WESTERMO
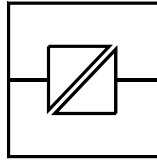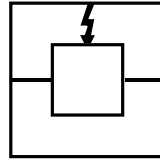
ID-90 HV/LV V.90
Quickguide

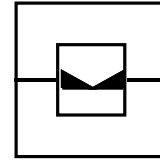# INSTALLATION MANUAL
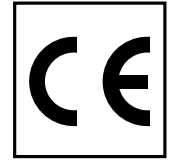
6607-2213
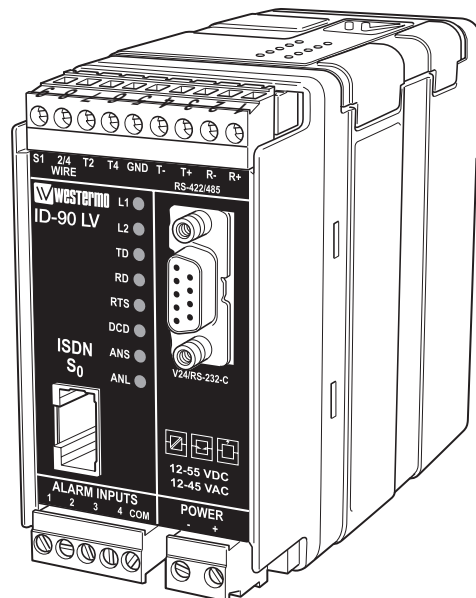
| Galvanic Isolation | Transient Protection | Balanced Transmission | CE Approved |

ISDN
Terminal Adapter

WESTERMO®

www.westermo.se

Introduction

This is only a quickguide, the complete manual can be found on the CD or on our website: www.westermo.se.

The Westermo ID-90 is an industrialised ISDN Terminal adapter. This Terminal adapter has been developed with high speed industrial data communications in mind and has some features you would not expect to find on normal adapters.

The unit is DIN rail mounted and has both an RS-232/V.24 and RS-485 interface in 2 or 4 wire connections.

Terminal data rates of up to 115.2 kbit/sec can be handled with a 128 kbit/s ISDN B-channel bit rate.

The ID-90 has been designed to meet the European ISDN standard DSS1 as well as French VN4. All standard ISDN transport protocols are supported including HDLC transparent, X75, PPP and ML-PPP.

V.110 asyncronous is supported with flow control at data rates up to 19.2 kbit/sec.

A watchdog facility continually monitors the power supply and internal hardware as well as the operational software. In the event of a problem the modem automatically resets. This feature has been included to make the unit more suitable for use in unmanned locations.

The ID-90 is available in two standard versions:

One for high input voltages, version HV with nominal voltage range 95–240V AC and 110–240V DC ±10%.

One low voltage version, version LV with nominal input voltages 12–45V AC and 12–55V DC ±10%.

The ID-90 has 4 Alarm inputs that can be used to trigger 20 character SMS paging messages or establish automatic data connections, making the unit ideal for alarm monitoring and remote diagnostics.

The ID-90 features DIP-switch configuration and can be programmed using AT-commands, and a Configurator for local as well as remote configuration and CAPI 2.0 compatibility.

The ID-90 is also available in an optional configuration with an internal analogue V90 modem enabling connections from ISDN to analogue modem end locations.

The ID-90 has been designed with the engineer in mind, hence the extensive information on the command set, S registers, DIP-switches and error codes. We have endeavoured to include all necessary information however if you need more please do not hesitate to call us.

Safety

This equipment should only be installed by professional service personnel. If the unit is intended for permanent connection to mains supply, there should be a readily accessible disconnect device (circuit breaker) incorporated into the fixed wiring.

The ID-90 ISDN S_0 is compliant to the requirement for TNV1 circuits for connection to Telecommunication networks. The mains connection is classified as hazardous voltage and the ID-90 classified as a Class I equipment.

The supply voltage to the Alarm input must use a SELV classified voltage source.

The RS-232/V.24 and RS-485 interface must only be connected to SELV circuits.

Description of the above classifications are given in SS-EN 60950 Issue 5.

The mains input is protected with a 1A, 250V time lag fuse. The fuse must only be replaced with the same type and rating. Wickman type no: 19372 1A/250V or Littelfuse® 664 001.

