the help of programmable tariff simulations.

It contains three sections :

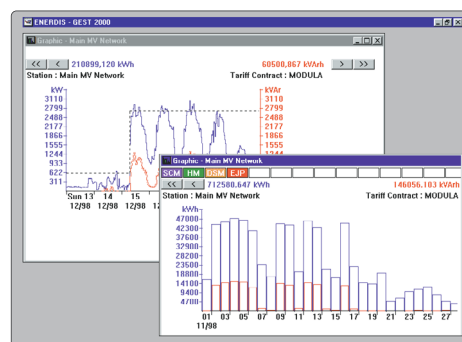
### 1 Table

- Stream-recorded table of power values per month.
- Direct exportation of the values in a format compatible with the principal spreadsheets.

	00mm	10mm	18mm	20mm	28mm	30mm	38mm	40mm	48mm	50mm	58mm
01/12/98 00:00	51.8	65.8	72.8	118.9	154.8	204.8					
01/12/98 01:00	234.6	217.0	164.7	101.7	220.2	105.9					
01/12/98 02:00	57.4	36.8	41.5	81.5	96.1	104.4					
01/12/98 03:00	113.4	176.4	104.1	147.9	99.7	87.4					
01/12/98 04:00	55.1	53.3	40.4	37.0	114.7	117.2					
01/12/98 05:00	95.1	75.9	66.3	92.5	100.4	329.0					
01/12/98 06:00	335.5	248.1	514.3	740.4	600.8	461.3					
01/12/98 07:00	355.0	278.9	438.5	335.7	300.3	222.2					
01/12/98 08:00	318.9	261.7	236.7	165.7	141.4	146.5					
01/12/98 09:00	234.1	288.5	206.0	161.7	133.3	105.9					
01/12/98 10:00	201.3	229.3	165.9	172.1	265.0	278.5					
01/12/98 11:00	215.6	254.8	199.7	200.1	254.4	272.9					
01/12/98 12:00	215.1	227.8	253.7	401.7	462.9	419.4					
01/12/98 13:00	443.4	456.4	348.0	409.7	450.8	354.5					
01/12/98 14:00	200.9	237.5	156.5	116.0	104.9	84.1					
01/12/98 15:00	172.5	237.9	200.7	169.6	147.5	338.3					
01/12/98 16:00	221.0	121.1	226.8	257.3	226.4	302.5					
01/12/98 17:00	348.5	419.1	421.7	394.4	380.5	203.4					
01/12/98 18:00	267.5	334.2	429.8	498.2	516.7	542.5					
01/12/98 19:00	678.5	685.0	641.5	557.9	100.5	70.9					
01/12/98 20:00	78.7	158.1	163.8	126.8	33.9	82.9					
01/12/98 21:00	260.5	312.6	300.5	440.0	444.3	305.1					
01/12/98 22:00	53.4	40.8	43.7	46.5	50.1	50.0					
01/12/98 23:00	40.8	37.4	33.7	40.1	41.7	51.5					
02/12/98 00:00	30.8	126.2	122.8	75.7	54.2	49.3					
02/12/98 01:00	52.9	52.6	64.6	55.4	74.2	107.1					

### 2 Graph

- Curve of overall consumption or consumption according to tariff range, in the year, month, week and day (peak periods).
- Simultaneous display of the load curve and the tariff contract selected (subscribed power, tariff periods...).



### 3 Report & Evaluation

- Calculation of energy consumption per tariff entry and in total for a period of your choice.
- Sum of subscribed power overruns per tariff entry and in total.
- Evaluation of the real cost of energy depending on the tariff contract selected.
- Direct exportation of the tables in a format compatible with the principal spreadsheets for printing out the energy bill.

