ASCON TECNOLOGIC

gammadue® and deltadue® controller series
Serial communications and configuration software

S E R I E S

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV = ISO 9001 =

USER GUIDE

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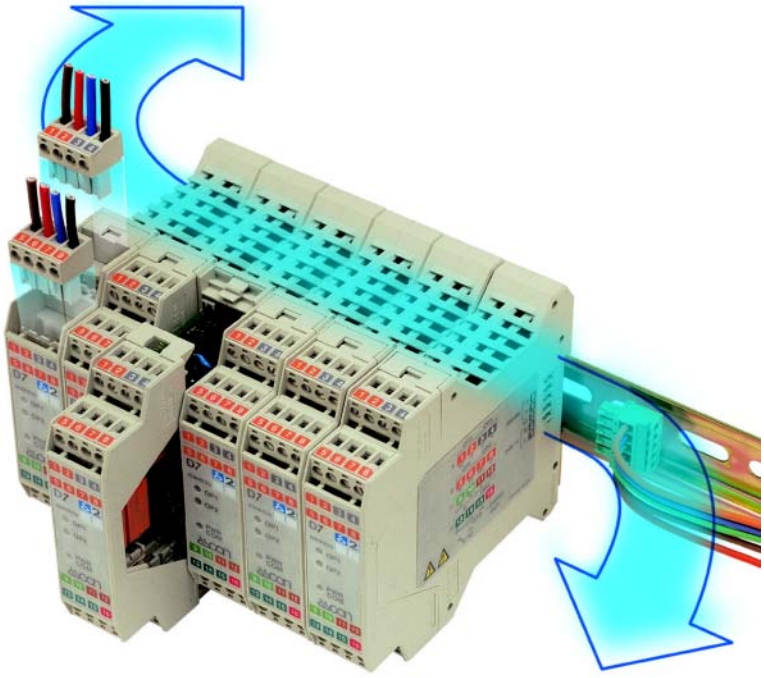
S E R I E S



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Chapter 1
Modbus protocol

The Modbus protocol defines the format and method of communications between a “master” which controls the system and one or more “slaves” which respond to commands sent by the master. Modbus defines how the transmitter and reciever are identified, how messages are exchanged and how errors are detected.
There may be one master and up to 247 slaves on a common line; this is the protocol’s logical limit, the physical interface may limit the number of devices further, for example, the standard RS485 interface handles a maximum of 31 slaves connected to a single line. Substituting the last device on the line with a proper “repeater” or “bridge”, further 31 instruments can be added to the line up to the above mentioned limit (247).
All transactions are started by the master. A transaction may be a direct question/ reply to a single slave or broadcast in which the message is sent to all the devices on the line and no answer is given. A transaction consists of a single question/ reply frame or a single broadcast message/no answer frame.
Some of the protocol characteristics are not defined. These are: standard interface, baud rate parity, number of bits and the RTU (binary) format.
Exists also an ASCII format, but only the RTU one is implemented on ASCON instruments as it is more efficient. The Jbus protocol is functionally identical to Modbus from which differs in how the addresses are numbered: in ModbuS numbering starts from zero (0000 = 1st address), while in Jbus from one (0001 = 1st address). From here on, unless explicitly specified, even though reference is made to Modbus, the description is valid for both.

Chapter 2
Message format

For communication to take place between the two devices, the message must be inserted in a "packet". The packet leaves the transmitter through a "port" and is "carried" along the line to a similar "port" on the receiver. MODBUS establishes the format of this packet which includes, for both master and slave:
The address of the device with which the master has established the connection (address 0 corresponds to a broadcast message sent to all slave devices).
The function code that is to be or has been performed.

- The data to be exchanged.
- The error check based on the CRC16 algorithm.

If a device detects an error in the message received (in the format, parity or CRC16) the message is considered invalid and rejected, a slave that detects an error in the message will therefore not take any action or answer the question, such as when the address does not correspond to a device on the line.

2-1 Characters Format

The above mentioned “packet” is referred to the transmitted character from the PC or Supervisor.In this case this character cannot be modified because they are set by Ascon. The default value is 8, N, 1. It means 8 data bits wit no parity check and 1 stop bit.

2-2 Address

As mentioned above, MODBUS transactions always involve the master, which manages the line, and a slave at a time (except for broadcast messages). To identify the user to whom the message is sent, the first character is a byte containing the numeric address of the selected slave device. To each of the slaves will therefore be assigned a different address that identifies it uniquely. Valid addresses range from 1 to 247, while address 0, which cannot be assigned to a slave, inserted at the beginningt of a message sent by the master indicates that it is a "broadcast message" sent to all the slaves at the same time. Broadcast messages are exclusively those that do not require an answer to carry out their function, i.e. assignments only.

2-3 The Function Code

The second character of each message identifies the action/function that the master orders to perform; the slave answers by sending back the same code to indicate that the function has been performed. On ASCON instruments, a subset of the MODBUS functions has been implemented as follows:

01 Read Coil Status;
02 Read Input Status;
03 Read Holding Registers;
04 Read Input registers;
05 Force Single Coil;
06 Preset Single register;
07 Read Status;
15 Force multiple Coils;
16 Preset Multiple Registers.

In the implementation for ASCON instruments, functions 01 and 02 are functionally identical and interchangeable, as are functions 03 and 04. For a full and detailed description of the functions, see chapter 3.

2-4 The CRC16 Algorithm

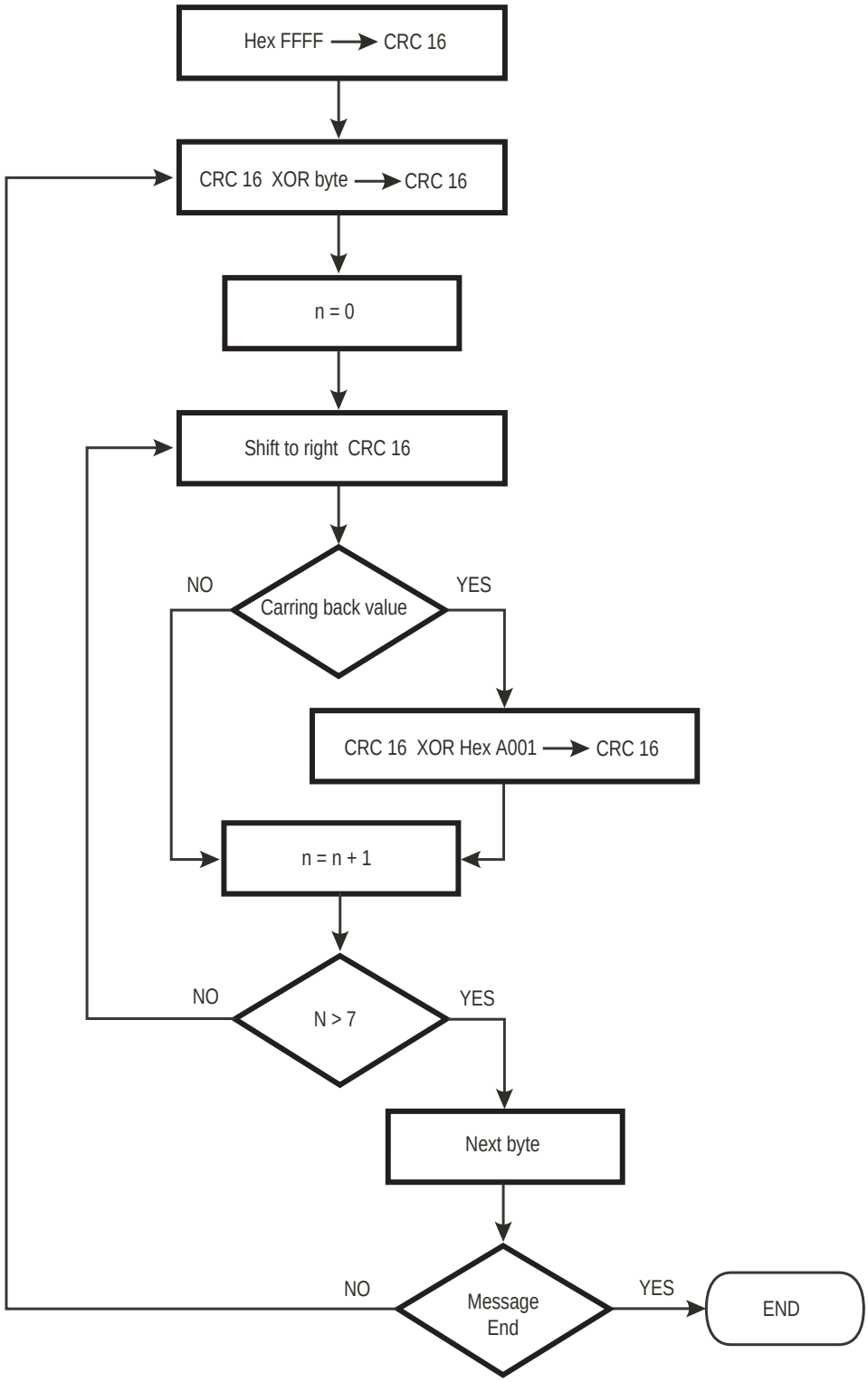
The last two characters of the message contain the Cyclic Redundancy Check based on the CRC16 algorithm. To calculate these two characters, the message (address, function code and data without the start, stop and parity bits) is considered as a single continuous binary number whose most significant bit (MSB) is sent first. The message is first multiplied by x^{16} (shifted to the left by 16 bits) and then divided by $2^{16}+2^{15}+2^{2}+1$ expressed as a binary number (1100000000000101). The integer part of the quotient is then rejected and the 16 bit remainder (initialised at FFFFh at the start to avoid messages consisting exclusively of zeros) is added on to the end of the message sent. The resulting message, when divided by the same polynomial ($2^{16}+2^{15}+2^{2}+1$) by the receiving device must give zero as a remainder if no errors occurred (the receiving device recalculates the CRC).

In reality, as the device that converts the data to be sent into serial form (UART) sends the least significant bit (LSB) first instead of the MSB as it should do for the CRC calculation, the CRC is carried out by inverting the polynomial. In addition, as the MSB of the polynomial only affects the quotient and not the remainder, the remainder is eliminated, thus giving 1010000000000001.

The step by step procedure for the CRC16 calculation is:

1) Load a 16-bit register with FFFFh (all bits set to 1).
2) Execute the exclusive OR of the first character with the high order byte in the register and place the result in the register.
3) Shift the register to the right by one bit.
4) If the bit that left the register on the right (flag) is a 1, execute the exclusive OR of the polynomial 1010000000000001 with the register.
5) Repeat steps 3 and 4 eight times.
6) Execute the exclusive OR of the next character with the high order byte in the register and place the result in the register.
7) Repeat steps 3 to 6 for all the characters in the message.
8) The contents of the 16 bit register are the CRC code that is to be added to the message.

2-4-1 CRC 16 Flow Chart



2-4-2 Visual Basic Calculate CRC16 example

```
Function CRC16(Stringa As String) As String

  Dim N As Integer, i As Integer, NByte As Integer
  Dim CRC As Long, a As Byte
  Dim Buffer As String

  NByte = Len(String)
  CRC = 65535

For i = 1 To NByte
    a = Asc(Mid$(String, i, 1)) 'C(I)
    CRC = (CRC Xor a) And &HFFFF

    For N = 0 To 7

      If CRC And 1 Then
        CRC = (CRC \ 2)
        CRC = (CRC Xor 40961)
      Else
        CRC = CRC \ 2
      End If

    Next

Next

Buffer = Right$("0000" + Hex$(CRC And &HFFFF), 4)
CRC16 = Chr$("&H" + Right$(Buffer, 2)) + Chr$("&H" + Left$(Buffer, 2))

End Function
```

2-5 Message Synchronisation

Message synchronisation between transmitter and receiver is obtained by inserting, between two messages, a pause of at least 3.5 times the time of a single character. If the receiving device does not receive for the time required for 3.5 characters, it considers the previous message completed and concludes that the next byte received will be the first of a new message and, consequently, an address.

Chapter 3
The Modbus functions

This section provides a detailed description of the MODBUS functions implemented on ASCON instruments.

3-1 Read Output Status (01)

This function is used for requesting the ON/OFF status of binary logical variables. Broadcast mode is not allowed.

Question In addition to the slave address and the function code (01), the message contains the starting address expressed in two bytes and the number of bits to be read, also occupying two bytes. Address numbering starts from zero (bit1 = 0) for MODBUS, or one (bit1 = 1) for JBUS

Example: Request for slave 17 to read bits 0004 to 0015.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
11	01	00	03	00	0C	CE	9F

Answer In addition to the slave address and the function code (01), the message includes a character containing the number of data bytes and the characters containing data. Data are compacted in one byte containing the status of 8 bits, the least significant bit of the first byte must contain the bit corresponding to the starting address and so on. If the number of bits to be read is not a multiple of 8, the last character must be completed with zeros in the most significant bits.

Example: Answer to the request indicated above.

ADDR	FUNC	DATA Byte Count	DATA bit 04...11	DATA bit 12...15	CRC HI	CRC LO
11	01	02	CD	0B	6D	68

3-2 Read Input Status (02)

This function works in exactly as the previous one.

3-3 Read Output Registers (03)

This function is used to request the value of the 16-bit registers (word) containing numeric variables. Broadcast mode is not allowed.

Question In addition to the slave address and the function code (03), the message contains the starting address expressed in two bytes and the number of words to be read, also occupying two bytes. The maximum number of words that can be read is 100. Address numbering starts from zero (word1 = 0) for MODBUS, or one (word1 = 1) for JBUS.

Example: Request for slave 25 to read registers 069 to 0071.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA word # HI	DATA word # LO	CRC HI	CRC LO
19	03	00	44	00	03	46	06

Answer In addition to the slave address and the function code (03), the message contains a character containing the number of data bytes and the characters containing data. The registers require two bytes each, the first of which contains the most significant byte.

Example: Answer to the request indicated above.

ADDR	FUNC	DATA Byte Count	DATA word 69 HI	DATA word 69 LO	DATA word 70 HI	DATA word 70 LO	DATA word 71 HI	DATA word 71 LO	CRC HI	CRC LO
19	03	06	02	2B	00	00	00	64	AF	7A

3-4 Read Input Registers (04)

This function works exactly as the previous one.

3-5 Force Single Coil (05)

This function is used to force to ON or OFF the status of a single binary variable. Broadcast mode is allowed.

Question In addition to the slave address and the function code (05), the message contains the address (2 bytes) of the changing variable and two characters the first of which is set to FFh (255) to force it ON and 00h to force it OFF, while the second is always set to zero. Address numbering starts from zero (bit1 = 0) in MODBUS and from one (bit1 = 1) in JBUS.

Example: Request to force bit 4 on slave 47 ON.

ADDR	FUNC	DATA bit # HI	DATA bit # LO	DATA ON/ OFF	DATA (zero)	CRC HI	CRC LO
2F	05	00	03	FF	00	7A	74

Answer The answer consists in retransmitting the message received after changing the variable status.

Example: Answer to request mentioned above.

ADDR	FUNC	DATA bit # HI	DATA bit # LO	DATA ON/OFF	DATA (zero)	CRC HI	CRC LO
2F	05	00	03	FF	00	7A	74

3-6 Preset Single Register (06)

This function is used to set the value of a single 16-bit register. Broadcast mode is allowed.

Question In addition to the slave address and the function code (06), the message contains the 2 bytes address of the changing variable and the value to be assigned. Address numbering starts from zero (word1 = 0) in MODBUS, from one (word1 = 1) in JBUS.

Example: Request to force address 26 (19h in MODBUS) of slave 38 (26h) to 926 (39Eh).

ADDR	FUNC	DATA bit # HI	DATA bit # LO	DATA WORD HI	DATA WORD LO	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07

Answer The answer consists in retransmitting the message received after changing the variable value.

Example: Answer to request indicated above.

ADDR	FUNC	DATA bit # HI	DATA bit # LO	DATA WORD HI	DATA WORD LO	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07

3-7 Read Status (07)

This function is used for reading the status of eight predetermined bits with a short message. Broadcast mode is not allowed.

Question The message consists only of the slave address and the function code (07).

Example: Request of the status of slave 25 (19h).

ADDR	FUNC	CRC HI	CRC LO
19	07	4B	E2

Answer In addition to the slave address and the function code (07), the message includes a character containing the status bits.

Example: Answer to the request indicated above.

ADDR	FUNC	DATA status byte	CRC HI	CRC LO
19	07	6D	63	DA

3-8 Force Multiple Coils (15)

This function is used to force the status of each binary variable in a consecutive block. Broadcast mode is allowed.

Question In addition to the slave address and the function code (15), the message contains the two bytes start address, the number of bits to be written, the number of bytes containing the data and the data characters. The data are compacted, so one byte contains the status of 8 bits, the least significant bit of the first byte must contain the bit corresponding to the starting address and so on. If the number of bits to be written is not a multiple of 8, the last character must be completed with zeros in the most significant bits. Address numbering starts from zero (bit1 = 0) for MODBUS, from one (bit1 = 1) for JBUS.

Example: Request to force 4 bits starting from address 1 on slave 12. Bits 1 and 4 forced to "1" and the others to "0".

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	DATA Byte Count	DATA bit 1...4	CRC HI	CRC LO
0C	0F	00	00	00	04	01	09	3F	09

Answer In addition to the slave address and the function code (15), the message contains the starting address and the number of bits that are to be written.

Example: Answer to request indicated above.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
0C	0F	00	00	00	04	55	15

3-9 Preset Multiple Registers (16)

This function is used for setting the value of a consecutive block of 16-bit registers. Broadcast mode is allowed.

Question In addition to the slave address and the function code (16), the message contains the start address, the number of words to be written, the number of bytes that contain data and the data characters. Address numbering starts from zero (word1 = 0) for MODBUS, from one (word1 = 1) for JBUS.

Note: In ASCON implementation, this function is present for compatibility but does not permit more than 8 word to be assigned.
Example: Request to set 1 word to value 268 at address 35 on slave 17.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA word # HI	DATA word # LO	DATA Byte Count	DATA word 35 HI	DATA word 35 LO	CRC HI	CRC LO
11	10	00	22	00	01	02	01	0C	6C	87

Answer In addition to the slave address and the function code (16), the message contains the start address and the number of written words.

Example: Answer to the request indicated above.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA word # HI	DATA word # LO	CRC HI	CRC LO
11	10	00	22	00	01	A3	53

Chapter 4
Error Management

In MODBUS there are two types of errors, handled in different ways: transmission errors and operating errors. Transmission errors are errors that change the format of the message, the parity (if used) or the CRC16. A device that detects errors of this type in the message treats it as invalid and gives no answer. When the format of the message is correct but the function requested cannot be executed for some reason, an operating error has occurred. When a slave device detects this kind of error, it answers by sending back an error message. This message consists of the address, the code of the requested function, an error code and the CRC. To indicate that the answer is an error message, the function code is returned with the most significant bit set to "1".

Example: Request for slave 10 to read bit 1185.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
0A	01	04	A1	00	01	AC	63

Answer The request is for the contents of bit 1185, which is not present on the slave. The slave answers by sending error code "02" (ILLEGAL DATA ADDRESS) and returns the function code 81h (129).

Example: Error code in response to the request indicated above.

ADDR	FUNC	DATA Except. Code	CRC HI	CRC LO
0A	81	02	B0	53

4-1 Error Codes

Although the MODBUS standard uses 8 error codes, the ASCON implementation of the protocol uses only four:

Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received does not correspond to a function allowed on the addressed slave.
02	ILLEGAL DATA ADDRESS	The address to which the data field refers is not an address allowed on the addressed slave.
03	ILLEGAL DATA VALUE	The value to be assigned, specified in the data field, is not allowed for this address.
07	NAK – NEGATIVE ACKNOWLEDGEMENT	The function cannot be performed under the current operating conditions or an attempt has been made to write in a read-only address.

Chapter 5
Modbus on ASCON'S γ2 and δ2 instruments

5-1 Serial communications parameters

The parameters are shown in the table below:

Parameter	Parameter code	Set up range
Communications protocol	Prot	Mbus /Jbus
Serial address	Addr	1... 247
Baud rate	baudr	1200, 2400, 4800, 9600, 19200

The protocol is chosen through the Mbus/Jbus selection. The address can be set between 1 and 247 and must be unique for each instrument connected on the same line. The Baud rate parameter enable a clear and simple communications speed setting. Parity and stop bit must be set as they have already been set by the manufacturer as follows:

Parity = none;
Stop bit = 1.

5-2 Communications timining

All the messages, as described in Chapter 2.4, must be exchanged with an internal pause that is less than 3.5 times the time required for a character to be exchanged, otherwise it would be interpreted as the end of the message. The ASCON instruments with the ModbuS protocol are able to receive and transmit characters without an interval. Between a master message and the following reply, on the part of the instrument there is a latency time necessary for the completion of the function. This is due to the fact that, once a command has been received, the instrument responds only after having completed the requested function. To evaluate the latency time for the various functions the following expressions can be used:

Request: $T_L > 3T_C + T_S$

Where:
T_L = Elapsed time.
T_C = Time of a character.
T_S = Variable time from 0 to 10ms that depends to the internal processes.

Assignment: $T_L > 3T_C + T_S + T_W$

Where:
- T_L = Elapsed time.
- T_C = Character's time.
- T_S = Variable time from 0 to 10ms that depends to the internal processes.
- T_W = Multiple time of 25ms that depends to the number of bytes to be written. For assignment of words, this time can be 0, 25 or 50 ms depending on whether both one or none of the two bytes is equal to the preceding value; for the assignment of bit T_W, it can be a value from 0 to 100ms.

5-3 Data Base

The ASCON instrument variables available for serial communications through the Modbus protocol (except those of the J1, J3 and J5 instruments) are contained in two distinct sections: the bit zone and the word zone.