Specifications

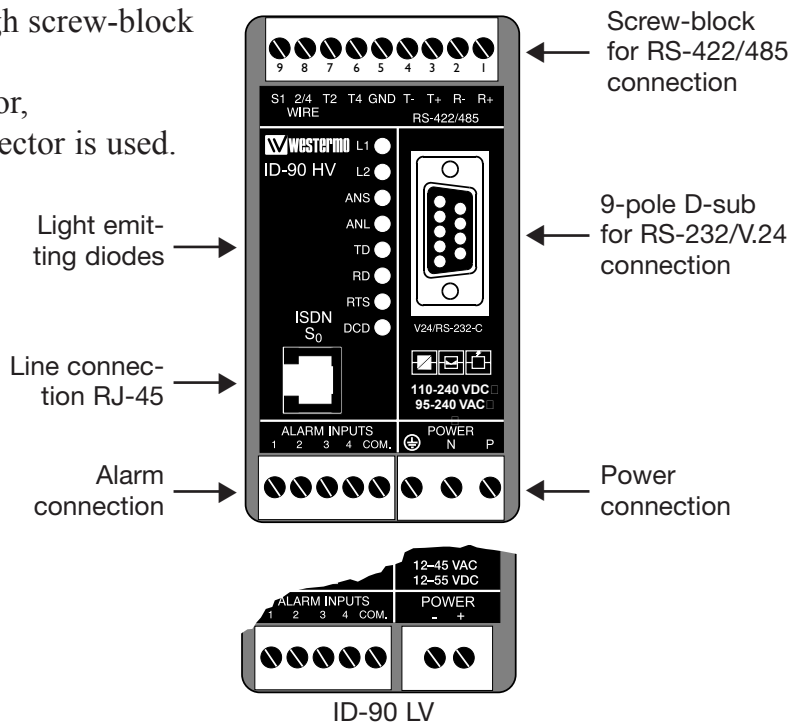|		
Transmission	Interface 1	Asynchronous, full/half duplex or simplex PPP and ML-PPP Asynchronous & Synchronous conversion V110 Asynchronous adaptation up to 19.2 kBit/s
	Interface 2	*B-channel protocols* V.110 async, V.120 async. HDLC async. to sync. HDLC transparent HDLC transparent Byte transparent X.75 SLP X.25 B-Channel T.70NL and T.90NL PPP and ML-PPP *D-channel protocols* Euro ISDN DSS1 and French VN4 X.31 Case B D-Channel
	Interface 1	RS-232/V.24 9-pin D-sub female. RS-422 and RS-485 2- and 4-wire with screw terminals
	Interface 2	RJ-45
Transmission speed	Interface 1	Up to 115.2 kbit/s
	Interface 2	Up to 128 kbit/s
Command interface	Interface 1	AT-command Configurator remote/local X3 PAD Hotline DTR, TxD, Alarm call.
Alarm inputs	Supply voltage	10–60 V DC 1mA/input @ 10V DC
Power supply	HV-version	95–240 V AC, 110–240V DC ±10%
	LV-version	12–45 V AC, 12–55V DC ±10%
Power consumption	HV-version	0.02A, 1.6W With V90 option 0.05A, 3.5W
	LV-version	Max 0.1A, 1.2W With V90 option 0.25A, 3.0W
Isolation	S_0 **Interface**	1 500 V AC
	Alarm	500 V AC
	Mains	3 000 V AC
Indicator LED's		TD, RD, DCD, RTS, L1, L2, ANS, ANL
Temperature		5–50°C ambient temperature
Humidity		0–95% without condensation
Dimensions		55x100x128 mm (WxHxD)
Weight		0.4 kg
Mounting		35 mm DIN-rail

Installation

The Terminal Adapter should be connected in the following way:
Power connection is made through screw-block
at bottom right corner.
For HV-version a 3-pole connector,
and for LV-version a 2-pole connector is used.

Computers or other equipment
are connected through an
RS-232/V.24 or RS-485 connection. The RS-232/V.24 uses a
9-pole D-sub and the RS-485
a 9-pole screw connector.
Do not use ribbon cable
for RS-232/V.24 connections.

Screw-block
for RS-422/485
connection

9-pole D-sub
for RS-232/V.24
connection

Light emit-
ting diodes

Line connec-
tion RJ-45

Alarm
connection

Power
connection

ID-90 LV

RS-232/V.24 Connections

Pinouts for the 9-pole D-sub

Direction	Pin no.	CCITT V.24 Description	Signal description
O	1	109	DCD/Data Carrier Detect
O	2	104	RD/Received Data
I	3	103	TD/Transmitted Data
I	4	108/2	DTR/Data Terminal Ready
–	5	102	SG/Signal Ground
O	6	107	DSR/Data Set Ready
I	7	105	RTS/Request to Send
O	8	106	CTS/Clear to Send
O	9	125	RI/Ring Indicator

I = input **O** = output on ID-90

RS-422/485 interface connection

The ID-90 is supplied with a RS-422/485 interface.

The RS-422/485 interface is internally in parallel to the RS-232/V.24 interface using the 9-pole D-sub. The two interfaces can not be used or be connected simultaneously, but the interface connected will automatically be selected as the DTE source.

The RS-422/485 connections are made as shown below. Please note that the selection of 2- or 4- wire and termination or no termination is done by linking between some of the screw terminals.

