

ACT 250

TURBOMOLECULAR PUMP CONTROLLER
FOR ATP 150 AND ATP 400



ATP Series User's Manual addendum



ACT 250 addendum

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ACT 250 addendum

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The ACT 250 controller

*Dear Customer,
You have just bought an
ACT 250 controller. In
order to ensure the best
possible performance of the
equipment and your
complete satisfaction in
using it, we advise you to
read this addendum
carefully before attempting
to service or use your
controller.*



Insertable "box" version
Part No. 108320



Integrable "OEM" version
Part No. 108151

ACT 250 controller

This controller drives **ATP 150** or **ATP 400** pumps, providing their power supply and enabling remote control.

The ACT 250 controller is available as:

- an insertable "box" version with case,
- an integrable "OEM" version without case.

This version can replace the "box" version when integrating the pump in a complex installation or device.

Main characteristics

- Dry contact signal outputs
- Opto-isolated control inputs
- RS 232 / 485 serial links
- Operate at all voltages from 85 to 265 V, 50/60 Hz

The ACT 250 controller is a new product, not described in Edition 09 of the ATP Series Pump User Manual.

This addendum provides the additional information needed to use the controller.

Accessories

Pump power supply cable

The controller is connected to the pump using a corresponding power supply cable, ordered separately.

Cable length (m)	Part No.
1	105086
1.5	A458885
3.5	101812
5	101810
10	101811
15	105303
20	A458478

"End-user" kit

This kit, ordered separately, is needed to use the ACT in local mode. It includes:

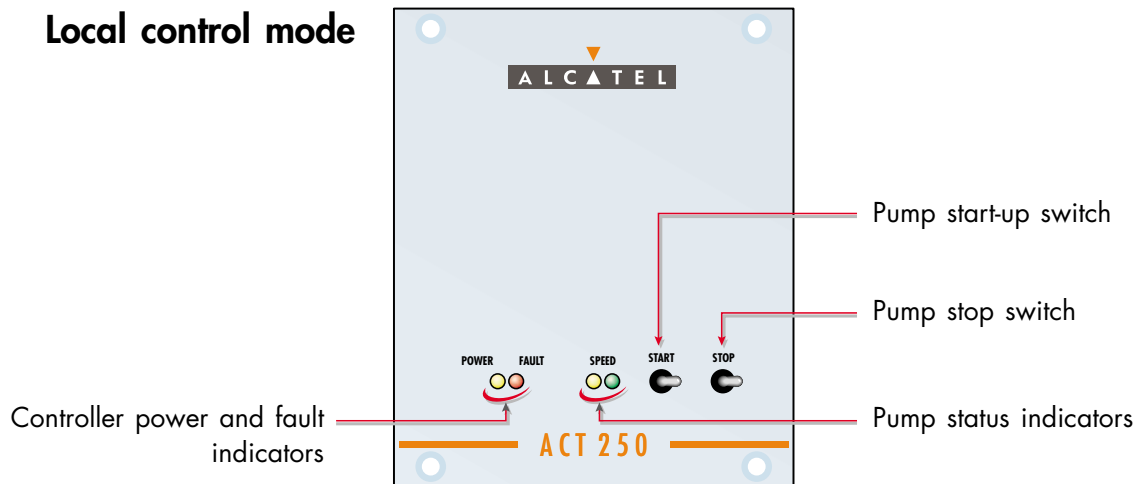
- 1 mains cable,
- 1 connector plug,
- 4 legs.

Kit	Part No.
USA	108935
Europe	108936
UK	108948

ACT 250 "box" controller control modes

There are two possible control modes: local control and remote control.

Local control mode



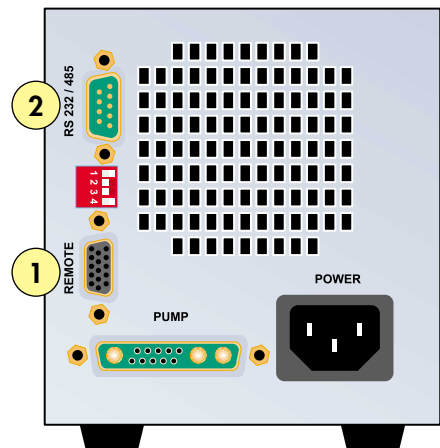
Remote control

There are three possible remote control modes:

1 The remote control

Established by the **REMOTE** connector which:

- provides remote control of the START, STOP, STANDBY, EXTERNAL SAFETY and MODE SELECT functions;
- replicate the available monitoring parameters (At speed / Starting / Fault) on dry contacts.



2 RS 232 serial link

The RS232 serial link is used to control and monitor the pump **using a computer**.