5-3-1 Bit Zone

The bit zone is made up of 16 addressable bits containing information on the functioning status of the instruments. With some instruments, certain bits are not used; the status request for these bits with the 01 and 02 functions is permitted but returns a fixed value of 0; these bits are indicated in the tables by the presence of an hyphen "-". The assignment of the bit status with the 05 and 15 functions is only allowed on addresses in which this is possible, which condition is indicated by "R/W".

5-3-2 Word Zone

The word zone is made up of 128 addressable words (202 for the M5 serie) that contain control variables and the instrument parameters. With some instruments certain words are not used; the request for the values of these words with the 03 and 04 functions is permitted but returns a fixed value of 0; these words are indicated in the table by the presence of a hyphen "-". The assignment of the word value with the 06 and 16 functions is only allowed on addresses in which this is possible, which condition is indicated by "R/W".

The variables and parameters are coded as integer numbers with a plus or minus sign (two's complement notation) without taking into account the decimal point in the representation (for example: the Proportional Band displayed on the screen with a decimal digit "25.0" is transmitted as 250). Assignment is only allowed within the values assigned to each parameter, any attempt to assign a value outside of those permitted within the field, will cause the instrument to respond with an error message and a an exception code equal to 3, and the assignment will not be carried out.

5-3-3 Reading and writing the SetPoint

In all the gammadue and deltadue instrument, the SetPoint can be read at address Jbus = 2 (Modbus = 1), while can be written at Jbus = 4 (Modbus = 3).

Some instruments (C1, M1, M2, M3, M4, X1, X3, Q1, Q3 e D1, D2, D3, D7, D9) loose the Jbus = 4 (Modbus = 3) value at power OFF. At power ON the instrument takes as SetPoint the value written at Jbus = 5 (Modbus = 4).

At address Jbus = 4 (Modbus = 3) is possible to write repeatedly, while at address Jbus = 5 (Modbus = 4)(normally on E^2PROM) is better to limit the number of writing processes.

When active slopes are applied to the SetPoint, the value present at address Jbus 2 (Modbus = 1) will be different from the one at address Jbus = 4 (Modbus = 3) until the ramp up/down set by the slopes has been completed.

The same considerations can be applied to D7 and D9 modules for the "**Reference value**". The addresses of the second loop of D2 and D9 modules must be incremented by 30 units.

5-3-4 Parameters assignment and E^{2}PROM

All the parameters modified from keyboard or assigned through serial communication, come written in a permanent way in the EEPROM of the instruments. As it is well known, these components have limited writing cycles beyond which the component could be damaged. In our case the number of writing cycles is about 10000 and also if this number could appear limited, must pointed out that the writings during the life of the instrument don't overcome the thousand of cycles. Different thing is when we talk about the serial communications. In fact the computer could assign to the regulators any parameter with any frequency.

Being well aware of this fact, Ascon has provided to protect the component in matter according to different hardware formality and resources of the instruments. A protection consists in comparing the new given with the datum already resident. If the two data correspond, no writing happens as it is not necessary and the new given comes writing only and entirely if the two data disagree.

Normally the mostly written datum is the Setpoint value. As the C1, M1, and M3 instruments have no NOVRAM or buffered RAM, two Setpoint assignment methods are given:

1. Assignment to Jbus address 4 (Modbus 3);
2. Assignment to Jbus address 5 (Modbus 4).

Using the first method, the Setpoint can be assigned endless times because is stored in the microprocessor's RAM; pay attention to the fact that when the regulator is turned off the datum is lost and, when powered on again, it will assume the last value written to the Jbus address 5, locally with the keyboard or using the serial communications. Using the second method the datum is permanently written in the EEPROM of the instrument and the writing must be limited to a real necessity.

The M5, X1, X3, X5, X7, Q1, Q3 and Q5 series have a different hardware structure with a NOVRAM or a buffered RAM installed, they are not subdued to the limits previously exposed and assigning the Setpoint to the Jbus addresses 2 or 5 involve no differences. Both addresses are maintained active only for compatibility with the other series.

Chapter 6
Electrical connections

6-1 General Description

All the gammadue® may be fitted with a two wire (half duplex) RS485 serial communications option. The deltadue® modules are always fitted with RS485 serial communications. This type of port makes the wiring simpler and enables a larger connection length (maximum 1200 m).
The gammadue ® C1, M1, M3 and M4 instruments have neither line termination nor polarization system. If necessary a termination resistance (120Ω ¼ W) must be connected to the terminals of the last instrument of the line. The polarization on the gammadue ® C1, M1, M3 and M4 instruments is not possible.
The gammadue ® M5, X1/Q1, X3/Q3 and X5/Q instruments have the line termination or polarization system. Please refer to the specific chapter of these instruments.
The deltadue® modules are supplied with termination kits, please refer to the user manual of the modules.

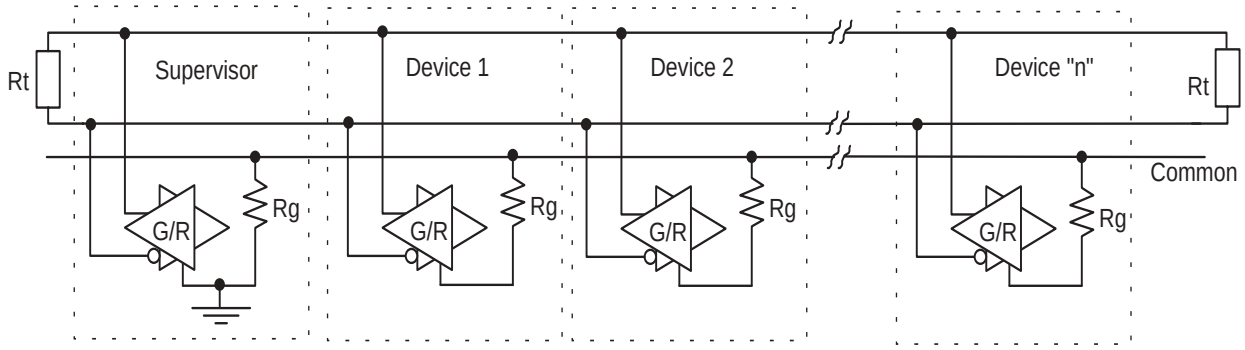
6-2 Communication Cable Laying Recommendations

In order to minimise interference caused by the external environment to serial communication, and thus obtain maximum efficiency between the supervisor and the instruments, a few essential technical precautions must be taken.
The most important and easiest to implement of all is to separate the power or power supply lines from the communication lines and lay them as far as possible from remote-controlled switches, electromagnets, powerful motors, etc. The same rule applies to the control panel in that it is pointless to cable the control panel perfectly and then haphazardly "throw" the cables into the channel or vice versa. If the communication cables are extended to another control panel or other equipment, leave a space in the terminal board, insulated from all the other cables (normally towards the sides).
The type of cable used is of fundamental importance for the functioning of the entire system. The most important condition to be respected is the cable's capacity per meter (pF/m). The lower the capacity of the cable is the longer the line can be. Consequently, power cables, shielded coaxial cables and general channel cables are to be avoided under all circumstances because they have an extremely high capacity per meter. In addition, to ensure high interference rejection, the cables must be twisted and preferably provided with a metal shield to be connected to an efficient ground socket (on one side only).

Two examples of cables with suitable characteristics produced by Belden are indicated below:
A) Belden Code 9729 Z = 100Ω pF/m = 41;
B) Belden Code 9502 Z = 150Ω pF/m = 98.
Only respecting these simple but effective precautions, the user can lay a 1200m length line and use it at the maximum allowed baud rate.

6-3 Instruments with an RS-485 interface (2 wires)

The line requires a twisted cable with a characteristic impedance of about 120Ω.
Normally this type of connection uses a standard 4-wire communication interface. The transmission and reception signals for the computer and the communicating device (Tx+Rx+ and Tx-Rx-) can be connected each other, resulting in a half duplex connection RTx+ and RTx-.
The communication port cannot work with this type of connection, as every time the supervisor transmits a message, the message itself arrives on the receiving port before awaiting the reply from the other devices. To prevent this kind problem, the supervisor uses the RTS (Request To Send) command. Before beginning a transmission, the supervisor “raises” the status of its RTS signal to inhibit its receiver. When the transmission ends, the supervisor brings the RTS signal back to “zero” to re-enable its receiver. In the same way, the devices connected to the supervisor must be able to manage the direction of the message that is flowing, otherwise the communication will fail. ASCON controllers include this ability in their software.
There are commercially available interfaces for handling the RTS signal at hardware level, so that it is completely transparent and not required by the communications software.
It is strongly recommended that the two ends of the link between the various devices is correctly terminated, as shown in the following drawing.



G = Transmitter;
R = Receiver;
G/R = Bi-directional (Receiver/Transmitter) buffer;
Rt = Termination resistance: the transmitter can drives up to 32 receivers plus two 120Ω resistors;
Rg = 100Ω Resistor.
From the above drawing it may be seen that a “star” connection is not valid. Each branch would have to be terminated, which in turn would reduce the overall the impedance of the line. In these conditions, the signal level would be too low for reliable communications.

6-3-1 References

GOULD Gould Modbus Protocol Reference Guide (PI-MBUS-300 Rev. B);

APRIL Jbus Specification;
GLOBAL ENG. DOC. EIA STANARD RS-485.

6-4 Controllers with ProfiBus DP interface

The M5, X5 and Q5 may be fitted with a ProfiBus DP slave EN 50 170 (DIN 19245 Part3) interface.
Profibus-DP (Process Field Bus Protocol) is an industrial standard used to connect periferals to an industrial machine or to a plant.
This ASCON interface offers some impovements:

1. Communications speed up to 12Mb/s with electrial isolation;
2. User configuration of the data package through the Controller Explorer software.

6-5 Profibus DP technical specifications

- Aynchronous transmission NRZ RS485;
- Selectable Baud Rate (9.6 kb/s...12 Mb/s divided into steps);
- Twinsted pair shielded cable;
- 32 stations per segment, max. 127 stations allowed;
- Maximum distance at 12 Mb/s: 100m;
- Using specific repeaters the maximum distance can be extended up to 10 km;
- Networlk type: Token passing multimaster.

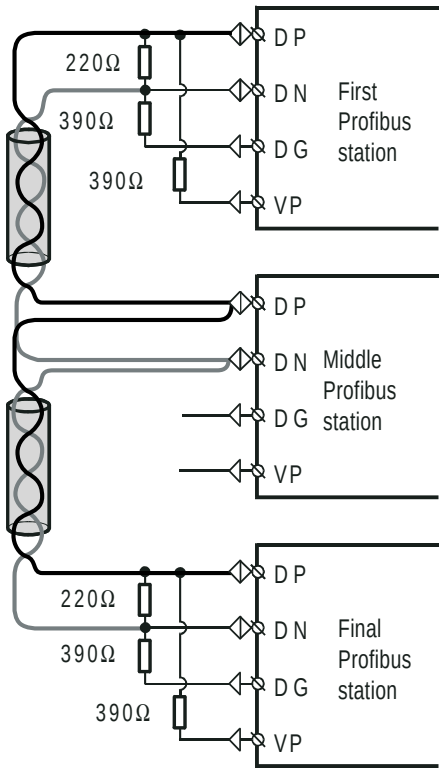
Baud Rate in kb/s	9.6	19.2	93.75	187.5	500	1500	12000
Cable length in m (cable type A)	1200	1200	1200	1000	400	200	100

6-6 Technical specification of the network cable

	Cable A specification	Cable B specification
Impededance	135... 165Ω , freq 3… 20Mhz	135… 165Ω , freq 3… 20Mhz
Capacitity	< 30pF/m	< 60pF/m
Diameter	Max 0.34mm2, AWG 22	Max 0.22mm2, AWG 24
D.C. Resistance	< 110Ω/km	< 110Ω/km
Shield	Yes	Yes

Detailed information on cables characteristics and cabling rules can be reached on the ProfiBus products guide or at the Internet addres:
http://www.profibus.com/online
Other useful information can be found in the Section FAQ (Frequently Asked Questions).

6-7 Electrical connections example



Chapter 7
C1/M1 Controllers

7-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0...2	1...3	-	-
3	4	Main output condition (0 = OFF, 1 = ON)	R
4	5	OP2 alarm status (0 = OFF, 1 = ON)	R
5	6	OP3 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	-	-
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10...15	11...16	-	-

7-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	-
2...3	2...3	-
4	4	Main output condition (0 = OFF, 1 = ON)
5	5	AL2 alarm status (0 = OFF, 1 = ON)
6	6	AL3 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

7-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	Process Variable (PV)	-	R
1	2	Setpoint (SP=)	-	R/W [1]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
2	3	Main control output (OP)	-	R
3	4	Target Setpoint (SPT)	-	R
4	5	Local Setpoint(SPL)	-	R/W [2]
5	6	Proportional band (Hysteresis ON - OFF)[3]	P.b. (hy.)	R/W
6	7	Overshoot Control	O.C.	R/W
7	8	Integral time	t. i.	R/W
8	9	Derivative time	t.d.	R/W
9	10	Output Cycle time	t.c.	R/W
10	11	Low range	Sc.Lo	R
11	12	High range	Sc.Hi	R
12	13	AL2 alarm threshold	A2S.P	R/W
13	14	AL3 alarm threshold	A3S.P	R/W
14	15	AL2 Alarm Hysteresis	A2hy	R/W
15	16	AL3 Alarm Hysteresis	A3hy	R/W
16... 28	17... 29	-	-	-
29	30	Setpoint low limit	S.P. L	R/W
30	31	Setpoint high limit	S.P. H	R/W
31	32	-	-	-
32	33	Main output high limit	OP. H	R/W
33	34	-	-	-
34	35	Slope up	S l. u	R/W
35	36	Slope down	S l. d	R/W
36	37	Input filter	t.F iL	R/W
37	38	Input shift	InSh	R/W
38	39	Auto-Tune enable (0=Stop; 1=Start)	tunE	R/W
39	40	Overshoot control advaced managenemt	OC.rb	-
40	41	Serial comm.s address	Addr	R/W
41	42	-	-	-
42	43	Retransmission low range	rt.Lo	R/W
43	44	Retransmission high range	rt.Hi	R/W
44...58	45...59	-	-	-
59	60	AL2 Latching/Blocking acknowlegment	A2. lb	R/W
60...99	61...100	-	-	-

7-4 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	-	-	-
101	102	Configuration code	ConF	R/W [4]
102	103	AL3 alarm configuration code (if enabled)	Con2	R/W [4]
103	104	Engineering units	un it	R/W [4/7]
104	105	Decimal point	Sc.d.d	R/W [4]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
105	106	Low range for engineering units	ScLo	R/W [4]
106	107	High range for engineering units	ScHi	R/W [4]
107	108	Communications protocol	Prot	R/W [8]
108	109	Baud rate	bAud	R/W [9]
109	110	Retransmitted range	rPtr	R/W [10]
110...111	111...112	-	-	-
112	113	Password	CodP	R/W
113	114	RTX low range calibration value (reserved)	CAL3	R/W
114	115	RTX high range calibration value (reserved)	CAL4	R/W
115...119	116...120	-	-	-
120	121	Factory code (600 = Ascon)	-	R(W) [5]
121	122	Product code ("**C1** " or "**M1** ") [6]	-	R
122	123	-	-	R
123	124	Software release code (e.g. " **00A**") [6]		R
124	125	-	-	R
125	126	Custom code		R
126...127	127...128	-	-	-

Notes:

1. Assignment of Setpoint to the address Jbus 2 writes the Computer Setpoint. It is different from the Local Setpoint, which can be in any case set by keypad.

2. Assignment of Setpoint to the address Jbus 5 writes the Local Setpoint (the previous value is lost).

3. In case of ON - OFF output (address Jbus 6) the proportional band is substituted by the output Hysteresis.

4. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.

5. Address Jbus 121 is read only, but if the code 55AAh (21930d) is written at this address, the configuration is brought into effect.

6. The Jbus 122 + 123 and 124 + 125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.

7. To select the engineering unit, the value between 0 and 10 must be assigned as shown in the following table:

Engineering units	Serial value
°C	0
°F	1
none	2
mV	3
V	4
mA	5
A	6
bar	7
PSI	8

Engineering units	Serial value
rH	9
Ph	10

8. To select the protocol type, the value between 0 and 1 must be assigned as shown in the following table:

Protocotocol type	Serial value
Modbus	0
Jbus	1

9. To select the serial comm.s baud rate, the value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

10. To select the retransmission signal type, the value between 0 and 1 must be assigned as shown in the following table:

Signal type	Serial value
0... 20 mA	0
4... 20 mA	1

7-5 Termination and Polarization

The gammadue ® C1 and M1 instruments do not have any line termination or polarization system. If necessary a termination resistance (120Ω ¼W) must be connected to the terminals of the last instrument of the line.
In any case the polarization is not possible.

Chapter 8
C1L/M4L limit switch function controllers

8-1 Bit zone

Address			
Modbus	**JbuS**	**Variable**	**Type**
0...3	1...4	-	-
4	5	AL2 alarm status (0 = OFF, 1 = ON)	R
5	6	AL3 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7...8	8...9	-	-
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10	11	-	-
11	12	IL1 Digital input status (0 = OFF, 1 = ON)(M4L only)	R
12...15	13...16	-	-

8-2 Read status

Function 07 (Read Status) returns an eight bit status with the following

Bit	Address	Variable
1 (LSB)	1	-
2	2	-
3	3	-
4	4	-
5	5	AL1 alarm status (0 = OFF, 1 = ON)
6	6	AL2 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	-

8-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	PV process variable	-	R
1	2	Selected threshold value	-	R

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
2	3	Limiter status	-	R
3...11	4...13	-	-	-
12	13	AL1 alarm threshold	AL1.P	R/W
13	14	AL2 alarm threshold	AL2.P	R/W
14	15	AL1 Alarm Hysteresis	AL1HY	R/W
15	16	AL2 Alarm Hysteresis	AL2HY	R/W
16... 28	17... 29	-	-	-
29	30	Low PV value in alarm condition	-	R
30	31	High PV value in alarm condition	-	R
31...35	32...36	-	-	-
36	37	Input filter	inFL	R/W
37	38	Input shift	InSh	R/W
38...39	39...40	-	-	-
40	41	Serial comm.s address	Addr	R/W
41...58	42...59	-	-	-
59	60	AL2 latching and blocking functions at Power ON	AL2L	R/W
60…99	61...100	-	-	-

8-4 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	-	-	-
101	102	1st Configuration code	ConF	R/W[1]
102	103	2nd Configuration code	Con2	R/W[1]
103	104	Engineering units	unit	R/W[1, 2]
104	105	Decimal point	Sc.dd	R/W[1]
105	106	Low range for engineering units	Sc.Lo	R/W[1]
106	107	High range for engineering units	Sc.Hi	R/W[1]
107	108	Communications protocol	Prot	R/W[2]
108	109	Baud rate	bAud	R/W[3]
109...111	110...112	-	-	-
112	113	Password	CodE	R/W
113...119	114...120	-	-	-
120	121	Factory code (600 = Ascon)	-	R(W)[1]
121	122	Product code (“**C1** ”)	-	R
122	123		-	R
123	124	Software release code (e.g. “ **00A**”)	-	R
124	125		-	R
125...127	126...128	-	-	-

Notes: 1. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into

effect, the code 55AAh must be written at the address JbuS 121.
Address JbuS 121 is read only, but if the code 55AAh (21930d) is written at this address, the configuration is brought into effect.
The JbuS 122 + 123 and 124 + 125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.

2. To select the engineering unit, the value between 0 and 10 must be assigned as shown in the following table:

Engineering units	Serial value
°C	0
°F	1
none	2
mV	3
V	4
mA	5
A	6
bar	7
PSI	8
rH	9
Ph	10

3. To select the protocol type, the value between 0 and 1 must be assigned as shown in the following table:

Protocol type	Serial value
Modbus	0
JbuS	1

4. To select the serial comm.s baud rate, the value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

8-5 Termination and Polarization

These lines of instruments have no line termination or polarization system. If necessary a termination resistance (120Ω ¼W) must be connected to the terminals of the last instrument of the line.
In any case the polarization is not possible.

Chapter 9
M3 controller

9-1 Bit zone

Address		Variable	Type
Modbus	**JbuS**		
0	1	Timer function status (0 = OFF, 1 = Run) [1]	R/W
1...2	2...3	-	-
3	4	Main output condition (0 = OFF, 1 = ON)	R
4	5	AL2 alarm status (0 = OFF, 1 = ON)	R
5	6	AL3 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	-	-
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10	11	Keypad lock (0 = locked, 1 = unlocked)	R/W
11	12	Outputs lock (0 = active, 1 = disabled)	R/W
12...15	13...16	-	-

9-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	Timer function status (0 = OFF, 1 = Run) [1]
2-3	2-3	-
4	4	Main output condition (0 = OFF, 1 = ON)
5	5	AL2 alarm status (0 = OFF, 1 = ON)
6	6	AL3 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

Note: Only available with Timer option.

