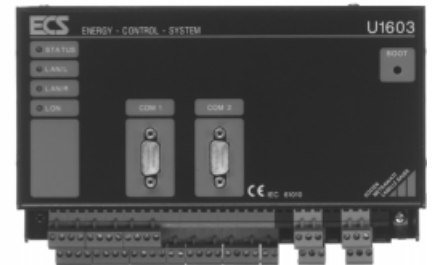
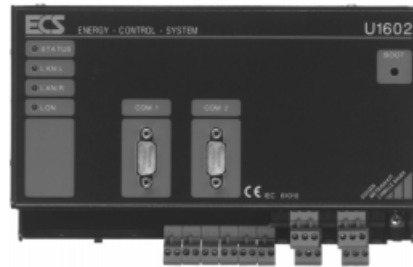


U1602, U1603

ECS ENERGY • CONTROL • SYSTEM

3-349-046-03
1/4.99

- 64 processing channels for the determination of energy, power and costs with freely assignable physical inputs
- Energy Control Language for the programming of analysis, monitoring and optimization functions
- LON interface for 63 U168x energy meters
- Two RS 232 interfaces (115 kBit/s) for connection to PC, modem, printer, or radio controlled clock
- Two ECS LAN interfaces for the linking of individual summators over great distances
- Simple software update via serial interface (EEPROM)



U1603:

- 6 universal inputs: ± 5 mA, ± 20 mA, ± 10 V, S0 pulse
- 2 analog outputs: ± 20 mA or ± 10 V, 2 relays and 4 MOS switches for controlling external processes

Applications

The U1602 micro-summator and the U1603 mini-summator are used as PC adapters or LON interfaces for the ECS LAN, and are not equipped with any display or operating elements. Inputs and outputs expand the U1603 mini-summator into a miniature data collector and optimization unit.

All relevant energy and consumption data are logged over defined time periods at a programmable interval via 64 processing channels and are stored to memory as load profiles along with the corresponding maximum values.

Beyond this, the U1603 mini-summator is also capable of processing analog or pulse signals via six input channels with configurable parameters. The U1603 is equipped with two analog outputs, four MOS switches and two relays (changeover contacts) for the control of external processes.

Up to 63 U168X electrical energy meters from GOSSEN-METRAWATT can be connected to the U1602 micro-summator or the U1603 mini-summator via the easy to wire, pole reversal protected, electrically isolated LON interface.

Data exchange with a PC, as well as remote querying via modem are accomplished via the RS 232 interface (115 kBit / s). A radio controlled clock for the synchronization of system time, as well as a report printer, can also be connected.

Individual summators can be linked into a network over great distances with the multi-master compatible **ECS LAN** with free selection of network topology, and have unrestricted access to all data available from each of the network users.

Both the U1602 micro-summator and the U1603 mini-summator are suitable for customer-specific calculations, analyses, monitoring and optimization thanks to high level integrated intelligence and the system-specific ECL programming language - even independent of the Energy Control System.

The compact housing and IP protection have been laid out for rugged industrial use, and the modules can be mounted to top-hat rails in accordance with EN50022. They can also be mounted with screws, or integrated into the control cabinet. Installation is user-friendly and easy with plug-in screw terminals.

U1602, U1603

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Applicable Regulations and Standards

EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use
DIN 43864	Current interface for pulse transmission between impulse meters and tariff devices
EN 55081 Part 2	Limit values and measuring methods for transmitted interference
EN 55082 Part 2	Interference immunity
VDE 0470 Part 1	IP protection provided by enclosures (DIN 40050)
IEC 255-4	High-frequency disturbance test
IEC 68 Part 2-6	Basic environmental test procedure Sinusoidal oscillation
UL 94	Test for flammability of plastic materials for parts in devices and appliances

Symbols and their Meanings

Symbol	Meaning
X	Measured quantity, analog input
X2	Upper range value of measured quantity
Y	Output quantity, analog output
Y2	Final value of output quantity
R	Output load
H	Auxiliary power