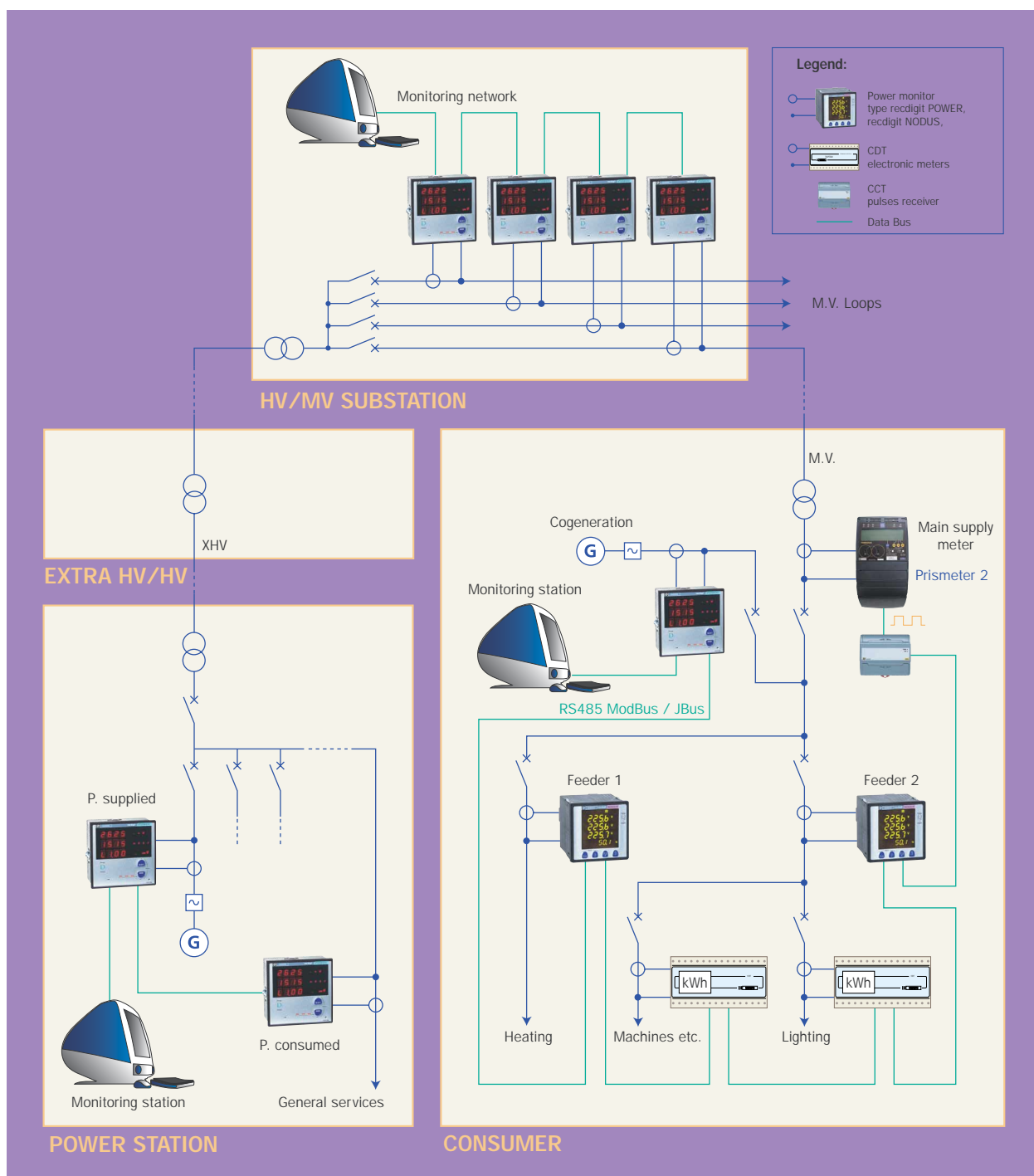
The screenshot shows two tables. The top table is titled 'Assessment of active energy - Main MV Network' and shows energy consumption in kWh for different tariff entries. The bottom table is titled 'Assessment of active energy - Main MV Network' and shows subscribed power overruns in kW for different tariff entries. Both tables have columns for Station, Ex, P. Sups, Exceed, S. Exceed, and SQ. Exceed.

## Product codes

Software		Reference
WinThor	«Configuration & Display» menus, in French	TELE 2000
WinThor	«Configuration, Display, & Analysis» menus, in French	GEST 2000
WinThor	«Configuration & Display» menus, in English	TELE 2001
WinThor	«Configuration, Display & Analysis» menus, in English	GEST 2001
Accessories		
CTA	Self-contained desktop RS232/RS485 converter	ACCJ 0006
CTB	Desktop RS232/RS485 converter (230Vac)	ACCJ 0005
AD 8522	Industrial RS232/2xRS485 converter (230Vac)	ACCJ 0002
INFINLINK	Industrial RS232/4xRS485 converter (115/230Vac)	ACCJ 1001
AMP-RS 485	RS/485/RS485 Repeater, power supply: 24 Vdc	ACCJ 1002
Alim AMP	Power supply: 230 Vac/24Vdc	ACCJ 1003
Modem	US Robotics Sporsters Voice Model 56 kbd	MODV 2000

## Configuration required

- Pentium type PC
- 16 Mb RAM minimum
- 200 Mb hard disk minimum
- 1024 x 768 graphic board
- Windows 3.1, 95, 98, or NT
- Serial port for communication
- Parallel port for printing



Power monitors can be used across all the stages in an electrical network, whether in production, transportation, distribution. There are various formats available and, depending on the application, some come with or without a display and are specifically adapted to the needs of high, medium or low voltage networks.