9-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	Process variable (PV)	-	R
1	2	SP Setpoint (SP)	-	R/W [1]
2	3	Main control output (OP)	-	R(W) [2]
3	4	Target Setpoint (SPT)	-	R [1]
4	5	Local Setpoint (SPL)	-	R/W [3]
5	6	Proportional band (Hysteresis ON - OFF)[4]	Pb. (HY.)	R/W
6	7	Overshoot control	OC.	R/W
7	8	Integral time	t.i.	R/W
8	9	Derivative time	t.d.	R/W
9	10	Output Cycle time	t.c.	R/W
10	11	Low range	Sc.Lo	R
11	12	High range	Sc.Hi	R
12	13	AL2 alarm threshold	AL2S.P	R/W
13	14	AL3 alarm threshold	AL3S.P	R/W
14	15	AL2 Alarm Hysteresis	AL2HY	R/W
15	16	AL3 Alarm Hysteresis	AL2HY	R/W
16	17	Relative Cold Gain	r.C.Ga	R/W
17	18	Cool output Hysteresis (ON-OFF only)	HY. C	R/W
18	19	-	-	-
19	20	Heat/Cool Dead band	db.nd	R/W
20	21	Cool cycle time	t.c. C	R/W
21	22	Cool output maximum value	OP.HC	R/W
22	23	Motor travel time	MU.tM	R/W
23	24	Minimum output step	MU.HY	R/W
24	25	Timer setting	t inE	R/W
25	26	Stand-by Setpoint	tM.S.P	R/W
26	27	Soft start output high limit	St.OP	R/W
27	28	Soft-start activation time	St.tM	R/W
28	29	-	-	-
29	30	Setpoint low limit	S.P. L	R/W
30	31	Setpoint high limit	S.P. H	R/W
31	32	PID Dead Band	d.Err	R/W
32	33	Main output high limit	OP. H	R/W
33	34	Output safety value	SA.OP	R/W
34	35	Slope up	S l. u	R/W
35	36	Slope down	S l. d	R/W
36	37	Input filter	t.F iL	R/W
37	38	Input shift	In.Sh	R/W
38	39	Start/Stop One shot tuning (0=Stop 1=Run)	tunE	R/W
39	40	-	-	-
40	41	Serial comm.s address	Addr	R/W
41	42	-	-	-
42	43	Retransmission low range	rt.Lo	R/W

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
43	44	Retransmission high range	rt.H i	R/W
44	45	Start-Up Setpoint	S.P.S.U	R/W
45	46	Start-Up Hold time	t.h.S.U	R/W
46	47	Output high limit during Start-up	OP.HS	R/W
47	48	Timer remaining time	tM.r.	R/W
48	49	Load current in ampere (CT option)	t.Cur	R
49...53	50...54	-	-	-
54	55	SP incremental value by IL	S.P. In	-
55	56	Proportional band calculated and used by Adaptive tune	P.b. A	-
56	57	Integral time calculated and used by Adaptive tune	t. i. A	-
57	58	Derivative time calculated and used by Adaptive tune	t.d. A	-
58...99	59...100	-	-	-

9-4 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	-	-	-
101	102	Configuration code	ConF	R/W [5]
102	103	AL3 alarm configuration code	Con2	R/W [5]
103	104	Engineering units	un it	R/W [5/]
104	105	Decimal point	Sc.d.d	R/W [5]
105	106	Low range for engineering units	Sc.Lo	R/W [5]
106	107	High range for engineering units	Sc.H i	R/W [5]
107	108	Communications protocol	Prot	R/W [9]
108	109	Baud rate	bAud	R/W [10]
109	110	Retransmitted range	rPtr	R/W [11]
110	111	Retransmitted signal selection	rtH	R/W [12]
111	112	Current transformer range	HtF.S	R/W
112	113	Password	CodE	R/W
113	114	RTX low range calibration value (reserved)	CAL.3	R/W
114	115	RTX high range calibration value (reserved	CAL.4	R/W
115	116	Timer/Start-up operating mode	t.Mod	R/W [13]
116	117	Timer action	t.Act	R/W [14]
117...119	118...120	-	-	-
120	121	Factory code (600 = Ascon)	-	R(W) [6]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
121	122	Product code (“**M3** ”)	-	R [7]
122	123		-	-
123	124	Software release code (e.g. “ **00A**”)	-	R [7]
124	125		-	-
125	126	Custom code	-	R
126...127	127...128	-	-	-

Notes:

1. Assignment of Setpoint to Jbus addresses 2 and 4 writes the Computer Setpoint. It is different from the Local Setpoint, which can be in any case set by keypad.
2. Assignment of output at the address Jbus 3 is only possible if the Auto/Man option if fitted and when the controller is in Manual mode.
3. Assignment of Setpoint to the address Jbus 5 writes the Local Setpoint (the previous value is lost).
4. In case of ON - OFF output (address Jbus 6) the proportional band is substituted by the output Hysteresis.
5. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.
6. Address Jbus 121 is read only, but if the code 55AAh (21930d) is written at this address, the configuration is brought into effect.
7. Jbus 122 + 123 and 124 + 125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.
8. To select the engineering unit, the value between 0 and 10 must be assigned as shown in the following table:

Engineering units	Serial value
°C	0
°F	1
none	2
mV	3
V	4
mA	5
A	6
bar	7
PSI	8
rH	9
Ph	10

9. To select the protocol type, a value between 0 and 1 must be assigned as shown in the following table:

Protocol type	Serial value
Modbus	0
Jbus	1

10. To select the serial communications baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

11. To select the retransmission output range, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted output range	Serial value
0... 20 mA	0
4... 20 mA	1

12. To select the retransmission signal type, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted variable (PV or SP)	Serial value
PV	0
SP	1

13. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the following table:

Timer/Start-up operating mode	Serial value
Disabled	0
Start-up	1
Counting inside a range	2
Counting inside a range/End mode OFF	3
Counting when launched	4
Counting when launched/End mode OFF	5
Counting disable when launched	6
Stand-by Setpoint	7

14. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the folowing table:

Timer action			Serial value
Launch	AL3 Status	Time	
By keypad	OFF	Seconds	0
By keypad	ON	Seconds	1
Keypad + power ON	OFF	Seconds	2
Keypad + power ON	ON	Seconds	3
By keypad	OFF	Minutes	4
By keypad	ON	Minutes	5
Keypad + power ON	OFF	Minutes	6
Keypad + power ON	ON	Minutes	7

9-5 Termination and Polarization

These lines of instruments have no line termination or polarization system. If necessary a termination resistance (120Ω ¼W) must be connected to the terminals of the last instrument of the line.
In any case the polarization is not possible.

Chapter 10
M4 controller

10-1 Bit zone

Address			
Modbus	**JbuS**	**Variable**	**Type**
0	1	Timer function status (0 = OFF, 1 = Run) [1]	R/W
1	2	Auto/Man (0 = Auto, 1 = Man)	R/W
2	3	-	-
3	4	Control output status (0 = OFF, 1 = ON)	R
4	5	AL2 alarm status (0 = OFF, 1 = ON)	R
5	6	AL3 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	-	-
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10	11	Keypad lock (0 = locked, 1 = unlocked)	R/W
11	12	Outputs lock (0 = active, 1 = disabled)	R/W
12	13	Logic input IL1 (0 = Open, 1 = Closed	R
13...15	14...16	-	-

10-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	Timer function status (0 = OFF, 1 = Run) [1]
2	2	Auto/Man (0 = Auto, 1 = Man) [2]
3	3	-
4	4	Control output status (0 = OFF, 1 = ON)
5	5	AL2 alarm status (0 = OFF, 1 = ON)
6	6	AL3 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

Notes: **1.** Only available with Timer option.
2. Only available with Auto/Man function.

10-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	Process variable (PV)	-	R
1	2	SP Setpoint (SP)	-	R/W [1]
2	3	Main control output (OP)	-	R(W) [2]
3	4	Target Setpoint (SPT)	-	R [1]
4	5	Local Setpoint (SPL)	-	R/W [3]
5	6	Proportional band (Hysteresis ON - OFF)[4]	P.b. hY.	R/W
6	7	Overshoot control	O.C.	R/W
7	8	Integral time	t. i.	R/W
8	9	Derivative time	t.d.	R/W
9	10	Output Cycle time	t.c.	R/W
10	11	Low range	Sc.Lo	R
11	12	High range	Sc.H i	R
12	13	AL2 alarm threshold	A2S.P	R/W
13	14	AL3 alarm threshold	A3S.P	R/W
14	15	AL2 Alarm Hysteresis	A2hY	R/W
15	16	AL3 Alarm Hysteresis	A2hY	R/W
16	17	Relative Cold Gain	r.C.Ga	R/W
17	18	Cool output Hysteresis (ON-OFF only)	HY. C	R/W
18	19	-	-	-
19	20	Heat/Cool Dead band	d.bnd	R/W
20	21	Cool cycle time	t.c. C	R/W
21	22	Cool output maximum value	OP.HC	R/W
22	23	Motor travel time	MU.tM	R/W
23	24	Minimum output step	MU.HY	R/W
24	25	Timer setting	t inP	R/W
25	26	Stand-by Setpoint	tM.S.P	R/W
26	27	Soft start output high limit	St.OP	R/W
27	28	Soft-start activation time	St.tM	R/W
28	29	-	-	-
29	30	Setpoint low limit	S.P. L	R/W
30	31	Setpoint high limit	S.P. H	R/W
31	32	PID Dead Band	d.Err	R/W
32	33	Main output high limit	OP. H	R/W
33	34	Output safety value	SA.OP	R/W
34	35	Slope up	S l. u	R/W
35	36	Slope down	S l. d	R/W
36	37	Input filter	t.F iL	R/W
37	38	Input shift	In.Sh	R/W
38	39	Start/Stop One shot tuning (0=Stop 1=Run)	tunP	R/W
39	40	-	-	-
40	41	Serial communications address	Addr	R/W
41	42	-	-	-

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
42	43	Retransmission low range	rt.Lo	R/W
43	44	Retransmission high range	rt.H i	R/W
44	45	Start-Up Setpoint	S.P.S.U	R/W
45	46	Start-Up Hold time	t.h.S.U	R/W
46	47	Output high limit during Start-up	OP.HS	R/W
47	48	Timer remaining time	t M.r.	R/W
48	49	Load current in ampere (CT option)	t.Cur	R
49...53	50...54	-	-	-
54	55	SP incremental value by IL	S.P. In	-
55	56	Proportional band calculated and used by Adaptive tune	P.b. A	-
56	57	Integral time calculated and used by Adaptive tune	t. i. A	-
57	58	Derivative time calculated and used by Adaptive tune	t.d. A	-
49...99	50...100	-	-	-

10-4 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	-	-	-
101	102	Configuration code	ConF	R/W [5]
102	103	AL3 alarm configuration code	Con.2	R/W [5]
103	104	Engineering units	un it	R/W [5/8]
104	105	Decimal point	Sc.d.d	R/W [5]
105	106	Low range for engineering units	Sc.Lo	R/W [5]
106	107	High range for engineering units	Sc.H i	R/W [5]
107	108	Communications protocol	Prot	R/W [9]
108	109	Baud rate	baud	R/W [10]
109	110	Retransmitted range	rPtr	R/W [11]
110	111	Retransmitted signal selection	rtH	R/W [12]
111	112	Current transformer range	HtF.S	R/W
112	113	Password	CodE	R/W
113	114	RTX low range calibration value (Reserved)	CAL.3	R/W
114	115	RTX high range calibration value (Reserved)	CAL.4	R/W
115	116	Timer operating mode	t.Mod	R/W [13]
116	117	Timer action	t.Act	R/W [14]
117	118	Digital input function	IL. n	R/W [15]
118...119	119...120	-	-	-

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
120	121	Factory code (600 = Ascon)	-	R(W) [6]
121	122	Product code (“**M4** ”)	-	R [7]
122	123		-	-
123	124	Software release code (e.g. “ **00A**”)	-	R [7]
124	125		-	-
125	126	Custom code	-	R
126...127	127...128	-	-	-

Notes:

1. Assignment of Setpoint to Jbus addresses 2 and 4 writes the Computer Setpoint. It is different from the Local Setpoint, which can be in any case set by keypad.
2. Assignment of output at the address Jbus 3 is only possible if the Auto/Man option if fitted and when the controller is in Manual mode.
3. Assignment of Setpoint to the address Jbus 5 writes the Local Setpoint (the previous value is lost).
4. In case of ON - OFF output (address Jbus 6) the proportional band is substituted by the output Hysteresis.
5. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.
6. Address Jbus 121 is read only, but if the code 55AAh (21930d) is written at this address, the configuration is brought into effect.
7. The Jbus 122 + 123 and 124 + 125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.
8. To select the engineering unit, the value between 0 and 10 must be assigned as shown in the following table:

Engineering units	Serial value
°C	0
°F	1
none	2
mV	3
V	4
mA	5
A	6
bar	7
PSI	8
rh	9
Ph	10

9. To select the protocol type, a value between 0 and 1 must be assigned from those shown in the following table:

Protocol type	Serial value
Modbus	0
Jbus	1

10. To select the serial communications baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

11. To select the retransmission output range, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted output range	Serial value
0... 20 mA	0
4... 20 mA	1

12. To select the retransmission signal type, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted variable (PV or SP)	Serial value
PV	0
SP	1
MV (OP heat)	2
MVC (OPcool)	3

13. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the following table:

Timer/Start-up operating mode	Serial value
Disabled	0
Start-up	1
Counting inside a range	2
Counting inside a range/End mode OFF	3
Counting when launched	4
Counting when launched/End mode OFF	5
Counting disable when launched	6
Stand-by Setpoint	7

14. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the folowing table:

Timer action			Serial value
Launch	AL3 Status	Time	
By keypad	OFF	Seconds	0
By keypad	ON	Seconds	1
Keypad + power ON	OFF	Seconds	2
Keypad + power ON	ON	Seconds	3
By keypad	OFF	Minutes	4
By keypad	ON	Minutes	5
Keypad + power ON	OFF	Minutes	6
Keypad + power ON	ON	Minutes	7

15. To select the Digital input function, a value between 0 and 9 must be assigned as shown in the following table:

Digital input function	Serial value
Not used	0
Keypad lock	1
Manual mode	2
Stand-by Setpoint	3
Timer launch	4

10-5 Termination and Polarization

These lines of instruments have no line termination or polarization system. If necessary a termination resistance (120Ω ¼W) must be connected to the terminals of the last instrument of the line.
In any case the polarization is not possible.

Chapter 11
M5 controller

11-1 Bit zone

Address			
Modbus	**JbuS**	**Variable**	**Type**
0	1	Remote status (0=LOC, 1=REM)	R/W
1	2	Auto/Manual (0 = Auto, 1 = Man)	R/W
2	3	AL3 alarm status (0 = OFF, 1 = ON)	R
3	4	AL4 alarm status (0 = OFF, 1 = ON)	R
4	5	AL1 alarm status (0 = OFF, 1 = ON)	R
5	6	AL2 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	-	R
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10-11	11-12	-	-
12	13	1st stored Setpoint	R/W
13	14	2nd stored Setpoint	R/W
14-15	15-16	-	-
16	17	IL1 Digital input status (0 = OFF, 1 = ON)	R
17	18	IL2 Digital input status (0 = OFF, 1 = ON)	R
18-19	19-20	-	-
20	21	Keypad lock (0 = locked, 1 = unlocked)	R/W
21	22	Slope inhibition (0 = Disabled 1, = Enabled)	R/W
22	23	Hold PV (0=Disabled, 1 = Enabled)	R/W
23	24	OP1 forced status by serial comm.s (0 = OFF, 1 = On)	R/W [19]
24	25	OP2 forced status by serial comm.s (0 = OFF, 1 = On)	R/W [19]
25	26	OP3 forced status by serial comm.s (0 = OFF, 1 = On)	R/W [19]
26	27	OP4 (logic) forced status by serial communications (0 = OFF, 1 = ON)	R/W [19]

11-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	Remote status (0=LOC, 1=REM)

Bit	Address	Variable
2	2	Auto/Manual (0 = Auto, 1 = Man)
3	3	AL3 alarm status (0 = OFF, 1 = ON)
4	4	AL4 alarm status (0 = OFF, 1 = ON)
5	5	AL1 alarm status (0 = OFF, 1 = ON)
6	6	AL2 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

11-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	Process variable (PV)	-	R
1	2	SP Setpoint (SP)	-	R
2	3	Main control output (OP)	-	R/W[1]
3	4	Target Setpoint (SPT)	-	R [2]
4	5	Local Setpoint (SPL)	-	R/W[2]
5	6	Proportional band (Hysteresis ON - OFF)	Pb. HY	R/W
6	7	Overshoot Control	OC.	R/W
7	8	Integral time	t. i.	R/W
8	9	Derivative time	t.d.	R/W
9	10	Cycle time	t.c.	R/W
10	11	Low range	Sc. lo	R/W
11	12	High range	Sc.h i	R/W
12	13	AL1 alarm threshold	1	R/W
13	14	AL2 alarm threshold	2	R/W
14	15	AL3 alarm threshold	3	R/W
15	16	AL4 alarm threshold	4	R/W
16	17	AL1 alarm hysteresis Up	HY 1u	R/W
17	18	AL1 alarm hysteresis Down	HY 1d	R/W
18	19	AL2 alarm Isteresis Up	HY2u	R/W
19	20	AL2 alarm Isteresis Down	HY2d	R/W
20	21	AL3 alarm Isteresis Up	HY3u	R/W
21	22	AL3 alarm Isteresis Down	HY3d	R/W
22	23	AL4 alarm Isteresis Up	HY4u	R/W
23	24	AL4 alarm Isteresis Down	HY4d	R/W
24	25	Cool proportional band	Pb. C	R/W
25	26	Cool integral time	t. i. C	R/W
26	27	Cool derivative time	t.d. C	R/W
27	28	Cool cycle time	t c.C	R/W
28	29	Output minimum step	MU.HY	R/W
29	30	Setpoint low limit	SPL I.	R/W
30	31	Setpoint high limit	SPL.H.	R/W
31	32	Control ouput low limit	OP. I	R/W
32	33	Control output high limit	OP.H	R/W

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
33	34	Cool output maximum value	OPCH	R/W
34	35	Setpoint ramp up	SLu	R/W
35	36	Setpoint ramp down	SLd	R/W
36	37	Input filter	tFil	R/W
37	38	Input shift	InSh	R/W
38	39	Start/Stop One shoot tuning (0=Stop 1=Run)	tunE	R/W
39	40	Start/Stop Adaptive tuning (0=Stop 1=Run)	AdPt	R/W
40	41	Serial comm.s address	Addr	R/W
41	42	Communications protocol (0=Modbus, 1=Jbus)	Prot	R/W
42	43	Baud rate	baud	R/W
43	44	Remote Setpoint	-	R/W
44	45	Soft start time	StTn	R/W
45	46	Soft start output high limit	StOP	R/W
46	47	Control output maximum speed	OPr	R/W
47	48	Cool output maximum speed	OPrC	R/W
48	49	CT current	Icur	R
49	50	Sampling time	tSan	R/W
50	51	Manual Reset	MrES	R/W
51	52	Configuration password	CPAS	R/W
52	53	Internal servomotor position	-	R
53	54	Heat/Cool Dead band	dbnd	R/W
54	55	Access password	PASS	R/W
55	56	Proportional band (Adaptive)	Pb.	R[3]
56	57	Integral time (Adaptive) (Deriv=1/4 Ti)	t. i.	R[3]
57	58	1st stored Setpoint	SP.1	R/W
58	59	2nd stored Setpoint	SP.2	R/W
59	60	Remote Setpoint Bias	biAS	R/W
60	61	Ratio remote Setpoint	rtio	R/W
61	62	Motor travel time	MUtM	R/W
62	63	Target Setpoint	tSP	R
63	64	PID Dead Band	dErr	R/W

11-4 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	Input type selection	In	R/W [4]
101	102	Square root (0 = OFF, 1 = ON)	Sqr	R/W
102	103	Number of decimals (0... 3)	SC.dd	R/W
103	104	Low range	SC.Lo	R/W
104	105	High range	SC.Hi	R/W
105	106	Engineering units	Unit	R/W [5]
106	107	Control type	CtrL	R/W[6]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
107	108	Main Output Type (heat)	OP.1	R/W[7]
108	109	Secondary output type (cool)	OP.2	R/W[7]
109	110	Retransmitted signal selection (SP or PV)	rtH	R/W[8]
110	111	Retransmitted output range	O.rtY	R/W[9]
111	112	Retransmission low range	rt.lo	R/W
112	113	Retransmission high range	rt.H1	R/W
113	114	Auto/Man enable	E.AMn	R/W
114	115	Remote Setpoint input selection	rS.In	R/W[11]
115	116	Setpoint type configuration	rSPC	R/W[10]
116	117	-	-	-
117	118	Access level	OPEr	R/W[12]
118	119	-	-	-
119	120	Main output safety value (-100... 100, 101 = OFF)	S.Out	R/W
120	121	Factory code (600 = Ascon)	-	R
121	122	Product code ("P" program) Product code (" " no program)	-	R[18]
122	123	Product code ("M5")	-	R[18]
123	124	1st byte release code	-	R[18]
124	125	2nd byte release code	-	R[18]
125	126	Custom code	-	R
126	127	AL1 alarm type	A1.1	R/W[13]
127	128	AL1 alarm addressing	A1.Ou	R/W[14]
128	129	AL1 alarm latching (0 = No 1= Yes)	ltch	R/W
129	130	AL1 alarm blocking (0 = No 1= Yes)	bloc	R/W
130	131	AL2 alarm type	A1.2	R/W[13]
131	132	AL2 addressing	A2.Ou	R/W[14]
132	133	AL2 alarm latching (0 = No 1= Yes)	ltch	R/W
133	134	AL2 alarm blocking (0 = No 1= Yes)	bloc	R/W
134	135	AL3 alarm type	A1.3	R/W[13]
135	136	AL3 addressing	A3.Ou	R/W[14]
136	137	AL3 alarm latching (0 = No 1= Yes)	ltch	R/W
137	138	AL3 alarm blocking (0 = No 1= Yes)	bloc	R/W
138	139	AL4 alarm type	A1.4	R/W[13]
139	140	AL4 addressing	A4.Ou	R/W[14]
140	141	AL4 alarm latching (0 = No 1= Yes)	ltch	R/W
141	142	AL4 alarm blocking (0 = No 1= Yes)	bloc	R/W
142	143	IL1 digital input function	IL.1	R/W[15]
143	144	IL2 digital input function	IL.2	R/W[15]
144	145	Time unit of Setpoint slope	S.PtM	R/W
145	146	CT alarm configuration (0 = OFF 1= ON)	HtOn	R/W
146	147	CT alarm configuration (0 = OFF 1= ON)	HtFC	R/W
147	148	Linearisation (0 = OFF 1= ON)	CHAr	R/W