Memory Capabilities per Channel

Energy

Cumulative Energy as of a Defined Starting Time	
E tot	Independent of tariff
E tot T1	For tariff 1 only
E tot T2	For tariff 2 only
E tot T1T2	For tariff 1 + tariff 2
Cumulative Energy for Defined Time Periods	
E Day	For current day and each of the last 10 days
E Month	For current month and each of the last 12 months
E Year	for current year and each of the last 4 years
E Int	For all stored measuring intervals (measurement data list)
Maximum Values for Measuring Intervals, with Date and Time Stamp	
E maxInt	The 10 highest values for all measuring intervals as of a defined starting time
E maxDay	Maximum value for the current day, and for each of the last 10 days
E maxMonth	Maximum daily value for the current month, and for each of the last 12 months
E maxYear	Maximum value for the current year, and for each of the last 4 years

Costs

Cumulative Costs as of a Defined Starting Time	
CostT1	For tariff 1 only
CostT2	For tariff 2 only
CostT1T2	For tariff 1 + tariff 2

Power

Instantaneous Power	
P mom	Determined from the time interval between the last two pulses (with connection to E1 ... E12)
Mean Values for Measuring Intervals	
P int	For all stored measuring intervals (measurement data list)
Maximum Values for Measuring Intervals, with Date and Time Stamp	
P maxInt	The 10 highest values from all measuring intervals as of a defined starting time
P maxTag	Maximum value for the current day, and for each of the last 10 days
P maxMonat	Maximum daily value for the current month, and for each of the last 12 months
P maxJahr	Maximum value for the current year, and for each of the last 4 years

Technical Data

Inputs: (U1603)

The 6 inputs can be configured individually with the DIP switches.

Analog Input (current)	
Input Quantity	direct current
Allowable Input Quantity Range	$-20 \text{ mA} \leq X \leq 20 \text{ mA}$
Allowable Overload Continuous	$\leq 2.5 X2$
Upper Range Value (configurable)	$1 \text{ mA} \leq X2 \leq 20 \text{ mA}$
Maximum Modulation	$\pm 1.25 X2$
Input Impedance X2: 20 mA X2: 5 mA	75 Ω 300 Ω
Input Circuit	see schematic diagram, figure 1
Electrical Isolation	with optocoupler
Common-Mode Rejection ($\leq 120 \text{ Hz}$)	$\geq 80 \text{ dB}$

Analog Input (voltage)	
Input Quantity	direct voltage
Allowable Input Quantity Range	$-10 \text{ V} \leq X \leq 10 \text{ V}$
Allowable Overload Continuous	$\leq 30 \text{ V}$
Upper Range Value (configurable)	$1 \text{ V} \leq X2 \leq 20 \text{ V}$
Maximum Modulation	$\pm 1.25 X2$
Input Impedance	118 k Ω
Input Circuit	see schematic diagram, figure 1
Electrical Isolation	with optocoupler
Common-Mode Rejection ($\leq 120 \text{ Hz}$)	$\geq 80 \text{ dB}$

Binary Input	
Input Quantity	direct voltage (square-wave pulse, SO compatible)
Allowable Input Quantity Range (configurable)	signal level: H: 0.8 mA ... 4.8 mA L: 0 mA ... 0.4 mA
Allowable Overload Continuous Intermittent ($t \leq 1 \text{ s}$)	$\leq 48 \text{ V}$ $\leq 60 \text{ V}$
Allowable Switching Elements	semiconductor switches, relays
Series Impedance (internal)	4.7 k Ω
Input Circuit	see schematic diagram, figure 1
Electrical Isolation	with optocoupler
Pulse Duration T_{on}	$\geq 2 \text{ ms}$
Interpulse Period T_{off}	$\geq 2 \text{ ms}$
Pulse Frequency	$\leq 250 \text{ Hz}$
Meter Range Upper Limit	22 places, 15 of which are usable

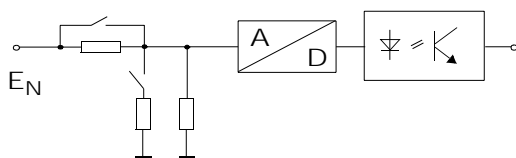


Figure 1 Schematic Diagram, Meter Input

Outputs:

The 2 analog outputs can be configured individually with the DIP switches.