Direction	Terminal	Name	Description
I	1	R+ (A')	ID-90 Receive
I	2	R– (B')	ID-90 Receive
I/O	3	T+ (A)	ID-90 Transmit, at RS-485
I/O	4	T– (B)	ID-90 Transmit, at RS-485 Bidirectional
–	5	Shield	If shielded cable is used, connect the shield only at one end to avoid ground currents.
–	6	T4	Termination 4-wire, connect to terminal 2 to terminate a 4-wire connection.
–	7	T2	Termination 2-wire, connect to terminal 3 to terminate a 2-wire connection.
–	8	2-/4-wire	2/4 wire input selector. Input open selects 2-wire and connected to terminal 9 for 4-wire.
–	9	S1	Select 1. Wired to terminal 8 when 4-wire connection is used. Internally connected to +5V via pull-up resistor.

I = input **O** = output on ID-90
The definations R+/R–, T+/T– can be various between different manufactures.
ID-90 uses the defination that in a "MARK"-condition R+/T+ is more negative than R–/T–.

6607-2213
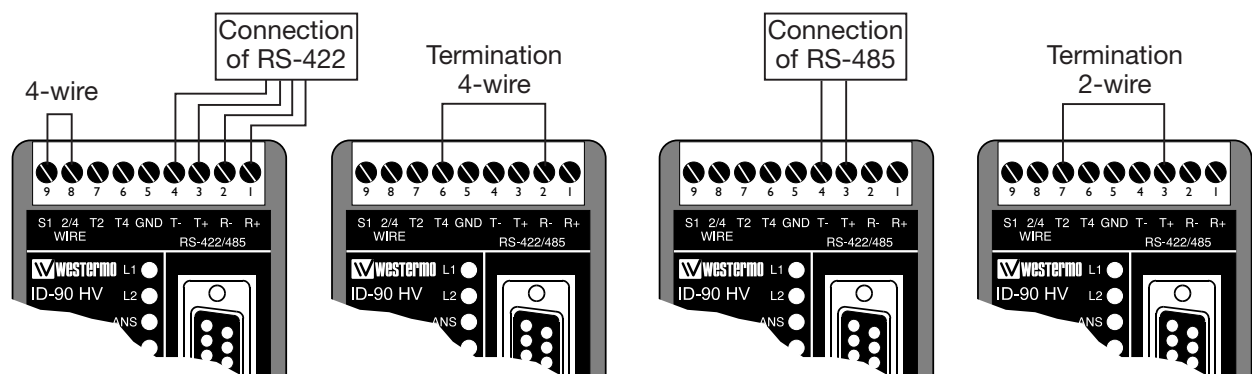
ISDN S_0 interface

The ISDN S_0 interface is connected via a 8-pol RJ-45 connector.

Pin number	Function
3	Transmit +
4	Receive
5	Receive
6	Transmit
1, 2, 7, 8	No connection
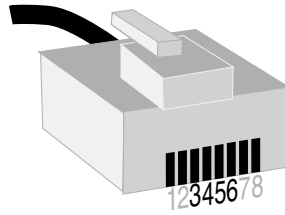
Typical S_0-bus connections

The Terminal equipment TE/TA like the ID-90 Terminal adapter can be connected to the NT in 3 different ways always with a terminating resistor TR in each end of the bus, TR should in all three cases be 100 ohm:

Point to Point Configuration
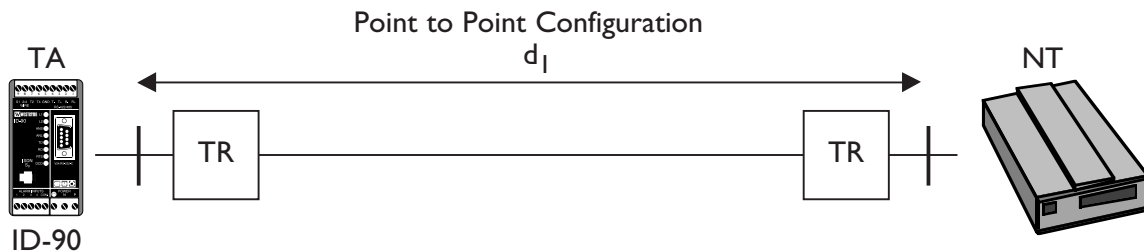
- **Point to Point**. In this configuration the ID-90 is the only TA on the S_0 bus. A distance d1 of 1000 m is generally archived with a 0.3 mm^2 40 nF/km cable.
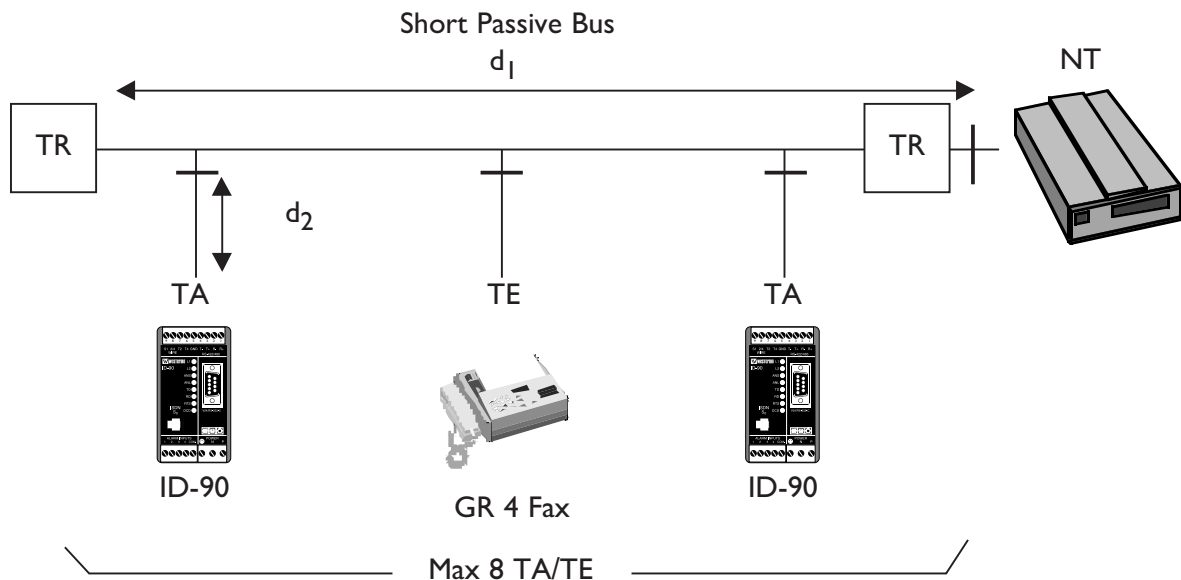
Short Passive Bus

- **Short Passive Bus**. The short passive bus puts no restriction on the distance between units, but only specifying the maximum round trip delay to be 10 to 14 µs giving a d1 of 100 to 200 m depending on the cable impedance. Up to 8 ID-90 in combination with other terminal equipment can be connected to the S_0 bus with a maximum connection length d_2 = 10 m.

Extended Passive Bus

Max 8 TA/TE
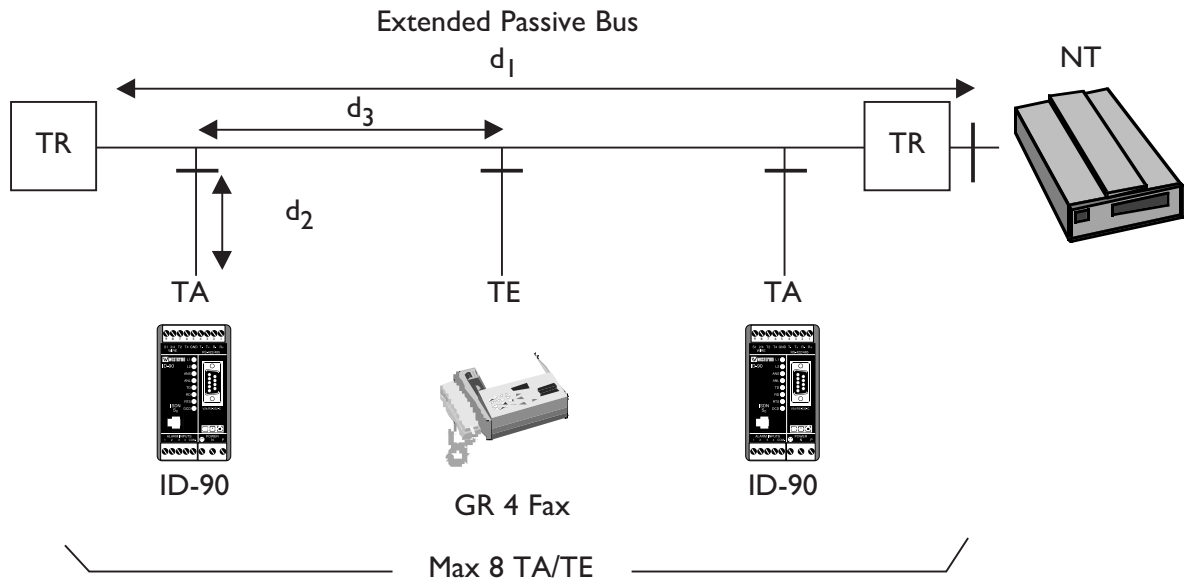
- **Extended Passive Bus.** The difference between the short passive bus and the extended passive bus is that the extended passive bus specifies a distance between the units, d3 and that the units are located at the far end from the NT at a distance of d3 from the far end terminating resistor TR. The range of d3 is from 25 to 50 m giving at least d1 =500 m. (d2 see Short Passive Bus).