11-5 Word zone - Page 3 Programmer

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
148	149	Program status	StAt	W [16]
149	150	Number of segments	n.SEG	R/W
150	151	Allowed deviation	bAnd	R/W
151	152	Recover action type after blackout	-	R/W [21]
152	153	Segment 0 - Time	Unit	R/W [17]
153	154	Cycles	Cyc.	R/W
154	155	Segment 0 - Time	t 1.0	R/W
155	156	Segment 0 - Setpoint	SP.0	R/W
156	157	Segment 0 - digital output [20]	dO.0	R/W
157	158	Segment 1 - Time	t 1.1	R/W
158	159	Segment 1 - Setpoint	SP.1	R/W
159	160	Segment 1 - digital output [20]	dO.1	R/W
160	161	Segment 2 - Time	t 1.2	R/W
161	162	Segment 2 - Setpoint	SP.2	R/W
162	163	Segment 2 - digital output [20]	dO.2	R/W
163	164	Segment 3 - Time	t 1.3	R/W
164	165	Segment 3 - Setpoint	SP.3	R/W
165	166	Segment 3 - digital output [20]	dO.3	R/W
166	167	Segment 4 - Time	t 1.4	R/W
167	168	Segment 4 - Setpoint	SP.4	R/W
168	169	Segment 4 - digital output [20]	dO.4	R/W
169	170	Segment 5 - Time	t 1.5	R/W
170	171	Segment 5 - Setpoint	SP.5	R/W
171	172	Segment 5 - digital output [20]	dO.5	R/W
172	173	Segment 6 - Time	t 1.6	R/W
173	174	Segment 6 - Setpoint	SP.6	R/W
174	175	Segment 6 - digital output [20]	dO.6	R/W
175	176	Segment 7 - Time	t 1.7	R/W
176	177	Segment 7 - Setpoint	SP.7	R/W
177	178	Segment 7 - digital output [20]	dO.7	R/W
178	179	Segment 8 - Time	t 1.8	R/W
179	180	Segment 8 - Setpoint	SP.8	R/W
180	181	Segment 8 - digital output [20]	dO.8	R/W
181	182	Segment 9 - Time	t 1.9	R/W
182	183	Segment 9 - Setpoint	SP.9	R/W
183	184	Segment 9 - digital output [20]	dO.9	R/W
184	185	Segment 10 - Time	t 1.10	R/W
185	186	Segment 10 - Setpoint	SP.10	R/W
186	187	Segment 10 - digital output [20]	dO.10	R/W
187	188	Segment 11 - Time	t 1.11	R/W
188	189	Segment 11 - Setpoint	SP 11	R/W

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
189	190	Segment 11 - digital output [20]	d0.11	R/W
190	191	Segment 12 - Time	t.12	R/W
191	192	Segment 12 - Setpoint	SP.12	R/W
192	193	Segment 12 - digital output [20]	d0.12	R/W
193	194	Segment 13 - Time	t.13	R/W
194	195	Segment 13 - Setpoint	SP.13	R/W
195	196	Segment 13 - digital output [20]	d0.13	R/W
196	197	Segment 14 - Time	t.14	R/W
197	198	Segment 14 - Setpoint	SP.14	R/W
198	199	Segment 14 - digital output [20]	d0.14	R/W
199	200	Segment F - Setpoint	SPF	R/W
200	201	Segment F - digital output [20]	d0.F	R/W
201	202	Program status	StAt	R [22]

Notes:

1. The OP1 value can only only assigned if the controller is in manual mode.

2. The Local Setpoint (Wloc) can be read at the both Jbus addresses 4 and 5. It only depend on the compatibility with the other Ascon instruments.

3. The above parameters can only be read when the Adaptive Tuning is launched. The Td derivative time is not shown but it can be simply calculated as the ¼ of the Ti integral time (Td = Ti/4).

4. To select the protocol type, a value between 0 and 15 must be assigned as per the following table:

Input type	Serial value
Tc **J**	0
Tc **L**	1
Tc **K**	2
Tc **S**	3
Tc **R**	4
Tc **T**	5
Tc Custom	6
Rtd 1	7
Rtd 2	8
ΔT	9
0... 50 mV	10
0... 5 V	11
1... 5 V	12
0... 10 V	13
0... 20 mA	14
4... 20 mA	15

5. To select the engineering unit, a value between 0 and 9 must be assigned as shown in the following table:

Engineering units	Serial value
none	0
°C	1

Engineering units	Serial value
°F	2
mA	3
mV	4
V	5
bar	6
PSI	7
rh	8
Ph	9

6. To select the control mode, a value between 0 and 8 must be assigned as shown in the following table:

Control type	Serial value
ON/OFF Reverse	0
ON/OFF Direct	1
PID Direct	2
PID Reverse	3
Valve Drive direct action	4
Valve Drive reverse action	5
Heat/Cool Linear	6
Heat/Cool oil	7
Heat/Cool water	8

7. To select the Output type, a value between 0 and 10 must be assigned as shown in the following table:

Output type	Serial value
Not used	0
Relay	1
Logic	5
0... 5 V	6
1... 5 V	7
0... 10 V	8
0... 20 mA	9
4... 20 mA	10

8. To select the retransmission content a value between 0 and 2 must be assigned as shown in the following table:

Retransmitted signal	Serial value
None	0
P.V.	1
S.P.	2

9. To select the retransmission signal range, a value between 6 and 10 must be assigned as shown in the following table:

Retransmitted output range	Serial value
0... 5 V	6

Retransmitted output range	Serial value
1... 5 V	7
0... 10 V	8
0... 20 mA	9
4... 20 mA	10

10. To select the Setpoint type, a value between 0 and 4 must be assigned as shown in the following table:

Setpoint type	Serial value
Local only	0
Remote only	1
Local/Remote	2
Local - Trim	3
Remote - Trim	4

11. To select the Setpoint type, a value between 11 and 15 must be assigned as shown in the following table:

Remote Setpoint Signal	Serial value
0... 5 V	11
1... 5 V	12
0... 10 V	13
0... 20 mA	14
4... 20 mA	15

12. To select the Access Level, a value between 0 and 2 must be assigned as shown in the following table:

Access level	Serial value
Full	0
Operator	1
Edit	2

13. To select the Alarm Function, a value between 0 and 7 must be assigned as shown in the following table:

Alarm Function	Serial value
Not used	0
Absolute High active	1
Absolute Low active	2
Deviation High active	3
Deviation Low active	4
Band Out active	5
Heater break	6
Loop break alarm	7

Note: Index 7 is available for first alarm output (AL1).

14. To select the Alarm output, a value between 1 and 3 must be assigned as shown in the following table:

Alarm addressing	Serial value
OP 1	1
OP 2	2
OP 3	3

15. To select the Digital input function, a value between 0 and 8 must be assigned as shown in the following table:

Digital input function	Serial value
Not used	0
Local/Remote	1
Automatic/Manual	2
1st stored setpoint	3
2nd stored setpoint	4
Keypad lock	5
Slope inhibition by serial comm.s	6
Hold P.V.	7
Program Run/Stop	8

16. To select the Program Status, a value between 0 and 4 must be assigned as shown in the table that follows:

Program status	Serial value
Reset	0
Run	1
Hold	2

17. To select the Time base, a value between 0 and 2 must be assigned as shown in the following table::

Segment time basis	Serial value
Seconds	0
Minutes	1
Hours	2

18. The Jbus 122+123 and 124 + 125 addresses contain the strings (4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.

19. These particular conditions can be activated if the corresponding outputs are specifically configured for it.

20. To configure the digital outputs status related to the setpoint programmer option, a value between 0 and 2 must be assigned as shown in the following table:

Digital Output Status	Serial value
No action	0
Open	1
Closed	2

21. To select the Run Program after Hold condition, a value between 0 and 4 must be assigned as shown in the following table:

Re-start status of the program	Serial value
Continue	0
Reset	1
Ramp	2

22. At Jbus address 202 can be reached the program functioning status. The values are shown in the following status:

Program status	Serial value
Reset	0
Run	1
Hold	2
Hold Back (note)	3
Program End	4

Note: This function is automatically activated every time the PV exceed the band limits set in each segment of the running program.

11-6 RS-485 Configuration Dip Switch

On the RS485 board a 4 position dip Switch is provided. It enables the correct hardware configuration of the instrument serial communications port as follows:

Position	ON	OFF
1	-	-
2	Polarization 0Vdc	Polarization excluded
3	Termination set	Termination excluded
4	Polarization +5Vdc	Polarization excluded

Chapter 12
X1/X3 and Q1/Q3 controllers

12-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	Remote status (0=LOC, 1=REM)[1] or program (0=LOC, 1=RUN)[2]	R/W
1	2	Auto/Man (0 = Automatic, 1 = Manual)	R/W
2	3	OP4 logical output status (0 = OFF, 1 = ON)	R
3	4	OP1 digital output status (0 = OFF, 1 = ON)	R
4	5	OP2 digital output status (0 = OFF, 1 = ON)	R
5	6	OP3 digital output status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	Timer function status (0 = OFF, 1 = Run) [4]	R/W
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10	11	Keypad lock (0 = locked, 1 = unlocked)	R/W
11	12	Outputs lock (0 = active, 1 = disabled)	R/W
12	13	IL1 Digital input status (0 = OFF, 1 = ON)	R
13	14	IL2 Digital input status (0 = OFF, 1 = ON)	R
14	15	IL3 Digital input status (0 = OFF, 1 = ON)	R
15	16	-	-

12-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings.

Bit	Address	Variable
1 (LSB)	1	Remote [1] or program status [2]
2	2	Auto/Man (0 = Automatic, 1 = Manual) [3]
3	3	OP4 logical output status (0 = OFF, 1 = ON)
4	4	OP1 digital output status (0 = OFF, 1 = ON)
5	5	OP2 digital output status (0 = OFF, 1 = ON)
6	6	OP3 digital output status (0 = OFF, 1 = ON)

Bit	Address	Variable
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

Notes: **1.** :Available when configured as Local + Remote Setpoint only.
2. Available when configured as programmed Setpoint only.
3. Valid for X3/Q3 only.
4. Only available with Timer option.

12-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	Process variable (PV)	-	R
1	2	Setpoint (SP)	-	R/W [1]
2	3	Main control output (OP)	-	R(/W) [2]
3	4	Target Setpoint (SPT)	-	R[1]
4	5	Local Setpoint (SPL)	-	R/W [3]
5	6	Proportional band (Hysteresis ON - OFF)[4]	Pb. (hy.)	R/W
6	7	Overshoot control	OC.	R/W
7	8	Integral time	t. i.	R/W
8	9	Derivative time	t.d.	R/W
9	10	Output Cycle time	t.c.	R/W
10	11	Low range	Sc.Lo	R
11	12	High range	Sc.H i	R
12	13	AL2 alarm threshold	A2SP	R/W
13	14	AL3 alarm threshold	A3SP	R/W
14	15	AL2 Alarm Hysteresis	A2hy	R/W
15	16	AL3 Alarm Hysteresis	A3hy	R/W
16	17	Relative Cold Gain	r.C.Ga	R/W
17	18	Cool output Hysteresis (ON-OFF only)	HY. C	R/W
18	19	-	-	-
19	20	Heat/Cool Dead band	dbnd	R/W
20	21	Cool cycle time	t.c. C	R/W
21	22	Cool output maximum value	OPHC	R/W
22	23	Motor travel time	MU.tM	R/W
23	24	Minimum output step	MU.HY	R/W
24	25	Timer setting	t iME	R/W
25	26	Stand-by Setpoint	S.P.Sb	R/W
26	27	Soft-start output value	St.OP	R/W
27	28	Soft-start activation time	St.tM	R/W
28	29	Manual reset	M.rES	R/W
29	30	Setpoint low limit	S.P. L	R/W
30	31	Setpoint high limit	S.P. H	R/W
31	32	PID Dead Band	dErr	R/W

12-4 Word Zone - Page 2 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
32	33	Control output high limit	OP. H	R/W
33	34	Output safety value	SA.OP	R/W
34	35	Slope up	S I. u	R/W
35	36	Slope down	S I. d	R/W
36	37	Input filter	t.F iL	R/W
37	38	Input shift	In.Sh	R/W
38	39	Start/Stop One shoot tuning (0=Stop 1=Run)	tunE	R/W
39	40	-	-	-
40	41	Serial comm.s address	Addr	R/W
41	42	-	-	-
42	43	Retransmission low range	rt.Lo	R/W
43	44	Retransmission high range	rt.H i	R/W
44	45	Start-up Setpoint	S.P.S.U	R/W
45	46	Start-Up Hold time	t.h.S.U	R/W
46	47	Output high limit during Start-up	OP.HS	R/W
47	48	Timer remaining time	tM.r.	R/W
48	49	Load current in ampere (CT option)	t.Cur	R
49	50	Setpoint selection	S.SEL	R/W
50	51	1st stored Setpoint	S.P. 1	R/W
51	52	2nd stored Setpoint	S.P. 2	R/W
52	53	-	-	-
53	54	Ratio remote Setpoint	rt io	R/W
54	55	Bias Remote Setpoint	b iaS	R/W
55	56	-	-	-
56	57	AL1 alarm threshold	A 1S.P	R/W
57	58	AL1 Alarm Hysteresis	A 1HY	R/W
58	59	AL1 latching and blocking functions	A 1Lb	R/W [21]
59	60	AL2 latching and blocking functions	A2Lb	R/W [21]
60	61	AL3 latching and blocking functions	A3Lb	R/W [21]
61	62	LBA delay	t.Lbd	R/W
62	63	Enhanced Overshoot control management	OC.rb	R/W
63	64	-	-	-

12-5 Word zone - Page 3 Program

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
64	65	Program status	StAt	R/W [8]
65	66	Recover action type after blackout	FAiL	R/W [9]
66	67	Time unit	Unit	R/W [10]
67	68	Number of segments	n.SEG	R/W

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
68	69	Number of cycles	CYc.	R/W
69	70	Allowed deviation	bAnd	R/W
70	71	Segment “0” - Time	t 1. 0	R/W
71	72	Segment “0” - Setpoint	S.P. 0	R/W
72	73	Segment “0” - OP3 digital output status	dO. 0	R/W[20]
73	74	Segment “1” - Time	t 1. 1	R/W
74	75	Segment “1” Setpoint	S.P. 1	R/W
75	76	Segment “1” - OP3 digital output status	dO. 1	R/W[20]
76	77	Segment “2” - Time	t 1. 2	R/W
77	78	Segment “2” - Setpoint	S.P. 2	R/W
78	79	Segment “2” - OP3 digital output status	dO. 2	R/W[20]
79	80	Segment “3” - Time	t 1. 3	R/W
80	81	Segment “3” - Setpoint	S.P. 3	R/W
81	82	Segment “3” - OP3 digital output status	dO. 3	R/W[20]
82	83	Segment “4” - Time	t 1. 4	R/W
83	84	Segment “4” - Setpoint	S.P. 4	R/W
84	85	Segment “4” - OP3 digital output status	dO. 4	R/W[20]
85	86	Segment “5” - Time	t 1. 5	R/W
86	87	Segment “5” - Setpoint	S.P. 5	R/W
87	88	Segment “5” - OP3 digital output status	dO. 5	R/W[20]
88	89	Segment “6” - Time	t 1. 6	R/W
89	90	Segment “6” - Setpoint	S.P. 6	R/W
90	91	Segment “6” - OP3 digital output status	dO. 6	R/W[20]
91	92	Segment F - Setpoint	S.P. F	R/W
92	93	Segment “F” - OP3 digital output status	dO. F	R/W [20]
93… 99	94… 100	-	-	-

12-6 Word zone - Page 4 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	Remote Setpoint input range	r S. In	R/W[5/11]
101	102	1st Configuration code	Con. 1	R/W [5]
102	103	2nd Configuration code	Con.2	R/W [5]
103	104	Engineering units	un it	R/W[5/12]
104	105	Decimal point	Sc.dd	R/W [5]
105	106	Low range for engineering units	Sc.Lo	R/W [5]
106	107	High range for engineering units	Sc.H i	R/W [5]
107	108	Communications protocol	Prot	R/W [13]
108	109	Baud rate	bAud	R/W [14]
109	110	Continuous control output range	rEtr	R/W [15]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
110	111	Retransmitted signal selection	rtH	R/W [16]
111	112	Current transformer range	HtF.S	R/W
112	113	Password	CodE	R/W
113	114	RTX low range calibration value (Reserved)	CAL.3	R/W
114	115	RTX high range calibration value (Reserved)	CAL.4	R/W
115	116	Timer/Start-up operating mode	t.Mod	R/W [17]
116	117	Timer action	t.Act	R/W [18]
117	118	IL1 digital input function	IL 1	R/W [19]
118	119	IL2 digital input function	IL2	R/W [19]
119	120	IL3 digital input function	IL3	R/W [19]
120	121	Factory code (600 = Ascon)	-	R(W) [6]
121	122	Product code (“X1”/“X3” or “Q1”/“Q3”)[7]	-	R
122	123		-	R
123	124	Software release code (e.g. “ 00A”) [7]	-	R
124	125		-	R
125	126	Custom code	-	R
126	127	-	-	-
127	128	-	-	-

Notes:

1. Assignment of Setpoint to Jbus addresses 2 and 4 writes the Computer Setpoint. It is different from the Local Setpoint, which can be in any case set by keypad.
2. Assignment of output at the address Jbus 3 is only possible if the Auto/Man option if fitted and when the controller is in Manual mode.
3. Assignment of Setpoint to the address Jbus 5 writes the Local Setpoint (the previous value is lost).
4. In case of ON - OFF output (address Jbus 6) the proportional band is substituted by the output Hysteresis.
5. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.
6. Address Jbus 121 is read only, but if the code 55AAh (21930d) is written at this address, the configuration is brought into effect.
7. The Jbus 122+123 and 124+125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.
8. To select the Program Status, a value between 0 and 4 must be assigned as shown in the following table:

Program status	Serial value
Reset	0
Hold	1
Run	2

9. To select the Run Program after Hold condition, the value between 0 and 4 must be assigned as shown in the following table:

Re-start status of the program	Serial value
Continue	0
Reset	1
Ramp	2

10. To select the Time base, the value between 0 and 2 must be assigned as shown in the following table::

Segment 0 - Time	Serial value
Seconds	0
Minutes	1

11. To select the remote setpoint input type, the value between 0 and 4 must be assigned as shown in the following table:

Remote Setpoint input type	Serial value
0... 5 V	0
1... 5 V	1
0... 10 V	2
0... 20 mA	3
4... 20 mA	4

12. To select the engineering unit, a value between 0 and 10 must be assigned as shown in the following table:

Remote Setpoint input type	Serial value
°C	0
°F	1
none	2
mV	3
V	4
mA	5
A	6
bar	7
PSI	8
rh	9
Ph	10

13. To select the protocol type, a value between 0 and 1 must be assigned as as shown in the following table:

Protocol type	Serial value
Modbus	0
Jbus	1

14. To select the serial communications baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

15. To select the retransmission signal type, the value between 0 and 1 must be assigned as per the below table:

Retransmitted output range	Serial value
0... 20 mA	0
4... 20 mA	1

16. To select the retransmission signal type, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted variable (PV or SP)	Serial value
PV	0
SP	1

17. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the following table:

Timer/Start-up operating mode	Serial value
Disabled	0
Start-up	1
Counting inside a range	2
Counting inside a range/End mode OFF	3
Counting when launched	4
Counting when launched/End mode OFF	5
Counting disable when launched	6
Stand-by Setpoint	7

18. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the folowing table:

Timer action			Serial value
Launch	**AL3 Status**	**Time**	
By keypad	Disabled	Seconds	0
By keypad	ON	Seconds	1
Keypad + power ON	Disabled	Seconds	2
Keypad + power ON	ON	Seconds	3
By keypad	Disabled	Minutes	4
By keypad	ON	Minutes	5
Keypad + power ON	Disabled	Minutes	6
Keypad + power ON	ON	Minutes	7

19. To select the Digital input function, the value between 0 and 9 must be assigned as shown in the following table:

Digital input function	Serial value
Not used	0
Keypad lock	1
Hold P.V.	2
Manual mode	3
Remote mode	4
Recall 1st stored Setpoint	5
Recall 2nd stored Setpoint	6
Recall local Setpoint	7
Run Timer	8
Program Start/Hold	9

20. The possible logical output status conditions when related to the program are listed below:

Digital Output Status	Serial value
No action	0
Open	1
Closed	2

21. To select the alarm function, a value between 0 and 3 must be assigned as shown in the following table:

Alarm condition	Serial value
No action	0
Latching	1
Blocking	2
Latching/Blocking	3

12-7 RS-485 Configuration Dip Switch

On the RS485 board a 4 position dip Switch is provided. It enables the correct hardware configuration of the instrument serial comm.s port as follows:

Position	ON	OFF
1	Polarization +5Vdc	Polarization excluded
2	Termination set	Termination excluded
3	Polarization 0Vdc	Polarization excluded
4	-	-

Chapter 13
X5 and Q5 controllers

13-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	Remote status (0=LOC, 1=REM)	R/W
1	2	Auto/Manual (0 = Auto, 1 = Manual)	R/W
2	3	AL3 alarm status (0 = OFF, 1 = ON)	R
3	4	AL4 alarm status (0 = OFF, 1 = ON)	R
4	5	AL1 alarm status (0 = OFF, 1 = ON)	R
5	6	AL2 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	-	-
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10… 11	11… 12	-	-
12	13	Local stored Setpoint	R/W
13	14	1st stored Setpoint	R/W
14	15	2nd stored Setpoint	R/W
15	16	3rd stored Setpoint	R/W
16	17	IL1 Digital input status (0=OFF, 1=ON)	R
17	18	IL2 Digital input status (0=OFF, 1=ON)	R
18	19	IL3 Digital input status (0=OFF, 1=ON)	R
19	20	-	-
20	21	Keypad lock (0=locked, 1=unlocked)	R
21	22	Slope inhibition by serial comm.s	R
22	23	PV Hold by serial comm.s	R/W
23	24	OP1 forced status by serial comm.s (0=OFF, 1=ON)	R/W [1]
24	25	OP2 forced status by serial comm.s (0=OFF, 1=ON)	R/W [1]
25	26	OP3 forced status by serial comm.s (0=OFF, 1=ON)	R/W [1]
26	27	OP4 forced status by serial comm.s (0=OFF, 1=ON)	R/W [1]
27	28	OP5 (logic) forced status by serial comm.s (0=OFF, 1=ON)	R/W [1]
28	29	Output forcing mode	R/W
29	30	1st Program Run/Reset	R/W
30	31	2nd Program Run/Reset	R/W
31	32	3rd Program Run/Reset	R/W
32	33	4th Program Run/Reset	R/W

