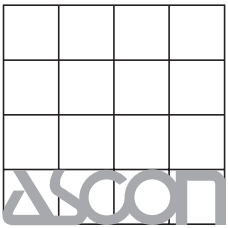


Ascon Serial communications protocol Supplement manual

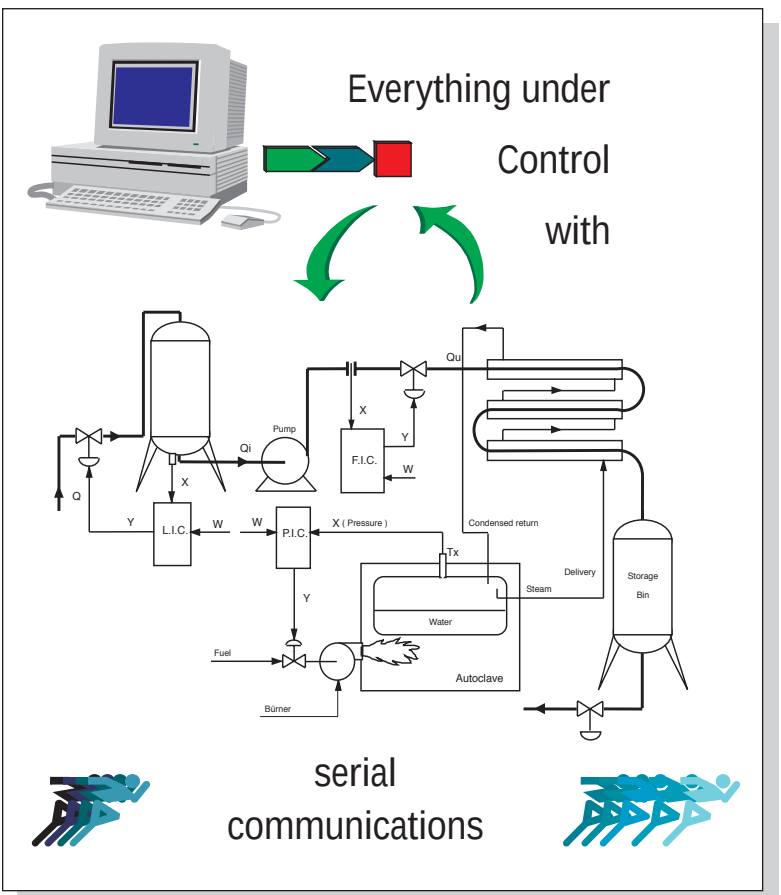
JM/JT, MF/MC, MS, XE, XF, XS/XP Series

MIU. CS4/98.03/E
Cod J31-152-CS1/ING

ASCON spa

Introduction

The instruments in the JM, JT, MC, MF, MS, XE, XF, XP and XS series may be equipped with the optional Current Loop serial interface, which enables up to 64 instruments to be connected to one I/O port of a computer, for continual supervision of their operating conditions.



CONTENTS

Orview of the communication protocol

It is an extremely simply ASCII code protocol which enables the request or assignment of various parameters and/or commands to the instrument.

• SERIAL LINE PARAMETERS •

Ad. Address. The instruments are identified by an Address number between 0 and 63 (entered in the controller by the instrument operator when putting it into operation). It must be unique in the controllers connected to the same supervisor.

bA. Baud rate The speed at which the messages are sent. It must be identical in all the controllers on a network and in the supervison unit; it may be selected from 150, 600, 1200, 2400, 4800 and 9600 bauds (bits / second).

PA. Parity This function is used for enabling the parity check on the data received. It may be set to none, even or odd. As an option on some instruments, it selects the type of software protocol switching from ASCON to the MODBUS or JBUS standard (see the manual on the matter).
To give the operator the opportunity to easily identify the source/destination of the messages in transit on the networks, the address codes in the communication protocol are converted into ASCII characters, as indicated in the table below.

• ASCII CHARACTER / CONTROLLER ADDRESS (AD.) CONVERSION TABLE •

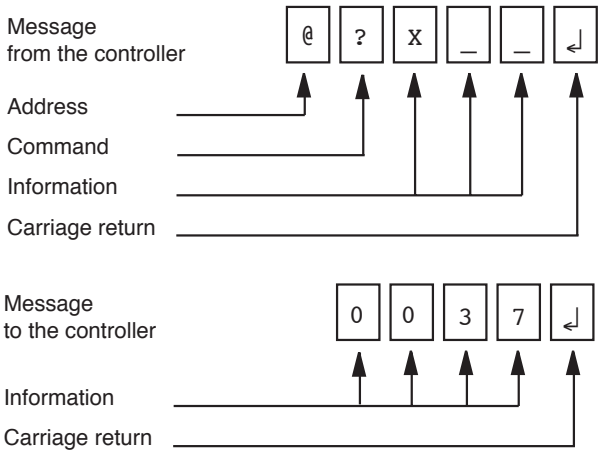
CAR. ASCII	Ad.	CAR. ASCII	Ad.	CAR. ASCII	Ad.	CAR. ASCII	Ad.
A	0	Q	16	a	32	q	48
B	1	R	17	b	33	r	49
C	2	S	18	c	34	s	50
D	3	T	19	d	35	t	51
E	4	U	20	e	36	u	52
F	5	V	21	f	37	v	53
G	6	W	22	g	38	w	54
H	7	X	23	h	39	x	55
I	8	Y	24	i	40	y	56
J	9	Z	25	j	41	z	57
K	10	[	26	k	42	{	58
L	11	\	27	l	43	|	59
M	12	]	28	m	44	}	60
N	13	^	29	n	45	~	61
O	14	_	30	o	46	DEL	62
P	15	'	31	p	47	@	63

• SPECIAL CONTROL CHARACTERS •

Description	Character	Hex code
Space	_	20
Carriage return	↲	0D
Minus sign	-	2D
Question mark	?	3F
Exclamation mark	!	21
Decimal point	.	2E
Asterisk	*	2A
Number	0	30
Number	1	31
Number	2	32
Number	3	33
Number	4	34
Number	5	35
Number	6	36
Number	7	37
Number	8	38
Number	9	39

Message format

The serial messages consist of a fixed number of ASCII characters, namely:
A message of 6 characters from the supervisor to the controller, of which the first indicates the address of the controller to which it is directed, the next 4 represent the information (request, assignment or command) and the last is a “carriage return” character used as a message terminator.
In response to the message received, the controller sends the supervisor 5 characters of which the first 4 represent the information and the last is again a “carriage return” character used as a message terminator.
The useful part of the messages (information), both in reception and transmission has a format of 4 characters. When alphabetical, the shorter messages are reported adding spaces after the message, and zeroes before the message when it is numeric. Negative numbers are expressed with a minus sign (-) as their first character.



It has to be pointed out that a controller can only send one message as a direct answer to a received message. So no address character is included in the string sent since the source of the answer is clearly defined. The characters that make up the message for the controller do not have to be consecutive. They must however be sent in the same given order and without spurious characters (for example, many terminals include a “line feed” [LF] character after every “carriage return”).
An incorrect message received by the controller has no effect.
The controller considers the message concluded when it receives a “carriage return” character, so if an error occurs during the transmission of a message, all that has to be done is to send one or more “CR” codes and resend the message correctly. Before starting to send any message, it is advisable to send a few “CR” codes on the line to clear the reception buffer of the controllers.

• TYPES OF MESSAGES IN TRANSIT ON THE LINE •

Three types of messages may transit on the line: requests, assignments or commands. They are formed by fields consisting of one or more characters with well-defined meanings. When a message is received correctly, the controller will send the appropriate answer to the supervisor or the system that polled it.

Requests: polling the instrument to find out, for example, the value of a parameter, the operating mode of the instrument or other information.

Assignments: used exclusively for changing the value of a particular parameter.

Commands: used for changing the operating mode (e.g. from automatic to manual or for enabling / disabling functions of the instrument concerned).

Answers: typically the controller answers to each command, assignment or request with the acknowledgement message (AKN_), the value requested or in the most recently produced controllers (e.g. MS) the echo of the received message.

Notes: In order to simplify and generalize the following explanations, use has been made of generic symbols to indicate the address of the controller, the space character and the carriage return character. These symbols are:

- `@` represents the address of the controller in ASCII format
- `_` represents the < space > character
- ↲ represents the < carriage return > character

Generic format of a request

Field	Characters	Description	Notes
Address	1	ASCII character in the range "**@**" to "**DEL**", corresponding to the range of addresses from 0="**A**" to 62=<DEL> and 63="**@**"	
Operation	1	ASCII character representing the current operation: for example "**?**" for the request.	
Mnemonic	3	ASCII character string containing the mnemonic of the parameter. p.e. "PB1" for the proportional band	
End of Message	1	Carriage return ↲	

• ANSWER FROM THE INSTRUMENTS •

Field	Characters	Description
Message	4	Four ASCII characters in the range from "**a**" to "**z**" and to "**0**" to "**9**"
End of Message	1	Carriage return ↲

Example:

Request	Answer
@ ? S L U ↲	**0 0 5 0** ↲

Generic format of an assignment

Field	N° characters	Description	Notes
Address	1	ASCII character in the range from "**@**" to "**DEL**", corresponding to the range of addresses from 0="A" to 62=<DEL> and 63="@"	
Operation	1	ASCII character representing the current operation: e.g. " **!** " for an assignment and" **?** " for a request.	
Mnemonic	3	String of ASCII characters containing the mnemonic of the parameter, for example "PB1" for the proportional band	
End of mnemonic	1	Carriage return ↲	Not present on the MS series
Delay	50 mS	A delay or repeated↲ characters to reach 50mS for example 25 at 4800 Bauds (see the note below)	Not present on the MS series
Address	1	ASCII character in the range "@" to "DEL", corresponding to the range of addresses from 0="A" up to 62=<DEL> and 63="@"	Not present on the MS series
Value to be assigned	4	Four ASCII characters in the range "**0**" to "**9**"	
End of message	1	Carriage return ↲	

The recently manufactured XS, XP, XE, XF, JM and JT instruments have an extra feature that enables them to convert the two strings into one thus eliminating the "CR" character from the first string, the delay, and the address of the second string drastically reducing the assignment times. These instruments maintain compatibility with the previous versions so they accept any assignment method:

1) two strings separated by a delay
2) two strings merged together
3) a single string

The MS series only accepts the single-string assignment method and answers by echoing the assigned parameter.

• ANSWER FROM THE INSTRUMENTS •

The instruments answer an assignment in two different ways:

- by returning an acknowledgement message (usually "AKN ").
- by returning the echo of the assigned value.