Total bus length d1
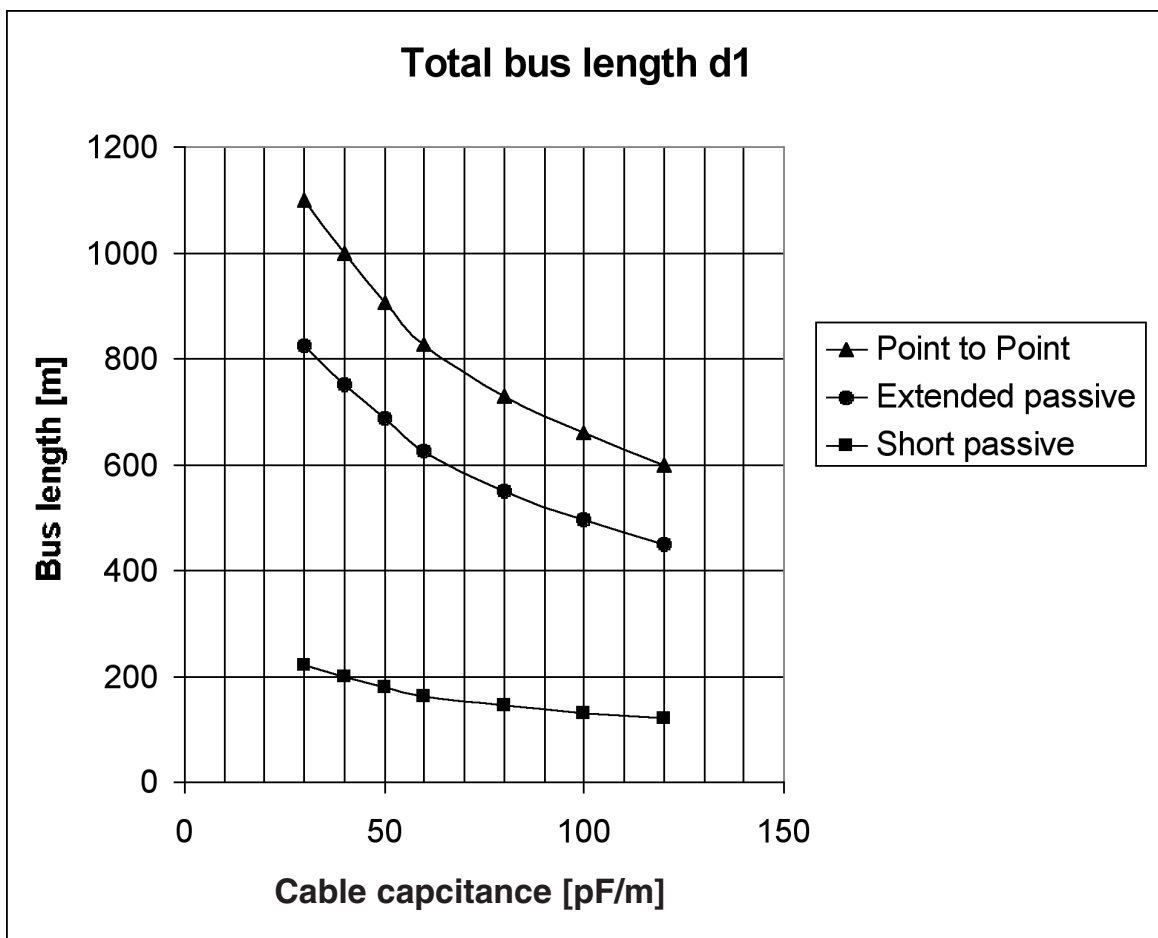
Diagram specifies practically achievable cable lengths as function of cable capacitance for a 0.3 mm^2 wire.