Analog Output (current) (U1603)	
Type	electrically isolated
Allowable Range	$-20 \text{ mA} \leq Y \leq 20 \text{ mA}$
Final Value, Y2 (linear configurable)	$1 \text{ mA} \leq Y2 \leq 20 \text{ mA}$
Max. Output Voltage	$\leq 30 \text{ V}$
Max. Output Current	1.25 Y2
Load Range	$0 \leq 5 \text{ V/Y2} \leq 10 \text{ V/Y2}$

Analog Output (voltage) (U1603)	
Type	electrically isolated
Allowable Range	$-10 \text{ V} \leq Y \leq 10 \text{ V}$
Final Value, Y2 (linear configurable)	$1 \text{ V} \leq Y2 \leq 10 \text{ V}$
Max. Output Voltage	1.25 Y2
Max. Output Current	$\leq 40 \text{ mA}$
Load Range	$Y2/4 \text{ mA} \leq Y2/2 \text{ mA} \leq \infty$
Alternating Component	$\leq 0.005 Y2$

Binary Output (U1603)	
Type	electrically isolated
Number	4
Contact Type (DIN 43864)	MOS relay
Volume Resistance (AC/DC)	5 Ω
Pulse Duration (configurable)	$\geq 100 \text{ ms}$
Interpulse Period (configurable)	$\geq 100 \text{ ms}$
Output Voltage (external, passive)	$\leq \pm 50 \text{ V}$
Output Current ON OFF	$\leq 200 \text{ mA}$ $\leq 10 \mu\text{A}$

Relay Output (U1603)	
Switching Element	relay
Number of Relays	2
Contact Type	changeover contact
Switching Voltage	250 V~, 30 V=
Switching Current	8 A ohmic, 3 A inductive
Switching Cycles	$\leq 10^5$

Power Supply for External Switching Contacts	
Voltage U_V (electrically isolated)	24 V =
Voltage Tolerance	$\leq \pm 4\%$
Current (short-circuit and idling proof)	$\leq 0.15 \text{ A}$
Alternating Component ($\leq 100 \text{ kHz}$)	$\leq 2\% V_{\text{pp}}$

U1602, U1603

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RS 232 Interface (PC / printer)

Number	2
Connectors	sub-miniature D9 plug connector
Possible Connection to COM1: COM2:	PC, modem, terminal printer, radio controlled clock, PC
Data Bits	8
Transmission Speed COM1: COM2:	115,000 bits / s 115,000 bits / s
Parity	even / no check
Operating Mode	full-duplex handshake Xon / Xoff or RTS / CTS

ECS LAN Interface (for linking summators) (RS 485)

Number	2
Connectors	threaded plug connector (up to 255 users)
Users per Segment	16 (32 with loop resistance < 100 Ω)
Operating Mode	multi-master, half-duplex or full-duplex
Data Protocol	HDLC / SDLC (adapted to multi-master requirement)
Topology (line and/or open ring)	≤ 1200 m open ring ≤ 100 m bus
Transmission (hamming distance = 4)	62.5 kbps
Status Display	2 LEDs
Matching Resistors	can be activated

LON Interface (for connecting meters)

Number	1 (FTT-10, twisted-pair wires)
Connectors	threaded plug connector (up to 63 users per summator)
Operating Mode	LonTalk protocol (CSMA)
Topology	free wiring ≤ 500 m terminated bus ≤ 2700 m (cable type: Belden 85102, 1.3 mm diameter 28 Ω/Km)
Baud Rate	78 kbps
Status Display	1 LED, LON active
Bus Termination	can be activated

Measurement Value Storage

Storage Mode	continuous
Memory Depth	single channel: 128,640 entries 64 channel 10,560 entries
Memory Duration	with backup battery ≥ 5 years (see also auxiliary power supply - backup battery)
Reset Values to Zero	via PC or instrument keypad

Time and Date Clock

Smallest Unit of Measure	1 s
Allowable Deviation	10 ppm = 5.3 min per year

Functions Monitoring

Status Display	with LED at front panel
Status Relay	changeover contact
Switching Voltage	250 V ~, 30 V =
Switching Current	8 A ohmic, 3 A inductive
Switching Cycles	≤ 10 ⁵