2 RS 485 serial link

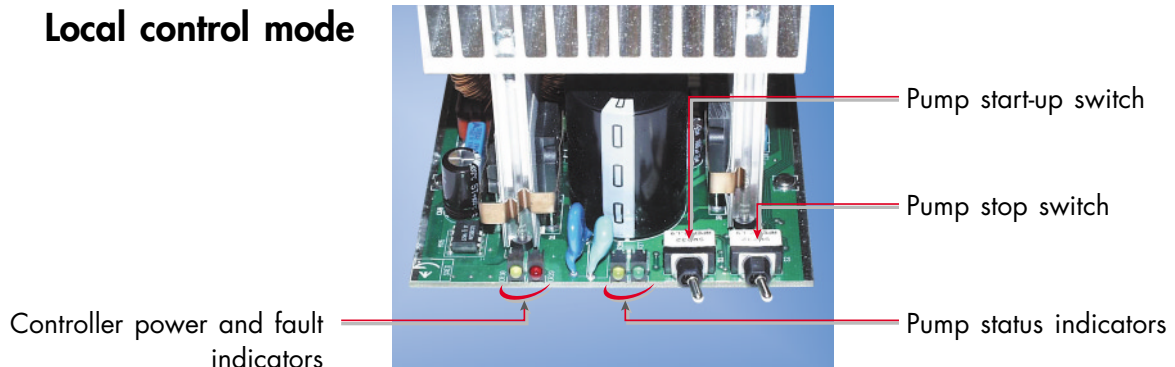
The RS485 serial link is used to connect several pumps **in a network**.

The wiring characteristics are given on [page 13](#)

ACT 250 "OEM" controller control modes

There are two possible control modes: local control and remote control.

Local control mode



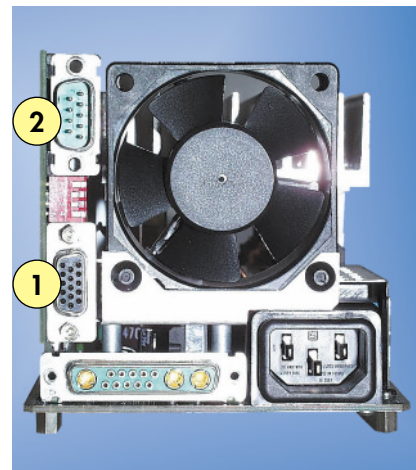
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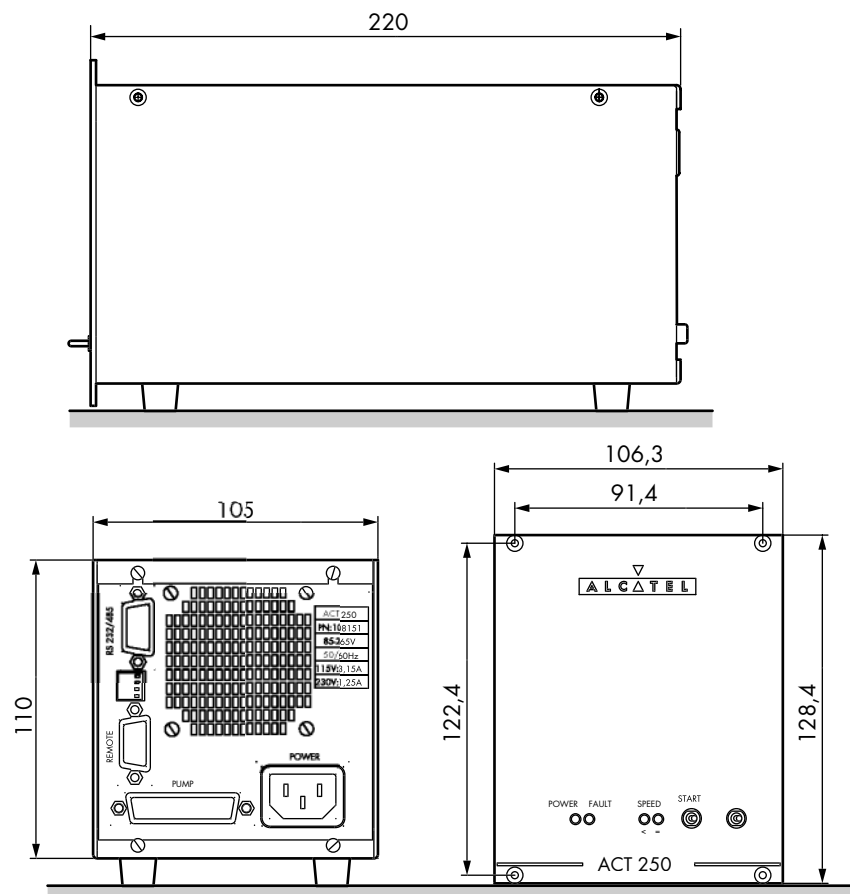
The RS485 serial link is used to connect several pumps **in a network**.

