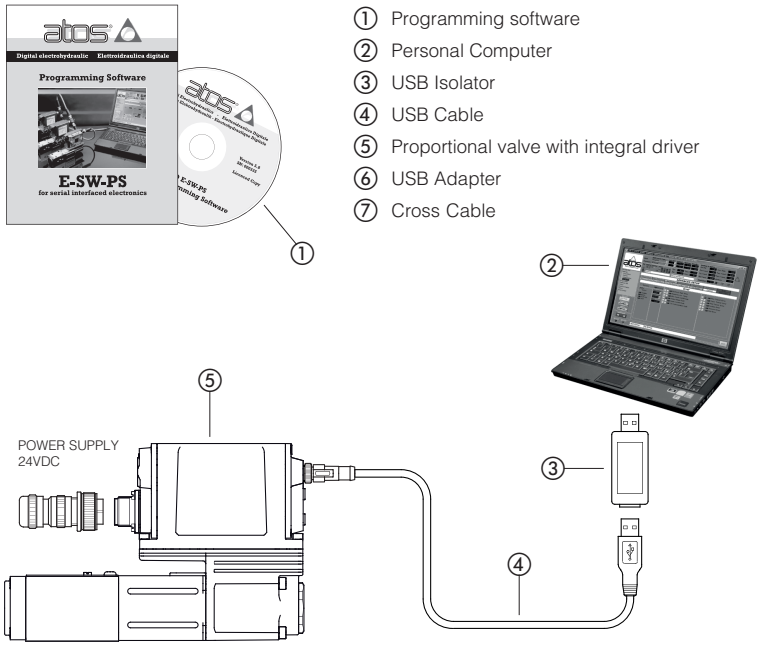
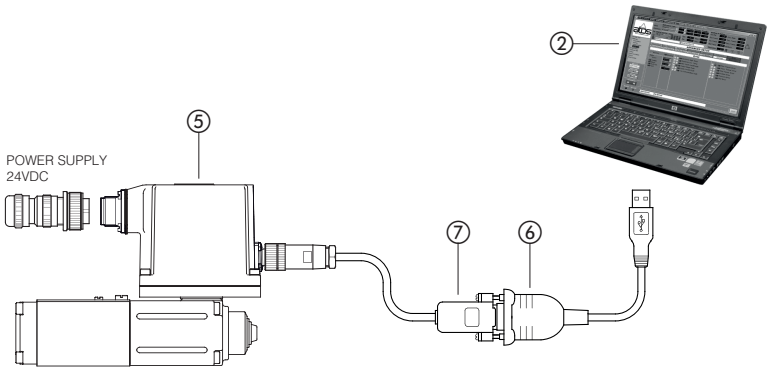
Programming tools for digital electronics

Atos PC software, USB adapters, cables and terminators



USB direct PC connection
available for TEB/LEB drivers and integral closed loop drivers/controllers series 40



USB adapter PC connection

The E-SW / Z-SW programming software are the entry door to the Atos digital technology. They are supplied in DVD format and can be easily installed on a desktop or a notebook computer.
The intuitive graphic interface allows to:

- set up valve's functional parameters
- verify the actual working conditions
- identify and quickly solve fault conditions
- adapt the factory preset parameters to the application requirements
- store the customized setting into the valve
- archive the customized setting into the PC

The graphic interface is organized in pages related to different specific groups of functions and parameters.
The software automatically recognizes the connected valve model and adapts the displayed parameter groups, according to the selected access level.
The programming software is available in different versions according to the driver and controller communication interfacing:

- PS = USB (NP), Serial (PS) and Infrared (IR)
- BC = CANopen
- BP = PROFIBUS DP
- EH = EtherCAT

Fieldbus communication software (BC, BP and EH) includes also dedicated manuals and configuration files for user self management of the Atos electronics, using a fieldbus master.