Influencing Quantities and Influence Error

Influencing Quantity	Nominal Range of Use	Allowable Influence Error as Percentage of Accuracy Class
Temperature	10 °C ... 22 - 24 ... 40 °C 0 °C ... 22 - 24 ... 55 °C	50% 100%
Output Load	load range	20%
HF Interference	IEC 255-4 E5 2.5 kV, 200 Ω, 1 MHz, 400 Hz	500%
EM Fields (severity level 3)	EN 61000-4-3 10 V / m 27 - 1000 MHz	500%
EMC Burst (severity level 3)	EN 61000-4-4 2 kV, 5/50 ns, 5 kHz	500%
EMC Cable, RF (severity level 3)	EN 61000-4-6 0.15 - 80 MHz, 10 V	200%
Auxiliary Power	nominal range of use	10%

Electrical Safety

Protection Class	I
Overvoltage Category	III
Nominal Insulation Voltage:	
Input	50 V
Analog, Binary, Uv Outputs	30 V
Relay Output	250 V
Interfaces	50 V
AC Auxiliary Power	265 V
DC Auxiliary Power	80 V
Interference Suppression EN 55022 (VDE 878.3) Device: Class B	0.15 ... 1000 MHz
ESD Protection EN 61000-4-2	4 kV
EMC Surge (severity level 3) EN 61000-4-5	2 kV
Test Voltages:	
Input - Housing	0.5 kV
Input - Output	0.5 kV
Auxiliary Power - Input	3.7 kV
Input - Relay	3.7 kV

Climatic Withstand Capability

Climatic Category	3z / 70
Relative Humidity	75%
Temperature Ranges	
Operation	- 10° C ... + 55° C
Storage and Transport	- 25° C ... + 70° C

Auxiliary Power Supply

Broad Range Input, AC - DC	
Nominal Range of Use, AC (45 ... 420 Hz)	85 V ... 264 V
Nominal Range of Use, DC	100 V ... 280 V
Power Consumption	≤ 15 W (25 VA)
Fuse	2 A slow-blow
Direct Voltage Input (optional)	
Nominal Range of Use, DC	20 V ... 72 V
Power Consumption	≤ 15 W
Fuse	2 A slow-blow
Backup Battery	
Lithium Cell (replaceable without tools and without data loss)	CR 2450
Service Life without Auxiliary Power at 20° C	≥ 5 years
Capacity Loss after 5 Years with Auxiliary Power at 20° C	≤ 15%
Auxiliary Power for External Circuits	
Voltage Range	direct voltage: 24 V ± 4%
Loading Capacity	max. 0.15 A
Electrically Isolated	from all other circuits

Mechanical Design

Housing Material	sheet aluminum
Dimensions	212 x 125 x 85 mm
Installation Position	as desired
Mounting	top-hat rail per EN 50022 / 35 mm, or screw mounted to plate
Protection	housing: IP 40 terminals: IP 20
Weight	1.6 kg

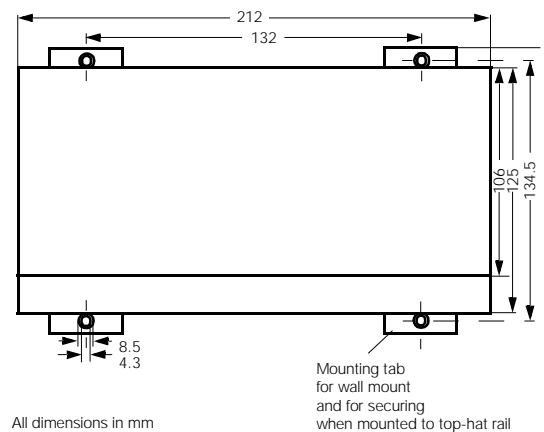


Figure 2 Dimensions

Mounting to Top-Hat Rail

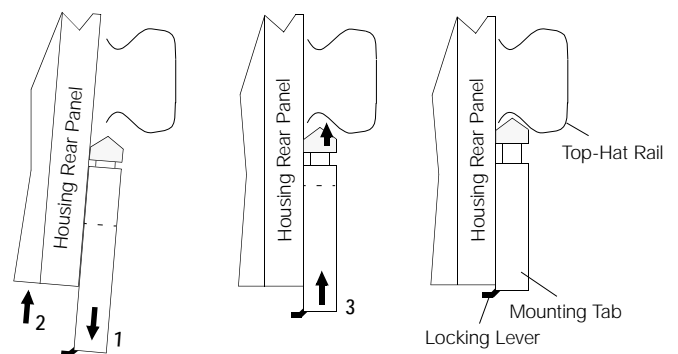


Figure 3 Securing with Mounting Tabs

Press the locking lever down and pull the mounting tab out to its last detent position. Pull the other mounting tab out in the same way. Set the summator onto the top-hat rail and push both mounting tabs in until they snap into position.