13-2 Read status

Function 07 (Read Status) returns an eight bit status with the following

Bit	Address	Variable
1 (LSB)	1	Local/Remote Setpoint (0=LOC, 1=REM)
2	2	Automatic/Manual (0 = Auto, 1 = Manual)
3	3	OP4 alarm status (0 = OFF, 1 = ON)
4	4	OP3 alarm status (0 = OFF, 1 = ON)
5	5	OP2 alarm status (0 = OFF, 1 = ON)
6	6	OP1 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

13-3 Word zone - Page 1 Parameters

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
0	1	Process variable (PV)	-	R
1	2	Setpoint (SP)	-	R
2	3	Main control output (OP)	-	R(/W)[2]
3	4	Target Setpoint (SPT)	-	R [3]
4	5	Local Setpoint (SPL)	-	R/W [3]
5	6	Proportional band (Hysteresis ON - OFF)	P.b. (HY.)	R/W
6	7	Overshoot control	O.C.	R/W
7	8	Integral time	t.i.	R/W
8	9	Derivative time	t.d.	R/W
9	10	Cycle time	t.c.	R/W
10	11	Low range	Sc.Lo	R
11	12	High range	Sc.Hi	R
12	13	AL1 alarm threshold	A1SP	R/W
13	14	AL2 alarm threshold	A2SP	R/W
14	15	AL3 alarm threshold	A3SP	R/W
15	16	AL4 alarm threshold	A4SP	R/W
16	17	AL1 alarm high hysteresis	HY.1u	R/W
17	18	AL1 alarm low hysteresis	HY.1d	R/W
18	19	AL2 alarm high hysteresis	HY.2u	R/W
19	20	AL2 alarm low hysteresis	HY.2d	R/W
20	21	AL3 alarm high hysteresis	HY.3u	R/W
21	22	AL3 alarm low hysteresis	HY.3d	R/W
22	23	AL4 alarm high hysteresis	HY.4u	R/W
23	24	AL4 alarm low hysteresis	HY.4d	R/W
24	25	Cool proportional band	P.b. C	R/W
25	26	Cool integral time	t.i. C	R/W
26	27	Cool derivative time	t.d. C	R/W
27	28	Cool cycle time	t.c. C	R/W
28	29	Minimum output step	MU.HY	R/W
29	30	Setpoint low limit	SP. L	R/W

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
30	31	Setpoint high limit	S.P. H	R/W
31	32	Control ouput low limit	OP. L	R/W
32	33	Control output high limit	OP. H	R/W
33	34	Cool control output high limit	OPC.H	R/W
34	35	Slope up	S l. u	R/W
35	36	Slope down	S l. d	R/W
36	37	Filter time constant	t.F iL	R/W
37	38	Input Shift	In.Sh	R/W
38	39	AutoTune (0 = Stop, 1 = Run)	tunE	R/W
39	40	Adaptive Tune (0 = Stop, 1 = Run)	AdPt	R/W
40	41	Serial comm.s SLAVE address	Add.S	R/W
41	42	Serial comm.s SLAVE protocol	Pro.S	R/W
42	43	SLAVE baud rate	bdr.S	R/W
43	44	Remote Setpoint	-	R
44	45	Soft-Start activation time	St.tI	R/W
45	46	Soft-Start output value	St.OP	R/W
46	47	Control output maximum speed	OP.r	R/W
47	48	Cool Control output maximum speed	OP.rC	R/W
48	49	Control output forcing value	F.Out	R/W
49	50	Sampling time	t.Sdn	R/W
50	51	Manual Reset	M.rES	R/W
51	52	Configuration Password	C.PASS	R/W
52	53	Internal servomotor position	-	R
53	54	Heat/Cool Dead band	d.bnd	R/W
54	55	Password Level access	A.PASS	R/W
55	56	Adaptive Proportional band	P.b.	R [4]
56	57	Adaptive Integral time	t. i.	R [4]
57	58	1st stored Setpoint	S.P. 1	R/W
58	59	2nd stored Setpoint	S.P. 2	R/W
59	60	3rd stored Setpoint	S.P. 3	R/W
60	61	Remote Setpoint Bias	b iAS	R/W
61	62	Ratio Setpoint	rt io	R/W
62	63	Motor travel time	MUtI	R/W
63	64	SPT Target Setpoint	t.S.P.	R
64	65	Read Status	-	R
65	66	MASTER enable	MASt	R/W
66	67	MASTER baud rate	bdr.M	R/W
67	68	Serial comm.s MASTER protocol	Pro.M	R/W
68	69	Profibus Dp address	Add.P	R/W
69	70	Cold junction temperature (for TC only)	-	R
70	71	Running program status	-	R [5]
71	72	Program selection	-	R
72	73	Running program number	-	R
73	74	1st Program Run/Stop	-	R/W [6]
74	75	2nd Program Run/Stop	-	R/W [6]
75	76	3rd Program Run/Stop	-	R/W [6]
76	77	4th Program Run/Stop	-	R/W [6]
77…78	78… 79	-	-	-

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
79	80	Error dead band	dErr	R/W
80	81	Hours	-	R
81	82	Minutes	-	R
82	83	Seconds	-	R
84	85	AL1 activation time filter	t.F 1	
85	86	AL2 activation time filter	t.F 2	
86	87	AL3 activation time filter	t.F 3	
87	88	AL4 activation time filter	t.F 4	
88	89	Potentiometer input value (for Profibus)		
89	90	-	-	-
90	91	Enhanced Overshoot control management	OC.rb	R
91	92	Enable potentiometer feedback use	-	R/W
92…99	93…100	-	-	-

13-4 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	Input type selection	In P.	R/W [7]
101	102	Square root (0 = OFF, 1 = ON)	SQr	R/W
102	103	No. of decimals	Sc.dd	R/W
103	104	Low range	Sc.Lo	R/W
104	105	High range	Sc.H i	R/W
105	106	Engineering units	Un it	R/W [8]
106	107	Control type	Cnt Y	R/W [9]
107	108	Main output (Heat)	M.C OP	R/W [10]
108	109	Secondary output (Cool)	S.C.OP	R/W [11]
109	110	1st retransmitted output selection	rt. 1	R/W [12]
110	111	1st retransmission output	O.rt.1	R/W [13]
111	112	1st retransmission low range	rtL.1	R/W
112	113	1st retransmission high range	rtH.1	R/W
113	114	Auto/Manual (0 = OFF, 1 = On)	E.AMn	R/W
114	115	Remote Setpoint input	rS. In	R/W [14]
115	116	Setpoint type	S.P.t Y	R/W [15]
116	117	Setpoint tracking	S.P.tr	R/W
117	118	Level access to parameters and groups	Ac.L P	R/W [16]
118	119	OP5 Cool output (0 = No, 1 = Yes)	C.O.P.5	R/W
119	120	Main output safety value	S.Out	R/W
120	121	Factory code (600 = Ascon)	-	R
121	122	1st byte product code (X5 and Q5)	-	R [17]
122	123	2nd byte product code	-	R [17]
123	124	1st byte release code	-	R [17]
124	125	2nd byte release code	-	R [17]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
125	126	Customer code	-	R
126	127	AL1 alarm type	AL. 1	R/W [18]
127	128	AL1 addressing	A1.Du	R/W [19]
128	129	AL1 alarm Latching	LtcH	R/W
129	130	AL1 alarm Blocking	bLoc	R/W
130	131	AL2 alarm type	AL. 2	R/W [18]
131	132	AL2 addressing	A2.Du	R/W [19]
132	133	AL2 alarm Latching	LtcH	R/W
133	134	AL2 alarm Blocking	bLoc	R/W
134	135	AL3 alarm type	AL. 3	R/W [18]
135	136	AL3 addressing	A3.Du	R/W [19]
136	137	AL3 alarm Latching	LtcH	R/W
137	138	AL3 alarm Blocking	bLoc	R/W
138	139	AL4 alarm type	AL. 4	R/W [18]
139	140	AL4 addressing	A4.Du	R/W [19]
140	141	AL4 alarm Latching	LtcH	R/W
141	142	AL4 alarm Blocking	bLoc	R/W
142	143	IL1 digital input function	IL 1	R/W [20]
143	144	IL2 digital input function	IL 2	R/W [20]
144	145	Time unit of Setpoint slope	S.P.tM	R/W [21]
145	146	CT alarm configuration (0 = OFF 1= ON)	HtOn	R/W
146	147	-	-	-
147	148	Linearisation (0 = OFF 1= ON)	ChAr	R/W
148	149	IL3 digital input function	IL 3	R/W [20]
149	150	2nd retransmitted output selection	rt. 2	R/W [22]
150	151	2nd retransmission output	O.rt.2	R/W [23]
151	152	2nd retransmission low range	rtL.2	R/W
152	153	2nd retransmission high range	rtH.2	R/W
153	154	Disable AL1 at sensor break	donb	R/W
154	155	Disable AL2 at sensor break	donb	R/W
155	156	Disable AL3 at sensor break	donb	R/W
156	157	Disable AL4 at sensor break	donb	R/W
157	158	Timed Setpoint	-	-
158	159	Time of Timed Setpoint	-	-
159...179	160...180	-	-	-

13-5 Word zone - Page 3 Programs

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
180	181	Power Failure - **Program 1**	FAiL	R/W [24]
181	182	Time units - **Program 1**	Unit	R/W [25]
182	183	Number of cycles - **Program 1**	Cyc.	R/W

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
183	184	Number of segments - **Program 1**	n.SEG	R/W
184	185	Allowed deviation - **Program 1**	bAnd	R/W
185	186	Time segment 0 - Program 1	t i. 0	R/W
186	187	Setpoint segment 0 - Program 1	SP. 0	R/W
187	188	OP3 digital output segment 3 - Program 1	OP. 3	R/W [26]
188	189	OP4 digital output segment 0 - Program 1	OP. 4	R/W [26]
190	191	Setpoint segment 1 - Program 1	SP. 1	R/W
191	192	OP3 digital output segment 1 - Program 1	OP. 3	R/W [26]
192	193	OP4 digital output segment 1 - Program 1	OP. 4	R/W [26]
189	190	Time segment 1 - Program 1	t i. 1	R/W
193	194	Time segment 2 - Program 1	t i. 2	R/W
194	195	Setpoint segment 2 - Program 1	SP. 2	R/W
195	196	OP3 digital output segment 2 - Program 1	OP. 3	R/W [26]
196	197	OP4 digital output segment 2 - Program 1	OP. 4	R/W [26]
197	198	Time segment 3 - Program 1	t i. 3	R/W
198	199	Setpoint segment 3 - Program 1	SP. 3	R/W
199	200	OP3 digital output segment 3 - Program 1	OP. 3	R/W [26]
200	201	OP4 digital output segment 3 - Program 1	OP. 4	R/W [26]
201	202	Time segment 4 - Program 1	t i. 4	R/W
202	203	Setpoint segment 4 - Program 1	SP. 4	R/W [26]
203	204	OP3 digital output segment 4 - Program 1	OP. 3	R/W [26]
204	205	OP4 digital output segment 4 - Program 1	OP. 4	R/W
205	206	Time segment 5 - Program 1	t i. 5	R/W
206	207	Setpoint segment 5 - Program 1	SP. 5	R/W
207	208	OP3 digital output segment 5 - Program 1	OP. 3	R/W [26]
208	209	OP4 digital output segment 5 - Program 1	OP. 4	R/W [26]
209	210	Time segment 6 - Program 1	t i. 6	R/W
210	211	Setpoint segment 6 - Program 1	SP. 6	R/W
211	212	OP3 digital output segment 6 - Program 1	OP. 3	R/W [26]
212	213	OP4 digital output segment 6 - Program 1	OP. 4	R/W [26]
213	214	Time segment 7 - Program 1	t i. 7	R/W
214	215	Setpoint segment 7 - Program 1	SP. 7	R/W
215	216	OP3 digital output segment 0 - Program 1	OP. 3	R/W [26]
216	217	OP4 digital output segment 0 - Program 1	OP. 4	R/W [26]
217	218	Time segment 8 - Program 1	t i. 8	R/W
218	219	Setpoint segment 8 - Program 1	SP. 8	R/W
219	220	OP3 digital output segment 8 - Program 1	OP. 3	R/W [26]
220	221	OP4 digital output segment 8 - Program 1	OP. 4	R/W [26]
221	222	Time segment 9 - Program 1	t i. 9	R/W
222	223	Setpoint segment 9 - Program 1	SP. 9	R/W
223	224	OP3 digital output segment 9 - Program 1	OP. 3	R/W [26]
224	225	OP4 digital output segment 9 - Program 1	OP. 4	R/W [26]
225	226	Time segment 10 - Program 1	t i. 10	R/W
226	227	Setpoint segment 10 - Program 1	SP. 10	R/W
227	228	OP3 digital output segment 10 - Program 1	OP. 3	R/W [26]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
228	229	OP4 digital output segment 10 - Program 1	OP. 4	R/W [26]
229	230	Time segment 11 - Program 1	t.11	R/W
230	231	Setpoint segment 11 - Program 1	SP.11	R/W
231	232	OP3 digital output segment 11 - Program 1	OP. 3	R/W [26]
232	233	OP4 digital output segment 11 - Program 1	OP. 4	R/W [26]
233	234	Time segment 12 - Program 1	t.12	R/W
234	235	Setpoint segment 12 - Program 1	SP.12	R/W
235	236	OP3 digital output segment 12 - Program 1	OP. 3	R/W [26]
236	237	OP4 digital output segment 12 - Program 1	OP. 4	R/W [26]
237	238	Time segment 13 - Program 1	t.13	R/W
238	239	Setpoint segment 13 - Program 1	SP.13	R/W
239	240	OP3 digital output segment 13 - Program 1	OP. 3	R/W [26]
240	241	OP4 digital output segment 13 - Program 1	OP. 4	R/W [26]
241	242	Time segment 14 - Program 1	t.14	R/W
242	243	Setpoint segment 14 - Program 1	SP.14	R/W
243	244	OP3 digital output segment 14 - Program 1	OP. 3	R/W [26]
244	245	OP4 digital output segment 14 - Program 1	OP. 4	R/W [26]
245	246	Setpoint segment F - Program 1	SP. F	R/W
246	247	OP3 digital output segment F - Program 1	OP. 3	R/W [26]
247	248	OP4 digital output segment F - Program 1	OP. 4	R/W [26]
248	249	Power Failure **Program 2**	FAIL	R/W [24]
249	250	Time units - **Program 2**	Unit	R/W [25]
250	251	Number of cycles - **Program 2**	Cyc.	R/W
251	252	Number of segments - **Program 2**	n.SEG	R/W
252	253	Allowed deviation - **Program 2**	band	R/W
253	254	Time segment 0 - Program 2	t. 0	R/W
254	255	Setpoint segment 0 - Program 2	SP. 0	R/W
255	256	OP3 digital output segment 0 - Program 2	OP. 3	R/W [26]
256	257	OP4 digital output segment 0 - Program 2	OP. 4	R/W [26]
257	258	Time segment 1 - Program 2	t. 1	R/W
258	259	Setpoint segment 1 - Program 2	SP. 1	R/W
259	260	OP3 digital output segment 1 - Program 2	OP. 3	R/W [26]
260	261	OP4 digital output segment 1 - Program 2	OP. 4	R/W [26]
261	262	Time segment 2 - Program 2	t. 2	R/W
262	263	Setpoint segment 2 - Program 2	SP. 2	R/W
263	264	OP3 digital output segment 2 - Program 2	OP. 3	R/W [26]
264	265	OP4 digital output segment 2 - Program 2	OP. 4	R/W [26]
265	266	Time segment 3 - Program 2	t. 3	R/W
266	267	Setpoint segment 3 - Program 2	SP. 3	R/W
267	268	OP3 digital output segment 3 - Program 2	OP. 3	R/W [26]
268	269	OP4 digital output segment 3 - Program 2	OP. 4	R/W [26]
269	270	Time segment 4 - Program 2	t. 4	R/W
270	271	Setpoint segment 4 - Program 2	SP. 4	R/W
271	272	OP3 digital output segment 4 - Program 2	OP. 3	R/W [26]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
272	273	OP4 digital output segment 4 - Program 2	OP. 4	R/W [26]
273	274	Time segment 5 - Program 2	t. 5	R/W
274	275	Setpoint segment 5 - Program 2	SP. 5	R/W
275	276	OP3 digital output segment 5 - Program 2	OP. 3	R/W [26]
276	277	OP4 digital output segment 5 - Program 2	OP. 4	R/W [26]
277	278	Time segment 6 - Program 2	t. 6	R/W
278	279	Setpoint segment 6 - Program 2	SP. 6	R/W
279	280	OP3 digital output segment 6 - Program 2	OP. 3	R/W [26]
280	281	OP4 digital output segment 6 - Program 2	OP. 4	R/W [26]
281	282	Time segment 7 - Program 2	t. 7	R/W
282	283	Setpoint segment 7 - Program 2	SP. 7	R/W
283	284	OP3 digital output segment 0 - Program 2	OP. 3	R/W [26]
284	285	OP4 digital output segment 0 - Program 2	OP. 4	R/W [26]
285	286	Time segment 8 - Program 2	t. 8	R/W
286	287	Setpoint segment 8 - Program 2	SP. 8	R/W
287	288	OP3 digital output segment 8 - Program 2	OP. 3	R/W [26]
288	289	OP4 digital output segment 8 - Program 2	OP. 4	R/W [26]
289	290	Time segment 9 - Program 2	t. 9	R/W
290	291	Setpoint segment 9 - Program 2	SP. 9	R/W
291	292	OP3 digital output segment 9 - Program 2	OP. 3	R/W [26]
292	293	OP4 digital output segment 9 - Program 2	OP. 4	R/W [26]
293	294	Time segment 10 - Program 2	t.10	R/W
294	295	Setpoint segment 10 - Program 2	SP.10	R/W
295	296	OP3 digital output segment 10 - Program 2	OP. 3	R/W [26]
296	297	OP4 digital output segment 10 - Program 2	OP. 4	R/W [26]
297	298	Time segment 11 - Program 2	t.11	R/W
298	299	Setpoint segment 11 - Program 2	SP.11	R/W
299	300	OP3 digital output segment 11 - Program 2	OP. 3	R/W [26]
300	301	OP4 digital output segment 11 - Program 2	OP. 4	R/W [26]
301	302	Time segment 12 - Program 2	t.12	R/W
302	303	Setpoint segment 12 - Program 2	SP.12	R/W
303	304	OP3 digital output segment 12 - Program 2	OP. 3	R/W [26]
304	305	OP4 digital output segment 12 - Program 2	OP. 4	R/W [26]
305	306	Time segment 13 - Program 2	t.13	R/W
306	307	Setpoint segment 13 - Program 2	SP.13	R/W
307	308	OP3 digital output segment 13 - Program 2	OP. 3	R/W [26]
308	309	OP4 digital output segment 13 - Program 2	OP. 4	R/W [26]
309	310	Time segment 14 - Program 2	t.14	R/W
310	311	Setpoint segment 14 - Program 2	SP.14	R/W
311	312	OP3 digital output segment 14 - Program 2	OP. 3	R/W [26]
312	313	OP4 digital output segment 14 - Program 2	OP. 4	R/W [26]
313	314	Setpoint segment F - Program 2	SP. F	R/W
314	315	OP3 digital output segment F - Program 2	OP. 3	R/W [26]
315	316	OP4 digital output segment F - Program 2	OP. 4	R/W [26]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
316	317	Power Failure - **Program 3**	FAIL	R/W [24]
317	318	Time units - **Program 3**	Unit	R/W [25]
318	319	Number of cycles - **Program 3**	CYc.	R/W
319	320	Number of segments - **Program 3**	n.SEG	R/W
320	321	Allowed deviation - **Program 3**	band	R/W
321	322	Time segment 0 - Program 3	t i. 0	R/W
322	323	Setpoint segment 0 - Program 3	SP. 0	R/W
323	324	OP3 digital output segment 0 - Program 3	OP. 3	R/W [26]
324	325	OP4 digital output segment 0 - Program 3	OP. 4	R/W [26]
325	326	Time segment 1 - Program 3	t i. 1	R/W
326	327	Setpoint segment 1 - Program 3	SP. 1	R/W
327	328	OP3 digital output segment 1 - Program 3	OP. 3	R/W [26]
328	329	OP4 digital output segment 1 - Program 3	OP. 4	R/W [26]
329	330	Time segment 2 - Program 3	t i. 2	R/W
330	331	Setpoint segment 2 - Program 3	SP. 2	R/W
331	332	OP3 digital output segment 2 - Program 3	OP. 3	R/W [26]
332	333	OP4 digital output segment 2 - Program 3	OP. 4	R/W [26]
333	334	Time segment 3 - Program 3	t i. 3	R/W
334	335	Setpoint segment 3 - Program 3	SP. 3	R/W
335	336	OP3 digital output segment 3 - Program 3	OP. 3	R/W [26]
336	337	OP4 digital output segment 3 - Program 3	OP. 4	R/W [26]
337	338	Time segment 4 - Program 3	t i. 4	R/W
338	339	Setpoint segment 4 - Program 3	SP. 4	R/W
339	340	OP3 digital output segment 4 - Program 3	OP. 3	R/W [26]
340	341	OP4 digital output segment 4 - Program 3	OP. 4	R/W [26]
341	342	Time segment 5 - Program 3	t i. 5	R/W
342	343	Setpoint segment 5 - Program 3	SP. 5	R/W
343	344	OP3 digital output segment 5 - Program 3	OP. 3	R/W [26]
344	345	OP4 digital output segment 5 - Program 3	OP. 4	R/W [26]
345	346	Time segment 6 - Program 3	t i. 6	R/W
346	347	Setpoint segment 6 - Program 3	SP. 6	R/W
347	348	OP3 digital output segment 6 - Program 3	OP. 3	R/W [26]
348	349	OP4 digital output segment 6 - Program 3	OP. 4	R/W [26]
349	350	Time segment 7 - Program 3	t i. 7	R/W
350	351	Setpoint segment 7 - Program 3	SP. 7	R/W
351	352	OP3 digital output segment 0 - Program 3	OP. 3	R/W [26]
352	353	OP4 digital output segment 0 - Program 3	OP. 4	R/W [26]
353	354	Time segment 8 - Program 3	t i. 8	R/W
354	355	Setpoint segment 8 - Program 3	SP. 8	R/W
355	356	OP3 digital output segment 8 - Program 3	OP. 3	R/W [26]
356	357	OP4 digital output segment 8 - Program 3	OP. 4	R/W [26]
357	358	Time segment 9 - Program 3	t i. 9	R/W
358	359	Setpoint segment 9 - Program 3	SP. 9	R/W
359	360	OP3 digital output segment 9 - Program 3	OP. 3	R/W [26]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
360	361	OP4 digital output segment 9 - Program 3	OP. 4	R/W [26]
361	362	Time segment 10 - Program 3	t. 10	R/W
362	363	Setpoint segment 10 - Program 3	SP. 10	R/W
363	364	OP3 digital output segment 10 - Program 3	OP. 3	R/W [26]
364	365	OP4 digital output segment 10 - Program 3	OP. 4	R/W [26]
365	366	Time segment 11 - Program 3	t. 11	R/W
366	367	Setpoint segment 11 - Program 3	SP. 11	R/W
367	368	OP3 digital output segment 11 - Program 3	OP. 3	R/W [26]
368	369	OP4 digital output segment 11 - Program 3	OP. 4	R/W [26]
369	370	Time segment 12 - Program 3	t. 12	R/W
370	371	Setpoint segment 12 - Program 3	SP. 12	R/W
371	372	OP3 digital output segment 12 - Program 3	OP. 3	R/W [26]
372	373	OP4 digital output segment 12 - Program 3	OP. 4	R/W [26]
373	374	Time segment 13 - Program 3	t. 13	R/W
374	375	Setpoint segment 13 - Program 3	SP. 13	R/W
375	376	OP3 digital output segment 13 - Program 3	OP. 3	R/W [26]
376	377	OP4 digital output segment 13 - Program 3	OP. 4	R/W [26]
377	378	Time segment 14 - Program 3	t. 14	R/W
378	379	Setpoint segment 14 - Program 3	SP. 14	R/W
379	380	OP3 digital output segment 14 - Program 3	OP. 3	R/W [26]
380	381	OP4 digital output segment 14 - Program 3	OP. 4	R/W [26]
381	382	Setpoint segment F - Program 3	SP. F	R/W
382	383	OP3 digital output segment F - Program 3	OP. 3	R/W [26]
383	384	OP4 digital output segment F - Program 3	OP. 4	R/W [26]
384	385	Power Failure - **Program 4**	FAIL	R/W [24]
385	386	Time units - **Program 4**	Unit	R/W [25]
386	387	Number of cycles - **Program 4**	Cyc.	R/W
387	388	Number of segments - **Program 4**	n.SEG	R/W
388	389	Allowed deviation - **Program 4**	band	R/W
389	390	Time segment 0 - Program 4	t. 0	R/W
390	391	Setpoint segment 0 - Program 4	SP. 0	R/W
391	392	OP3 digital output segment 0 - Program 4	OP. 3	R/W [26]
392	393	OP4 digital output segment 0 - Program 4	OP. 4	R/W [26]
393	394	Time segment 1 - Program 4	t. 1	R/W
394	395	Setpoint segment 1 - Program 4	SP. 1	R/W
395	396	OP3 digital output segment 1 - Program 4	OP. 3	R/W [26]
396	397	OP4 digital output segment 1 - Program 4	OP. 4	R/W [26]
397	398	Time segment 2 - Program 4	t. 2	R/W
398	399	Setpoint segment 2 - Program 4	SP. 2	R/W
399	400	OP3 digital output segment 2 - Program 4	OP. 3	R/W [26]
400	401	OP4 digital output segment 2 - Program 4	OP. 4	R/W [26]
401	402	Time segment 3 - Program 4	t. 3	R/W
402	403	Setpoint segment 3 - Program 4	SP. 3	R/W
403	404	OP3 digital output segment 3 - Program 4	OP. 3	R/W [26]