Features:

- automatic valve recognition
- multilevel graphic interface
- numeric parameters settings (scale, bias, ramp, linearization, dither, etc.)
- real-time parameters modification
- diagnostic and monitor signals
- preset data storing into the digital driver and controller
- internal oscilloscope function
- internal database of customized preset

DVD contents:

- software installer
- user manuals
- fieldbus communication manuals and configuration files (BC, BP, EH)

1 **PROGRAMMING SOFTWARE** - see section 7

E - SW	-	PS	-	*	/	*

Programming software:
E-SW = for valve drivers
Z-SW = for axis controllers

Communication interfaces:
PS = USB (NP), Serial (PS) and Infrared (IR)
BC = CANopen
BP = PROFIBUS DP
EH = EtherCAT **(1)**

Supplies, see section 7 :
- = first supply
N = next supply

Options, see section 7 :
S = for alternated P/Q controls (only for E-SW software)

(1) E-SW-EH and Z-SW-EH allow driver/controller programming only through USB/Serial communication, according to relevant electronic model code

2 USB CABLE and ISOLATOR - see sections 10 , 11

The USB cable directly connects USB port of integral closed loop drivers/controllers to PC USB port.
Optional USB isolator adapter can be installed between USB cable and PC USB port.

WARNING: drivers/controllers USB port is not isolated! Use of USB isolator adapter is highly recommended for PC protection: wrong earthing connections may cause high potential difference between GNDs, generating high currents that could damage the PC connected to integral closed loop drivers/controllers.

E - C	-	SB	-	USB	/	M12
E - C = USB Cable **E - A** = USB adapter USB communication				Connector, PC side: **USB** = from PC USB port		Connector, drivers/controllers side - only for cable **E - C**: **M12** = to standard integral drivers/controllers Isolator connector, USB Cable side - only for adapter **E - A**: **OPT** = to USB cable

3 USB COMMUNICATION ADAPTERS - see section 11

The adapters have to be connected to the USB communication port of the PC to activate a proper communication interface towards Atos digital electrohydraulics. For PS versions and AES drivers with serial port always present, the adapter is not required if the PC is already equipped with a RS232 serial communication port.

E - A	-	PS	-	USB	/	DB9
USB Adapter Communication interfaces: **PS** = Serial **(1)** **BC** = CANopen **BP** = PROFIBUS DP				Connector, PC side: **USB** = from PC USB port		Connector, drivers/controllers side: **DB9** = to serial or fieldbus cables **IR** = to infrared E-MI-AS drivers

(1) for AES and Z-ME-KZ select E-A-PS-USB/DB9 - see 11.2

4 CROSS CABLES - see section 12

The cross cables connect the DB9 connector of the USB adapter with the communication port of the digital drivers/controllers.

E - C	-	PS	-	DB9	/	M12
Cross Cable Communication interfaces: **PS** = Serial **(1)** **BC** = CANopen **BP** = PROFIBUS DP				Connector, PC/adapter side: **DB9** = from DB9 connector		Connector, drivers/controllers side: **M12** = to standard integral drivers/controllers **M8** = to Ex-proof integral drivers (for PS) **RA** = to Ex-proof integral drivers (for BC, BP) **RJ45**= to E-BM-AS drivers **DB9** = to Z-ME-KZ controllers

(1) for AES select E-C-PS-DB9/M12 - see 12.1

5 TERMINATORS - see section 14

For CANopen (BC) or PROFIBUS DP (BP) the fieldbus terminator has to be used according to the schemes showed at section 14 .

E - TRM	-	BC	-	M12	/	5PM
Terminator Fieldbus interfaces: **BC** = CANopen **BP** = PROFIBUS DP				Connector: **M12** = from M12 output fieldbus connector, drivers/controllers side **(1)** **DB9** = from DB9 connector, adapter side		Connector: **5PM** = to BC executions, drivers/controllers side **(1)** **4PM** = to BP executions, drivers/controllers side **(1)** **DB9** = to DB9 connector, cable side

(1) for integral closed loop drivers/controllers series 40

6 E-SW / Z-SW MINIMUM PC REQUIREMENTS

Personal Computer	Pentium® processor 1GHz or equivalent	**Memory**	512 MB RAM + Hard Disk with 250MB free space
Operating System	Windows XP SP3	**Device**	Dvd reader
Monitor Resolution	1024 x 768	**Interface**	RS232 serial port (only for PS) or USB port

7 E-SW / Z-SW SOFTWARE

Valve's functional parameters can be easily set up with Atos E-SW / Z-SW programming software using proper connection to the digital driver/controller. E-SW / Z-SW software are available in different versions according to fieldbus interface and/or alternated P/Q control:

	Fieldbus :	**Drivers :** **SN**	**Drivers with P/Q control (1):** **SP, SF, SL**	**Controllers :** **SN, SP, SF, SL**
NP, PS, IR	Not Present	E-SW-PS	E-SW-PS/S	Z-SW-PS
BC	CANopen	E-SW-BC	E-SW-BC/S	Z-SW-BC
BP	PROFIBUS DP	E-SW-BP	E-SW-BP/S	Z-SW-BP
EH	EtherCAT	E-SW-EH	E-SW-EH/S	Z-SW-EH