U1602, U1603

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Electrical Connection (U1602)



Signal Cables

Connectors	screw terminals
Allowable Connector Cable Conductor Cross Section	2.5 square mm

Auxiliary Voltage Cables

Connectors	screw terminals (L and N, or + and -)
Allowable Connector Cable Conductor Cross Section	2.5 square mm
Protective Conductor	6.3 mm cable lug

Terminal Assignments

																			
										85_264V									
Uv		LAN L			LAN R			LON		Status		~ U _H ~							
+24V		+EA	+E	+EA	+E	A	B			L	N	AC 45..420Hz AC / DC							
43 44		45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	20..72V DC	



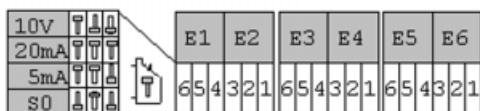
Terminal	Function	Designation
43	power to ext. switching contacts	+ 24 V
44	power to ext. switching contacts	0 V
45	LAN Left	EA +
46	LAN Left	EA -
47	LAN Left	E +
48	LAN Left	E -
49	LAN Right	EA +
50	LAN Right	EA -
51	LAN Right	E +
52	LAN Right	E -
53	LON	A
54	LON	B
55	status relay	Ö
56	status relay	W
57	status relay	Sch
58	auxiliary power supply	L / +
59		
60	auxiliary power supply	N / -

U1602, U1603

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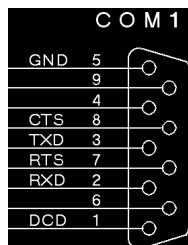
Meter Input and Output Configuration (U1603)

The analog inputs and outputs can be matched to the desired measuring range with the DIP switches. The respective upper limit value for any given range is configured with the help of the firmware .



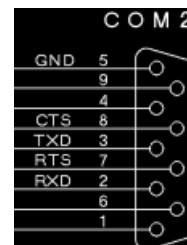
Connector Pin Assignments, Sub-Miniature D9 Plug at COM1

Pin Number	Function
1	DCD
2	RXD
3	TXD
4	
5	signal-ground
6	
7	RTS
8	CTS
9	



Connector Pin Assignments, Sub-Miniature D9 Plug at COM2

Pin Number	Function
1	
2	RXD
3	TXD
4	
5	signal-ground
6	
7	RTS
8	CTS
9	



The cable with the designation Z5232 000 R0001 must be used for connecting a PC or a terminal.

Micro and Mini-Summator Configuration

Communications and parameters configuration for the U1602 micro-summatore and the U1603 mini-summatore are accomplished with ECSwin software.

Configuration of the U1602 micro-summatore and the U1603 mini-summatore is clearly structured. Differentiation is made amongst five different parameters groups (see figure 4, setup parameters).

"General" parameters are used to configure the summator and are thus superordinate in nature, whereas the "channel-specific" parameters are directly related to the individual channels.

The "RS 232" and "ECS LAN" parameter groups relate to the serial interface (RS 232) and the ECS LAN system bus (Energy Control System local area network).

A six character password is used to protect individual parameters against unauthorized modification.