Field	Character	Description
Message	4	Four ASCII characters in the range from "**a**" to "**z**" and "**0**" to "**9**"
End of message	1	Carriage return ↲

Examples:

Assignment of slope up value = 10.0 to an instrument in the XS series

Assignment	Answer
@ ! S L U ↲	
50 mS delay	
@ 0 1 0 0 ↲	A K N _ ↲

Assignment of slope up value = 10.0 to an instrument in the XS series

Assignment	Answer
@ ^ S L U ↲	
@ 0 1 0 0 ↲	0 1 0 0 ↲

Assignment of slope up value = 10.0 to an instrument in the XS series

Assignment	Answer
@ ! S L U 0 1 0 0 ↲	A K N _ ↲

Assignment of slope up value = 10.0 to an instrument in the XS series

Assignment	Answer
@ ^ S L U 0 1 0 0 ↲	0 1 0 0 ↲

Assignment of slope up value = 10.0 to an instrument in the XS series

Assignment	Answer
@ ! S L O 0 1 0 0 ↲	0 1 0 0 ↲

Generic format of a command

Field	Characters	Description	Notes
Address	1	ASCII character in the range from "@" to "DEL", corresponding to the range of addresses from 0="A" to 62=<DEL> and 63="@"	
Operation	1	ASCII character representing the assignment operation of a command for example " * "	
Mnemonic	3	String of ASCII characters containing the mnemonic of the command: For example "**MAN**" to force the instrument into manual mode.	
End of message	1	Carriage return ↲	

• ANSWER FROM INSTRUMENTS •

The instruments may answer a command in two different ways:

- an acknowledgement message (usually "**AKN** ").
- the echo of the command argument

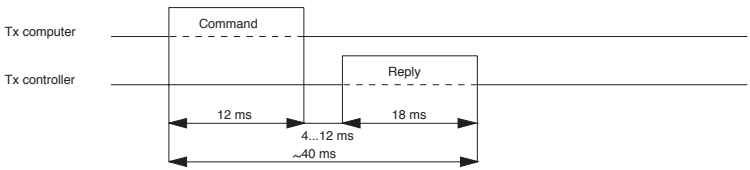
Field	Characters	Description
Message	4	Four ASCII characters in the range from "**a**" to "**z**" and "**0**" to "**9**"
End of message	1	Carriage return ↲

Example: **To force an XS series instrument into manual mode.**

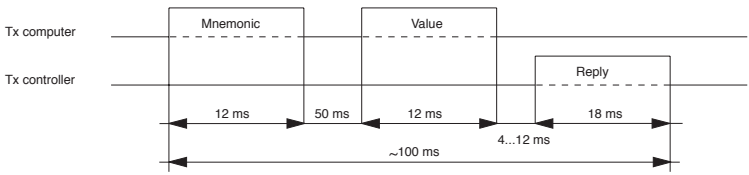
Command	Answer
@ * M A N ↲	**A K N _** ↲
@ > M A N ↲	**M A N _** ↲

Time representation of events on the 4800 baud serial line

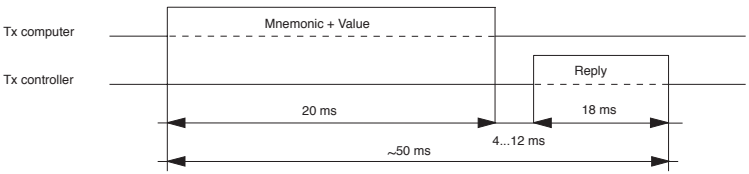
Format of a request/command



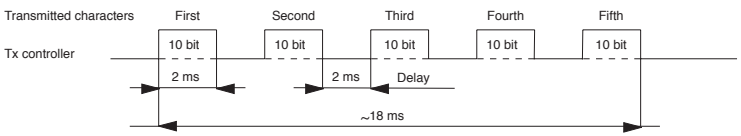
Format of an assignment with two strings and one delay



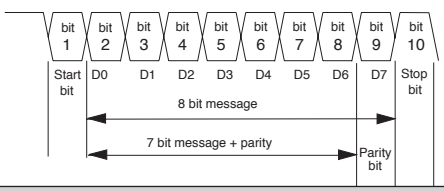
Format of an assignment with one string only



Format of string reply



Format of characters



Communication software

When writing the communication routines, it should be borne in mind that the instruments are capable of processing just one message at a time and so it is necessary to wait for the answer to the previous request/assignment/command before proceeding with the following messages.

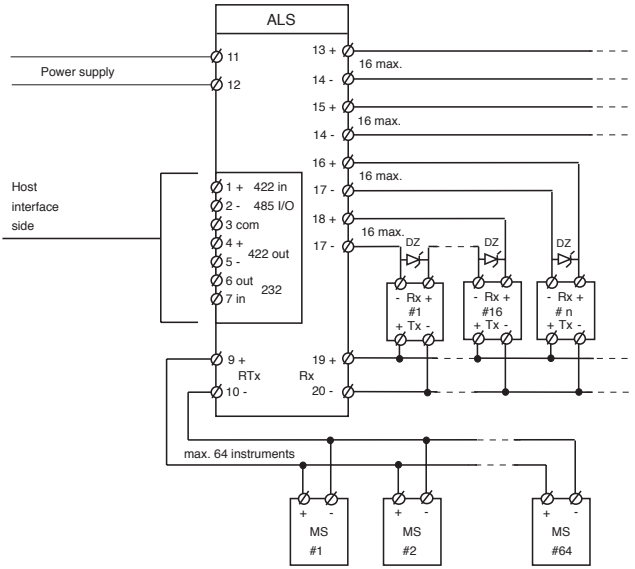
The simple program example, written in QBasic, indicated simply as a demonstration, repeatedly requests the value of the measurement and then shows it on the display.

```
DECLARE FUNCTION Ricevi$ ()                          ‘
’_____________________________________________       ‘
OPEN “COM1:4800,N,8,1,RS,CS0,DS0,CD0”                ‘ Opens serial port 1 at 4800
FOR RANDOM AS #1                                     ‘ Opens serial port 1 at 4800
’_____________________________________________       ‘ Bauds, 8 Bit, no Parity
DO                                                   ‘ Run
’_____________________________________________       ’
  PRINT #1, “A?X  “; CHR$(13);                       ‘ Requests measurement
  Rx$ = Ricevi                                       ‘ Waits for answer
  PRINT Rx$                                          ‘ Prints answer
’_____________________________________________       ‘
LOOP UNTIL INKEY$ = CHR$(27)                         ‘ Until the <ESC> key is pressed
                                                     ‘

CLOSE                                                ‘ Closes serial port
END                                                  ‘
                                                     ‘

FUNCTION Ricevi$                                     ‘ Reception routine
    T! = TIMER                                       ‘
    DO                                               ‘
                                                     ‘ Waits for timeout to expire
     Waiting! = TIMER - T!                           ‘  maximum wait (200 mS) and/or until
LOOP UNTIL (Waiting! > .2) OR LOC(1) >= 5            ‘ at least 5 characters are received.
 IF LOC(1) = 5 AND (Waiting! <= .2) THEN             ‘ If 5 characters have been received and
       Rx$ = INPUT$(5, 1)                            ‘ the maximum timeout has not expired.
      IF RIGHT$(Rx$, 1) = CHR$(13) THEN              ‘ If the character on the right is <CR>
              Ricevi = LEFT$(Rx$, 4)                 ‘ it removes it and returns the measurement
        ELSE                                         ‘ Otherwise:
              Ricevi = “Errore”                      ‘ there is an invalid message and it exits
        END IF                                       ‘
    ELSE                                             ‘ If the maximum time has expired
IF LOC(1)<>0 THEN                                    ‘ or the number of characters is not 5
Dummy$=INPUT$(LOC(1),1)                              ‘ It clears the Reception Buffer
END IF                                               ‘
        Ricevi = “Errore”                            ‘ returns an error.
    END IF                                           ‘
END FUNCTION                                         ‘
```

Electrical connexions

All ASCON instruments have a modified current loop interface and therefore, require a special converter for the connection with a supervision computer, such as, for example, an ALS model traffic concentrator, capable of connecting to the various types of instruments, up to a maximum of 64 units.
ALS has a highly flexible interface towards the computer, capable of being configured in accordance with various standards, such as RS 232-C, RS 422-A and RS 485.

Electrical interconnections between ASCON and ALS instruments

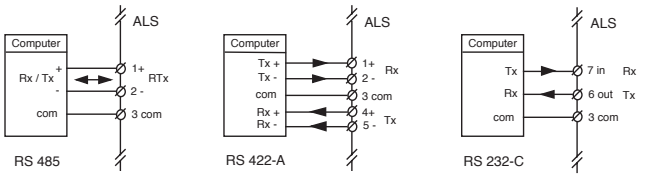


Note: the number of instruments may not exceed the maximum limit of 64 even though it is theoretically possible to connect 128.
DZ is a 2.7 V zener diode set on the rear terminals of the instrument. Its only purpose is to allow current to pass through even when a controller is removed from its case thus enabling communication to be carried out with the other controllers on line.

• SERIAL PORT PINS •

Signal name	Connector DB9S	Connector DB25P	Segnals used
DCD (Data Carrier Detect)	1	8	NO
RX (Receive Data)	2	3	SI
TX (Transmit Data)	3	2	SI
DTR (Data Terminal Ready)	4	20	NO
GND (Signal Ground)	5	7	SI
DSR (Data Set Ready)	6	6	NO
RTS (Request To Send)	7	4	NO
CTS (Clear To Send)	8	5	NO
RI (Ring Indicator)	9	22	NO

• DETAIL FOR CONNECTIONS BETWEEN ALS AND SUPERVISOR •



• COMMUNICATION CABLE LAYING RECOMMENDATIONS •

In order to minimize any interference from the external environment in the serial communication so as to obtain the maximum efficiency between the supervisor and the controllers, a few small but essential technical measures must be taken.

The most important and least difficult is to physically separate the power supply and power cables from the communication cables and lay them as far away as possible from remote control switches, electromagnets, powerful motors etc. The same condition must also be respected inside the control panel so there is no point in cabling a control panel perfectly and then just “bunging” the cables into the ducts! If the communication cables are extended to another panel or other equipment, we recommend you leave a space on the terminal board, isolated from all other cables (usually on one side).

The choice of the type of cable is of fundamental importance for the operation of the entire system. The most important rule to be respected is the capacity per metre (pF/m). The lower the capacity of the cable, the longer the line can be. For this reason, power cables, shielded coaxial cables and generic duct cables are to be avoided at all costs in that they have an extremely high capacity/metre. In addition, to ensure a high resistance to interference, the cables must be twisted and preferably equipped with a metal shield to be connected to an efficient ground socket (on one side only).

For example, the characteristics of two types of cable manufactured by Belden are indicated below:

A) Belden code 9729 Z = 100Ω pF/m = 41

B) Belden code 9502 Z = 150Ω pF/m = 98

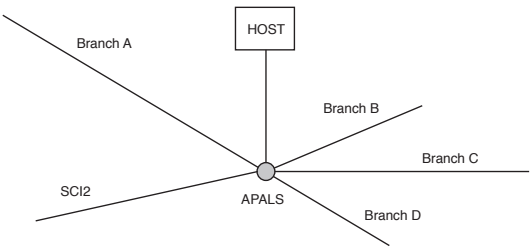
If you consider that the maximum capacity that may be applied to the reception terminals of the APALS concentrator is about 20,000 pF at a speed of 4,800 bauds, from the capacity per metre of the cable used, you can calculate the maximum length the line may have. If the type A cable is used, the total length of the line may be about 500 m while, in the case of type B, the total length of the line decreases to about 200 m.

Remember that 4 separate communication branches can be made with the APALS concentrator. The 4 transmission loops of the APALS concentrator are independent of one another but as the reception line is of the “parallel” type, it is the same for all (see the connections described on page 5) so the total distance is intended to mean the length of the entire reception line and not the single transmission branch. The SCI2 line dedicated to MS or MF

series controllers is to be considered separately from the current loop lines. The total length of this two-wire line can be calculated from the 2 examples given previously. The table below indicates the maximum distances between the supervisor and concentrator according to the type of interface used:

Type of interface	Max. distance between the HOST and the APALS
RS - 232-C	15 mt.
RS - 422-A	1200 mt.
RS - 485	1200 mt.