Notes: (1) E-SW-*/S software support also SN drivers programming

The software communication options (PS, BC, BP, EH) are not interchangeable and must be ordered separately.
Fieldbus programming software can program digital electronics through:
- RS232 Serial communication port for all versions of AES drivers and Z-ME-KZ controllers
- USB communication port for all versions of integral closed loop drivers/controllers series 40

Basic programming software, free download :

E-SW-PS web download = software can be downloaded upon web registration at www.download.atos.com; service and DVD not included
Upon web registration user receive via email the Activation Code (software free license) and login data to access Atos Download Area. The software remains active for 10 days from the installation date and then it stops until the user inputs the Activation Code.

Full programming software, to be ordered separately :

E-SW-* / **Z-SW-*** DVD first supply = software has to be activated via web registration at www.download.atos.com; 1 year service included
Upon web registration user receive via email the Activation Code (software license) and login data to access personal Atos Download Area. The software remains active for 10 days from the installation date and then it stops until the user inputs the Activation Code.

E-SW-*-N / **Z-SW-*-N** DVD next supplies = only for supplies after the first; service not included, web registration not allowed
Software has to be activated with Activation Code received upon first supply web registration

DVD contents

Include software installer, user manuals and fieldbus configuration files (EDS for BC, GSD for BP and XML for EH).

Atos Download Area

Direct access to latest releases of programming software, manuals, USB drivers and fieldbus configuration files at www.download.atos.com
Software and USB drivers can be easily installed following the instruction contained in the “info.txt” files.
An automatic mailing message will inform all the registered users whenever a new software upgrade is available.

8 FIRMWARE UPDATE

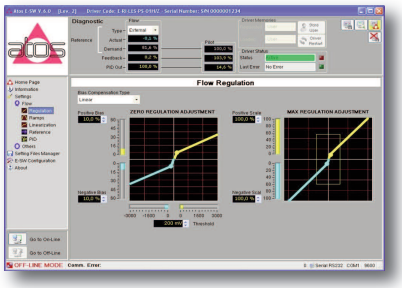
It is possible to update the firmware of the following digital drivers and controllers using proper USB/Serial communication:

Communication Type	RS232 Serial				USB				
Model Code	E-RI-AES s30	E-RI-AEG s30	E-RI-AEZ s10	Z-ME-KZ-PS	E-RI-TEB s10 E-RI-LEB s10	E-RI-TES s40 E-RI-LES s40	E-RI-TES-S s40 E-RI-LES-S s40	E-RI-PES-S s40	Z-RI-TEZ s40 Z-RI-LEZ s40

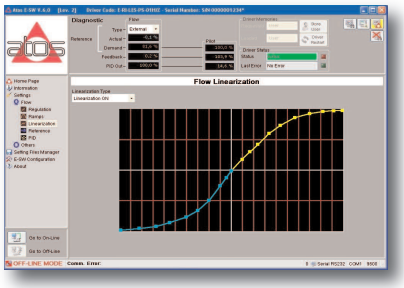
Note: for firmware update procedure, please contact Atos technical department

9 SOFTWARE GRAPHIC INTERFACE - Examples

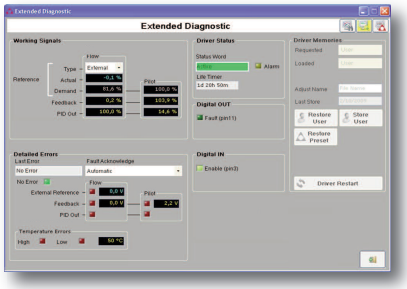
BIAS & SCALE : numeric setting of bias and scale parameters allows to optimize the valve’s hydraulic regulation; the graph shows the effect of your changes



LINEARIZATION : linearization curve can be modified using the coordinates of the 10 available points; drag each point directly on the graph to modify the linearization setting



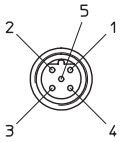
DIAGNOSTIC : complete and comprehensive representation of actual valve’s working conditions and alarms



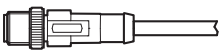
10 USB CABLE CHARACTERISTCS

E-C-SB-USB/M12 - 4m cables

For connection of PC USB port to proportional valves -ZO(R) with TEB/LEB drivers and integral drivers/controllers series 40 .