The wiring characteristics are given on **page 13**

ACT 250 controller technical characteristics

Characteristic	Unit	ACT 250 "box"	ACT 250 "OEM"
Weight	kg	1.8	1.3
Dimensions H x W x D	mm	128.4 × 106.3 × 220 3U × 1/4 Rack	95 × 100 × 212
Nominal voltage	V	85 - 265	
Frequency	Hz	50/60	
Maximum power	W	300	
Maximum ambient temperature	° C	T ≤ 50	
Storage temperature	° C	-15/+70	
Customer mains circuit breaker rating	A	T10A	

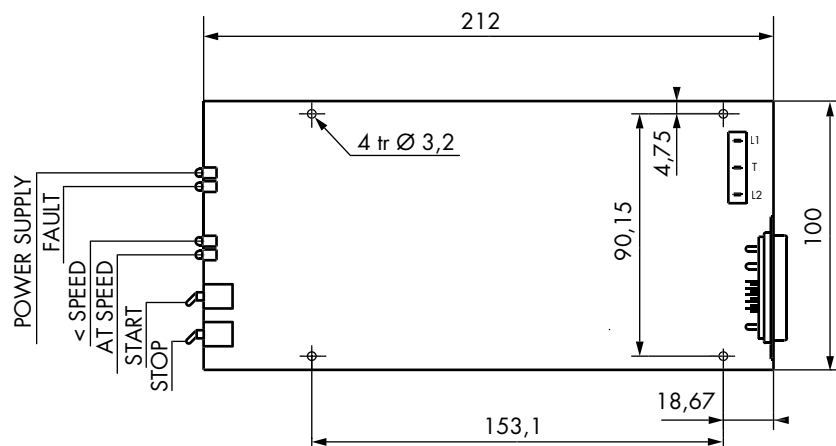
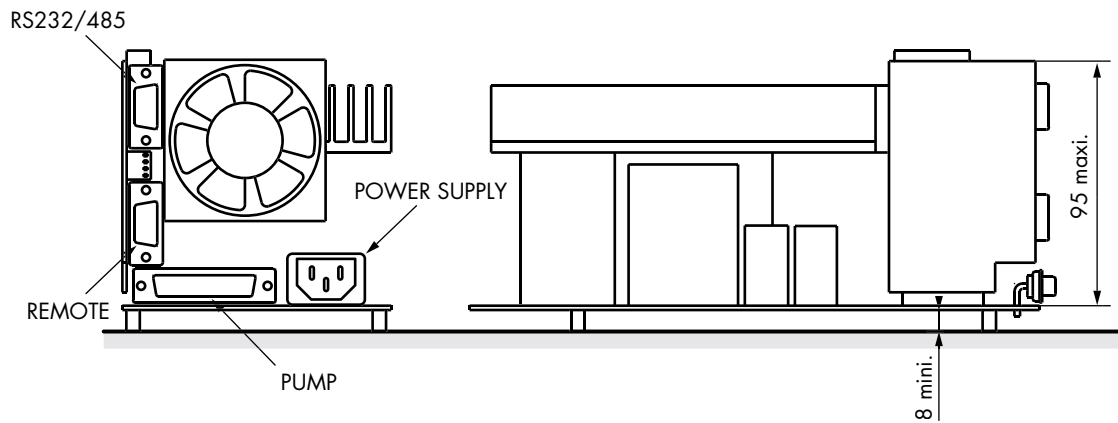
ACT 250 "box" dimensions (in mm)



Presentation

ACT 250 controller technical characteristics

ACT 250 "OEM" dimensions (in mm)



Attached using four M3 screws or mounted in an Alcatel cabinet

January 2001

Commissioning

Safety instructions



**Before switching on the controller, the user should study the manual and follow the safety instructions listed in the compliance certificate booklet supplied with the pump.
See sheet B10 in the ATP pump User Manual.**