The length of the communication line between the HOST and the APALS depends on the type of interface selected. The maximum length can be taken from the table given above.
The length of the Current Loop line between the APALS and ASCON instruments is given by the sum of its branches: Total length = A + B + C + D.
The length of the SCI2 line depends on the capacity/metre of the cable used.



Communication protocol for JM - JT series indicators

The indicator instruments in the JM and JT series have an advanced, complete communication protocol. The messages that can be exchanged with these instruments can be divided into three categories: requests, assignments and commands.
These instruments offer the possibility of converting the two strings required for assignments into a single one, thus eliminating the "**CR**" character from the first string and the address of the second string drastically reducing the assignment times. Despite having this new assignment method, the instruments in this series maintain compatibility with the previous versions so they can accept any assignment method:

1) two strings separated by a delay
2) two strings merged together
3) a single string

Another new feature is the command execution code which may be one of two types. By assigning a parameter with the " **!** ", character, the controller answers with the acknowledgement AKN_ while if a parameter is assigned with the " **^** ", character, the controller answers by echoing the message sent. The echo may differ from the value sent if the new value assigned is outside the allowed or preset limits.

Example:

Assignment	Answer
@ ^ H Y 1 7 8 5 0 ↲	**0 1 0 0** ↲
@ ! H Y 1 7 8 5 0 ↲	**A K N _** ↲

The outer limit of the parameters is specified on the "programming procedure" sheet which is annexed to the user manual of the instrument.
The controller can be completely reconfigured via the serial line by sending messages. At the end of this operation, a "reset" command must be sent to reinitialize the controller. The parameters of the SCI line may also be changed via the serial line. The new parameters assigned to the SCI line will take effect after a reset command has been received or the controller has been switched off and on again.

· REQUESTS ·

Message	Description	Answer	Notes
@ ? X _ _ ↲	Value of variable displayed	**# # # #** ↲	[1]
@ ? Y 1 _ ↲	Status of output Y1	**# # # #** ↲	[4]
@ ? Y 2 _ ↲	Status of output Y2	**# # # #** ↲	[4]
@ ? Y 3 _ ↲	Status of output Y3	**# # # #** ↲	[4]
@ ? Y 4 _ ↲	Status of output Y4	**# # # #** ↲	[4]
@ ? S P 1 ↲	Stored set point value 1	**# # # #** ↲	
@ ? S P 2 ↲	Stored set point value 1	**# # # #** ↲	
@ ? S P 3 ↲	Stored set point value 3	**# # # #** ↲	
@ ? S P 4 ↲	Stored set point value 4	**# # # #** ↲	
@ ? H Y 1 ↲	Hysteresis of output Y1	**# # # #** ↲	
@ ? H Y 2 ↲	Hysteresis of output Y2	**# # # #** ↲	

• Requests • continued

Message	Description	Answer	Notes
@ ? HY 3 ↲	Hysteresis of output Y3	# # # # ↲	
@ ? H Y 4 ↲	Hysteresis of output Y4	# # # # ↲	
@ ? A C C ↲	Number for access to groups of parameters	# # # # ↲	
@ ? F I L ↲	Digital filter time constant	# # # # ↲	
@ ? H L D ↲	Hold mode	# # # # ↲	
@ ? T H L ↲	Hold display time	# # # # ↲	
@ ? R E S ↲	Display resolution of variable X	# # # # ↲	
@ ? I N S ↲	Input shift	# # # # ↲	
@ ? A D R ↲	S.C.I. instrument address	# # # # ↲	
@ ? B D R ↲	S.C.I. baud rate	# # # # ↲	[2]
@ ? P A R ↲	S.C.I. parity	# # # # ↲	[3]
@ ? Y 5 L ↲	Start of retransmission scale	# # # # ↲	
@ ? Y 5 H ↲	End of retransmission scale	# # # # ↲	
@ ? D E L ↲	Output activation delay	# # # # ↲	
@ ? C N 1 ↲	First configuration code	# # # # ↲	
@ ? C N 2 ↲	Second configuration code	# # # # ↲	
@ ? D D C ↲	Position of decimal point	# # # # ↲	
@ ? R H C ↲	High-range configuration	# # # # ↲	
@ ? R L C ↲	Low-range configuration	# # # # ↲	
@ ? C O 1 ↲	Configuration of output Y1	# # # # ↲	
@ ? C O 2 ↲	Configuration of output Y2	# # # # ↲	
@ ? C O 3 ↲	Configuration of output Y3	# # # # ↲	
@ ? C O 4 ↲	Configuration of output Y4	# # # # ↲	
@ ? M O D ↲	Model identifier	J M _ _ ↲	
@ ? R E L ↲	Software release identifier	_ # # # ↲	
@ ? U C F ↲	°C or °F selection	# # # # ↲	[5]
@ ? S Q R ↲	Square root	# # # # ↲	

The acquisition times can be shortened by using the new table function. In fact, with a single special request, the controller answers with a set of parameters that are normally used by the supervisors.These parameters are:

Message	Description	Answer	Notes
@ ? ? _ _ ↲	Value of variable X	# # # # ↲	
	Status of alarm 1	# # # # ↲	[4]
	Status of alarm 2	# # # # ↲	[4]
	Status of alarm 3	# # # # ↲	[4]
	Status of alarm 4	# # # # ↲	[4]
	Close table	E N D _ ↲	

Note 1. The answer string normally consists of four digits but if the value is outside the upper and lower limits of the scale, the string may contain a message in letters:

O V R R ↲ = Over scale

U N D R ↲ = Under scale

Note 2. This parameter is used for changing the communication speed of the instrument. The number that can be set has the following meaning:

0	=	9600 baud (Special execution)
1	=	4800 baud
2	=	2400 baud
3	=	1200 baud
4	=	600 baud

Note 3. This parameter is used for enabling the parity check on the data in transit and selecting the type of protocol. The number that can be set has the following meaning:

0	=	No check	(None)	ASCON protocol
1	=	Odd		ASCON protocol
2	=	Even		ASCON protocol
3	=	MODBUS protocol, 8 bit, no parity		(Special execution)
4	=	JBUS protocol, 8 bit, no parity		(Special execution)

Note 4. The answer string of the alarm status may contain various kinds of information depending on he methods selected in the configuration. If an alarm is selected for normal operation, the nswer may be one of the following two:

REST	=	Normal situation
ALAR	=	Alarm in progress

If an alarm is selected for ISA sequence operation, the answers may be:

REST	=	Normal situation
ALAR	=	Alarm in progress
LOCK	=	Alarm retained
ACKN	=	Alarm recognized

Note 5. Selection of measurement units (Special execution):

0	=	Degrees Centigrade (°C)
1	=	Degrees Fahrenheit

· COMMANDS ·

Message	Description	Answer	Notes
@ * > _ _ ↲	Alarm recognition	**A K N _ ↲**	
@ * * * * ↲	Reset	None	

Note. Alarm recognition only works if an ISA sequence mode has been selected.

· ASSIGNMENTS ·

Message	Description	Answer	Notes
@ ! S P 1 # # # # ↲	Value of set point 1	**A K N _ ↲**	
@ ! S P 2 # # # # ↲	Value of set point 2	**A K N _ ↲**	

• Assignments • continued

Message	Description	Answer	Notes
@ ! S P 3 # # # # ↲	Value of set point 3	A K N _ ↲	
@ ! S P 4 # # # # ↲	Valore set point 4	A K N _ ↲	
@ ! H Y 1 # # # # ↲	Hysteresis of output Y1	A K N _ ↲	
@ ! H Y 2 # # # # ↲	Hysteresis of output Y2	A K N _ ↲	
@ ! H Y 3 # # # # ↲	Hysteresis of output Y3	A K N _ ↲	
@ ! H Y 4 # # # # ↲	Hysteresis of output Y4	A K N _ ↲	
@ ! A C C # # # # ↲	Number for access to groups of parameters	A K N _ ↲	
@ ! F I L # # # # ↲	Digital filter time constant	A K N _ ↲	
@ ! H L D # # # # ↲	Hold mode	A K N _ ↲	
@ ! T H L # # # # ↲	Hold display time	A K N _ ↲	
@ ! R E S # # # # ↲	Display resolution of variable X	A K N _ ↲	
@ ! I N S # # # # ↲	Input shift	A K N _ ↲	
@ ! A D R # # # # ↲	S.C.I. instrument address	A K N _ ↲	
@ ! B D R # # # # ↲	S.C.I. baud rate	A K N _ ↲	[2]
@ ! P A R # # # # ↲	S.C.I. parity	A K N _ ↲	[3]
@ ! Y 5 L # # # # ↲	End of retransmission scale	A K N _ ↲	
@ ! Y 5 H # # # # ↲	Fondo scala ritrasmissione	A K N _ ↲	
@ ! D E L # # # # ↲	Output activation delay	A K N _ ↲	
@ ! C N 1 # # # # ↲	First configuration code	A K N _ ↲	
@ ! C N 2 # # # # ↲	Second configuration code	A K N _ ↲	
@ ! D D C # # # # ↲	Position of decimal point	A K N _ ↲	
@ ! R H C # # # # ↲	High-range configuration	A K N _ ↲	
@ ! R L C # # # # ↲	Low-range configuration	A K N _ ↲	
@ ! C O 1 # # # # ↲	Configuration of output Y1	A K N _ ↲	
@ ! C O 2 # # # # ↲	Configuration of output Y2	A K N _ ↲	
@ ! C O 3 # # # # ↲	Configuration of output Y3	A K N _ ↲	
@ ! C O 4 # # # # ↲	Configuration of output Y4	A K N _ ↲	
@ ! U C F # # # # ↲	°C or °F selection	A K N _ ↲	[5]
@ ? S Q R # # # # ↲	Square root	A K N _ ↲	

The controllers in the MF and MC series have a complete communication protocol. The messages that can be exchanged with the controllers can be divided into two categories: requests and assignments. No commands may be assigned. Unlike all the other Ascon controllers, the assignments must consist of a single string of 10 characters where :
The first must necessarily be the address of the controller (**@**).
The second must necessarily be an exclamation point (**!**).
The next three characters must correspond to the mnemonic of the parameter to be changed (e.g. ACC).
The next four characters represent the new value to be assigned (e.g. 0022).
The last character must necessarily be the "carriage return"(↲).
Another particular feature distinguishes it from the other controllers. The controller always answers an assignment by echoing the value assigned and never **AKN_**.
The echo may differ from the value sent if the new value assigned is outside the allowed or preset limits.