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
404	405	OP4 digital output segment 3 - Program 4	OP. 4	R/W [26]
405	406	Time segment 4 - Program 4	t. 4	R/W
406	407	Setpoint segment 4 - Program 4	SP. 4	R/W
407	408	OP3 digital output segment 4 - Program 4	OP. 3	R/W [26]
408	409	OP4 digital output segment 4 - Program 4	OP. 4	R/W [26]
409	410	Time segment 5 - Program 4	t. 5	R/W
410	411	Setpoint segment 5 - Program 4	SP. 5	R/W
411	412	OP3 digital output segment 5 - Program 4	OP. 3	R/W [26]
412	413	OP4 digital output segment 5 - Program 4	OP. 4	R/W [26]
413	414	Time segment 6 - Program 4	t. 6	R/W
414	415	Setpoint segment 6 - Program 4	SP. 6	R/W
415	416	OP3 digital output segment 6 - Program 4	OP. 3	R/W [26]
416	417	OP4 digital output segment 6 - Program 4	OP. 4	R/W [26]
417	418	Time segment 7 - Program 4	t. 7	R/W
418	419	Setpoint segment 7 - Program 4	SP. 7	R/W
419	420	OP3 digital output segment 0 - Program 4	OP. 3	R/W [26]
420	421	OP4 digital output segment 0 - Program 4	OP. 4	R/W [26]
421	422	Time segment 8 - Program 4	t. 8	R/W
422	423	Setpoint segment 8 - Program 4	SP. 8	R/W
423	424	OP3 digital output segment 8 - Program 4	OP. 3	R/W [26]
424	425	OP4 digital output segment 8 - Program 4	OP. 4	R/W [26]
425	426	Time segment 9 - Program 4	t. 9	R/W
426	427	Setpoint segment 9 - Program 4	SP. 9	R/W
427	428	OP3 digital output segment 9 - Program 4	OP. 3	R/W [26]
428	429	OP4 digital output segment 9 - Program 4	OP. 4	R/W [26]
429	430	Time segment 10 - Program 4	t. 10	R/W
430	431	Setpoint segment 10 - Program 4	SP. 10	R/W
431	432	OP3 digital output segment 10 - Program 4	OP. 3	R/W [26]
432	433	OP4 digital output segment 10 - Program 4	OP. 4	R/W [26]
433	434	Time segment 11 - Program 4	t. 11	R/W
434	435	Setpoint segment 11 - Program 4	SP. 11	R/W
435	436	OP3 digital output segment 11 - Program 4	OP. 3	R/W [26]
436	437	OP4 digital output segment 11 - Program 4	OP. 4	R/W [26]
437	438	Time segment 12 - Program 4	t. 12	R/W
438	439	Setpoint segment 12 - Program 4	SP. 12	R/W
439	440	OP3 digital output segment 12 - Program 4	OP. 3	R/W [26]
440	441	OP4 digital output segment 12 - Program 4	OP. 4	R/W [26]
441	442	Time segment 13 - Program 4	t. 13	R/W
442	443	Setpoint segment 13 - Program 4	SP. 13	R/W
443	444	OP3 digital output segment 13 - Program 4	OP. 3	R/W [26]
444	445	OP4 digital output segment 13 - Program 4	OP. 4	R/W [26]
445	446	Time segment 14 - Program 4	t. 14	R/W
446	447	Setpoint segment 14 - Program 4	SP. 14	R/W
447	448	OP3 digital output segment 14 - Program 4	OP. 3	R/W [26]

Address		Variable	Parameter Code	Type
Modbus	Jbus			
448	449	OP4 digital output segment 14 - Program 4	OP. 4	R/W [26]
449	450	Setpoint segment F - Program 4	SP. F	R/W
450	451	OP3 digital output segment F - Program 4	OP. 3	R/W [26]
451	452	OP4 digital output segment F - Program 4	OP. 4	R/W [26]

Notes:

1. This function may be used only with suitable configuration outputs properly set.
2. The OP1 value can be only assigned when the controller is in Manual mode.
3. The Local Setpoint (Wloc) can be read at the both Jbus addresses 4 and 5. It only depends on the compatibility with the other Ascon instruments.
4. The above parameters can only be read when the Adaptive Tuning is launched. The Td derivative time is not shown but it can be simply calculated as the ¼ of the Ti integral time (Td = Ti/4).
5. When the Program status is requested, the instrument replies as shown in the following table:

Program status	Serial value
Reset	0
Run	1
Hold	2
Automatic Hold	3
Program End	4

6. To select a Program command, a value between 0 and 1 must be assigned as shown in the following table:

Program command	Serial value
Reset	0
Start	1

7. To select the input type, a value between 0 and 24 must be assigned as shown in the following table:

Input type	Serial value
TC J	0
TC K	1
TC L	2
TC S	3
TC R	4
TC T	5
TC B	6
TC N	7
TC NI	8
TC W3%	9
TC W5%	10
TC E	11
Custom	12
RTD 1	13

Input type	Serial value
RTD 2	14
ΔT	15
0... 50 mV	16
0... 300 mV	17
0... 5 V	18
1... 5 V	19
0... 10 V	20
0... 20 mA	21
4... 20 mA	22
2 kHz Frequency	23
20 kHz Frequency	24
500 Hz Frequency	25

8. To select the engineering unit, a value between 0 and 10 must be assigned as shown in the following table:

Engineering unit	Serial value
None	0
°C	1
°F	2
mA	3
mV	4
V	5
bar	6
PSI	7
rh	8
Ph	9
Hz	10
l/h	11
%	12
O2	13
CO	14

9. To select the Control type & action, a value between 0 and 8 must be assigned as shown in the following table:

Control type	Action	Serial value
ON/OFF	Reverse	0
ON/OFF	Direct	1
PID	Direct	2
PID	Reverse	3
Valve drive PID	Direct	4
Valve drive PID	Reverse	5
Heat/Cool	Linear	6
Heat/Cool	Oil	7
Heat/Cool	Water	8

10. To select the Main output (Heat), a value between 0 and 11 must be assigned as shown in the following table:

Main output (Heat)	Serial value
None	0
Relay/Triac	1
Logic	6
0... 5 V	7
1... 5 V	8
0... 10 V	9
0... 20 mA	10
4... 20 mA	11

11. To select the Secondary output (Cool), a value between 0 and 11 must be assigned as shown in the following table:

Secondary output (Cool)	Serial value
None	0
Relay/Triac	2
Logic	6
0... 5 V	7
1... 5 V	8
0... 10 V	9
0... 20 mA	10
4... 20 mA	11

12. To select the 1st retransmitted output selection, a value between 0 and 2 must be assigned as shown in the following table

1st retransmitted output selection	Serial value
None	0
Provess variable	1
Setpoint	2

13. To select the range of the1st retransmitted output, a value between 7 and 11 must be assigned as shown in the following table:

1st retransmitted output range	Serial value
0... 5 V	7
1... 5 V	8
0... 10 V	9
0... 20 mA	10
4... 20 mA	11

14. To select the remote Setpoint input, the value between 18 and 22 must be assigned as per the below table::

Remote Setpoint input	Serial value
0... 5 V	18
1... 5 V	19
0... 10 V	20
0... 20 mA	21
4... 20 mA	22

15. To select the remote Setpoint input, a value between 18 and 22 must be assigned as shown in the following table:

Setpoint type	Serial value
Local only	0
Remote only	1
Local/Remote	2
Local - Trim	3
Remote - Trim	4
Setpoint Programmer (option)	5

16. To select the Setpoint type, a value between 0 and 5 must be assigned as shown in the following table:

Access level	Serial value
Full	0
Operator	1
Edit	2

17. The Jbus 122+123 and 124+125 addresses contain the strings (4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.

18. To select the alarm type, a value between 0 and 6 must be assigned as shown in the following table:

Alarm type	Serial value
Not used	0
Absolute High active	1
Absolute Low active	2
Deviation High active	3
Deviation Low active	4
Band Out active	5
Loop Break Alarm	6

19. To select the output assignment, a value between 1 and 4 must be assigned as shown in the following table:

Output assignment	Serial value
OP1	1
OP2	2
OP3	3
OP4	4

20. To select the Digital input function, a value between 0 and 15 must be assigned as shown in the following table:

Digital input function	Serial value
Not used	0
Local/Remote	1
Automatic/Manual	2
Recall 1st stored Setpoint	3
Recall 2nd stored Setpoint	4
Recall 3rd stored Setpoint	5
Keypad lock	6
Setpoint slopes disable	7
Measure Hold	8
Output forcing mode	9
Select 1st program (opt.)	10
Select 2nd program (opt.)	11
Select 3rd program (opt.)	12
Select 4th program (opt.)	13
Run/Stop program (opt.)	14
Reset program (opt.)	15

21. To select the slopes time unit, a value between 0 and 2 must be assigned as shown in the following table:

Slopes time unit	Serial value
Seconds	0
Minutes	1
Hours	2

22. To select the 2nd retransmitted output selection, a value between 0 and 2 must be assigned as shown in the following table:

2nd retransmitted output selection	Serial value
None	0
Process variable	1
Setpoint	2

23. To select the Power fail, a value between 0 and 2 must be assigned as shown in the following table:

2nd retransmission output	Serial value
0... 5 V	7
1... 5 V	8
0... 10 V	9
0... 20 mA	10
4... 20 mA	11

24. To select the Power fail, a value between 0 and 2 must be assigned as shown in the following table:

Power Fail	Serial value
Continue	0
Reset	1
Ramp	2

25. To select the Segment time basis, a value between 0 and 2 must be assigned as shown in the following table:

Segment time basis	Serial value
Seconds	0
Minutes	1
Hours	2

26. To select the logic output status of segment #, a value between 0 and 2 must be assigned as shown in the following table:

Logic output status of segment #	Serial value
Closed	2
Open	1
Disabled	0

13-6 RS-485 Configuration Dip Switch

On the RS485 board a 4 position dip Switch is provided. It enables the correct hardware configuration of the instrument serial comm.s port as follows:

Position	On	OFF
1	Polarization +5Vcc	Polarization excluded
2	Termination set	Termination excluded
3	Polarization 0 Vcc	Polarization excluded
4	-	-

Chapter 14
J1 and J3 indicators

14-1 Bit Zone

Address					
ModBus	**JBus**	**Variable**	**J1**	**J3**	**Type**
0	1	Alarm_1 Condition (0 = OFF, 1 = alarm active)	✓	✓	R
1	2	Alarm_2 Condition (0 = OFF, 1 = alarm active)	✓	✓	R
2	3	Alarm_3 Condition (0 = OFF, 1 = alarm active)	-	✓	R
3	4	Alarm_4 Condition (0 = OFF, 1 = alarm active)	-	✓	R
4	5	Alarms Acknowledge	✓	✓	R/W[1]
5	6	OP1 Status	✓	✓	R/W
6	7	OP2 Status	✓	✓	R/W
7	8	OP3 Status	-	✓	R/W
8	9	OP4 Status	-	-	R/W
9	10	Out of range (0 = Normal Operation, 1 = Out of Range)	✓	-	R
10	11	Keyboard Disable (0=Enabled, 1=Disabled)	✓	✓	R/W
11	12	Outputs Disable (0=Enabled, 1=Disabled)	✓	✓	R/W
12	13	IL1 Status (0=Off, 1=ON)	✓	✓	R
13	14	IL2 Status (0=Off, 1=ON)	✓	✓	R
14	15	IL3 Status (0=Off, 1=ON)	-	✓	R
15	16	Min./Max. Reset	✓	✓	W
16	17	Input 2 Out of range (0 = Normal Operation, 1 = Out of Range)	✓	✓	R
17	18	Cin 2 Out of range (0 = Normal Operation, 1 = Out of Range)	✓	✓	R[2]

Notes: **1.** Writing Alarm Ack Coil, Alarms acknowledge is performed. The returned value of the coil in reading operation is 1 if one (or more) alarm is not acknowleged state.
2. Out of range for Cin is set if calculation exceeds the range defined by CinLo, CinHi (the result is limited to the range).

14-2 Read status

Function 07 (Read Status) returns an eight bit status with the following

Bit	Address	Variable
1 (LSB)	1	Alarm_1 Condition (0 = OFF, 1 = alarm active)
2	2	Alarm_2 Condition (0 = OFF, 1 = alarm active)
3	3	Alarm_3 Condition (0 = OFF, 1 = alarm active)
4	4	Alarm_4 Condition (0 = OFF, 1 = alarm active)
5	5	IL1 Status (0=Off, 1=ON)
6	6	IL2 Status (0=Off, 1=ON)
7	7	IL3 Status (0=Off, 1=ON)
8 (MSB)	8	Out of range (0=Normal Operation, 1=Out of Range)

14-3 Word zone - Page 1 Parameters

Address						
Modbus	**Jbus**	**Variable**	**Parameter Code**	**J1**	**J3**	**Type**
0	1	In1 main universal input	-	✓	✓	R
1	2	In2 auxiliary input	-	-	✓	R
2	3	Cin calculated value	-	-	✓	R
3	4	In1 main universal input (reading not influenced by the Hold command)	-	✓	✓	R
4	5	Max. value read	-	✓	✓	R
5	6	Min. value read	-	✓	✓	R
6	7	Analogue output value	-	-	✓	R/W
7...9	8...10	-	-	-	-	-
10	11	In1 Input low range	in.1Lo	✓	✓	R/W
11	12	In1 Input high range	in.1H1	✓	✓	R/W
12	13	AL1 alarm threshold	AL.1SP	✓	✓	R/W
13	14	AL2 alarm threshold	AL.2SP	✓	✓	R/W
14	15	AL3 alarm threshold	AL.3SP	-	✓	R/W
15	16	AL4 alarm threshold	AL.4SP	-	✓	R/W
16	17	AL1 alarm high hysteresis	AL.1HY	✓	✓	R/W
17	18	AL2 alarm high hysteresis	AL.2HY	✓	✓	R/W
18	19	AL3 alarm high hysteresis	AL.3HY	-	✓	R/W
19	20	AL4 alarm high hysteresis	AL.4HY	-	✓	R/W
20	21	-	-	-	-	-
21	22	Alarm reference value	AL.rEF	✓	✓	R/W
22	23	In1 Input filter	tF iL1	✓	✓	R/W
23	24	In1 Input Shift	in.1Sh	✓	✓	R/W
24	25	In1 Input conditioned measure	in1cn	✓	✓	R/W
25	26	In1 Input cut off square root	Cut 1	✓	✓	R/W
26	27	In2 Input low range	in.2Lo	-	✓	R/W
27	28	In2 Input high range	in.2Lo	-	✓	R/W
28	29	In2 Input decimal point	in.2dd	-	✓	R/W
29	30	In2 Input decimal point	tF iL2	-	✓	R/W

Address						
Modbus	**Jbus**	**Variable**	**Parameter Code**	**J1**	**J3**	**Type**
30	31	In2 Input Shift	in.2Sh	-	✓	R/W
31	32	In2 Input conditioned measure	in.2Cn	-	✓	R/W
32	33	In2 Input cut off square root	Cut 2	-	✓	R/W
33	34	Measure conditioning	C in.SL	-	✓	R/W
34	35	Conditioned measure (Cin) low limit	C in.Lo	-	✓	R/W
35	36	Conditioned measure (Cin) high limit	C in.Hi	-	✓	R/W
36	37	Conditioned measure (Cin) decimal point	C in.dd	-	✓	R/W
37	38	Analogue output low range	AO.Lo	-	✓	R/W
38	39	Analogue output high range	AO.Hi	-	✓	R/W
39	40	-	-	-	-	-
40	41	Serial communications address	Addr	✓	✓	R/W
41	42	Measure hold time	HLdt	-	✓	R/W
42	43	Alternate display period (Cin active)	t inP	-	✓	R/W
43	44	Default displayed parameter	dEF.Sh	-	✓	R/W
44... 57	45...58	-	-	-	-	-
58	59	AL1 Alarm Latching/Blocking	AL.1Lb	✓	✓	R/W
59	60	AL2 Alarm Latching/Blocking	AL.2Lb	✓	✓	R/W
60	61	AL3 Alarm Latching/Blocking	AL.3Lb	-	✓	R/W
61	62	AL4 Alarm Latching/Blocking	AL.4Lb	-	✓	R/W
62	63	AL1 Alarm source	AL.1Sr	✓	✓	R/W
63	64	AL2 Alarm source	AL.2Sr	✓	✓	R/W
64	65	AL3 Alarm sourcr	AL.3Sr	-	✓	R/W
65	66	AL4 Alarm source	AL.4Sr	-	✓	R/W
66	67	AL1 Alarm output	AL.1OP	✓	✓	R/W
67	68	AL2 Alarm output	AL.2OP	✓	✓	R/W
68	69	AL3 Alarm output	AL.3OP	-	✓	R/W
69	70	AL4 Alarm output	AL.4OP	-	✓	R/W
70	71	AL1 Alarm action	OP.1a	✓	✓	R/W
71	72	AL2 Alarm action	OP.2a	✓	✓	R/W
72	73	AL3 Alarm action	OP.3a	-	✓	R/W
73	74	AL4 Alarm action	OP.4a	-	✓	R/W
74	75	Alarm reference value	AL.rEF	-	✓	R/W

14-4 Command registers

Register	Variable	Parameter Code	Type
81	Hold command	-	R/W [1]
82	Reset min./max. values	-	R/W [2]
83	Alarms acknowledgement	-	R/W [2]
84	Keypad lock	-	R/W [3]
85	Outputs lock	-	R/W [3]
86	Analogue output value at power ON	-	R/W [4]

14-5 Word zone - Page 2 Configuration

Address				
Modbus	**Jbus**	**Variable**	**Parameter Code**	**Type**
100	101	Auxiliary Input range	In2.St	R/W
101	102	1st part of configuration code	Con.1	R/W
102	103	2nd part of configuration code	Con.2	R/W
103	104	Engineering units	Unit	R/W
104	105	In1 main input decimal point position	In.Idd	R/W
105	106	Low range	In.ILo	R/W
106	107	High range	In.IH1	R/W
107	108	Communications protocol	Prot	R/W
108	109	Baud rate	baud	R/W
109	110	Anaolgue output type	AO.tYP	R/W
110	111	Analogue output source	AO.Src	R/W
111	112	-	-	-
112	113	Password	CodE	R/W
113	114	Analogue output calibration low limit	CAL.3	R/W
114	115	Analogue output calibration high limit	CAL.4	R/W
115...116	116...117	-	-	-
117	118	IL1 digital input function	IL 1	R/W
118	119	IL2 digital input function	IL2	R/W
119	120	IL3 digital input function	IL3	R/W
120	121	Factory code (600 = Ascon)	-	R
121	122	Product code (J1 and J3) (note)	-	R
122	123		-	R
123	124	Release code	-	R
124	125		-	R
125	126	Custom code	-	R
1001	1000	Cold reset (value 298)	-	W

Note: All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.