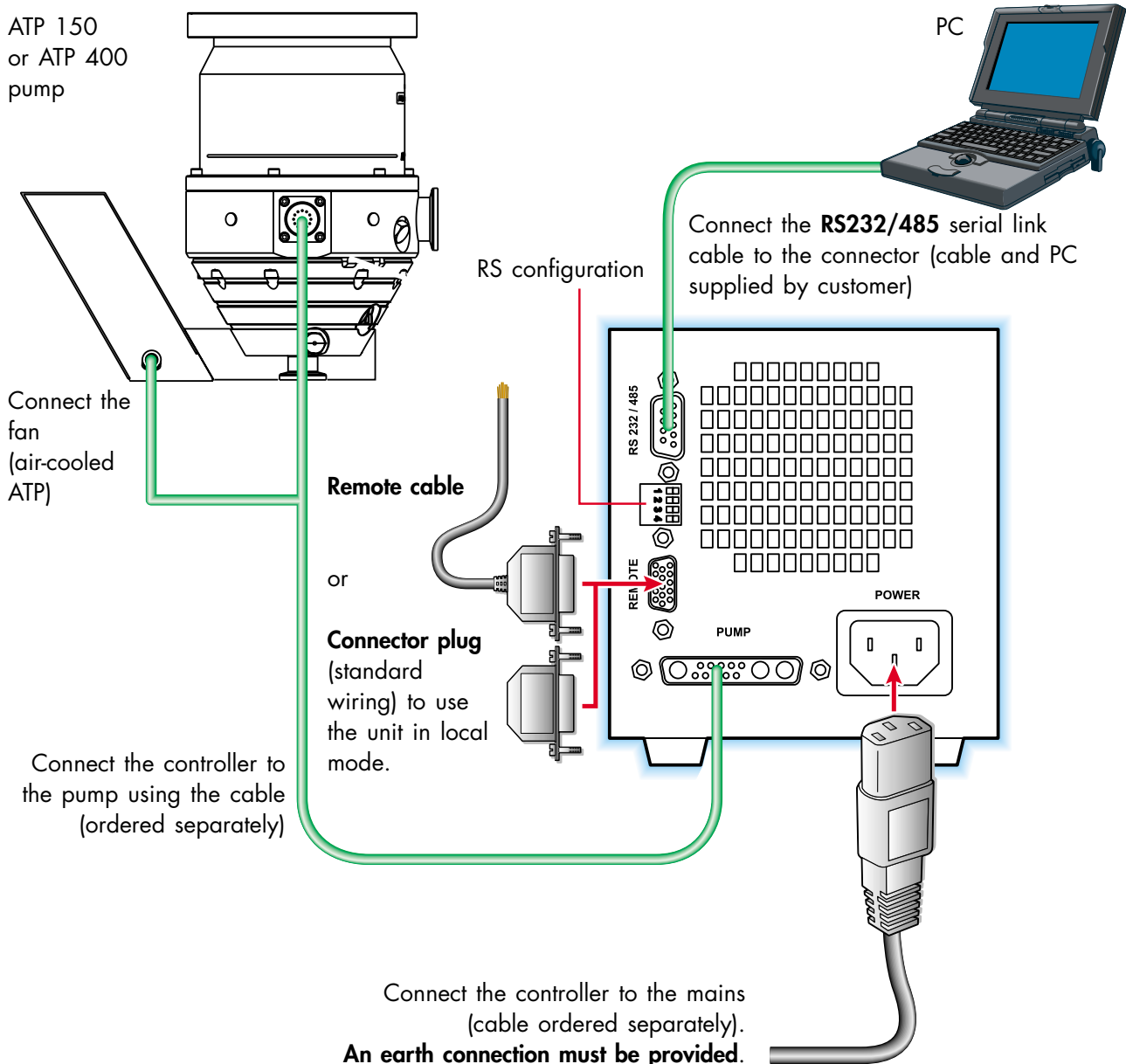
Commissioning

ACT 250 controller electrical connections

■ If the controller is remote controlled, make the various connections on the **REMOTE** connector (see [page 13](#) for wiring details).



■ If the controller is used in **local mode**, the pump can **only operate if the connector plug** (ordered separately) is connected to the **REMOTE connector** (see [page 13](#) for wiring details).



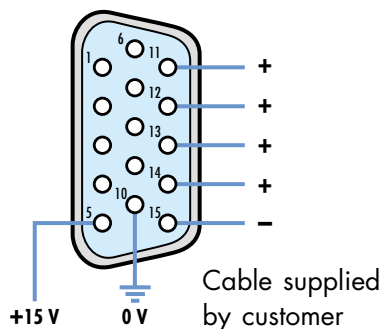
Commissioning

ACT 250 remote connector characteristics



When units containing the control circuits are equipped with dry contact outputs, it is the customer's responsibility to use the outputs in compliance with safety regulations.

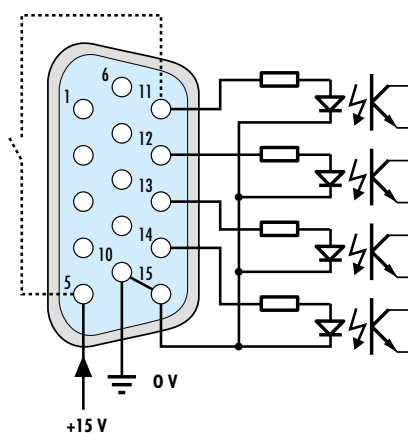
Voltage control mode



The inputs are activated when an AC or DC voltage is applied. The voltage should be between 15 and 24 Volts. (15-pin Sub-D female connector).

Principle of voltage-controlled optocoupled inputs

Example : Ext. safety activated



External contact supplied by customer

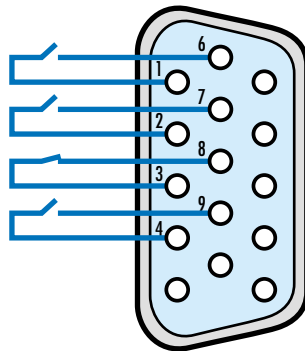
Ext. safety 11	Inactive = the external safety device is activated (e.g. an emergency stop) Active = pump operation authorised
Select Mode 12	Select "status" or "pulse" command mode. This affects the START/STOP and STANDBY commands. <ul style="list-style-type: none"> ■ 12 - inactive = "status" mode <ul style="list-style-type: none"> Start/Stop signal (Ex. pin 14) nominal speed/standby signal (Ex. pin 13) ■ 12 - active = "pulse" mode <ul style="list-style-type: none"> Start/Stop signal (Ex. pin 14) nominal speed/standby signal (Ex. pin 13)
Standby Mode 13	Inactive = operation at nominal speed Active = operation at reduced speed
Start/Stop 14	Inactive = Stop Active = Start
15	Common for inputs

Commissioning

ACT 250 remote connector characteristics

Signalling on output contacts

These are dry contacts (**48 V AC - 1 A**) which replicate pump status information.