Alarm inputs

The four alarm inputs are accessed through screw terminals, the alarm inputs are opto-isolated from all other parts of the ID-90. The alarm inputs need an external supply voltage of 10–60V DC to be operated. The supply is connected between the alarm input common and the four inputs via making or breaking contacts. The inputs is not polarity sensitive but all inputs must use the same common. The alarm inputs can use any mix of making and breaking contacts as the alarm trigger condition is programmable through AT-commands.
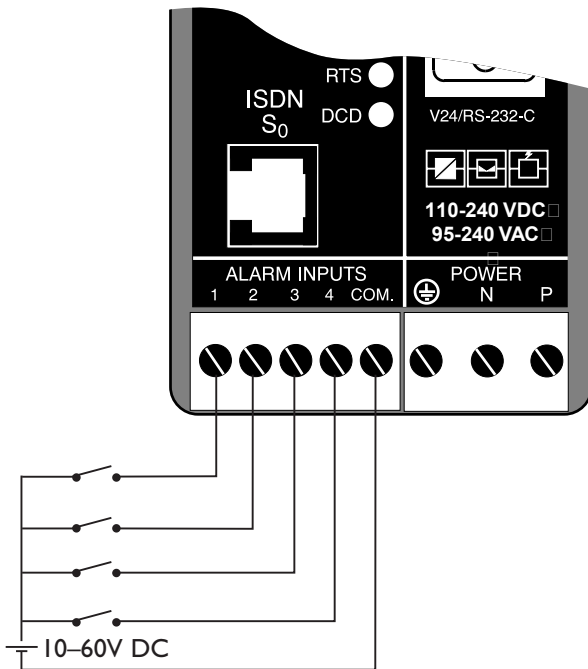
Example 1
Alarm through relay contacts.
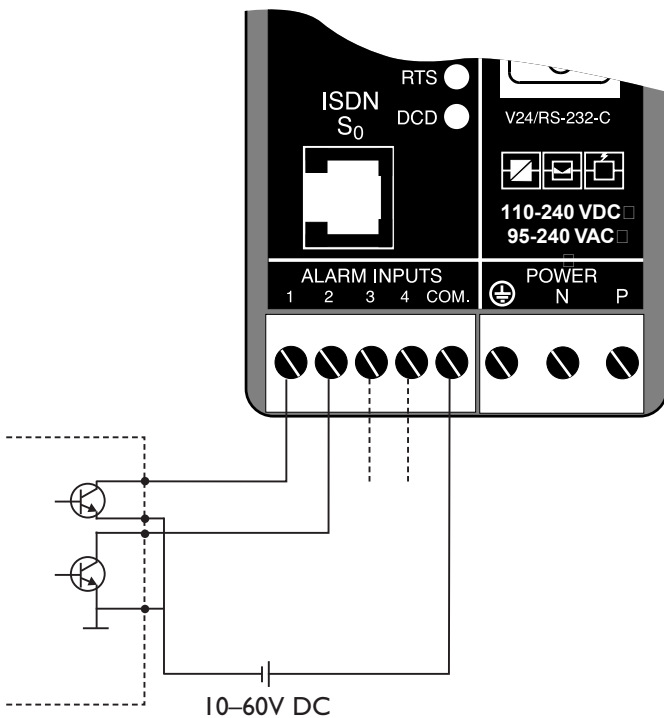
Example 2
Alarm from a PLC with open collector.

LED Indicators

Indications via LED's:		
L1	ISDN Line status	LED normally showing the status of the ISDN S_0 interface. L1 together with L2 is also used to indicate error conditions in the ID-90 and the connection to the ISDN S_0 interface.
L2	ISDN Data connection	LED Normally showing the state of the data connection
ANS	Auto answer	OFF = ID-90 will reject incoming calls. ON = ID-90 will respond to incoming calls
ANL	Analogue line	Only used when V.90 option installed. OFF = No analogue connection established BLINK = Analogue call in progress ON = Analogue line established
TD	Transmit Data	LED showing data from the DTE, the LED will blink when data received
RD	Receive Data	LED showing data transmitted to the DTE, the LED will blink when data transmitted
RTS	Request to Send	LED showing the status of the handshake line RTS from DTE, LED is ON when DTE requests to send data.
DCD	Data Carrier Detect	LED showing the status of the handshake line DCD from ID-90, The behavior of the DCD-line is programable, see configuration command cdcd.

Active states:			
L1	**L2**	**Status**	**Action**
⊗	Θ 5x1s	Start up phase	
⊗	O	Connection to ISDN S_0 OK	; ISDN ok, no ISDN connection established
⊗	∅	Call setup in progress	
⊗	⊕	Waiting for B channel synchronization	
⊗	⊗	Data connection is established	

Error states:			
L1	L2	Status	
O	O	ID-90 NOT OK	No power or Hardware error, check power distribution, send ID-90 for repair if necessary
Θ 1x1s	O	Connection to ISDN S_0 NOT OK	Check ISDN interface/ -connector
O	Θ 2x1s	ID-90 internal RAM error	ID-90 repair necessary
O	Θ 1x1s	ID-90 internal ROM error	Reload Flash firmware, repair ID-90 if necessary

LED Legend:	
⊗	ON
∅	Short on, long off Cycle 1 s
⊕	Long on, short off Cycle 1 sec
Θ	Continuous blinking: *n* times every *m* seconds, (*nxms*)
O	Off

DIP-Switch Setup

Disconnect power before changing DIP-switches.