Basic Configuration

Setup Parameters Overview

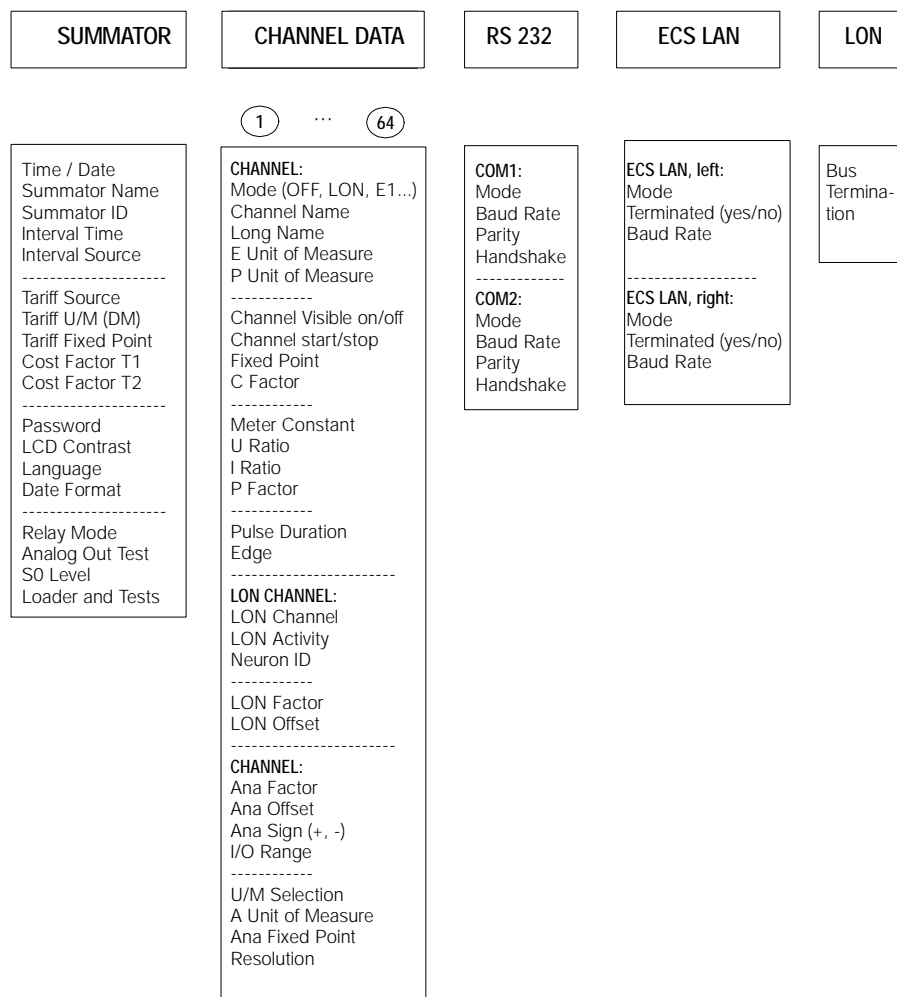


Figure 4 Setup Parameters

U1602, U1603

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Network Setup (ECS LAN)

The network topology for the ECS LAN can be freely selected, and can thus be adapted to available lines of communication at the installation site.

A network may include up to 255 summators, each of which functions as router and repeater thanks to the two ECS LAN interfaces. Messages are only forwarded, if the recipient is located within the corresponding bus segment. Transmission distance is measured from device to device if a line-to-line structure is implemented.

Cable Lengths

The maximum allowable distance between two summators is 400 m if 2-wire connection is used, and 1.2 km if 4-wire connection is used. Alternatively, a 2-wire bus connection covering a distance of maximum 100 m is also possible for 16 users. A twisted-pair wired cable is used for connections (0.6 to 0.8 mm diameter).