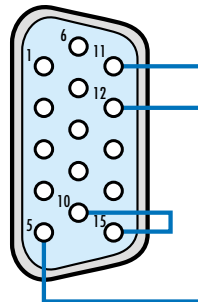
When the output contact is closed:

1 - 6	The pump has reached the selected speed
2 - 7	The pump is accelerating
3 - 8	No fault signal
4 - 9	Not used

Commissioning

ACT 250 remote connector wiring

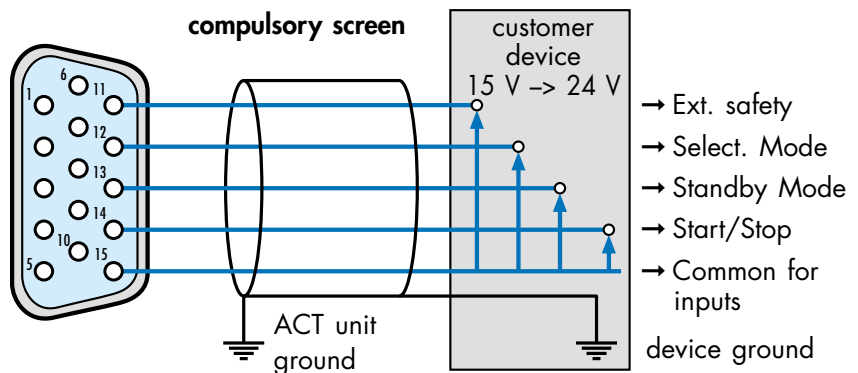
Use in local mode ■ Standard connector plug (factory wired)



Wiring seen from solder side

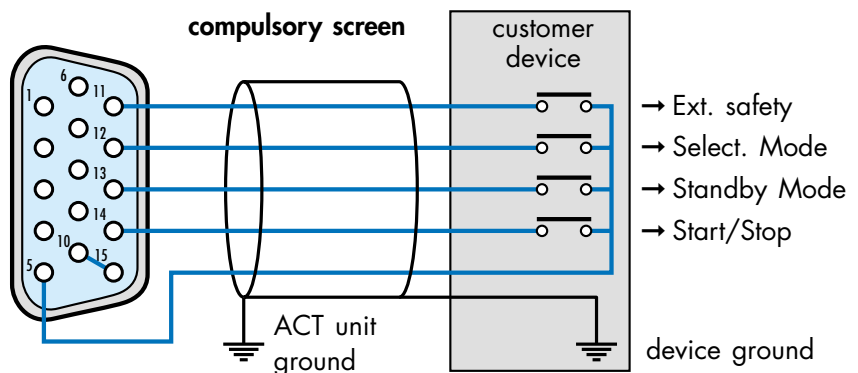
Use in remote control mode ■ With galvanic isolation (recommended)

Wiring seen from solder side.



■ Without galvanic isolation (not recommended)

Wiring seen from solder side.



The voltage used to power the contacts is supplied by the ACT 250 (terminal 5). The disadvantage of this method is the risk of exposing this voltage to external interference (see also diagrams on [page 11](#)).

Commissioning

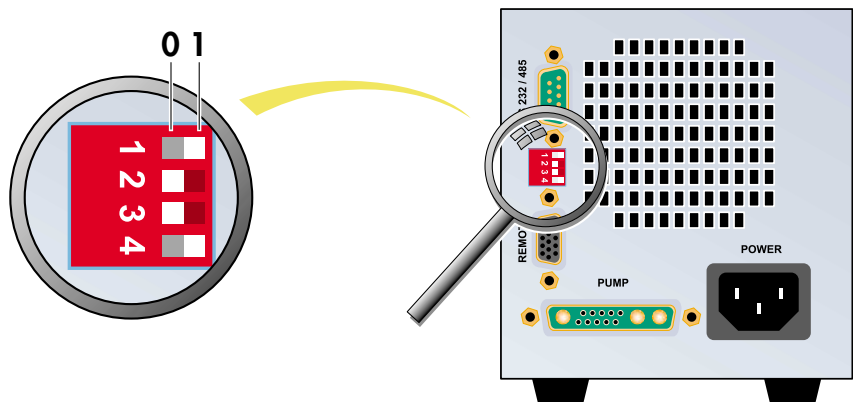
RS 232 / 485 serial link

Wiring the RS 232 or RS 485 serial link

See sheet **B 110** in the ATP Series Pump User Manual.

Configuring the RS 232 or RS 485 serial link

The link is configured using switches on the rear panel of the controller.