Example:

Assignment	Answer
@ ! Y H 1 7 8 5 0 ↲	**0 1 0 0** ↲

• REQUESTS •

Message	Description	Answer	Notes
@ ? X _ _ ↲	Value of regulated variable	# # # # ↲	[1]
@ ? W _ _ ↲	Current set point	# # # # ↲	
@ ? W T _ ↲	Permanent target set point	# # # # ↲	[6]
@ ? S W T ↲	Temporary target set point	# # # # ↲	[6]
@ ? Y _ _ ↲	Value of regulation output	# # # # ↲	
@ ? A _ _ ↲	Alarm status	# # # # ↲	
@ ? A C C ↲	Numbers for access to groups of parameters	# # # # ↲	
@ ? A T U ↲	Enable self tuning	# # # # ↲	
@ ? A D R ↲	S.C.I. instrument address	# # # # ↲	
@ ? B D R ↲	S.C.I. baud rate	# # # # ↲	[2]
@ ? P A R ↲	S.C.I. parity	# # # # ↲	[3]
@ ? H Y 1 ↲	Hysteresis of main output	# # # # ↲	[4]
@ ? P B 1 ↲	Proportional band	# # # # ↲	
@ ? T I 1 ↲	Integral time	# # # # ↲	
@ ? T D 1 ↲	Derivative time	# # # # ↲	
@ ? T C 1 ↲	Cycle time	# # # # ↲	[8]
@ ? Y H 1 ↲	Maximum value of main output	# # # # ↲	
@ ? F I N ↲	Fuzzy intensity	# # # # ↲	
@ ? F E R ↲	Size of fuzzy range	# # # # ↲	
@ ? F D E ↲	Fuzzy derivative	# # # # ↲	
@ ? T S A ↲	Sampling time	# # # # ↲	
@ ? R C G ↲	Relative cold gain	# # # # ↲	[5]

• Requests • continued

Message	Description	Answer	Notes
@ ? D B _ ↵	Dead band of hot/cold algorithm	# # # # ↵	[5]
@ ? T C 2 ↵	Cycle time of cold output	# # # # ↵	[5]
@ ? Y H 2 ↵	Maximum value of cold output	# # # # ↵	[5]
@ ? S A 2 ↵	Set point of output Y2	# # # # ↵	
@ ? H Y 2 ↵	Hysteresis of output Y2	# # # # ↵	
@ ? M A X ↵	Maximum set point value	# # # # ↵	
@ ? M I N ↵	Minimum set point value	# # # # ↵	
@ ? I N S ↵	Input shift	# # # # ↵	
@ ? S L O ↵	Slope	# # # # ↵	
@ ? C N F ↵	Configuration code	# # # # ↵	
@ ? U C F ↵	°C or °F selection	# # # # ↵	[7]
@ ? D D C ↵	Position of decimal point	# # # # ↵	
@ ? R H C ↵	End of scale value	# # # # ↵	
@ ? R L C ↵	Start of scale value	# # # # ↵	
@ ? M O D ↵	Model identifier	M F _ _ ↵	[9]
@ ? N E S ↵	Special execution number	# # # # ↵	

Note 1. Normally the answer string consists of four digits but, if the value is outside the upper or lower limits of the scale, the string may contain a message in letters:

O V R R ↵	=	Over scale
U N D R ↵	=	Under scale

Note 2. This parameter can be used for changing the communication speed of the instrument. The number that can be set has the following meaning:

0	=	9600 baud (Special execution)
1	=	4800 baud
2	=	2400 baud
3	=	1200 baud
4	=	600 baud

Note 3. This parameter is used for enabling the parity check on the data in transit and selecting the type of protocol. The number that can be set has the following meaning:

0	=	No parity (None)	ASCON protocol
1	=	Odd	ASCON protocol
2	=	Even	ASCON protocol
3	=	MODBUS protocol, 8 bit, no parity	(Special execution)
4	=	JBUS protocol, 8 bit, no parity	(Special execution)

Note 4. Only if the controller is configured for On/Off operation.

Note 5. Only if configured for hot/cold algorithm operation.

Note 6. The set point value assigned with the " **WT_** ", message is written in EEPROM as a permanent value while, the set point value, assigned with the message "

SWT “, is written in the working RAM, as a temporary value. After an interruption in the network, the controller returns to work using the default set point value written with the message “ **WT_** “ while the value that was assigned with the message “ SWT “ is irremediably lost. For frequent change of the set point value from the serial line, we recommend you send a safety value with the message “ **WT_** “ and work by assigning values in RAM using the message “ **SWT** “.

Note 7. Measurement unit selection (Special execution):

0	=	Degrees Centigrade (°C)
1	=	Degrees Fahrenheit

Note 8. Function not available in the MC controller.

Note 9. To the request for the model, the controller answers with the string ↲

· ASSIGNMENTS ·

Message	Description	Answer	Notes
@ ! W T _ # # # # ↲	Permanent target set point	# # # # ↲	[6]
@ ! S W T # # # # ↲	Temporary target set point	# # # # ↲	[6]
@ ! A C C # # # # ↲	Numbers for access to groups of parameters	# # # # ↲	
@ ! A T U # # # # ↲	Enable self tuning	# # # # ↲	
@ ! A D R # # # # ↲	S.C.I. instrument address	# # # # ↲	
@ ! B D R # # # # ↲	S.C.I. baud rate	# # # # ↲	[2]
@ ! P A R # # # # ↲	S.C.I. parity	# # # # ↲	[3]
@ ! H Y 1 # # # # ↲	Hysteresis of main output	# # # # ↲	[4]
@ ! P B 1 # # # # ↲	Proportional band	# # # # ↲	
@ ! T I 1 # # # # ↲	Integral time	# # # # ↲	
@ ! T D 1 # # # # ↲	Derivative time	# # # # ↲	
@ ! T C 1 # # # # ↲	Cycle time	# # # # ↲	[8]
@ ! Y H 1 # # # # ↲	Maximum value of main output	# # # # ↲	
@ ! F I N # # # # ↲	Fuzzy intensity	# # # # ↲	
@ ! F E R # # # # ↲	Size of fuzzy range	# # # # ↲	
@ ! F D E # # # # ↲	Fuzzy derivative	# # # # ↲	
@ ! T S A # # # # ↲	Sampling time	# # # # ↲	
@ ! R C G # # # # ↲	Relative cold gain	# # # # ↲	[5]
@ ! D B _ # # # # ↲	Dead band of hot/cold algorithm	# # # # ↲	[5]
@ ! T C 2 # # # # ↲	Cycle time of cold output	# # # # ↲	[5]
@ ! Y H 2 # # # # ↲	Maximum value of cold output	# # # # ↲	[5]
@ ! S A 2 # # # # ↲	Set point of output Y2	# # # # ↲	
@ ! H Y 2 # # # # ↲	Hysteresis of output Y2	# # # # ↲	
@ ! M A X # # # # ↲	Maximum set point value	# # # # ↲	
@ ! M I N # # # # ↲	Minimum set point value	# # # # ↲	
@ ! I N S # # # # ↲	Input shift	# # # # ↲	
@ ! S L O # # # # ↲	Slope	# # # # ↲	
@ ! C N F # # # # ↲	Configuration code	# # # # ↲	

• Assignments • continued

Message	Description	Answer	Notes
@ ! D D C # # # # ↲	Position of decimal point	# # # # ↲	
@ ! R H C # # # # ↲	End of scale configuration	# # # # ↲	
@ ! R L C # # # # ↲	Start of scale configuration	# # # # ↲	
@ ! U C F # # # # ↲	°C or °F selection	# # # # ↲	[7]

Communication protocol for MS series controller

The controller in the MS series has a complete communication protocol. The messages that can be exchanged with the controller can be divided into two categories: requests and assignments. No commands can be assigned. Unlike all the other Ascon controllers, the assignments must consist of a single string of 10 characters where :
The first must necessarily be the address of the controller (**@**).
The second must necessarily be an exclamation point (**!**).
The next three characters must correspond to the mnemonic of the parameter to be changed (e.g. **ACC**, **WT_**, **PB1**, etc.).
The next four characters represent the new value to be assigned (e.g.0022).
The last character must necessarily be "carriage return" (↲).
Another special feature distinguishes it from all other controllers. The controller always answers an assignment by echoing the value assigned and never **AKN_**.
The echo may differ from the value sent if the new assigned value is outside the allowed or preset limits.

Example:

Assignment	Answer
@ ! Y H 1 7 8 5 0 ↲	0 1 0 0 ↲

· REQUESTS ·

Message	Description	Answer	Notes
@ ? X _ _ ↲	Value of the regulated variable	# # # # ↲	[1]
@ ? W _ _ ↲	Current set point	# # # # ↲	
@ ? W T _ ↲	Target set point	# # # # ↲	
@ ? Y _ _ ↲	Value of regulation output	# # # # ↲	
@ ? A _ _ ↲	Alarm status	# # # # ↲	
@ ? A C C ↲	Numbers for access to groups of parameters	# # # # ↲	
@ ? A T U ↲	Enable self-tuning	# # # # ↲	
@ ? A D R ↲	S.C.I. instrument address	# # # # ↲	
@ ? B D R ↲	S.C.I. baud rate	# # # # ↲	[2]
@ ? P A R ↲	S.C.I. parity	# # # # ↲	[3]
@ ? H Y 1 ↲	Hysteresis of main output	# # # # ↲	[4]
@ ? P B 1 ↲	Proportional band	# # # # ↲	
@ ? T I 1 ↲	Integral time	# # # # ↲	
@ ? T D 1 ↲	Derivative time	# # # # ↲	
@ ? T C 1 ↲	Cycle time	# # # # ↲	
@ ? Y H 1 ↲	Maximum value of main output	# # # # ↲	
@ ? R C G ↲	Relative cold gain	# # # # ↲	[5]
@ ? D B _ ↲	Dead band of hot/cold algorithm	# # # # ↲	[5]
@ ? T C 2 ↲	Cycle time of cold output	# # # # ↲	[5]
@ ? Y H 2 ↲	Maximum value of cold output	# # # # ↲	[5]
@ ? S A 2 ↲	Set point of output Y2	# # # # ↲	
@ ? H Y 2 ↲	Hysteresis of output Y2	# # # # ↲	

• Requests • continued

Message	Description	Answer	Notes
@ ? M A X ↵	Maximum set point value	# # # # ↵	
@ ? M I N ↵	Minimum set point value	# # # # ↵	
@ ? I N S ↵	Input shift	# # # # ↵	
@ ? S L O ↵	Slope	# # # # ↵	
@ ? C N F ↵	Configuration code	# # # # ↵	
@ ? D D C ↵	Position of decimal point	# # # # ↵	
@ ? R H C ↵	End of scale value	# # # # ↵	
@ ? R L C ↵	Start of scale value	# # # # ↵	
@ ? U C F ↵	°C or °F selection	# # # # ↵	[6]

Note 1. The answer string normally consists of four digits but if the value is over the top limit or under the bottom limit, the string may contain a message in letters:

O V R R ↵	=	Over scale
U N D R ↵	=	Under scale

Note 2. This parameter can be used for changing the communication speed of the instrument. The number that can be set has the following meaning:

0	=	9600 baud (Special execution)
1	=	4800 baud
2	=	2400 baud
3	=	1200 baud
4	=	600 baud

Note 3. This parameter can be used for enabling the parity check on the data in transit and selecting the type of protocol. The number that can be set has the following meaning:

0	=	No check	(None)	ASCON protocol
1	=	Odd	(Odd)	ASCON protocol
2	=	Even	(Even)	ASCON protocol
3	=	MODBUS protocol, 8 bit, no parity		(Special execution)
4	=	JBUS protocol, 8 bit, no parity		(Special execution)

Note 4. Only if the controller is configured for On/Off operation.