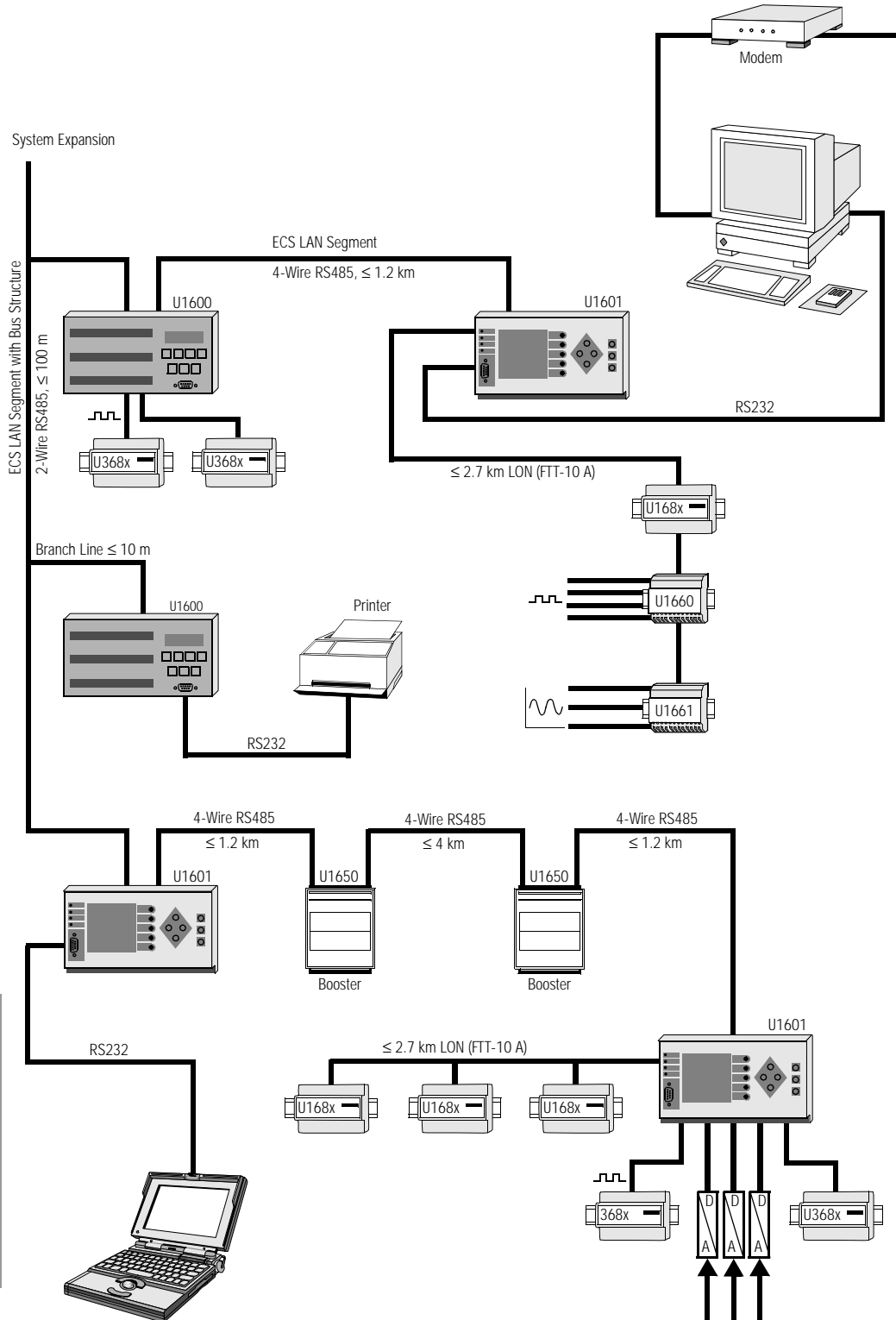
Distances of greater than 1.2 km are made possible through the use of RS 485 boosters or fiber optic cable. A modem is used for remote data transmission via public telephone lines.

Complete wiring instructions are included in the operating instructions.