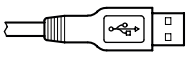


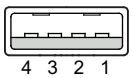
Connector to driver/controller side
M12 - 5poles - male



1	+5V_USB	- - - **(1)**	-
2	ID	- - - **(1)**	-
3	GND_USB	GND_USB	4
4	D -	D -	2
5	D+	D+	3

Connector to PC side
USB type A - male



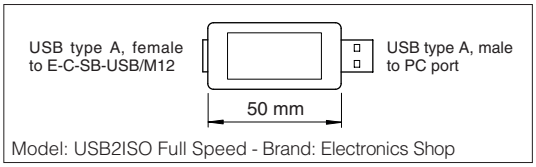


Note: (1) do not connect

11 USB ADAPTERS CHARACTERISTCS

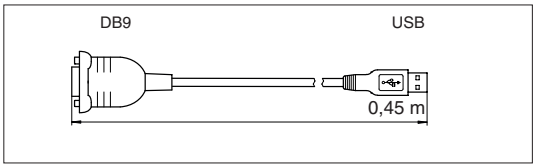
11.1 E-A-SB-USB/OPT isolator adapter from PC USB port to USB cables

- USB 2.0 Full speed (12 MBps)
- electrical isolation 1 kV
- temperature range, -40° ÷ +50° (relative humidity 25% ÷ 75%)
- external power supply not required (power 400 mA output, 5 V ±10%)
- MTBF >1,2 million hours (MIL standard)



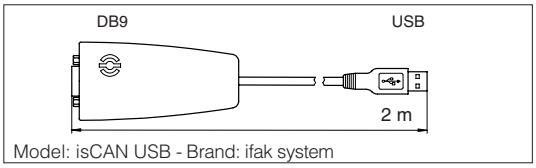
11.2 E-A-PS-USB/DB9 adapter from PC USB port to PS Serial cables

- DB9 male connector according to RS232 specification
- USB male connector, type A
- transmission rate from 1,6 kbit/s up to 225 kbit/s
- external power supply not required (USB supply)



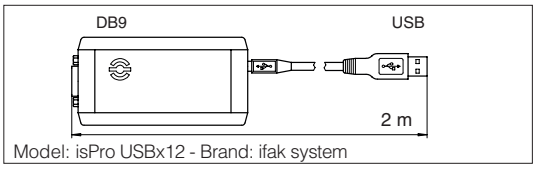
11.3 E-A-BC-USB/DB9 adapter from PC USB port to BC CANopen cables

- DB9 male connector according to the CiA specification DR303-1
- USB male connector, type A
- transmission rate from 10 kbit/s to 1 Mbit/s
- external power supply not required (USB supply)
- LEDs indicate the actual working condition



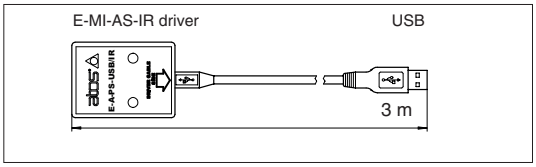
11.4 E-A-BP-USB/DB9 adapter from PC USB port to BP PROFIBUS DP cables

- DB9 female connector according to the PROFIBUS RS485 specification
- USB male connector, type A
- transmission rate from 1,6 kbit/s to 12 Mbit/s
- external power supply not required (USB supply)
- LEDs indicate the actual working condition



11.5 E-A-PS-USB/IR adapter from PC USB port to E-MI-AS-IR drivers

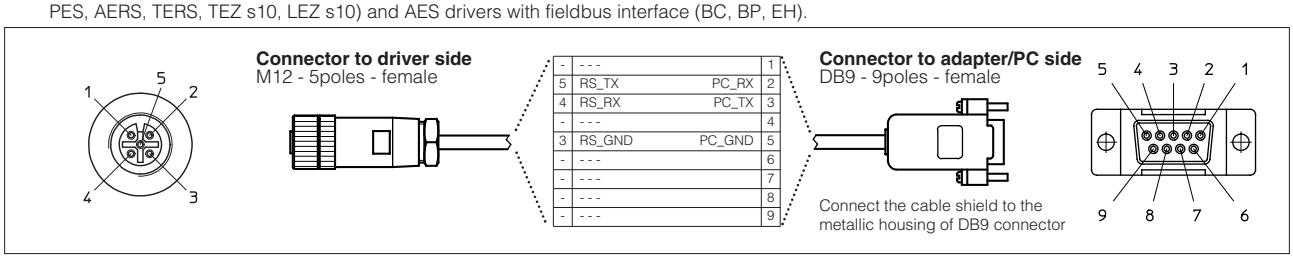
- direct infrared communication with the driver
- USB male connector, type A
- plug-in format for direct connection on the driver
- transmission rate 9,6 kbit/s
- external power supply not required (USB supply)