Note 5. Only if configured for hot/cold algorithm operation.

Note 6. Measurement unit selection (Special execution):

0	=	Degrees Centigrade (°C)
1	=	Degrees Fahrenheit

Message	Description	Answer	Notes
@ ! W T _ # # # # ↲	Target set point (desired)	# # # # ↲	
@ ! A C C # # # # ↲	Numbers for access to groups of parameters	# # # # ↲	
@ ! A T U # # # # ↲	Enable self-tuning	# # # # ↲	
@ ! A D R # # # # ↲	S.C.I. instrument address	# # # # ↲	
@ ! B D R # # # # ↲	S.C.I baud rate.	# # # # ↲	[2]
@ ! P A R # # # # ↲	S.C.I. parity	# # # # ↲	[3]
@ ! H Y 1 # # # # ↲	Hysteresis of main output	# # # # ↲	[4]
@ ! P B 1 # # # # ↲	Proportional band	# # # # ↲	
@ ! T I 1 # # # # ↲	Integral time	# # # # ↲	
@ ! T D 1 # # # # ↲	Derivative time	# # # # ↲	
@ ! T C 1 # # # # ↲	Cycle time	# # # # ↲	
@ ! Y H 1 # # # # ↲	Maximum value of main output	# # # # ↲	
@ ! R C G # # # # ↲	Relative cold gain	# # # # ↲	[5]
@ ! D B _ # # # # ↲	Dead band of hot/cold algorithm	# # # # ↲	[5]
@ ! T C 2 # # # # ↲	Cycle time of cold output	# # # # ↲	[5]
@ ! Y H 2 # # # # ↲	Maximum value of cold output	# # # # ↲	[5]
@ ! S A 2 # # # # ↲	Set point of output Y2	# # # # ↲	
@ ! H Y 2 # # # # ↲	Hysteresis of output Y2	# # # # ↲	
@ ! M A X # # # # ↲	Maximum set point value	# # # # ↲	
@ ! M I N # # # # ↲	Minimum set point value	# # # # ↲	
@ ! I N S # # # # ↲	Input shift	# # # # ↲	
@ ! S L O # # # # ↲	Slope	# # # # ↲	
@ ! C N F # # # # ↲	Configuration code	# # # # ↲	
@ ! D D C # # # # ↲	Position of decimal point	# # # # ↲	
@ ! R H C # # # # ↲	End of scale configuration	# # # # ↲	
@ ! R L C # # # # ↲	Start of scale configuration	# # # # ↲	
@ ! U C F # # # # ↲	°C or °F selection	# # # # ↲	[6]

The controller in the XE series has an advanced, complete communication protocol. The messages that can be exchanged with the controller can be divided into two categories: requests and assignments. No commands can be assigned. This series of controllers has the possibility of converting the two strings required for the assignments into a single string, thus eliminating the "**CR**" character from the first string and the address of the second string drastically reducing the assignment times. Despite having this new assignment method, the instruments in this series maintain compatibility with the previous versions so they accept any assignment method:

1) two strings separated by a delay
2) two strings merged together
3) a single string

Another new feature is the command execution code which may be of two types. If a parameter is assigned with the " **!** ", character, the controller answers with the acknowledgement **AKN_** while, if a parameter is assigned with the " ^ ", character, the controller answers by echoing the message sent. The echo may differ from the value sent if the new assigned value is outside the allowed or preset limits.

Example:

Assignment	Answer
@ ^ Y H 1 7 8 5 0 ↵	**0 1 0 0** ↵
@ ! Y H 1 7 8 5 0 ↵	**A K N _** ↵

The outer limit of the parameters is specified on the "programming procedure" sheet annexed to the user manual of the instrument.
The controller can be completely reconfigured via the serial line by sending messages. At the end of this operation, a "reset" command must be sent to reinitialize the controller. The parameters of the SCI line may also be changed via the serial line. The new parameters assigned to the SCI line will take effect after a reset command has been received or the controller has been switched off and on again.

• REQUESTS •

Message	Description	Answer	Notes
@ ? X _ _ ↵	Value of regulated variable	**# # # #** ↵	[1]
@ ? W _ _ ↵	Current set point	**# # # #** ↵	
@ ? W L _ ↵	Local set point	**# # # #** ↵	
@ ? W T _ ↵	Target set point	**# # # #** ↵	
@ ? Y _ _ ↵	Value of regulation output	**# # # #** ↵	
@ ? A _ _ ↵	Alarm status	**# # # #** ↵	[2]
@ ? O _ _ ↵	Operating mode	**L O C _** ↵	
@ ? A C C ↵	Number for access to groups of parameters	**# # # #** ↵	
@ ? A T U ↵	Enable self-tuning	**# # # #** ↵	
@ ? A D R ↵	S.C.I. instrument address	**# # # #** ↵	
@ ? B D R ↵	S.C.I. baud rate	**# # # #** ↵	[3]

• Requests • continued

Message	Description	Answer	Notes
@ ? P A R ↲	S.C.I. parity	# # # # ↲	[4]
@ ? H Y 1 ↲	Hysteresis of main output	# # # # ↲	
@ ? P B 1 ↲	Proportional band	# # # # ↲	
@ ? T I 1 ↲	Integral time	# # # # ↲	
@ ? T D 1 ↲	Derivative time	# # # # ↲	
@ ? T C 1 ↲	Cycle time	# # # # ↲	
@ ? Y H 1 ↲	Maximum value of main output	# # # # ↲	
@ ? P B 2 ↲	Proportional band of cold output	# # # # ↲	
@ ? D B _ ↲	Dead band of hot/cold algorithm	# # # # ↲	
@ ? T C 2 ↲	Cycle time of cold output	# # # # ↲	
@ ? Y H 2 ↲	Maximum value of cold output	# # # # ↲	
@ ? S A 2 ↲	Set point of output Y2	# # # # ↲	
@ ? H Y 2 ↲	Hysteresis of output Y2	# # # # ↲	
@ ? S A 3 ↲	Set point of output Y3	# # # # ↲	
@ ? H Y 3 ↲	Hysteresis of output Y3	# # # # ↲	
@ ? M A X ↲	Maximum set point value	# # # # ↲	
@ ? M I N ↲	Minimum set point value	# # # # ↲	
@ ? I N S ↲	Input shift	# # # # ↲	
@ ? S L D ↲	Slope down	# # # # ↲	
@ ? S L U ↲	Slope up	# # # # ↲	
@ ? F I L ↲	Digital filter time constant	# # # # ↲	
@ ? C N 1 ↲	First configuration code	# # # # ↲	
@ ? C N 2 ↲	Second configuration code	# # # # ↲	
@ ? D D C ↲	Position of decimal point	# # # # ↲	
@ ? R H C ↲	High-range configuration	# # # # ↲	
@ ? R L C ↲	Low-range configuration	# # # # ↲	
@ ? M O D ↲	Model identifier	X E _ _ ↲	
@ ? R E L ↲	Software release identifier	_ # # # ↲	
@ ? N E S ↲	Number of special software execution	# # # # ↲	
@ ? U C F ↲	°C or °F selection	# # # # ↲	[5]

The acquisition times can be shortened by using the new table function. In fact, with a single special request, the controller answers with a set of parameters that are normally used by the supervisors. These parameters are:

Message	Description	Answer	Notes
@ ? ? _ _ ↲	Value of variable X	# # # # ↲	[1]
	Working set point value	# # # # ↲	
	Value of Y1	# # # # ↲	
	Operating mode	L O C _ ↲	
	Alarm status	# # # # ↲	[2]
	Close table	E N D _ ↲	

The time between the answers is 2 mS at 4800 bauds.

Note 1. The answer string normally consists of four digits but if the value is outside the upper and lower limits, the string may contain a message in letters:

O V R R ↲	=	Fuori scala superiore
U N D R ↲	=	Fuori scala inferiore

Note 2. The meaning of the data in the answer string is as follows:

0 0 0 0	=	Y2 and Y3 Off
0 0 0 1	=	Y3 On, Y2 Off
0 0 0 2	=	Y2 On, Y3 Off
0 0 0 3	=	Y2 and Y3 On

Note 3. This parameter can be used for changing the communication speed of the instrument. The number that may be set has the following meaning:

0	=	9600 bauds (Special execution)
1	=	4800 bauds
2	=	2400 bauds
3	=	1200 bauds
4	=	600 bauds

Note 4. This parameter can be used for enabling the parity check on the data in transit and selecting the type of protocol. The number that may be set has the following meaning:

0	=	No check (None)	ASCON protocol
1	=	Odd (Odd)	ASCON protocol
2	=	Even (Even)	ASCON protocol
3	=	MODBUS protocol, 8 bit, no parit	(Special execution)
4	=	JBUS protocol, 8 bit, no parity	(Special execution)

Note 5. Measurement unit selection (Special execution):

0	=	Degrees Centigrade (°C)
1	=	Degrees Fahrenheit

· ASSIGNMENTS ·

Message	Description	Answer	Notes
@ ! W L _ # # # # ↲	Local set point	**A K N _** ↲	
@ ! A C C # # # # ↲	Number for access to groups of parameters	**A K N _** ↲	
@ ! A T U # # # # ↲	Enable self tuning	**A K N _** ↲	
@ ! A D R # # # # ↲	S.C.I. instrument address	**A K N _** ↲	
@ ! B D R # # # # ↲	S.C.I. baud rate	**A K N _** ↲	[3]
@ ! P A R # # # # ↲	S.C.I. parity	**A K N _** ↲	[4]
@ ! H Y 1 # # # # ↲	Hysteresis of main output	**A K N _** ↲	
@ ! P B 1 # # # # ↲	Proportional band	**A K N _** ↲	
@ ! T I 1 # # # # ↲	Integral time	**A K N _** ↲	
@ ! T D 1 # # # # ↲	Derivative time	**A K N _** ↲	
@ ! T C 1 # # # # ↲	Cycle time	**A K N _** ↲	
@ ! Y H 1 # # # # ↲	Maximum value of main output	**A K N _** ↲	

• Assignments • continued

Message	Description	Answer	Notes
@ ! P B 2 # # # # ↲	Proportional band of cold output	A K N _ ↲	
@ ! D B _ # # # # ↲	Dead band of hot/cold algorithm	A K N _ ↲	
@ ! T C 2 # # # # ↲	Cycle time of cold output	A K N _ ↲	
@ ! Y H 2 # # # # ↲	Maximum value of cold output	A K N _ ↲	
@ ! S A 2 # # # # ↲	Set point of output Y2	A K N _ ↲	
@ ! H Y 2 # # # # ↲	Hysteresis of output Y2	A K N _ ↲	
@ ! S A 3 # # # # ↲	Set point of output Y3	A K N _ ↲	
@ ! H Y 3 # # # # ↲	Hysteresis of output Y3	A K N _ ↲	
@ ! M A X # # # # ↲	Maximum set point value	A K N _ ↲	
@ ! M I N # # # # ↲	Minimum set point value	A K N _ ↲	
@ ! I N S # # # # ↲	Input shift	A K N _ ↲	
@ ! S L D # # # # ↲	Slope down	A K N _ ↲	
@ ! S L U # # # # ↲	Slope up	A K N _ ↲	
@ ! F I L # # # # ↲	Digital filter time constant	A K N _ ↲	
@ ! C N 1 # # # # ↲	First configuration code	A K N _ ↲	
@ ! C N 2 # # # # ↲	Second configuration code	A K N _ ↲	
@ ! D D C # # # # ↲	Position of decimal point	A K N _ ↲	
@ ! R H C # # # # ↲	High-range configuration	A K N _ ↲	
@ ! R L C # # # # ↲	Low-range configuration	A K N _ ↲	
@ ! U C F # # # # ↲	°C or °F selection	A K N _ ↲	[5]
@ * * * * ↲	Reset instrument	None	

WARNING ! It may happen that the controller sends the **BUSY**↲ code in response to any request or assignment attempt. This is due to a momentary overload of functions that the controller is to carry out at the same time. In case just repeat the request or assignment to be carried out. If you try to force the instrument into an operating mode that is already active or you recall a function that is disabled or not present, it answers with the **NOP_**↲ string (Not operating).
In this series of instruments, the SCI parameter can be used to disable the assignment mode so the controller will only answer requests. If you try to assign a parameter with the SCI disabled, the controller answers with the code **OFFL**↲. The answer **"OFFL**" may be received at different times according to the mode used for assignment. If a parameter is assigned with the two strings method, the controller sends **OFFL**↲ immediately after receiving the first string without waiting for the second containing the value to be assigned. If a parameter is assigned with a single string, the controller sends **OFFL**↲ immediately after it has received the entire message of 10 characters.