14-6 RS-485 Configuration Dip Switch

On the RS485 board a 4 position dip Switch is provided. It enables the correct hardware configuration of the instrument serial communications port as follows:

Position	ON	OFF
1	Polarization 5 Vdc	Polarization excluded
2	Termination set	Termination excluded
3	Polarization 0 Vdc	Polarization excluded
4	-	-

Chapter 15
D1 controller

15-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	-	-
1	2	Auto/Man (0 = Automatic, 1 = Manual)	R/W
2	3	OP4 logical output status (0 = OFF, 1 = ON)	R
3	4	OP1 digital output status (0 = OFF, 1 = ON)	R
4	5	OP2 digital output status (0 = OFF, 1 = ON)	R
5	6	OP3 digital output status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	Timer function status (0 = OFF, 1 = Run)(note)	R/W
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10	11	-	-
11	12	Output status (0 = not influenced, 1 = forced to OFF)	R/W
12	13	IL Digital input status (0 = OFF, 1 = ON)	R
13	14	Tune Fail	R
14	15	-	-
15	16	Latching alarms acknowledgement	W

Note: Only available with Timer option.

15-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	-
2	2	Auto/Man (0 = Automatic, 1 = Manual)
3	3	OP4 logical output status (0 = OFF, 1 = ON)
4	4	OP1 digital output status (0 = OFF, 1 = ON)
5	5	OP2 digital output status (0 = OFF, 1 = ON)
6	6	OP3 digital output status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

15-3 Word zone - Page 1 Parameter

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	Process variable (PV)	R
1	2	Setpoint (SP)	R/W [1]
2	3	Main control output (OP)	R(/W) [2]
3	4	Target Setpoint (SPT)	R[1]
4	5	Local Setpoint (SPL)	R/W [3]
5	6	Proportional band (Hysteresis ON - OFF)[4]	R/W
6	7	Overshoot control	R/W
7	8	Integral time	R/W
8	9	Derivative time	R/W
9	10	Control Output Cycle time	R/W
10	11	Low range	R
11	12	High range	R
12	13	AL2 alarm threshold	R/W
13	14	AL3 alarm threshold	R/W
14	15	AL2 Alarm Hysteresis	R/W
15	16	AL3 Alarm Hysteresis	R/W
16	17	Relative Cold Gain	R/W
17	18	Cool output Hysteresis (ON-OFF only)	R/W
18	19	-	-
19	20	Heat/Cool Dead band	R/W
20	21	Cool cycle time	R/W
21	22	Cool output maximum value	R/W
22...23	23...24	-	-
24	25	Timer setting	R/W
25	26	Stand-by Setpoint	R/W
26	27	Soft-start output value	R/W
27	28	Soft-start activation time	R/W
28	29	Manual reset	R/W
29	30	Setpoint low limit	R/W
30	31	Setpoint high limit	R/W
31	32	PID Dead Band	R/W
32	33	Control output high limit	R/W
33	34	Output safety value	R/W
34	35	Slope up	R/W
35	36	Slope down	R/W
36	37	Input filter	R/W
37	38	Input shift	R/W
38	39	Start/Stop One shoot tuning (0=Stop 1=Run)	R/W
39	40	Enhanced overshoot control management	R/W
40	41	Serial communications address	R/W
41...43	42...44	-	-
44	45	Start-up Setpoint	R/W
45	46	Start-Up Hold time	R/W
46	47	Output high limit during Start-up	R/W
47	48	Timer remaining time	R/W
48	49	Current used by the heather (from CT sensor)	R

Address		Variable	Type
Modbus	**Jbus**		
49	50	Setpoint selection	R/W
50	51	1st stored Setpoint	R/W
51	52	2nd stored Setpoint	R/W
52...55	53...56	-	-
56	57	AL1 alarm threshold	R/W
57	58	AL1 Alarm Hysteresis	R/W
58	59	AL1 latching and blocking functions	R/W [16]
59	60	AL2 latching and blocking functions	R/W [16]
60	61	AL3 latching and blocking functions	R/W [16]
61	62	LBA delay	R/W
62	63	Instrument position [8]	-
63	64	Read the first 16 coils on word (B.O.R. = Bit On Register)[17]	R
64… 100	65… 101	-	-

15-4 Word zone - Page 2 Configuration

Address		Variable	Type
Modbus	**Jbus**		
101	102	1st Configuration code	R/W [5]
102	103	2nd Configuration code	R/W [5]
103	104	Engineering units	R/W [5/10]
104	105	Decimal point	R/W [5]
105	106	Low range for engineering units	R/W [5]
106	107	High range for engineering units	R/W [5]
107	108	Communications protocol	R/W [11]
108	109	Baud rate	R/W [12]
109...111	110...112	-	-
112	113	Password	R/W
113	114	RTX low range calibration value (Reserved)	R/W
114	115	RTX high range calibration value (Reserved)	R/W
115	116	Timer/Start-up operating mode	R/W [13]
116	117	Timer action	R/W [14]
117	118	IL digital input function	R/W [15]
118… 119	119… 120	-	-
120	121	Factory code (600 = Ascon)	R(W) [6]
121	122	Product code (“**D1** ”) [7]	R
122	123		R
123	124	Software release code (e.g. “ **00A**”) [7]	R
124	125		R
125	126	Custom code	R
126...127	127...128	-	-

Notes: 1. Assignment of Setpoint to the addresses Jbus 2 and 4 writes the Computer Setpoint (local Setpoint).

2. Assignment of output at the address Jbus 3 is only possible when the controller is in Manual mode.
3. Assignment of Setpoint to the address Jbus 5 writes the Local Setpoint (the previous value is lost).
4. In case of ON - OFF output (address Jbus 6) the proportional band is substituted by the output Hysteresis.
5. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.
6. The Jbus 122+123 and 124+125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.
7. The address includes, as said before, the product code. The code results from the setup of address 151.
8. The instrument position is set by a value between 0... 2;
   0= stand alone;
   1= the instrument is part of a system but stays on a side;
   2= any other position.
9. To edit properly an output you have to check that this output is not used for other options.
10. To select the engineering unit, a value between 0 and 10 must be assigned as shown in the following table:

Serial value	Engineering unit
0	°C
1	°F
2	None
3	mV
4	V
5	mA
6	A
7	bar
8	PSI
9	rh
10	Ph

11. To select the protocol type, the value between 0 and 1 must be assigned as per the below table:

Serial value	Protocol type
0	Modbus
1	Jbus

12. To select the serial communications baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Serial value	Baud Rate
0	1200
1	2400
2	4800
3	9600

13. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the following table:

Serial value	Timer/Start-up operating mode
0	Disabled
1	Start-up
2	Counting inside a range
3	Counting inside a range/End mode OFF
4	Counting when launched
5	Counting when launched/End mode OFF
6	Counting disable when launched
7	Stand-by Setpoint

14. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the folowing table:

Serial value	Timer action		
	Launch	AL3 Status	Time
0	Serial	Disabled	Seconds
1	Serial	ON	Seconds
2	Power ON	Disabled	Seconds
3	Power ON	ON	Seconds
4	Serial	Disabled	Minutes
5	Serial	ON	Minutes
6	Power ON	Disabled	Minutes
7	Power ON	ON	Minutes

15. To select the Digital input function, the value between 0 and 9 must be assigned as shown in the following table:

Serial value	Digital input function
0	Not used
1	-
2	Hold P.V.
3	Manual mode
4	-
5	Recall 1st stored Setpoint
6	Recall 2nd stored Setpoint
7	-
8	Run Timer
9	-

16. To select the alarm function, a value between 0 and 3 must be assigned as shown in the following table:

Serial value	Alarm condition
0	No action
1	Latching
2	Blocking
3	Latching/Blocking

17. Using this register is possible to read the coils status. The number taken from the instrument is equal to the sum of the active coils as shown in the following table:

Coil address	Function	Value
1	Not used	0
2	Auto/Man	2
3	OP4	4
4	OP1	8
5	OP2	16
6	OP3	32
7	Out of range (0 = Normal, 1 = Safety)	64
8	Autotune	128
9	Timer	256
10	Out of range	512
11	Not used	0
12	Output status	2048
13	IL 1	4096
14	Tune Fail	8192
15	-	-
16	-	-

Chapter 16
D2 controller and D9 data acquisition module

16-1 Bit zone

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
0	1	OP1 digital output status (0 = OFF, 1 = ON)	✓	✓	R/W[1]
1	2	OP2 digital output status (0 = OFF, 1 = ON)	✓	✓	R/W[1]
2	3	OP3 logical output status (0 = OFF, 1 = ON)	✓	✓	R/W[1]
3	4	OP4 logical output status (0 = OFF, 1 = ON)	✓	✓	R/W[1]
4	5	Alarms acknowledgement	✓	✓	R/W[2]
5	6	Outputs lock	✓	✓	R/W[3]
6	7	PV1 measure Hold	✓	✓	R/W[4]
7	8	PV2 measure Hold	✓	✓	R/W[4]
8	9	Auto/Man enable for Loop1	✓	-	R/W[5]
9	10	Auto/Man enable for Loop2	✓	-	R/W[5]
10	11	PV1 out of range	✓	✓	R[6]
11	12	PV2 out of range	✓	✓	R[6]
12	13	AL1 alarm	✓	✓	R[7]
13	14	AL2 alarm	✓	✓	R[7]
14	15	AL3 alarm	✓	✓	R[7]
15	16	AL4 alarm	✓	✓	R[7]
16	17	IL1 logic input status	✓	✓	R[8]
17	18	OP3 I/O status	✓	✓	R[9]
18	19	OP4 I/O status	✓	✓	R[9]
19	20	Tune Loop1	✓	-	R[10]
20	21	Tune Loop2	✓	-	R[10]
21...31	22...32	-	-	-	-
32	33	NOT OP1 output	✓	✓	R/W[11]
33	34	NOT OP2 output	✓	✓	R/W[11]
34	35	NOT OP3 output	✓	✓	R/W[11]
35	36	NOT OP4 output	✓	✓	R/W[11]

Notes:
1. These coils represent the logical status of the outputs connected. Those output ports that are not used by the instrument functions (control/alarm) can be used as digital output, forcing the writing status.
2. Writing the value 1 causes the recognition of those alarm that are in Latching status. The reading funtion returns always 0.
3. Writing the value 1 causes the outputs Lock status. When Locked, all Outputs are forced to logical status 0 apart from the current status.
4. Writing the value 1 the reading of the corresponding PVx input is locked. The measures value is hold. When the hold function is connected to the IL input, the IL input has the priority and the coil reading identifies the measure functioning status.
5. Writing the value 1 the correspondent loop is put in manual status, when the function is connected to the IL input, the IL input has the priority.
6. When the read value is 0 says that the measure of the associated channel is valid, when the value read is 1 the channel is out of range.
7. Reading these bits can be reached the status of each alarm.
8. Reading this bit can be reached the status of the IL1 input.
9. Reading these bits can be reached the logical status at OP3 and OP4 terminals; when these terminals are not used as output ports, they can be used as digital inputs.
10. When the read value is 1 the connected loop is performing the autotune.
11. Writing the value 1 enables the NOT logical function on the actuating command of the physical output.

16-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	PV1 Out of range (0 = Valid value, 1 = Out of range)
2	2	PV2 Out of range (0 = Valid value, 1 = Out of range)
3	3	Outputs lock (0 = active, 1 = disabled)
4	4	Auto/Man (0 = Automatic, 1 = Manual) (OR of A/M1 and A/M2 status)
5	5	Tune (0 = OFF, 1 = ON)
6	6	IL1 input status (0 = OFF, 1 = ON)
7	7	OP3 I/O port status (0 = OFF, 1 = ON)
8 (MSB)	8	OP4 I/O port status (0 = OFF, 1 = ON)

16-3 Word zone - Page 1 Loop1 Parameters

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
0	1	Process Value Loop 1 (PV)	✓	✓	R
1	2	Setpoint (SP)(REF value for D9)[1] Loop 1	✓	✓	R/W
2	3	Main output Loop1 (OP)	✓	-	R/W[2]
3	4	Target Setpoint Loop1 (SPT)	✓	-	R/W
4	5	Local Setpoint (threshold for D9) Loop1 (SPL)	✓	✓	R/W[3]

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
5	6	Proportional band (hysteresis ON/OFF) Loop1	✓	-	R/W[4]
6	7	Overshoot control Loop1	✓	-	R/W[4]
7	8	Integral time Loop1	✓	-	R/W[4]
8	9	Derivative time Loop1	✓	-	R/W[4]
9	10	Control Output Cycle time Loop1	✓	-	R/W[4]
10	11	Manual reset Loop1	✓	-	R/W[4]
11	12	Control output high limit Loop1	✓	-	R/W[5]
12	13	Control output low limit Loop1	✓	-	R/W[5]
13	14	PID Dead Band Loop1	✓	-	R/W[6]
14	15	Output safety value Loop1	✓	-	R/W[7]
15	16	Setpoint low limit Loop1	✓	-	R/W[8]
16	17	Setpoint high limit Loop1	✓	-	R/W[8]
17	18	Slope up Setpoint Loop1	✓	-	R/W[9]
18	19	Slope down Setpoint Loop2	✓	-	R/W[9]
19	20	1st stored Setpoint Loop1	✓	-	R/W[10]
20	21	2nd stored Setpoint Loop1	✓	-	R/W[10]
21	22	Input filter PV1 measure	✓	✓	R/W
22	23	Input shift PV1 measure	✓	✓	R/W
23	24	Output stored value Loop1	✓	-	R/W[11]
24...29	25...30	-	-	-	-

Notes:
1. Current value of the Setpoint stored in the volatile memory; for the D9 module the value is the reference of the deviation and band alarms.
2. To write the output value, is mandatory that the involved loop is in manual status.
3. Setpoint value stored in the non volatile memory.
4. Loop1 PID parameters, Ascon standard.
5. Low-High limits for the control output (default 0 and 100).
6. Dead band, the band inside which the control Output is maintained constant (0.1...10 digit).
7. Value taken by the control output when the connected measure is in out of range condition.
8. Low/High limits for the Setpoint.
9. Slopes in digit/min applied during Setpoint changes.
10. Setpoint values stored in non volatile memory that can be recalled with specific commands.
11. Control output value at Power ON.

16-4 Word zone - Page 1 Loop2 Parameters

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
30	31	Process Value Loop 2 (PV)	✓	✓	R
31	32	Setpoint (SP)(REF value for D9)[1] Loop 2	✓	✓	R/W
32	33	Main control output Loop2 (MV)	✓	-	R/W[2]
33	34	Target Setpoint Loop2 (SPT)	✓	-	R/W
34	35	Local Setpoit Loop2 (SPL)	✓	✓	R/W[3]
35	36	Proportional band (hysteresis ON/OFF) Loop2	✓	-	R/W[4]
36	37	Overshoot control Loop2	✓	-	R/W[4]
37	38	Integral time Loop2	✓	-	R/W[4]
38	39	Derivative time Loop2	✓	-	R/W[4]
39	40	Cycle time Loop2	✓	-	R/W[4]
40	41	Manual reset Loop2	✓	-	R/W[4]
41	42	Control output high limit Loop2	✓	-	R/W[5]
42	43	Control output low limit Loop2	✓	-	R/W[5]
43	44	PID Dead Band Loop2	✓	-	R/W[6]
44	45	Output safety value Loop2	✓	-	R/W[7]
45	46	Setpoint low limit Loop2	✓	-	R/W[8]
46	47	Setpoint high limit Loop2	✓	-	R/W[8]
47	48	Slope up Setpoint Loop2	✓	-	R/W[9]
48	49	Slope down Setpoint Loop2	✓	-	R/W[9]
49	50	1st stored Setpoint Loop2	✓	✓	R/W[10]
50	51	2nd stored Setpoint Loop2	✓	✓	R/W[10]
51	52	Input filter PV2 measure	✓	✓	R/W
52	53	Input shift PV2 measure	✓	✓	R/W
53	54	Output stored value Loop2	✓	-	R/W[11]
54…59	55…60	-	-	-	R/W

Notes:
1. Current value of the Setpoint stored in the volatile memory; for the D9 module the value is the reference of the deviation and band alarms.
2. To write the output value, is mandatory that the involved loop is in manual status.
3. Setpoint value stored in the non volatile memory.
4. Loop2 PID parameters, Ascon standard.
5. Low-High limits for the control output (default 0 and 100).
6. Dead band, the band inside which the control Output is maintained constant (0.1...10 digit).
7. Value taken by the control output when the connected measure is in out of range condition.
8. Low/High limits for the Setpoint.
9. Slopes in digit/min applied during Setpoint changes.
10. Setpoint values stored in non volatile memory that can be recalled with specific commands.
11. Control output value at Power ON.

16-5 Word zone - Alarms parameters

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
60	61	AL1 alarm threshold	✓	✓	R/W [1]
61	62	AL2 alarm threshold	✓	✓	R/W [1]
62	63	AL3 alarm threshold	✓	✓	R/W [1]
63	64	AL4 alarm threshold	✓	✓	R/W [1]
64	65	AL1 Alarm Hiysteresis	✓	✓	R/W [2]
65	66	AL2 alarm Hysteresis	✓	✓	R/W [2]
66	67	AL3 alarm Hysteresis	✓	✓	R/W [2]
67	68	AL4 alarm Hysteresis	✓	✓	R/W [2]
68	69	AL1 Alarm addressing	✓	✓	R/W [3]
69	70	AL1 alarm type	✓	✓	R/W [3]
70	71	AL1 alarm Latching/Blocking	✓	✓	R/W [3]
71	72	AL1 Alarm output	✓	✓	R/W [3]
72	73	AL2 alarm addressing	✓	✓	R/W [3]
73	74	AL2 alarm type	✓	✓	R/W [3]
74	75	AL2 alarm Latching/Blocking	✓	✓	R/W [3]
75	76	AL2 alarm output	✓	✓	R/W [3]
76	77	AL3 alarm addressing	✓	✓	R/W [3]
77	78	AL3 alarm type	✓	✓	R/W [3]
78	79	AL3 alarm Latching/Blocking	✓	✓	R/W [3]
79	80	AL3 alarm output	✓	✓	R/W [3]
80	81	AL4 alarm addressing	✓	✓	R/W [3]
81	82	AL4 alarm type	✓	✓	R/W [3]
82	83	AL4 alarm Latching/Blocking	✓	✓	R/W [3]
83	84	AL4 alarm output	✓	✓	R/W [3]

Notes: **1.** Thresholds for triggering the alarms.
2. Hysteresis range, expressed as a percentage of the measuring range.
3. For each alarm can be indepently defined: the measuring channel to be considered, alarm type, latching and/or blocking at power-ON and the physical Output connected to the alarm.

16-5-1 Alarms configuration

Detailed information about the alarms configuration follows:

Alarm addressing: AxSr

Value	Action/Meaning
0	The alarm status is determined by the value of the measure PV1; ina case of deviation or band alarms the reference for the threshold is the Loop1 Setpoint
1	The alarm status is determined by the value of the measure PV2; ina case of deviation or band alarms the reference for the threshold is the Loop2 Setpoint

Alarm type: Axtp

Value	Action/Meaning	
0	Disabled	
1	Sensor/Loop Break (Sensor Break only for D9 model)	
2	Absolute high	Absolute
3	Absolute low	
4	Deviation High	Deviation
5	Deviation Low	
6	Band Out active	Band
7	Band IN active	

Alarm Latching/Blocking: Axlb

Value	Action/Meaning
0	The alarm active status is triggered only by the value of the connected measure
1	Applies the latching function to the alarm status: to reset the alarm, it must be acnowledged and the measure must return to a non alarm value
2	Applies the blockung function to the alarm status: the alarm condition is removed during the start UP
3	Both Latching and Blocking function are allied to the alarm status

Alarm output: Ax.O

Value	Action/Meaning
0	The alarm condition is not sent to the phisical outputs; on the associated coil remains the information about the alarm status
1	The alarm condition is associated to OP1
2	The alarm condition is associated to OP2
3	The alarm condition is associated to OP3
4	The alarm condition is associated to OP4

16-6 Word zone - General parameters

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
90	91	Autotune activation	✓	-	R/W[1]
91	92	Loop-Break delay	✓	-	R/W[2]
92	93	Loop1 Setpoint selection	✓	✓	R/W[3]
93	94	Loop2 Setpoint selection	✓	✓	R/W[3]
94	95	Serial communications address	✓	✓	R/W
95	96	Instrument position	✓	✓	R/W

Notes: 1. Command to run the Autotune procedure; using the write command can be selected the loop to be autotuned.