12 CROSS CABLES CHARACTERISTCS

12.1 E-C-PS-DB9/M12 - 4 m cables

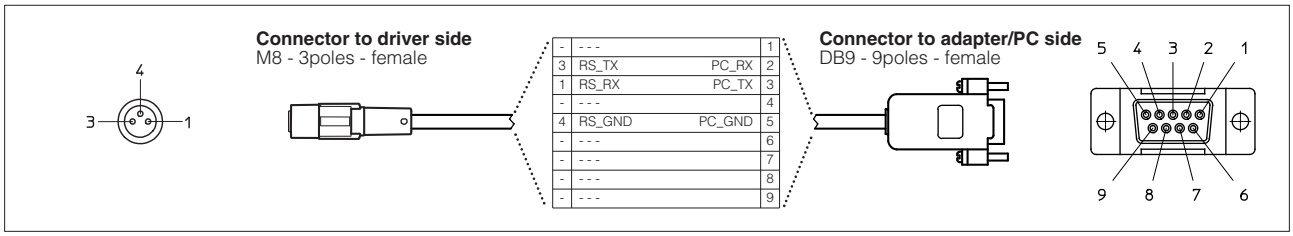
For connection of E-A-PS-USB adapter to digital proportional valves -ZO(R) with integral PS drivers/controllers (AES, AEG, AEZ, TES s31, LES s31, PES, AERS, TERS, TEZ s10, LEZ s10) and AES drivers with fieldbus interface (BC, BP, EH).



-	- - -		1
5	RS_TX	PC_RX	2
4	RS_RX	PC_TX	3
-	- - -		4
3	RS_GND	PC_GND	5
-	- - -		6
-	- - -		7
-	- - -		8
-	- - -		9

12.2 E-C-PS-DB9/M8 - 4m cables

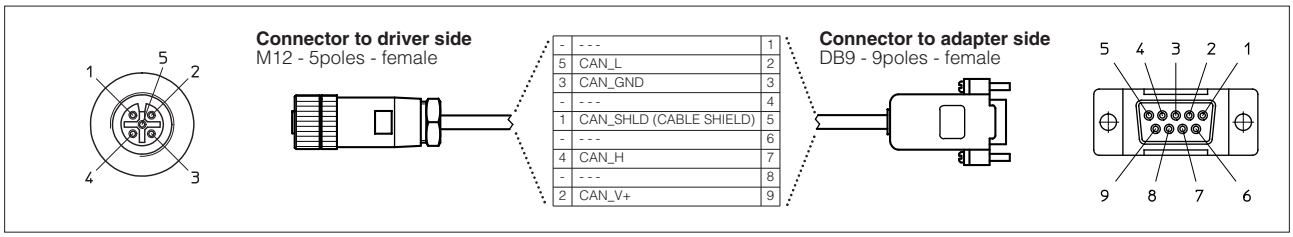
For connection of E-A-PS-USB adapter to **Ex-proof** digital proportional -ZA valves with integral PS drivers/controllers (AES, TES, LES AERS, TERS) and AES drivers with fieldbus interface (BC, BP).



-	- - -		1
3	RS_TX	PC_RX	2
1	RS_RX	PC_TX	3
-	- - -		4
4	RS_GND	PC_GND	5
-	- - -		6
-	- - -		7
-	- - -		8
-	- - -		9

12.3 E-C-BC-DB9/M12 - 2 m cables

For connection of E-A-BC-USB adapter to digital proportional valves -ZO(R) with integral BC drivers/controllers (AES, TES, LES, PES, AERS, TERS, TEZ, LEZ).

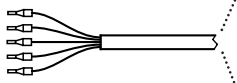


-	- - -	1
5	CAN_L	2
3	CAN_GND	3
-	- - -	4
1	CAN_SHLD (CABLE SHIELD)	5
-	- - -	6
4	CAN_H	7
-	- - -	8
2	CAN_V+	9

12.4 E-C-BC-DB9/RA - 2 m cables

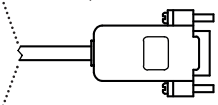
For connection of E-A-BC-USB adapter to **Ex-proof** digital proportional valves -ZA with integral BC drivers (TES, LES, AERS, TERS).