Controllers in the XF series have an advanced, complete communication protocol. The messages that can be exchanged with the controllers can be divided into three categories: requests, assignments and commands.
This series of controllers presents the possibility of converting the two strings required for the assignments into a single one thus eliminating the “CR” character from the first string and the address of the second string drastically reducing the assignment times. Although they have this new assignment method, the instruments in this series maintain compatibility with the previous versions so they can accept any assignment method:

1) two strings separated by a delay
2) two strings merged together
3) a single string

Another new feature is the command execution code which may be one of two types. By assigning a parameter with the “ ! “ character, the controller answers with the acknowledgement **AKN_** while, if a parameter is assigned with the “ ^ “, character, the controller answers by echoing the message sent. The echo may differ from the value sent if the new value assigned is outside the allowed or preset limits.

Example:

Assignment	Answer
@ ^ Y H 1 7 8 5 0 ↲	0 1 0 0 ↲
@ ! Y H 1 7 8 5 0 ↲	A K N _ ↲

The outer limit of the parameters is specified on the “programming procedure” sheet which is annexed to the user manual of the instrument.
The controller can be completely reconfigured via the serial line by sending messages. At the end of this operation, a “reset” command must be sent to reinitialize the controller. The parameters of the SCI line may also be changed via the serial line. The new parameters assigned to the SCI line will take effect after a reset command has been received or the controller has been switched off and on again.

• REQUESTS •

Message	Description	Answer	Notes
@ ? X _ _ ↲	Value of regulated variable	# # # # ↲	[1]
@ ? W _ _ ↲	Current set point	# # # # ↲	
@ ? W L _ ↲	Local set point	# # # # ↲	
@ ? W T _ ↲	Target set point	# # # # ↲	
@ ? Y _ _ ↲	Value of regulation output	# # # # ↲	
@ ? A _ _ ↲	Alarm status	# # # # ↲	[2]
@ ? O _ _ ↲	Operating mode	# # # # ↲	[3]
@ ? A C C ↲	Number for access to groups of parameters	# # # # ↲	
@ ? A T U ↲	Enable self-tuning	# # # # ↲	
@ ? A D R ↲	S.C.I. instrument address	# # # # ↲	
@ ? B D R ↲	S.C.I. baud rate	# # # # ↲	[4]
@ ? P A R ↲	S.C.I. parity	# # # # ↲	[5]

• Requests • continued

Message	Description	Answer	Notes
@ ? H Y 1 ↵	Hysteresis of main output	# # # # ↵	
@ ? P B 1 ↵	Proportional band	# # # # ↵	
@ ? T I 1 ↵	Integral time	# # # # ↵	
@ ? T D 1 ↵	Derivative time	# # # # ↵	
@ ? T C 1 ↵	Cycle time	# # # # ↵	
@ ? Y L 1 ↵	Minimum value of main output	# # # # ↵	
@ ? Y H 1 ↵	Valore massimo dell'uscita principale	# # # # ↵	
@ ? F I N ↵	Fuzzy modulation depth	# # # # ↵	
@ ? F E R ↵	Fuzzy modulation band	# # # # ↵	
@ ? F D E ↵	Fuzzy derivative	# # # # ↵	
@ ? T S A ↵	Sampling time	# # # # ↵	
@ ? R C R ↵	Relative cold gain	# # # # ↵	[6]
@ ? D B _ ↵	Dead band of hot/cold algorithm	# # # # ↵	[6]
@ ? T C 2 ↵	Cycle time of cold output	# # # # ↵	[6]
@ ? Y H 2 ↵	Maximum value of cold output	# # # # ↵	[6]
@ ? D Y _ ↵	Dead band of modulating output	# # # # ↵	[7]
@ ? T Y _ ↵	Total rotation time of mot. valve	# # # # ↵	[7]
@ ? S V 1 ↵	Status of safety Y1	# # # # ↵	
@ ? S V 2 ↵	Status of safety Y2	# # # # ↵	
@ ? S V 3 ↵	Status of safety Y3	# # # # ↵	
@ ? S A 2 ↵	Set point of output Y2	# # # # ↵	
@ ? H Y 2 ↵	Hysteresis of output Y2	# # # # ↵	
@ ? S A 3 ↵	Set point of output Y3	# # # # ↵	
@ ? H Y 3 ↵	Hysteresis of output Y3	# # # # ↵	
@ ? M A X ↵	Maximum set point value	# # # # ↵	
@ ? M I N ↵	Minimum set point value	# # # # ↵	
@ ? I N S ↵	Input shift	# # # # ↵	
@ ? S L D ↵	Slope down	# # # # ↵	
@ ? S L U ↵	Slope up	# # # # ↵	
@ ? F I L ↵	Digital filter time constant	# # # # ↵	
@ ? S L 1 ↵	Stored set point value 1	# # # # ↵	[8]
@ ? S L 2 ↵	Stored set point value 2	# # # # ↵	[8]
@ ? S L 3 ↵	Stored set point value 3	# # # # ↵	[8]
@ ? S L 4 ↵	Stored set point value 4	# # # # ↵	[8]
@ ? S R 1 ↵	Remote set point linearization	# # # # ↵	[9]
@ ? S R 2 ↵	Remote set point linearization	# # # # ↵	[9]
@ ? S R 3 ↵	Remote set point linearization	# # # # ↵	[9]
@ ? C N 1 ↵	First configuration code	# # # # ↵	
@ ? C N 2 ↵	Second configuration code	# # # # ↵	
@ ? D D C ↵	Position of decimal point	# # # # ↵	
@ ? R H C ↵	End of scale value	# # # # ↵	
@ ? R L C ↵	Start of scale value	# # # # ↵	
@ ? M O D ↵	Model identifier	X F _ _ ↵	
@ ? R E L ↵	Software release identifier	_ # # # ↵	
@ ? N E S ↵	Special software execution number	# # # # ↵	
@ ? U C F ↵	°C or °F selection	# # # # ↵	[10]
@ ? S Q R ↵	Square root	# # # # ↵	[12]

The acquisition times can be shortened by using the new table function. In fact, with a single special request, the controller answers with a set of parameters that are normally used by the supervisors.
These parameters are:

Message	Description	Answer	Notes
@ ? ? _ _ ↲	Value of variable X	# # # # ↲	[1]
	Working set point value	# # # # ↲	
	Value of	# # # # ↲	
	Operating mode	# # # # ↲	[2]
	Alarm status	# # # # ↲	[3]
	Close table	E N D _ ↲	

The time interval between the answer strings is 2 mS at 4800 bauds.

Note 1. The answer string normally consists of four digits but if the value is outside the upper and lower scale limits, the string may contain a message in letters:

O V R R ↲	=	Over scale
U N D R ↲	=	Under scale

Note 2. The meaning of the data in the answer string is as follows:

0 0 0 0	=	Y2 and Y3 Off
0 0 0 1	=	Y3 On, Y2 Off
0 0 0 2	=	Y2 On, Y3 Off
0 0 0 3	=	Y2 and Y3 On

Note 3. When requested for the operating mode, the controller answers in clear form and the meaning of the answer strings is as follows:

L O C _ ↲	=	Automatic local mode
M A N _ ↲	=	Manual mode after LOC > MAN switch
R E M _ ↲	=	Remote mode
M A N R ↲	=	Manual mode after REM > MAN switch

Note 4. This parameter may be used for changing the communication speed of the instrument. The number that can be set has the following meaning:

0	=	9600 bauds (Special execution)
1	=	4800 bauds
2	=	2400 bauds
3	=	1200 bauds
4	=	600 bauds

Note 5. This parameter can be used for enabling the parity check on the data in transit and selecting the type of protocol. The number that can be set has the following meaning:

0	=	No check	(None)	ASCON protocol
1	=	Odd	(Odd)	ASCON protocol
2	=	Even	(Even)	ASCON protocol
3	=	MODBUS protocol, 8 bit, no parity		(Special execution)
4	=	JBUS protocol, 8 bit, no parity		(Special execution)

Note 6. Only if configured for a hot/cold algorithm.

Note 7. Only if configured for a servomotor output.

Note 8. Only if configured with the four stored set points.

Note 9. Only if configured with analog remote set point.

Note 10 Select measurement unit (Special execution):

0	=	Degrees Centigrade (°C)
1	=	Degrees Fahrenheit

Note 11. This parameter can only be assigned with the controller in “Manual” mode. On controllers for servomotors, rotation can be controlled by means of the following commands:

@ ! Y _ _ 0 0 0 1 ↲	Open	**A K N _** ↲
@ ! Y _ _ 0 0 0 0 ↲	Stop	**A K N _** ↲
@ ! Y _ _ – 0 0 1 ↲	Close	**A K N _** ↲

Note 12. Special execution.

· COMMANDS ·

Message	Description	Answer	Notes
@ * A U T ↲	Assign automatic mode	**A K N _** ↲	
@ * L O C ↲	Assign local mode	**A K N _** ↲	
@ * M A N ↲	Assign manual mode	**A K N _** ↲	
@ * R E M ↲	Assign remote mode	**A K N _** ↲	[9]
@ * S P 1 ↲	Recall stored set point 1	**A K N _** ↲	[8]
@ * S P 2 ↲	Recall stored set point 2	**A K N _** ↲	[8]
@ * S P 3 ↲	Recall stored set point 3	**A K N _** ↲	[8]
@ * S P 4 ↲	Recall stored set point 4	**A K N _** ↲	[8]
@ * * * * ↲	Reset instrument	None	

As an alternative to the “ * “ character, you can enter the “ > “ character to obtain the echo of the command instead of **AKN_**↲. as the answer. This alternative is not valid for the reset command.