Switch	description	0	1
1	parity type	odd	even
2	parity	no	yes
3	baud rate	9600	4800
4	RS type	RS 485	RS 232

Factory configuration: **9600 baud, NO parity, RS 232**

Use See the detailed list of commands on [page 15](#)

Commissioning

Detailed description of RS commands

Syntax conventions applicable to all commands

adr = address, from 000 to 255
<CR> Carriage Return (ascii 13)
<LF> Line Feed (ascii 10); shown in brackets as it is not compulsory.

Status values **ok** : command executed correctly

Error messages **Err0** : adjustment error (out of bounds)
Err1 : command error (syntax)
Err2 : parameter error (e.g. non-hexadecimal character)
Err3 : context error
Err4 : checksum error

ADR Specifies the address of the device for networking

Syntax #adr**ADR**aaa<CR>[<LF>]
adr = address of device before this command
aaa = new address of device
condition : 000 ≤ aaa ≤ 255

Result #aaa,ok or Err2

This command is used to allocate a specific number to each device on the network (loop for RS232 or parallel for RS485).

Note: it is important to note the number allocated to each device.

Commissioning

Detailed description of RS commands

CKS Enables or disables checksums on reply strings

Syntax #adr**CKSON**<CR>[<LF>]
Enables the ASCII checksum character at the end of a reply string

or

#adr**CKSOFF**<CR>[<LF>]
Disables the ASCII checksum character at the end of a reply string

Result #adr,ok,**S** for CKSON
#adr,ok for CKSOFF

This feature enables the user to test whether a transmission error has occurred for the reply string.

S is a character whose ASCII value is the 7-bit checksum of all ASCII character values from the start of the reply string to the character preceding the **S**. The 8th bit of **S** (most significant bit) is always 1.

CYC Starts the specified running-in cycle

Syntax #adr**CYC1**<CR>[<LF>] to start running-in program 1,
or
#adr**CYC2**<CR>[<LF>] to start running-in program 2

Result #adr,ok

Running-in program 1 should be executed after a pump maintenance operation (change of bearings).

At the end of the program, the pump maintenance parameters are updated and the "maintenance requested" alert can be cleared.

Program 2 is used after regreasing (ATP series only), or after prolonged storage (ATH 20/40 only).

Commissioning

Detailed description of RS commands

DLI Defines the DataLogger transmission interval

Syntax #adr**DLI**xxx<CR>[<LF>]
xxx: DataLogger transmission interval in seconds
condition: $001 \leq xxx \leq 255$

Result #adr,ok or Err2

See also: **DLR** Note: if ok, the interval sent is stored in user memory.

DLR Enables DataLogger operation (RS232 only)

Syntax #adr**DLR**<CR>[<LF>]

Result #adr,sssss,nnnnn,iiii,tttt,uuuu.o,www,ppp,vvv

Returns current values :

sssss : current speed (rpm)
nnnnn : speed set point (rpm)
iiii : current value (mA)
tttt : pump operating time (hours)
uuuu.o : (reserved)
www : pwm (reserved)
ppp : pump temperature (°C)
vvv : variator temperature (°C)

The main characteristics of the pump and its controller are sent over the RS link, at the rate defined by the **DLI** command.

See also: **DLI**, **LNG**, **SEP**, **SHT** Note: any new characters arriving on the serial port (RS 232) will cancel the automatic DataLogger transmission.

Commissioning

Detailed description of RS commands

ECH Enables or disables command echoing

Syntax #adr**ECHON**<CR>[<LF>]
enables all characters received to be echoed over the serial port
or
#adr**ECHOFF**<CR>[<LF>]
disables characters received from being echoed over the serial port.

Result #adr,ok

Comments:

- This command is disabled in RS 485 operation, the value OFF is required.
- Using a loop-type RS 232 network requires "ECHON".

HDR Defines the start character for a command reply string

Syntax #adr**HDR**nnn<CR>[<LF>]
nnn: 3-digit decimal value of the ascii code of the corresponding character (with leading zeros).
condition : 020 •nnn •255

Result ?adr,ok ? is the desired character.
#adr,ErrX if error

Allows the user to distinguish between the first character in a "command" string (for which # cannot be changed) and the first character of a "reply" string.

Affects the first character of **all** replies.

Default value: the hash sign, # (ascii code = 035)

If ok, the selected value is automatically stored in user memory.

IDN Identifies the device which is communicating, and its software version

Syntax #adr**IDN**<CR>[<LF>]

Result #adr, VS.... - Vx.zz'
or
#adr, VS.... - Vx.zz for "Alcatel pump type"

Returns the type of Variator Supervisor, the software version (x), the software edition (zz), and the type of pump for which this variator is set up.

Commissioning

Detailed description of RS commands

LEV Returns the state of the parameters defined by SET

Syntax #adrLEV<CR>[<LF>]

Result #adr,nnnnn,sssss,aaaa,hhhhh or
#adr,nnnnn rpm,sssss rpm,aaaa mA,hhhhh hours

Returns the current values:

nnnnn : speed set point

sssss : stand-by speed

aaaa : max. current set point

hhhhh : alert level for pump bearing maintenance

LNG Returns the strings sent with the identification sub-strings

Syntax #adrLNG<CR>[<LF>]

Result #adr,ok
AVT>

Allows the parameters returned by the **DLR**, **LEV** and **SPD** commands to be identified with sub-strings. **DLR**, **LEV**, **SPD**.