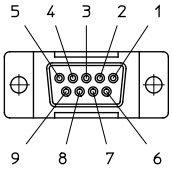
Driver side
wires to driver terminal block



-	- - -	1
brown	CAN_L	2
yellow	CAN_GND	3
-	- - -	4
shield	CAN_SHLD (SHIELD)	5
-	- - -	6
white	CAN_H	7
-	- - -	8
green	CAN_V+	9

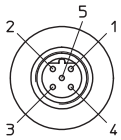
Connector to adapter side
DB9 - 9poles - female



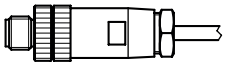


12.5 E-C-BP-DB9/M12 - 2 m cables

For connection of E-A-BP-USB/DB9 adapter to digital proportional valves -ZO(R) with integral BP drivers/controllers (AES, TES, LES, PES, AERS, TERS, TEZ, LEZ).

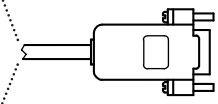


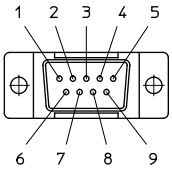
Connector to driver side
M12 - 5poles - male reverse key



5	CABLE SHIELD	1
-	- - -	2
4	B_LINE	3
-	- - -	4
-	- - -	5
-	- - -	6
-	- - -	7
2	A_LINE	8
-	- - -	9

Connector to adapter side
DB9 - 9poles - male

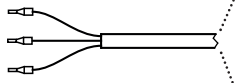




12.6 E-C-BP-DB9/RA - 2 m cables

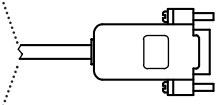
For connection of E-A-BP-USB/DB9 adapter to **Ex-proof** digital proportional valves -ZA with integral BP drivers (TES, LES, AERS, TERS).

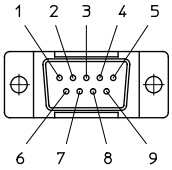
Driver side
wires to driver terminal block



shield	CABLE SHIELD	1
-	- - -	2
red	B_LINE	3
-	- - -	4
-	- - -	5
-	- - -	6
-	- - -	7
green	A_LINE	8
-	- - -	9

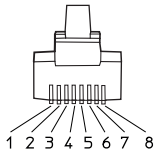
Connector to adapter side
DB9 - 9poles - male



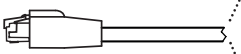


12.7 E-C-PS-DB9/RJ45 - 2,5 m cables

For connection of E-A-PS-USB adapter to digital E-BM-AS drivers.

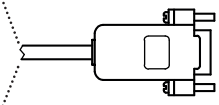


Connector to driver side
RJ45 - 8poles - male

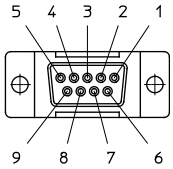


-	- - -		1
6	RS_TX	PC_RX	2
5	RS_RX	PC_TX	3
-	- - -		4
4	RS_GND	PC_GND	5
-	- - -		6
-	- - -		7
-	- - -		8
-	- - -		9

Connector to adapter/PC side
DB9 - 9poles - female

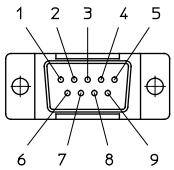


Connect the cable shield to the metallic housing of DB9 connector

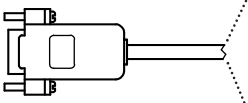


12.8 E-C-PS-DB9/DB9 - 4 m cables

For connection of E-A-PS-USB adapter to digital Z-ME-KZ-PS controllers.

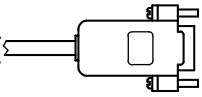


Connector to controller side
DB9 - 9poles - male

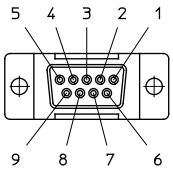


-	- - -		1
2	RS_TX	PC_RX	2
3	RS_RX	PC_TX	3
-	- - -		4
5	RS_GND	PC_GND	5
-	- - -		6
-	- - -		7
-	- - -		8
-	- - -		9

Connector to adapter/PC side
DB9 - 9poles - female

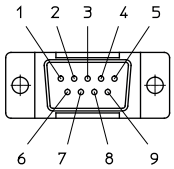


Connect the cable shield to the metallic housing of DB9 connector

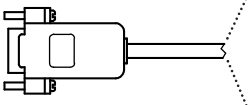


12.9 E-C-BP-DB9/DB9 - 2 m cables

For connection of E-A-BP-USB adapter to digital Z-ME-KZ-PS/BP controllers.