Use ESD-protection when changing switches.
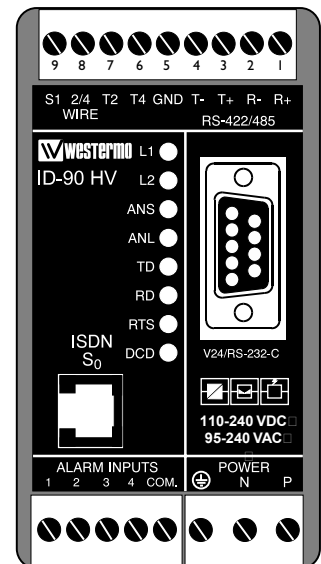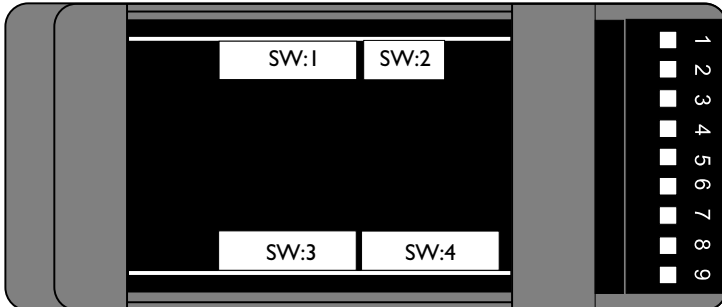
Data bits parity

When using DIP-swithes for parity and data bits
remember to set DTE baudrate switches as well.

			Related AT-command
S1	Stored setting from ID-90 database is used		–
S1	No Parity	8-data bits	AT**prty=0 AT**dbits=8
S1	Even Parity	8-data bits	AT**prty=1 AT**dbits=8
S1	Odd Parity	8-data bits	AT**prty=2 AT**dbits=8
S1	Not used		–
S1	Not used		–
S1	Even Parity	7-data bits	AT**prty=1 AT**dbits=7
S1	Odd Parity	7-data bits	AT**prty=2 AT**dbits=7

DSR and DCD line control

			Related AT-command

			Related AT-command
S1 [ON 1 2 3 4 5 6 7 8]	Stored setting from ID-90 database is used	–
S1 [ON 1 2 3 4 5 6 7 8]	ID-90 control line DSR and DCD is always ON	AT&S AT&C
S1 [ON 1 2 3 4 5 6 7 8]	DSR is always ON DCD ON indicates ISDN connection is established and synchronized	AT&S AT&C1
S1 [ON 1 2 3 4 5 6 7 8]	DSR ON indicates ISDN connection is established and synchronized DCD always ON	AT&S1 AT&C
S1 [ON 1 2 3 4 5 6 7 8]	DSR ON indicates ISDN connection is established and synchronized DCD ON indicates ISDN connection is established and synchronized	AT&S1 AT&C1
S1 [ON 1 2 3 4 5 6 7 8]	Reserved	–
S1 [ON 1 2 3 4 5 6 7 8]	Reserved	–
S1 [ON 1 2 3 4 5 6 7 8]	DSR and DCD follows DTR	AT**cdsr=2 AT**cdcd=2

DTR line control

			Related AT-command
S1 [ON 1 2 3 4 5 6 7 8]	Stored setting from ID-90 database is used	–
S1 [ON 1 2 3 4 5 6 7 8]	DTR is evaluated: Ignored	AT&D AT**cdtr = 0
S1 [ON 1 2 3 4 5 6 7 8]	DTR is evaluated: Dropping the DTR line by the DTE will disconnect an existing ISDN connection. An incoming call will be accepted only with DTR active	AT&D2 AT**cdtr = 2
S1 [ON 1 2 3 4 5 6 7 8]	DTR is evaluated: Incoming calls will be accepted independent of DTR status; DTR drop disconnects an active connection	AT&D4 AT**cdtr = 4

DTE baudrate

			Related AT-command
S2		Stored setting from ID-90 database is used	–
S2		Automatic baud detection	AT%B0
S2		1 200 bit/s	AT%B1
S2		2 400 bit/s	AT%B2
S2		4 800 bit/s	AT%B3
S2		9 600 bit/s	AT%B4
S2		19 200 bit/s	AT%B5
S2		38 400 bit/s	AT%B6
S2		57 600 bit/s	AT%B7
S2		115 200 bit/s	AT%B8

B-Channel protocol

		Related AT-command
S3	Stored setting from ID-90 database is used	–
S3	V.110 asynchronous	ATB0
S3	HDLC asynchronous to synchronous conversion (for PPP asynchronous and single link PPP)	ATB3
S3	HDLC transparent (DTE data octets packed into HDLC frames)	ATB4
S3	Byte transparent (raw B-channel data)	ATB5
S3	X.75 SLP	ATB10
S3	V.120 asynchronous	ATB13
S3	X25 / X31 B channel (X.25 B channel)	ATB20
S3	X25 / X31 D channel	ATB21
S3	T.70-NL-CEPT	ATB22
S3	T.90-NL	ATB23
S3	ML-PPP Multilink PPP	ATB31

Command set

Selects the flow control behaviour of the ID-90 while in data communication phase.