Also generates the "AVT>" prompt each time a <CR> character is received.

See also: **SHT**

NSP Switches the speed set point to the nominal speed value

Syntax #adrNSP<CR>[<LF>]

Result #adr,ok

The speed set point for the pump is set to its nominal value.

This configuration is automatically saved in user memory.

This mode of operation prevents the use of the "RPM" command.

See also: **RPM**, **SBY**

Commissioning

Detailed description of RS commands

OPT Used to select possible user choices

Syntax #adr**OPT2** n<CR>[<LF>]
choice of temperature unit:
n = 0 : degrees Centigrade
n = 1 : degrees Fahrenheit

Result #adr,ok

See also: **SEL** Comment: The choice of the temperature unit affects the results of the **DLR** and **STA** strings.

RPM Defines the speed set point in stand-by mode

Syntax #adr**RPM** nnnnn<CR>[<LF>] or #adr**RPM**nnnnn<CR>[<LF>]

Result #adr,ok or #adr,ErrX
X = 1, out of range; 2, parameters ; 3, context (not in Stand-by mode)

See also: **NSP, SBY** Comment: if ok, the new speed is automatically stored in user memory.

SAV Saves the internal parameters in user memory

Syntax #adr**SAV**<CR>[<LF>]

Result #adr,ok

Saves the current context (except for running-in cycles). If this command is sent when the pump is powered up, it can for example allow automatic re-start in the event of a power cut.

January 2001

Commissioning

Detailed description of RS commands

SBY Switches the speed set point to the stand-by value

Syntax #adr**SBY**<CR>[<LF>]

Result #adr,ok

Resets the stand-by speed to its last stored value, and allows it to be modified if an "RPM" command is sent.

See also: **NSP**, **RPM**

This configuration is automatically stored in user memory.

SEL Returns the state of the parameters defined by OPT

Syntax #adr**SEL**<CR>[<LF>]

Result #adr,a,u

a: Reserved

u: Returns the choice of temperature unit::

u = 0: degrees Centigrade u = 1: degrees Fahrenheit

SEP Defines the character which separates the parameters in a reply

Syntax #adr**SEP**nnn<CR>[<LF>]

3-digit decimal value of the ASCII code of the desired character (with leading zeros if necessary).

condition: $000 \leq nnn \leq 255$

Result #adr,ok or #adr,ErrX if error

Allows the user to select the character which separates the parameters returned by the **DLR**, **STA** and **LEV**

commands. Default value: comma ",", ASCII code = 044

If ok, the selected value is automatically stored in user memory.

Commissioning

Detailed description of RS commands

SET Defines the internal operating parameters

Syntax #adr**SET**1 hhhh<CR>[<LF>] : maintenance time limit
000<hhhhh<65535

Result #adr,ok or #adr,ErrX
See also: **LEV**

SHT Return the DataLogger string without the identification sub-string

Syntax #adr**SHT**<CR>[<LF>]

Result #adr,ok

The strings sent following **DLR**, **LEV** and **SPD** commands are sent without parameter identification sub-strings (e.g. without units).
See also: **LNG**

SPD Returns the current speed

Syntax #adr**SPD**<CR>[<LF>]

Result #adr,nnnnn
See also: **LNG**, **SHT** #adr,nnnnn rpm

Commissioning

Detailed description of RS commands

STA Returns the status of the internal dynamic parameters

Syntax #adr**STA**<CR>[<LF>]

Result #adr,xxxxxx,yyyyyy,zzzzzz,sssss,iiii,www,ppp,vvv,tttt<CR><LF>

adr: address

543210

xxxxxx status bits:

5 - RS echo (1->off)
4 - String long (0) / short (1)
3 - On (1) / Off (0)
2 - reduced or nominal
speed reached(1)
1 - standby (1)
0 - running-in (1)

yyyyyy fault bits:

5 - variator temperature
4 - motor temperature
3 - excess current
2 - sensors or start-up
1 - external
0 - pump not connected

zzzzzz alert bits:

5 - reserved (future use)
4 - reserved (future use)
3 - variator temperature
2 - motor temperature
1 - start-up time exceeded (future)
0 - operating time exceeded

sssss current speed value in rpm

iiii current value in mA

www reserved (pwm value)

ppp pump temperature value

vvv variator temperature

tttt pump operating time value



Reminder: The “#” character at the start of the reply string can be set with the “**HDR**” command. The “,” character which separates the parameters in the reply string can be modified with the “**SEP**” command.