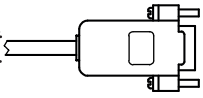


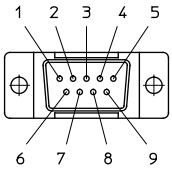
Connector to controller side
DB9 - 9poles - male



1	CABLE-SHIELD	1
-	- - -	2
3	B_LINE	3
-	- - -	4
-	- - -	5
-	- - -	6
-	- - -	7
8	A_LINE	8
-	- - -	9

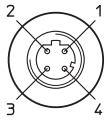
Connector to adapter/PC side
DB9 - 9poles - male



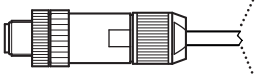


13 EtherCAT CABLE WIRING DIAGRAM

Typical EtherCAT cable wiring diagram from industrial M12 connectors to standard RJ45 ethernet connectors.



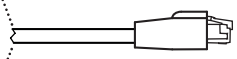
Connector to driver side
M12 - 4poles - male

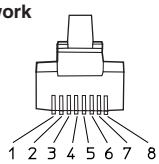


The cable shield can be connected to the metallic housing of M12 connector

1	TX+	white/orange	1
3	TX-	orange	2
2	RX+	white/green	3
-	- - -		4
-	- - -		5
4	RX-	green	6
-	- - -		7
-	- - -		8
-	- - -		-

Connector to EtherCAT network
RJ45 - 8poles - male

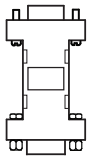




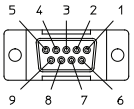
14 TERMINATORS CHARACTERISTICS

The fieldbus terminators for CANopen and PROFIBUS DP are required when USB adapter has to be connected directly to the digital driver or output fieldbus connector has to be used as network end point.