· ASSIGNMENTS ·

Message	Description	Answer	Notes
@ ! W L _ # # # # ↲	Local set point	**A K N _** ↲	
@ ! A C C # # # # ↲	Number for access to groups of parameters	**A K N _** ↲	
@ ! A T U # # # # ↲	Enable self-tuning	**A K N _** ↲	
@ ! A D R # # # # ↲	S.C.I. instrument address	**A K N _** ↲	
@ ! B D R # # # # ↲	S.C.I. baud rate	**A K N _** ↲	[4]

Message	Description	Answer	Notes
@ ! P A R # # # # ↲	S.C.I. parity	A K N _ ↲	[5]
@ ! H Y 1 # # # # ↲	Hysteresis of main output	A K N _ ↲	
@ ! P B 1 # # # # ↲	Proportional band	A K N _ ↲	
@ ! T I 1 # # # # ↲	Integral time	A K N _ ↲	
@ ! T D 1 # # # # ↲	Derivative time	A K N _ ↲	
@ ! T C 1 # # # # ↲	Cycle time	A K N _ ↲	
@ ! Y _ _ # # # # ↲	Value of main output	A K N _ ↲	
@ ! Y L 1 # # # # ↲	Minimum value of main output	A K N _ ↲	[11]
@ ! Y H 1 # # # # ↲	Maximum value of main output	A K N _ ↲	
@ ! F I N # # # # ↲	Fuzzy modulation depth	A K N _ ↲	
@ ! F E R # # # # ↲	Fuzzy modulation band	A K N _ ↲	
@ ! F D E # # # # ↲	Fuzzy derivative	A K N _ ↲	
@ ! T S A # # # # ↲	Sampling time	A K N _ ↲	
@ ! R C R # # # # ↲	Relative cold gain	A K N _ ↲	[6]
@ ! D B _ # # # # ↲	Dead band of hot/cold algorithm	A K N _ ↲	[6]
@ ! T C 2 # # # # ↲	Cycle time of cold output	A K N _ ↲	[6]
@ ! Y H 2 # # # # ↲	Maximum value of cold output	A K N _ ↲	[6]
@ ! D Y _ # # # # ↲	Dead band of modulating output	A K N _ ↲	[7]
@ ! T Y _ # # # # ↲	Total rotation time of mot. valve	A K N _ ↲	[7]
@ ! S V 1 # # # # ↲	Status of safety Y1	A K N _ ↲	
@ ! S V 2 # # # # ↲	Status of safety Y2	A K N _ ↲	
@ ! S V 3 # # # # ↲	Status of safety Y3	A K N _ ↲	
@ ! S A 2 # # # # ↲	Set point of output Y2	A K N _ ↲	
@ ! H Y 2 # # # # ↲	Hysteresis of output Y2	A K N _ ↲	
@ ! S A 3 # # # # ↲	Set point of output Y3	A K N _ ↲	
@ ! H Y 3 # # # # ↲	Hysteresis of output Y3	A K N _ ↲	
@ ! M A X # # # # ↲	Maximum set point value	A K N _ ↲	
@ ! M I N # # # # ↲	Minimum set point value	A K N _ ↲	
@ ! I N S # # # # ↲	Input shift	A K N _ ↲	
@ ! S L D # # # # ↲	Slope down	A K N _ ↲	
@ ! S L U # # # # ↲	Slope up	A K N _ ↲	
@ ! F I L # # # # ↲	Digital filter time constant	A K N _ ↲	
@ ! S L 1 # # # # ↲	Stored set point value 1	A K N _ ↲	[8]
@ ! S L 2 # # # # ↲	Stored set point value 2	A K N _ ↲	[8]
@ ! S L 3 # # # # ↲	Stored set point value 3	A K N _ ↲	[8]
@ ! S L 4 # # # # ↲	Stored set point value 4	A K N _ ↲	[8]
@ ! S R 1 # # # # ↲	Remote set point linearization	A K N _ ↲	[9]
@ ! S R 2 # # # # ↲	Remote set point linearization	A K N _ ↲	[9]
@ ! S R 3 # # # # ↲	Remote set point linearization	A K N _ ↲	[9]
@ ! C N 1 # # # # ↲	First configuration code	A K N _ ↲	
@ ! C N 2 # # # # ↲	Second configuration code	A K N _ ↲	
@ ! D D C # # # # ↲	Position of decimal point	A K N _ ↲	
@ ! R H C # # # # ↲	End of scale configuration	A K N _ ↲	
@ ! R L C # # # # ↲	Start of scale configuration	A K N _ ↲	
@ ! U C F # # # # ↲	°C or °F selection	A K N _ ↲	[10]

WARNING ! It may happen that the controller sends the **BUSY**↲ code in response to any request or assignment attempt. This is due to a momentary overload of functions that the controller is to carry out at the same time in htat case just repeat the request or assignment to be carried out.
If you try to force the instrument into an operating mode that is already active or you recall a function that is disabled or not present, it answers with the **NOP_**↲ string (Not operating).
In this series of instruments, the SCI parameter can be used to disable the assignment mode so the controller will only answer requests. If you try to assign a parameter with the SCI disabled, the controller answers with the code **OFFL**↲. The answer "**OFFL**" may be received at different times according to the mode used for assignment. If a parameter is assigned with the two string method, the controller sends **OFFL**↲ immediately after receiving the first string without waiting for the second containing the value to be assigned. If a parameter is assigned with a single string, the controller sends **OFFL**↲ immediately after it has received the entire message of 10 characters.

XS and XP series controllers have an advanced, complete communication protocol. The messages that can be exchanged with the controllers can be divided into three categories: requests, assignments and commands.
These instruments offer the possibility of converting the two strings required for assignments into a single one, thus eliminating the "**CR**" character from the first string and the address of the second string drastically reducing the assignment times. Despite having this new assignment method, the instruments in this series maintain compatibility with the previous versions so they can accept any assignment method:

1) two strings separated by a delay
2) two strings merged together
3) a single string

Another new feature is the command execution code which may be one of two types. By assigning a parameter with the " **!** ", character, the controller answers with the acknowledgement AKN_ while if a parameter is assigned with the " ^ " character, the controller answers by echoing the message sent. The echo may differ from the value sent if the new value assigned is outside the allowed or preset limits.

Example:

Assignment	Answer
@ ^ Y H 1 7 8 5 0 ↵	**0 1 0 0** ↵
@ ! Y H 1 7 8 5 0 ↵	**A K N _** ↵

The outer limit of the parameters is specified in the "programming procedure" sheet which is annexed to the user manual of the instrument.
The controller can be completely reconfigured via the serial line by sending messages. At the end of this operation, a "reset" command must be sent to reinitialize the controller. The parameters of the SCI line may also be changed via the serial line. The new parameters assigned to the SCI line will take effect after a reset command has been received or the controller has been switched off and on again.

• REQUESTS •

Message	Description	Answer	Notes
@ ? X _ _ ↵	Value of regulated variable	**# # # #** ↵	[1]
@ ? W _ _ ↵	Current set point	**# # # #** ↵	
@ ? W L _ ↵	Local set point	**# # # #** ↵	
@ ? W T _ ↵	Target set point	**# # # #** ↵	
@ ? Y _ _ ↵	Value of regulation output	**# # # #** ↵	
@ ? A _ _ ↵	Alarm status	**# # # #** ↵	[2]
@ ? O _ _ ↵	Operating mode	**# # # #** ↵	[3]
@ ? A C C ↵	Number for access to groups of parameters	**# # # #** ↵	
@ ? A T U ↵	Enable self-tuning	**# # # #** ↵	
@ ? A D R ↵	S.C.I. instrument address	**# # # #** ↵	
@ ? B D R ↵	S.C.I. baud rate	**# # # #** ↵	[8]
@ ? P A R ↵	S.C.I. parity	**# # # #** ↵	[9]
@ ? H Y 1 ↵	Hysteresis of main output	**# # # #** ↵	

• Requests • continued

Message	Description	Answer	Notes
@ ? P B 1 ↲	Proportional band	# # # # ↲	
@ ? T I 1 ↲	Integral time	# # # # ↲	
@ ? T D 1 ↲	Derivative time	# # # # ↲	
@ ? T C 1 ↲	Cycle time	# # # # ↲	
@ ? Y H 1 ↲	Maximum value of main output	# # # # ↲	
@ ? F F _ ↲	Feed forward	# # # # ↲	
@ ? P B 2 ↲	Proportional band of cold output	# # # # ↲	
@ ? T I 2 ↲	Integral time of cold output	# # # # ↲	
@ ? T D 2 ↲	Derivative time of cold output	# # # # ↲	
@ ? D B _ ↲	Dead band of hot/cold algorithm	# # # # ↲	
@ ? T C 2 ↲	Cycle time of cold output	# # # # ↲	
@ ? Y H 2 ↲	Maximum value of cold output	# # # # ↲	
@ ? D Y _ ↲	Dead band of modulating output	# # # # ↲	[7]
@ ? T Y _ ↲	Total rotation time of mot. valve	# # # # ↲	[7]
@ ? A P L ↲	Approach low	# # # # ↲	
@ ? A P H ↲	Approach high	# # # # ↲	
@ ? S A 2 ↲	Set point of output Y2	# # # # ↲	
@ ? H Y 2 ↲	Hysteresis of output Y2	# # # # ↲	
@ ? S A 3 ↲	Set point of output Y3	# # # # ↲	
@ ? H Y 3 ↲	Hysteresis of output Y3	# # # # ↲	
@ ? M A X ↲	Maximum set point value	# # # # ↲	
@ ? M I N ↲	Minimum set point value	# # # # ↲	
@ ? I N S ↲	Input shift	# # # # ↲	
@ ? S L D ↲	Slope down	# # # # ↲	
@ ? S L U ↲	Slope up	# # # # ↲	
@ ? S D L ↲	Serial slope down	# # # # ↲	[10]
@ ? S U L ↲	Serial slope up	# # # # ↲	[10]
@ ? F I L ↲	Digital filter time constant	# # # # ↲	
@ ? C Y _ ↲	Cycle in progress	# # # # ↲	[4]
@ ? N C Y ↲	Number of program repetitions	# # # # ↲	[4]
@ ? P R _ ↲	Segment running	# # # # ↲	[4]
@ ? T I M ↲	Time left for segment	# # # # ↲	[4]
@ ? N P R ↲	Segments forming the program	# # # # ↲	[4]
@ ? n S P ↲	Set point of segment " n " (n=0..9)	# # # # ↲	[4]
@ ? n D U ↲	Time of segment " n "	# # # # ↲	[4]
@ ? n E R ↲	Error band of segment " n "	# # # # ↲	[4]
@ ? n Y 2 ↲	Status of Y2 and/or Y3 in segment " n "	# # # # ↲	[4]
@ ? F S P ↲	Set point of segment " F "	# # # # ↲	[4]
@ ? F D U ↲	Time of segment " F "	# # # # ↲	[4]
@ ? F E R ↲	Error band of segment " F "	# # # # ↲	[4]
@ ? F Y 2 ↲	Status of Y2 and/or Y3 in segment " F "	# # # # ↲	[4]
@ ? S L 1 ↲	Stored set point value 1	# # # # ↲	[6]
@ ? S L 2 ↲	Stored set point value 2	# # # # ↲	[6]
@ ? S L 3 ↲	Stored set point value 3	# # # # ↲	[6]
@ ? S L 4 ↲	Stored set point value 4	# # # # ↲	[6]

Message	Description	Answer	Notes
@ ? C N 1 ↵	First configuration code	# # # # ↵	
@ ? C N 2 ↵	Second configuration code	# # # # ↵	
@ ? D D C ↵	Position of decimal point	# # # # ↵	
@ ? R H C ↵	High-range configuration	# # # # ↵	
@ ? R L C ↵	Low-range configuration	# # # # ↵	
@ ? M O D ↵	Model identifier	X # _ _ ↵	
@ ? R E L ↵	Software release identifier	_ # # # ↵	
@ ? N E S ↵	Special software execution number	# # # # ↵	
@ ? U C F ↵	°C or °F selection	# # # # ↵	[11]

The acquisition times can be shortened by using the new table function. In fact, with a single special request, the controller answers with a set of parameters that are normally used by the supervisors.
These parameters are:

Message	Description	Answer	Notes
@ ? ? _ _ ↵	Value of variable X	# # # # ↵	[1]
	Working set point value	# # # # ↵	
	Value of Y1	# # # # ↵	
	Operating mode	# # # # ↵	[3]
	Alarm status	# # # # ↵	[2]
	Cycle in progress	# # # # ↵	[5]
	Segment running	# # # # ↵	[5]
	Time left	# # # # ↵	[5]
	Close table	E N D _ ↵	

The time interval between the answers is 2 ms at 4800 bauds.