			Related AT-command

			Related AT-command
S3 [ON 1 2 3 4 5 6 7 8]	Stored setting from ID-90 database is used		–
S3 [ON 1 2 3 4 5 6 7 8]	AT-command set		AT**cmds = 0
S3 [ON 1 2 3 4 5 6 7 8]	X.3 PAD		AT**cmds = 1
S3 [ON 1 2 3 4 5 6 7 8]	Hot line DTR call		AT**cmds = 6
S3 [ON 1 2 3 4 5 6 7 8]	Hot line TxD call		AT**cmds = 7
S3 [ON 1 2 3 4 5 6 7 8]	Reserved		–
S3 [ON 1 2 3 4 5 6 7 8]	Configurator		AT**cmds = 10

Incomming call handling

			Related AT-command
S3 [ON 1 2 3 4 5 6 7 8]	Stored setting from ID-90 database is used		–
S3 [ON 1 2 3 4 5 6 7 8]	Reject all incoming calls		AT#R1

Flow control

Selects the flow control behaviour of the ID-90 while in data communication phase.

		Related AT-command
S4 `ON 1 2 3 4 5 6 7 8`	Stored setting from ID-90 database is used	–
S4 `ON 1 2 3 4 5 6 7 8`	No local flow control between the DTE and ID-90 is used CTS is always ON, RTS ignored	AT&K AT&R1
S4 `ON 1 2 3 4 5 6 7 8`	No local flow control between the DTE and ID-90 is used CTS follows DTR, RTS ignored	AT&K AT&R2
S4 `ON 1 2 3 4 5 6 7 8`	No local flow control between the DTE and ID-90 is used CTS follows changes on RTS	AT&K AT&R
S4 `ON 1 2 3 4 5 6 7 8`	Local flow control is set to hardware handshake RTS/CTS	AT&K3
S4 `ON 1 2 3 4 5 6 7 8`	Local flow control is set to software handshake XON/XOFF CTS is always ON, RTS ignored	AT&K4 AT&R1
S4 `ON 1 2 3 4 5 6 7 8`	Local flow control is set to software handshake XON/XOFF CTS follows DTR, RTS ignored	AT&K4 AT&R2
S4 `ON 1 2 3 4 5 6 7 8`	Local flow control is set to software handshake XON/XOFF CTS follows changes on RTS	AT&K4 AT&R

Selection of analogue coding V-90

S4 `ON 1 2 3 4 5 6 7 8`	A-Law, European analogue data coding standard
S4 `ON 1 2 3 4 5 6 7 8`	μ-Law, US analogue data coding standard
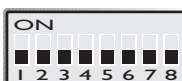
Software update

S4 `ON 1 2 3 4 5 6 7 8`	Enable Flash programming, should always be in OFF position for normal operation, ref. software update

Line baudrate at V.110

Switch	Setting	Related AT-command
S4	Default setting from ID-90 database is used	–
S4	1 200 bit/s	ATN1
S4	2 400 bit/s	ATN2
S4	4 800 bit/s	ATN3
S4	9 600 bit/s	ATN4
S4	19 200 bit/s	ATN5

Factory settings

ID-90

S1
S2
S3
S4

ID-90 V.90

S1
S2
S3
S4

The ID-90 DIP-switches will be read at Power on and override the current database setting. If an AT-command or Configurator command given after Power on addressing the same parameter as a DIP-switch setting the command will in turn override the DIP-switch setting.

A Save command AT&W will store the current configuration set by DIP-switches or configuration commands.

OWN COMMENTS

OWN COMMENTS

Westermo

Westermo Teleindustri AB • SE-640 40 Stora Sundby, Sweden
Phone +46 16 42 80 00 Fax +46 16 42 80 01
E-mail: info@westermo.se • Westermo Web site: www.westermo.se

Subsidiaries

Westermo Data Communications Ltd
Unit 14 Talisman Business Centre • Duncan Road
Park Gate, Southampton • SO31 7GA
Phone: +44(0)1489 580 585 • Fax.:+44(0)1489 580586
E-Mail: sales@westermo.co.uk • Web: www.westermo.co.uk

Westermo Data Communications GmbH
Goethestraße 67, 68753 Waghäusel
Tel.: +49(0)7254-95400-0 • Fax.:+49(0)7254-95400-9
E-Mail: info@westermo.de • Web: www.westermo.de

Westermo Data Communications S.A.R.L.
9 Chemin de Chilly 91160 CHAMPLAN
Tél : +33 1 69 10 21 00 • Fax : +33 1 69 10 21 01
E-mail : infos@westermo.fr • Site WEB: www.westermo.fr

Westermo Teleindustri AB have distributors in several countries, contact us for further information.