TMP Defines the turbomolecular pump operating state

Syntax #adr**TMPON**<CR>[<LF>]: start pump rotation

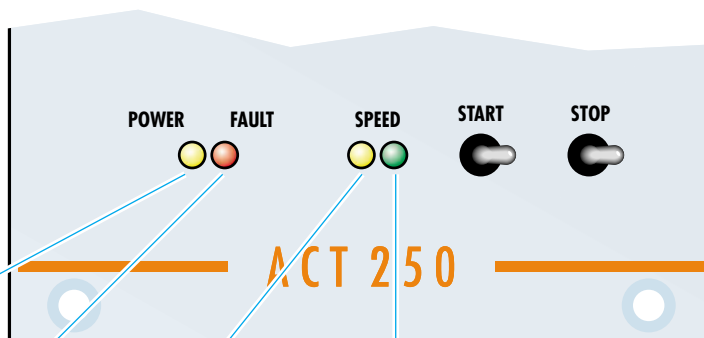
#adr**TMPOFF**<CR>[<LF>]: stop pump

Result #adr,ok or #adr,Err3 if the pump is already in the state requested (context error)

Controlling the pump from the ACT 250 controller

Once all connections are complete, plug the controller into the mains.

Indicator lights "box" version



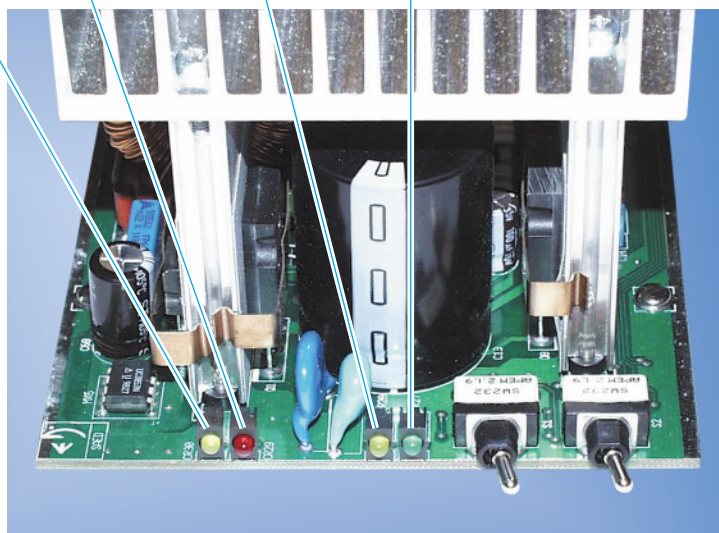
Yellow lit
Controller on

Red lit
Controller fault
Red flashing
Controller alert

Yellow lit
pump rotation
speed **accelerating**

Green flashing
The pump rotation speed is
greater than the selected
speed (speed reduction during
operation)
Green lit
The pump has attained the
selected speed.

"OEM" version



Controlling the pump from the ACT 250 controller

Starting the pump with the START switch



The pump is started up to reach the selected speed. The yellow rising speed indicator light comes on. When the pump reaches its selected speed, the yellow indicator light goes off and the green indicator light comes on.

Stopping the pump with the STOP switch



The rotation speed monitoring indicator lights go off. The pump motor is no longer powered, the pump decelerates.

Controller functions

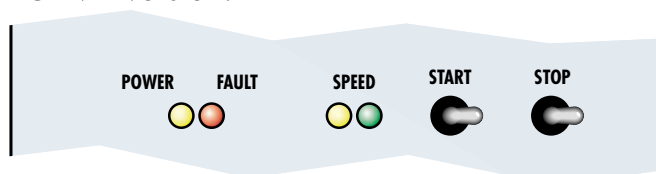
Precautions



The "OEM" version of the ACT 250 has been designed with electrical safety and electromagnetic compatibility standards in mind. It is the user's responsibility to provide external shielding to comply with EMC and electrical safety standards.

Local mode operation

The Start and Stop functions use switches located on the front panel of the "box" version and on the board for the "OEM" version.



The pump's operating status is shown by the state of the "POWER" indicator (yellow) and the three "FAULT" (red) and "SPEED" (yellow and green) indicators.

Indication of rotation during operation (controller on)

	Press button		Pump motor on	Pump rotation speed	State of indicators			
	START	STOP			Power Yellow	Fault Red	Speed Yellow Green	
1	Before start-up		NO	0				
2	During start-up		YES	< selected speed				
3	Pump at nominal speed		YES	= selected speed				
4	Alert or fault triggered (see page 27)	Alert	YES	≤ selected speed				
		Fault	NO	↘ 0				
5	Overload		YES	< selected speed				
6	Speed set point lowered		YES	> selected speed				
7	Pumping stopped		NO	↘ 0				

○ indicator off indicator on indicator flashing

Controller functions

Fault monitoring

■ **Alerts** are indicated by:

- flashing red indicator. The pump power supply is maintained.

■ **Faults** are indicated by:

- lit red indicator. The pump is stopped as soon as a fault is detected.

Alerts and faults shown by the indicator light include:

- controller overheating,
- pump motor overheating,
- cable disconnected (pump / controller)
- external safety device open,
- overcurrent on speed variator.

Alerts and faults can be identified using the serial link (see [page 23](#), **STA** command).

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