Note 1. The answer string normally consists of four digits but if the value is outside the upper and lower scale limits, the string may contain a message in letters:

O V R R ↵	=	Over scale
U N D R ↵	=	Under scale

Note 2. The meaning of the data in the answer string is as followed:

0 0 0 0	=	Y2 and Y3 Off
0 0 0 1	=	Y3 On, Y2 Off
0 0 0 2	=	Y2 On, Y3 Off
0 0 0 3	=	Y2 and Y3 On

Note 3. When requested for the operating mode, the controller answers in clear mode and the meaning of the answer strings is as follows:

L O C _ ↵	=	Automatic local mode	
M A N _ ↵	=	Manual mode after LOC > MAN switch	
R E M _ ↵	=	Remote mode	
M A N R ↵	=	Manual mode after REM > MAN switch	
R U N _ ↵	=	Program running	[4]

• Note 3 • continued

H L D A ↵	=	Controller waiting in automatic mode	[4]
H L D M ↵	=	Controller waiting in manual mode	[4]
M A N S ↵	=	Manual mode with SCI enabled	
L O C S ↵	=	Auto local mode with SCI enabled	
R E M S ↵	=	Remote mode with SCI enabled	
M A N _ ↵	=	Manual mode with SCI disabled	
L O C _ ↵	=	Auto local mode with SCI disabled	
R E M _ ↵	=	Remote mode with SCI disabled	

Note 4. All these parameters are only available for the XS and XP models with the "programmed set point" option.

Note 5. If the program is in Hold mode (Wait), these parameters are omitted.

Note 6. The stored set points are not available if the "programmed set point" option is present.

Note 7. Not available on the XS model

Note 8. This parameter can be used for changing the speed of communication of the instrument. The number that can be set has the following meaning:

0	=	9600 bauds (Special execution)
1	=	4800 bauds
2	=	2400 bauds
3	=	1200 bauds
4	=	600 bauds

Note 9. This parameter can be used for enabling the parity check on the data in transit and selecting the type of protocol. The number that may be set has the following meaning:

0	=	No check	(None)	ASCON protocol
1	=	Odd	(Odd)	ASCON protocol
2	=	Even	(Even)	ASCON protocol
3	=	MODBUS protocol, 8 bit, no parity		(Special execution)
4	=	JBUS protocol, 8 bit, no parity		(Special execution)

Note 10. Special serial parameters only available in the XC series controller

Note 11. Select measurement unit (Special execution):

0	=	Degrees Centigrade (°C)
1	=	Degrees Fahrenheit

Note 12. This parameter can only be assigned with the controller in "Manual" mode. With controllers for servomotors, rotation can be controlled by means of the following commands:

@ ! Y _ _ 0 0 0 1 ↵	Open	**A K N _ ↵**
@ ! Y _ _ 0 0 0 0 ↵	Stop	**A K N _ ↵**
@ ! Y _ _ – 0 0 1 ↵	Close	**A K N _ ↵**

· COMMANDS ·

Message	Description	Answer	Notes
@ * A U T ↲	Assign automatic mode	A K N _ ↲	
@ * L O C ↲	Assign local mode	A K N _ ↲	
@ * M A N ↲	Assign manual mode	A K N _ ↲	
@ * R E M ↲	Assign remote mode	A K N _ ↲	
@ * R U N ↲	Run program	A K N _ ↲	[4]
@ * H L D ↲	Put program on hold	A K N _ ↲	[4]
@ * C N T ↲	Resume program from hold	A K N _ ↲	[4]
@ * N X T ↲	Move on to next segment	A K N _ ↲	[4]
@ * S P 1 ↲	Recall stored set point 1	A K N _ ↲	[6]
@ * S P 2 ↲	Recall stored set point 2	A K N _ ↲	[6]
@ * S P 3 ↲	Recall stored set point 3	A K N _ ↲	[6]
@ * S P 4 ↲	Recall stored set point 4	A K N _ ↲	[6]
@ % S _ _ ↲	Enable or disable SCI	A K N _ ↲	[10]
@ * * * * ↲	Reset instrument	None	

As an alternative to the " * " character, you can enter the " > " character to obtain the echo of the command instead of **AKN_**↲. as the answer. This alternative is not valid for the reset command.

· ASSIGNMENTS

Message	Description	Answer	Notes
@ ! W L _ # # # # ↲	Local set point	A K N _ ↲	
@ ! Y _ _ # # # # ↲	Percentage value of Y1	A K N _ ↲	[12]
@ ! A C C # # # # ↲	Number for access to groups of parameters	A K N _ ↲	
@ ! A T U # # # # ↲	Enable self-tuning	A K N _ ↲	
@ ! A D R # # # # ↲	S.C.I. instrument address	A K N _ ↲	
@ ! B D R # # # # ↲	S.C.I. baud rate.I.	A K N _ ↲	[8]
@ ! P A R # # # # ↲	S.C.I. parity	A K N _ ↲	[9]
@ ! H Y 1 # # # # ↲	Hysteresis of main output	A K N _ ↲	
@ ! P B 1 # # # # ↲	Proportional band	A K N _ ↲	
@ ! T I 1 # # # # ↲	Integral time	A K N _ ↲	
@ ! T D 1 # # # # ↲	Derivative time	A K N _ ↲	
@ ! T C 1 # # # # ↲	Cycle time	A K N _ ↲	
@ ! Y H 1 # # # # ↲	Maximum value of main output	A K N _ ↲	
@ ! F F _ # # # # ↲	Feed forward	A K N _ ↲	
@ ! P B 2 # # # # ↲	Proportional band of cold output	A K N _ ↲	
@ ! T I 2 # # # # ↲	Integral time of cold output	A K N _ ↲	
@ ! T D 2 # # # # ↲	Derivative time of cold output	A K N _ ↲	
@ ! D B _ # # # # ↲	Dead band of hot/cold algorithm	A K N _ ↲	
@ ! T C 2 # # # # ↲	Cycle time of cold output	A K N _ ↲	
@ ! Y H 2 # # # # ↲	Maximum value of cold output	A K N _ ↲	

• Assignments • continued

Message	Description	Answer	Notes
@ ! D Y _ # # # # ↲	Dead band of modulating output	A K N _ ↲	[7]
@ ! T Y _ # # # # ↲	Total rotation time of mot. valve	A K N _ ↲	[7]
@ ! A P L # # # # ↲	Approach low	A K N _ ↲	
@ ! A P H # # # # ↲	Approach high	A K N _ ↲	
@ ! S A 2 # # # # ↲	Set point of output Y2	A K N _ ↲	
@ ! H Y 2 # # # # ↲	Hysteresis of output Y2	A K N _ ↲	
@ ! S A 3 # # # # ↲	Set point of output Y3	A K N _ ↲	
@ ! H Y 3 # # # # ↲	Hysteresis of output Y3	A K N _ ↲	
@ ! M A X # # # # ↲	Maximum set point value	A K N _ ↲	
@ ! M I N # # # # ↲	Minimum set point value	A K N _ ↲	
@ ! I N S # # # # ↲	Input shift	A K N _ ↲	
@ ! S L D # # # # ↲	Slope down	A K N _ ↲	
@ ! S L U # # # # ↲	Slope up	A K N _ ↲	
@ ! S D L # # # # ↲	Serial slope down	A K N _ ↲	[10]
@ ! S U L # # # # ↲	Serial slope up	A K N _ ↲	[10]
@ ! F I L # # # # ↲	Digital filter time constant	A K N _ ↲	
@ ! N C Y # # # # ↲	Number of program repetitions	A K N _ ↲	[4]
@ ! N P R # # # # ↲	Segments forming the program	A K N _ ↲	[4]
@ ! n S P # # # # ↲	Set point of segment " n " (n = 0...9)	A K N _ ↲	[4]
@ ! n D U # # # # ↲	Time of segment " n "	A K N _ ↲	[4]
@ ! n E R # # # # ↲	Error band of segment " n "	A K N _ ↲	[4]
@ ! n Y 2 # # # # ↲	Status of Y2 and/or Y3 in segment " n "	A K N _ ↲	[4]
@ ! F S P # # # # ↲	Set point of segment " F "	A K N _ ↲	[4]
@ ! F D U # # # # ↲	Time of seg" F "	A K N _ ↲	[4]
@ ! F E R # # # # ↲	Error band of segment " F "	A K N _ ↲	[4]
@ ! F Y 2 # # # # ↲	Status of Y2 and/or Y3 in segment " F "	A K N _ ↲	[4]
@ ! S L 1 # # # # ↲	Stored set point value 1	A K N _ ↲	[6]
@ ! S L 2 # # # # ↲	Stored set point value 2	A K N _ ↲	[6]
@ ! S L 3 # # # # ↲	Stored set point value 3	A K N _ ↲	[6]
@ ! S L 4 # # # # ↲	Stored set point value 4	A K N _ ↲	[6]
@ ! C N 1 # # # # ↲	First configuration code	A K N _ ↲	
@ ! C N 2 # # # # ↲	Second configuration code	A K N _ ↲	
@ ! D D C # # # # ↲	Position of decimal point	A K N _ ↲	
@ ! R H C # # # # ↲	High-range configuration	A K N _ ↲	
@ ! R L C # # # # ↲	Low-range configuration	A K N _ ↲	
@ ! U C F # # # # ↲	°C or °F selection	A K N _ ↲	[11]

WARNING!

It may happen that the controller sends the **BUSY**↲ code in response to any request or assignment attempt. This is due to a momentary overload of functions that the controller is to carry out at the same time, in that case just repeat the request or assignment to be carried out. If you try to force the instrument into an operating mode that is already active or you recall a function that is disabled or not present, it answers with the **NOP_**↲ string (Not operating). In this series of instruments, the SCI parameter can be used to disable the assignment mode so the controller will only answer requests. If you try to assign a parameter with the SCI disabled, the controller answers with the code **OFFL**↲. The answer "**OFFL**" may be received at different times according to the mode used for assignment. If a parameter is assigned with the two string method, the controller sends **OFFL**↲ immediately after receiving the first string without waiting for the second containing the value to be assigned. If a parameter is assigned with a single string, the controller sends **OFFL**↲ immediately after it has received the entire message of 10 characters.

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