E-TRM-BC-DB9/DB9 CANopen terminator for E-A-BC-USB/DB9 USB adapter

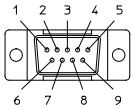


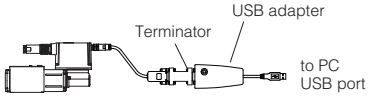
Adapter side
DB9
9poles - female



CAN_SHLD	5		5	CAN_SHLD
CAN_GND	3		3	CAN_GND
CAN_L	2	121 ohm	2	CAN_L
CAN_H	7		7	CAN_H
CAN_V+	9		9	CAN_V+

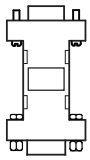
Cable side
DB9
9poles - male



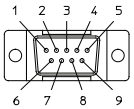


bus line terminator must be used

E-TRM-BP-DB9/DB9 PROFIBUS DP terminator for E-A-BP-USB/DB9 USB adapter

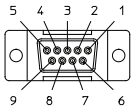


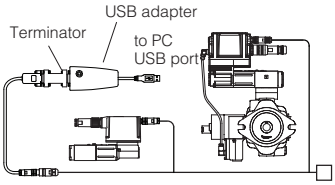
Adapter side
DB9
9poles - male



SHIELD	1		1	SHIELD
+5 V	6	390 ohm	6	+5 V
B_LINE	3	221 ohm	3	B_LINE
A_LINE	8	390 ohm	8	A_LINE
GND	5		5	GND

Cable side
DB9
9poles - female

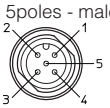




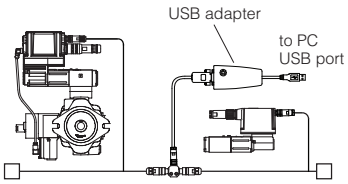
bus line terminator must be used

E-TRM-BC-M12/5PM network CANopen terminator

Adapter side
M12
5poles - male



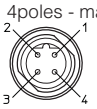
1	
2	
3	
4	120 ohm
5	



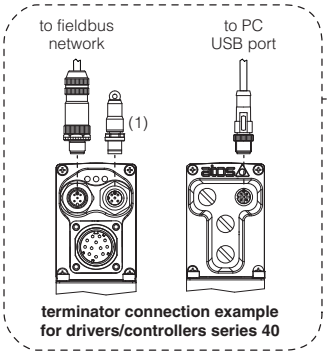
bus line terminator must not be used

E-TRM-BP-M12/4PM network PROFIBUS DP terminator

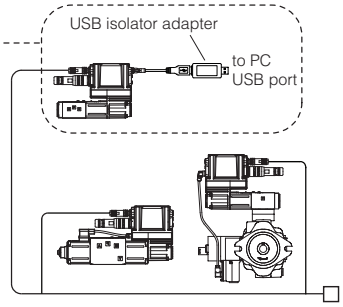
Adapter side
M12
4poles - male



1	390 ohm
2	221 ohm
3	390 ohm
4	



terminator connection example for drivers/controllers series 40



fieldbus network

Note: (1) terminator must be connected to output fieldbus connector, refer to specific valve tech table

15 TOOLS SELECTION EXAMPLES

	Model Code	Software	Cable	USB Adapter	Terminator
IR	E-MI-AS-IR			E-A-PS-USB/IR	
PS	E-BM-AS-PS	E-SW-PS	E-C-PS-DB9/RJ45	E-A-PS-USB/DB9	
	Ex-proof: AES, AERS, TERS, TES s31, LES s31		E-C-PS-DB9/M8		
	AES, AEG, AEZ, AERS, TERS, TES s31, LES s31		E-C-PS-DB9/M12		
	TES/S s31, LES/S s31, PES s31	E-SW-PS/S			
	TEZ s10, LEZ s10	Z-SW-PS			
	Z-ME-KZ-PS		E-C-PS-DB9/DB9		
NP	TEB, LEB	E-SW-PS	E-C-SB-USB/M12	E-A-SB-USB/OPT	
	TES s40, LES s40				
	TES-S s40, LES-S s40, PES-S s40	E-SW-PS/S			
	TEZ s40, LEZ s40	Z-SW-PS			
BC	AES	E-SW-BC	E-C-PS-DB9/M12	E-A-PS-USB/DB9	
	Ex-proof: AES		E-C-PS-DB9/M8		
	AERS, TERS, TES s31, LES s31		E-C-BC-DB9/M12	E-A-BC-USB/DB9	E-TRM-BC-DB9/DB9
	Ex-proof: AERS, TERS, TES s31, LES s31		E-C-BC-DB9/RA		
	TES s40, LES s40		E-C-SB-USB/M12	E-A-SB-USB/OPT	
	TES/S s31, LES/S s31, PES s31	E-SW-BC/S	E-C-BC-DB9/M12	E-A-BC-USB/DB9	E-TRM-BC-DB9/DB9
	TES-S s40, LES-S s40, PES-S s40		E-C-SB-USB/M12	E-A-SB-USB/OPT	
	TEZ s10, LEZ s10	Z-SW-BC	E-C-BC-DB9/M12	E-A-BC-USB/DB9	E-TRM-BC-DB9/DB9
	TEZ s40, LEZ s40		E-C-SB-USB/M12	E-A-SB-USB/OPT	
BP	AES	E-SW-BP	E-C-PS-DB9/M12	E-A-PS-USB/DB9	
	Ex-proof: AES		E-C-PS-DB9/M8		
	AERS, TERS, TES s31, LES s31		E-C-BP-DB9/M12	E-A-BP-USB/DB9	E-TRM-BP-DB9/DB9
	Ex-proof: AERS, TERS, TES s31, LES s31		E-C-BP-DB9/RA		
	TES s40, LES s40		E-C-SB-USB/M12	E-A-SB-USB/OPT	
	TES/S s31, LES/S s31, PES s31	E-SW-BP/S	E-C-BP-DB9/M12	E-A-BP-USB/DB9	E-TRM-BP-DB9/DB9
	TES-S s40, LES-S s40, PES-S s40		E-C-SB-USB/M12	E-A-SB-USB/OPT	
	TEZ s10, LEZ s10	Z-SW-BP	E-C-BP-DB9/M12	E-A-BP-USB/DB9	E-TRM-BP-DB9/DB9
	Z-ME-KZ-PS/BP		E-C-PS-DB9/DB9	E-A-PS-USB/DB9	
	TEZ s40, LEZ s40		E-C-SB-USB/M12		
EH	AES	E-SW-EH	E-C-PS-DB9/M12	E-A-PS-USB/DB9	
	TES s40, LES s40		E-C-SB-USB/M12	E-A-SB-USB/OPT	
	TES-S s40, LES-S s40, PES-S s40	E-SW-EH/S			
	TEZ s40, LEZ s40	Z-SW-EH			