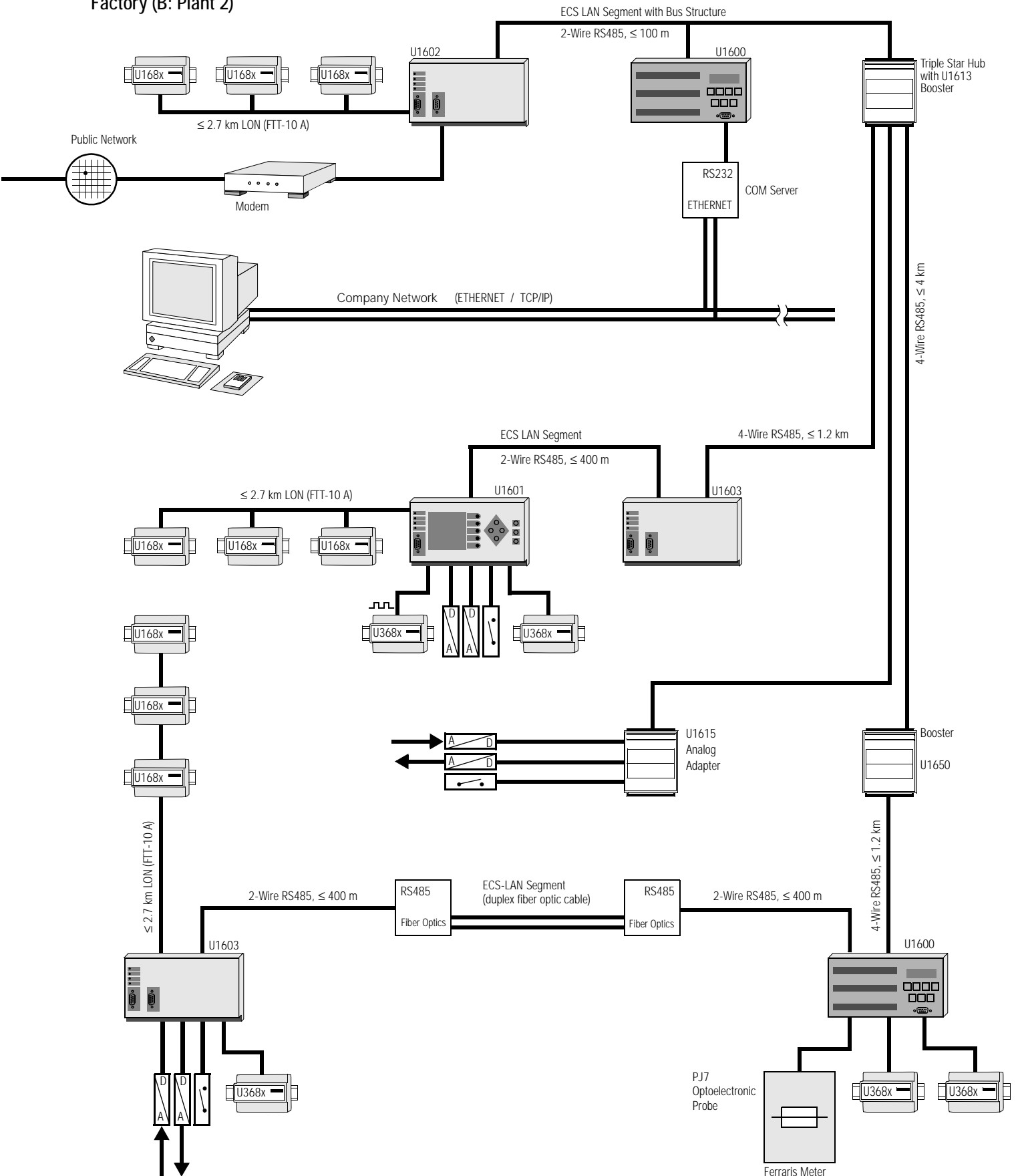
Technical Data ECS LAN

Bus Type	LAN (local area network), electrical RS 485 interface
Data Protocol	HDLC / SDLC adapted to multi-master requirement
Bus Topology	line, open ring, line and open ring (mixed as desired)
Allowable Cable Lengths	1200 m with open ring or 100 m with bus
Baud Rate	62.5 kBit / s or 125 kBit / s
Transmission Integrity	hamming distance = 4
Status Display for Bus Function	via LED

Office Building (A: Plant 1)



Factory (B: Plant 2)



U1602, U1603

ECS ENERGY · CONTROL · SYSTEM

Order Information

- The following applies to order designations:
- Only one designation may be chosen for each given letter.
 - If only zeros follow the upper case letter in the designation, it need not be included in the order.

Feature		Designation				
U1602 Micro-Summatom	with bus termination, serial interface and LON interface	U 1602				
U1603 Mini-Summatom	with bus termination, serial interface and 6 universal inputs, LON interface	U 1603				
Auxiliary Power	AC + DC nominal range of use: 85 V ... 264 V DC nominal range of use: 20 V ... 72 V	H1 H2				
Operating Instructions and Commands Reference	German English French	W1 W2 W3				

Order Example

Either the feature or the designation can be included in the order. .

Feature (clear text)		Designation				
U1603 Summatom	with bus termination, serial interface and 6 universal inputs, LON interface	U 1603				
Auxiliary Power	DC nominal range of use: 20 V ... 72 V	H2				
Operating Instructions and Commands Reference	English	W2				

Accessories

Feature		Designation				
Connector Cable	for PC or terminal	GTZ 5232 000 R0001				

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