Autotune activation: tune

Value	Action/Meaning	
	Writing	**Read status**
0	No action	No Autotune procedure active
1	Runs the Autotune on Loop1	Autotune active on Loop1
2	Runs the Autotune on Loop2	Autotune active on Loop2

2. Delay, in seconds, for the intervention of the Sensor/Loop Break alarm; the value 0 causes the immediate triggering.

Tune enabling

Value	Action/Meaning	
0	The Autotune functions are disabled on both the loops; all the tune execution commands are ignored	
1	Enables Loop1 Autotune	Command to run the Autotune procedure
2	Enables Loop2 Autotune	

3. Select the Setpoint source for both the loops.

Setpoint selection: S.SELx

Value	Action/Meaning	
0	Local Setpoint	The stored Setpoints can be separately recalled for both the loops.
1	1st stored Setpoint	
2	2nd stored Setpoint	

16-7 Word zone - Configuration

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
96	97	Enhanced Overshoot control management Loop1	✓	-	R/W[1]
97	98	Enhanced Overshoot control management Loop2	✓	-	R/W[1]
98...100	99...101	-	-	-	-
101	102	1st Configuration code	✓	✓	R/W[2]
102	103	2nd Configuration code	✓	-	R/W[2]
103	104	-	-	-	-
104	105	PV1 Engineering units	✓	✓	R/W[3]
105	106	PV Decimal point	✓	✓	R/W[4]
106	107	Low range for engineering units PV1	✓	✓	R/W[5]
107	108	High range for engineering units PV1	✓	✓	R/W[5]
108	109	Engineering units PV2	✓	✓	R/W[3]
109	110	PV2 Decimal point	✓	✓	R/W[4]
110	111	Low range for engineering units PV2	✓	✓	R/W[5]
111	112	High range for engineering units PV2	✓	✓	R/W[5]
112..114	113...115	-	-	-	-
115	116	Communications protocol	✓	✓	R/W[6]
116	117	Baud rate	✓	✓	R/W
117	118	IL digital input function	✓	✓	R/W[7]
118...119	119...120	-	-	-	-
120	121	Factory code (600 = Ascon)	✓	✓	R/(W)
121	122	Product code (“D2”)/(“D9”)	✓	✓	R
122	123				
123	124	Software release code (e.g. “ 00A”)	✓	✓	R
124	125				

Address					
Modbus	**Jbus**	**Variable**	**D2**	**D9**	**Type**
125	126	Custom code	✓	✓	R
126...127	127...128	-	-	-	-
999	1000	Reset	✓	✓	W[8]

Notes: **1.** Defines the range inside which the overshoot control is disabled.

2. See Chapter 6.

3. Units selection connected to PV1 or PV2 measures. This setting causes changes to the measure only when temperature units (celsius/fahrenheit) are selected. For linear scales the selection causes no effects.

Engineering units: Unitx

Value	Action/Meaning
0	Celsius degrees
1	Fahrenheit Degrees
2	None
3	mV
4	Volt
5	mA
6	Ampere
7	Bar
8	PSI
9	Rh
10	pH

4. Valid values between 0 and 3 decimals.

5. Settable in the range -999/9999. The difference between the two values must be at least 100.

6. Selection of the Modbus/Jbus notation for registers addressing.

7. Defins the functionality connected to the IL logical input.

IL confuguration

Value	Action/Meaning	D2	D9
0	No functions	✓	✓
1	Hold measure input 1 (PV1)	✓	✓
2	Hold measure input 2 (PV2)	✓	✓
3	Hold both the input measures (PV1 + PV2)	✓	✓
4	Outputs lock	✓	✓
5	Alarms acknowledgement	✓	✓
6	1st stored Setpoint selection Loop1 (S.sel1=1)	✓	✓
7	1st stored Setpoint selection Loop2 (S.sel2=1)	✓	✓
8	2nd stored Setpoint selection for both the loops (S.sel1=S.Sel2=2)	✓	✓
9	Loop1 Auto/Man	✓	-
10	Loop2 Auto/Man	✓	-
11	Auto/Man for both the Loops	✓	-

8. When writing in the Reset code (298) the instrument executes a cold reset.

Chapter 17
D3 controller

17-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	-	-
1	2	Auto/Man (0 = Automatic, 1 = Manual)	R/W
2	3	OP4 logical output status (0 = OFF, 1 = ON)	R
3	4	OP1 digital output status (0 = OFF, 1 = ON)	R
4	5	OP2 digital output status (0 = OFF, 1 = ON)	R
5	6	OP3 digital output status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Normal operation, 1 = Safety)	R
7	8	Auto-Tune (0 = Disabled, 1 = Run)	R
8	9	Timer function status (0 = OFF, 1 = Run)(note)	R/W
9	10	Out of range (0 = Normal operation, 1 = Safety)	R
10	11	-	-
11	12	Output status (0 = not influenced, 1 = forced to OFF)	R/W
12	13	IL Digital input status (0 = OFF, 1 = ON)	R
13	14	Tune Fail	R
14	15	-	-
15	16	Latching alarms acknowledgement	W

Note: Only available with Timer option.

17-2 Read status

Function 07 (Read Status) returns an eight bit status with the following

Bit	Address	Variable
1 (LSB)	1	-
2	2	Auto/Man (0 = Automatic, 1 = Manual)
3	3	OP4 logical output status (0 = OFF, 1 = ON)
4	4	OP1 digital output status (0 = OFF, 1 = ON)
5	5	OP2 digital output status (0 = OFF, 1 = ON)
6	6	OP3 digital output status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Normal operation, 1 = Safety)
8 (MSB)	8	Auto-Tune (0 = Disabled, 1 = Run)

17-3 Word zone - Page 1 Parameters

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	PV process variable	R
1	2	SP Setpoint	R/W [1]
2	3	Main output	R(/W) [2]
3	4	Target Setpoint	R/W [1]
4	5	SPL local Setpoint	R/W [3]
5	6	Proportional band (Hysteresis ON - OFF)[4]	R/W
6	7	Overshoot control	R/W
7	8	Integral time	R/W
8	9	Derivative time	R/W
9	10	Control output cycle time	R/W
10	11	Low range	R
11	12	High range	R
12	13	AL2 alarm threshold	R/W
13	14	AL3 alarm threshold	R/W
14	15	AL2 Alarm Hysteresis	R/W
15	16	AL3 Alarm Hysteresis	R/W
16	17	Relative Cold Gain	R/W
17	18	Cool output Hysteresis (ON-OFF only)	R/W
18	19	-	-
19	20	Heat/Cool Dead band	R/W
20	21	Cool cycle time	R/W
21	22	Cool output maximum value	R/W
22	23	Motor travel time	R/W
23	24	Minimum output step	R/W
24	25	Timer setting	R/W
25	26	Stand-by Setpoint	R/W
26	27	Soft-start output value	R/W
27	28	Soft-start activation time	R/W
28	29	Manual reset	R/W
29	30	Setpoint low limit	R/W
30	31	Setpoint high limit	R/W
31	32	Error Dead Band	R/W
32	33	Control output high limit	R/W
33	34	Output safety value	R/W
34	35	Slope up	R/W
35	36	Slope down	R/W
36	37	Input filter	R/W
37	38	Input shift	R/W
38	39	Start/Stop One shot tuning (0=Stop 1=Run)	R/W
39	40	Enhanced overshoot control management	R/W
40	41	Serial communications address	R/W
41	42	-	-
42	43	Retransmission low range	R/W
43	44	Retransmission high range	R/W

Address			
Modbus	**Jbus**	**Variable**	**Type**
44	45	Start-up Setpoint	R/W
45	46	Start-Up Hold time	R/W
46	47	Output high limit during Start-up	R/W
47	48	Timer remaining time	R/W
48	49	-	-
49	50	Setpoint selection	R/W
50	51	1st stored Setpoint	R/W
51	52	2nd stored Setpoint	R/W
52...55	53...56	-	-
56	57	AL1 alarm threshold	R/W
57	58	AL1 Alarm Hysteresis	R/W
58	59	AL1 latching and blocking functions	R/W [17]
59	60	AL2 latching and blocking functions	R/W [17]
60	61	AL3 latching and blocking functions	R/W [17]
61	62	LBA delay	R/W
62	63	Instrument position [7]	-
63	64	Read the first 16 coils on word (B.O.R. = Bit On Register)[18]	R
64… 100	65… 101	-	-

17-4 Word zone - Page 2 Configuration

Address			
Modbus	**Jbus**	**Variable**	**Type**
101	102	1st Configuration code	R/W [5]
102	103	2nd Configuration code	R/W [5]
103	104	Engineering units	R/W [5/9]
104	105	Decimal point	R/W [5]
105	106	Low range for engineering units	R/W [5]
106	107	High range for engineering units	R/W [5]
107	108	Communications protocol	R/W [10]
108	109	Baud rate	R/W [11]
109	110	Continuous control output range	R/W [12]
110	111	Retransmitted signal selection	R/W [13]
111	112	-	-
112	113	Password	R/W
113	114	RTX low range calibration value (Reserved)	R/W
114	115	RTX high range calibration value (Reserved)	R/W
115	116	Timer/Start-up operating mode	R/W [14]
116	117	Timer action	R/W [15]
117	118	IL digital input function	R/W [16]
118..119	119..120	-	-

Address			
Modbus	**Jbus**	**Variable**	**Type**
120	121	Factory code (600 = Ascon)	R(W) [6]
121	122	Product code ("**D3** ") [7]	R
122	123	-	-
123	124	Software release code (e.g. " **00A**") [7]	R
124	125	-	R
125	126	Custom code	-
126	127	-	-
127	128	-	-

Notes:
1. Assignment of Setpoint to the addresses Jbus 2 and 4 writes the Computer Setpoint (local Setpoint).
2. Assignment of output at the address Jbus 3 is only possible when the controller is in Manual mode.
3. Assignment of Setpoint to the address Jbus 5 writes the Local Setpoint (the previous value is lost).
4. In case of ON - OFF output (address Jbus 6) the proportional band is substituted by the output Hysteresis.
5. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.
6. The Jbus 122+123 and 124+125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.
7. The instrument position is set by a value between 0... 2;
   0 = stand alone;
   1 = the instrument is part of a system but stays on a side;
   2 = any other position.
8. To edit properly an output you have to check that this output is not used for other options.
9. To select the engineering unit, a value between 0 and 10 must be assigned as shown in the following table:

Engineering unit	Serial value
°C	0
°F	1
None	2
mV	3
V	4
mA	5
A	6
bar	7
PSI	8
rh	9
Ph	10

10. To select the protocol type, the value between 0 and 1 must be assigned as shown in the following table:

Protocol type	Serial value

Modbus	0
Jbus	1

11. To select the serial comm.s baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

12. To select the retransmission sautput range, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted output range	Serial value
0... 20 mA	0
4... 20 mA	1

13. To select the retransmission signal type, a value between 0 and 1 must be assigned as shown in the following table:

Retransmitted variable (PV or SP)	Serial value
PV	0
SP	1

14. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the following table:

Timer/Start-up operating mode	Serial value
Disabled	0
Start-up	1
Counting inside a range	2
Counting inside a range/End mode OFF	3
Counting when launched	4
Counting when launched/End mode OFF	5
Counting disable when launched	6
Stand-by Setpoint	7

15. To select the Timer/Start-up operating mode, a value between 0 and 7 must be assigned as shown in the following table:

Timer action			Serial value
Launch	**AL3 Status**	**Time**	
Serial	Disabled	Seconds	0
Serial	ON	Seconds	1
Power ON	Disabled	Seconds	2
Power ON	ON	Seconds	3
Serial	Disabled	Minutes	4
Serial	ON	Minutes	5
Power ON	Disabled	Minutes	6

Power ON	ON	Minutes	7

16. To select the Digital input function, a value between 0 and 9 must be assigned as shown in the following table:

Digital input function	Serial value
Not used	0
-	-
Hold P.V.	2
Manual mode	3
-	-
Recall 1st stored Setpoint	5
Recall 2nd stored Setpoint	6
-	-
Run Timer	8
-	-

17. To select the alarms intervetion condition must be assigned a value selected from those inserted in the following table:

Alarm condition	Serial value
No action	0
Latching	1
Blocking	2
Latching/Blocking	3

18. Using this register is possible to read the coils status. The number taken from the instrument is equal to the sum of the active coil as shown in the following table:

Coil address	Function	Value
1	Not used	0
2	Auto/Man	2
3	OP4	4
4	OP1	8
5	OP2	16
6	OP3	32
7	Out of range	64
8	Auto-Tune	128
9	Timer	256
10	Out of range	512
11	Not used	0
12	Output status	2048
13	IL 1	4096
14	Tune Fail	8192
15	-	-
16	-	-

Chapter 18
D7 data acquisition module

18-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0...2	1...3	-	-
3	4	OP1 digital output status (0 = OFF, 1 = ON)	R
4	5	OP2 digital output status (0 = OFF, 1 = ON)	R
5	6	AL3 alarm status (0 = OFF, 1 = ON)	R
6	7	Out of range (0 = Valid value, 1 = Out of range)	R
7...8	8...9	-	-
9	10	Out of range (0 = Valid value, 1 = Out of range)	R
10	11	-	-
11	12	Output status (0 = not influenced, 1 = forced to OFF)	R/W
12	13	IL Digital input status (0 = OFF, 1 = ON)	R
13...14	14...15	-	-
15	16	Latching alarms acknowledgement	W

18-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	-
2...3	2...3	-
4	4	OP1 digital output status (0 = OFF, 1 = ON)
5	5	OP2 digital output status (0 = OFF, 1 = ON)
6	6	AL3 alarm status (0 = OFF, 1 = ON)
7	7	Out of range (0 = Valid value, 1 = Out of range)
8 (MSB)	8	-

18-3 Word zone - Page 1 Parameters

Address		Variable	Type
Modbus	Jbus		
0	1	PV process variable	R
1	2	Alarms reference value	R/W[1]
2...3	3...4	-	-
4	5	Alarms local reference value	R/W[1]
5...9	6...10	-	-
10	11	Low range	R
11	12	High range	R
12	13	AL2 alarm threshold	R/W
13	14	AL3 alarm threshold	R/W
14	15	AL2 Alarm Hysteresis	R/W
15	16	AL3 Alarm Hysteresis	R/W
16...28	17...29	-	-
29	30	Reference value low limit	R/W
30	31	Reference value high limit	R/W
31...35	32...36	-	-
36	37	Input filter	R/W
37	38	Input shift	R/W
38...39	39...40	-	-
40	41	Serial communications address	R/W
41	42	-	-
42	43	Retransmission low range	R/W
43	44	Retransmission high range	R/W
44...55	45...56	-	-
56	57	AL1 alarm threshold	R/W
57	58	AL1 Alarm Hysteresis	R/W
58	59	AL1 latching and blocking functions	R/W [12]
59	60	AL2 latching and blocking functions	R/W [12]
60	61	AL3 latching and blocking functions	R/W [12]
61	62	LBA delay	R/W
62	63	Instrument position [8]	-
63	64	Reads the first 16 coils on word (B.O.R. = Bit On Register)[10]	R
64...100	65...101	-	-

18-4 Word zone - Page 2 Configuration

Address		Variable	Type
Modbus	Jbus		
101	102	1st Configuration code	R/W [5]
102	103	2nd Configuration code	R/W [5]
103	104	Engineering units	R/W [7]
104	105	Decimal point	R/W [1]

Address			
Modbus	**Jbus**	**Variable**	**Type**
105	106	Low range for engineering units	R/W [1]
106	107	High range for engineering units	R/W [1]
107	108	Communications protocol	R/W [8]
108	109	Baud rate	R/W [9]
109	110	Continuous control output range	R/W [10]
110...111	111...112	-	-
112	113	Password	R/W
113	114	RTX low range calibration value (Reserved)	R/W
114	115	RTX high range calibration value (Reserved)	R/W
115...116	116...117	-	-
117	118	IL digital input function	R/W [11]
118...119	119...120	-	-
120	121	Factory code (600 = Ascon)	R(W) [2]
121	122	Product code ("**D7** ") [7]	R
122	123	2nd byte of product code	R
123	124	Software release code (e.g. " **00A**") [7]	R
124	125	2nd byte release code	R
125...127	126...128	-	-

Notes:

1. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the reconfiguration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.

2. The Jbus 122+123 and 124+125 addresses contain the strings (of 4 characters) for the product and release codes: each address represents two characters, the most significant byte in the word contains the ASCII code of the second.

3. The instrument position is set by a value between 0... 2; 0= stand alone; 1= the instrument is part of a system but stays on a side; 2= any other position.

4. To select the engineering unit, a value between 0 and 10 must be assigned as shown in the following table:

Engineering unit	Serial value
°C	0
°F	1
None	2
nU	3
U	4
nA	5
A	6
bar	7
PSI	8
rh	9
Ph	10

5. To select the protocol type, a value between 0 and 1 must be assigned as shown in the following table:

Protocol type	Serial value
Modbus	0

Jbus	1

6. To select the serial communications baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

7. To select the retransmission signal type, the value between 0 and 1 must be assigned as per the below table:

Retransmitted output range	Serial value
0... 20 mA	0
4... 20 mA	1

8. To select the digital input function “measure hold” a “2” value must be assigned.
9. To select the alarms intervetion condition must be assigned a value selected from those inserted in the following table:

Alarm condition	Serial value
No action	0
Latching	1
Blocking	2
Latching/Blocking	3

10. Using this register is possible to read the coils status. The number taken from the instrument is equal to the sum of the active coil as shown in the following table:

Coil address	Function	Value
1	Not used	0
2	Auto/Man	2
3	Not used	0
4	OP1	8
5	OP2	16
6	AL3	32
7	Out of range	64
8	Auto-Tune	128
9	Timer	256
10	Out of range	512
11	Not used	0
12	Output status	2048
13	IL 1	4096
14	Tune Fail	8192
15	-	-
16	-	-

Chapter 19
D8 I/O module

19-1 Bit zone

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	Internal logical status DI1	R
1	2	Internal logical status DI2	R
2	3	Internal logical status DI3	R
3	4	Internal logical status DI4	R
4	5	Internal logical status DI5	R
5	6	Internal logical status DI6	R
6	7	Internal logical status DO1	R/W
7	8	Internal logical status DO2	R/W
8	9	TOGGLE - DI1	R
9	10	TOGGLE - DI2	R
10	11	TOGGLE - DI3	R
11	12	TOGGLE - DI4	R
12	13	TOGGLE - DI5	R
13	14	TOGGLE - DI6	R
14	15	FLIP-FLOP 1	R
15	16	FLIP-FLOP 2	R/
16	17	FLIP-FLOP 3	R
17	18	HOLD output DO1 enable	R/W
18	19	HOLD output DO2 enable	R/W
19	20	Output DO1 status at Power-ON	R/W
20	21	Output DO2 status at Power-ON	R/W
22	23	Status retention	R/W
23...31	24...32	-	-
32	33	NOT enable - DI1	R/W
33	34	NOT enable - DI2	R/W
34	35	NOT enable - DI3	R/W
35	36	NOT enable - DI4	R/W
36	37	NOT enable - DI5	R/W
37	38	NOT enable - DI6	R/W
38	39	NOT enable - DO1	R/W
39	40	NOT enable - DO2	R/W
40...42	41...43	-	-

43	44	Timer 1 Enable	R/W
44	45	Timer 1 Reset in Memory	R/W
45	46	Timer 1 Event (Output Status)	R
46	47	Timer 1 Trigger in Memory	R/W
47	48	Timer 2 Enable	R/W
48	49	Timer 2 Reset in Memory	R/W
49	50	Timer 2 Event (Output Status)	R
50	51	Timer 2 Trigger in Memory	R/W

Note: For writing coils, the logical status 1 causes the activation of the connected function.

19-2 Read status

Function 07 (Read Status) returns an eight bit status with the following meanings:

Bit	Address	Variable
1 (LSB)	1	Physical input status from the field (LED) - DI1
2	2	Physical input status from the field (LED) - DI2
3	3	Physical input status from the field (LED) - DI3
4	4	Physical input status from the field (LED) - DI4
5	5	Physical input status from the field (LED) - DI5
6	6	Physical input status from the field (LED) - DI6
7	7	Physical output status to the field (LED) - DO1
8 (MSB)	8	Physical output status to the field (LED) - DO2

Note: When the frequency reading on D1 and/or DI2 is active, their bits report the physical status of the input port.

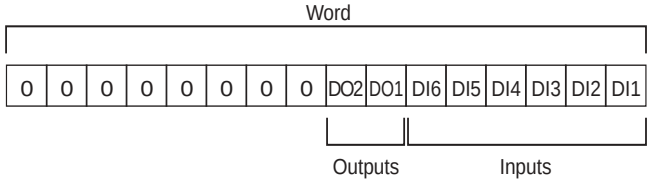
19-3 Word zone

19-3-1 Page 1 - Parameters

Address			
Modbus	**Jbus**	**Variable**	**Type**
0	1	Internal logical status of the inputs (bits 1...6) and of the outputs (bits 7... 8) (1)	R
1	2	DI1 frequency (2)	R
2	3	DI2 frequency (2)	R
3	4	PWM frequency (3)	R/W
4	5	Duty Cycle output DO1 (4)	R/W
5	6	Duty Cycle output DO2 (4)	R/W
6	7	Duty Cycle output DO1 at Power-On (4)	R/W
7	8	Duty Cycle output DO2 at Power-ON (4)	R/W
8...29	9...30	-	-
30	31	Input filter DI1 (5)	R/W
31	32	Input filter DI2 (5)	R/W
32	33	Input filter DI3 (5)	R/W

33	34	Input filter DI4 (5)	R/W
34	35	Input filter DI5 (5)	R/W
35	36	Input filter DI6 (5)	R/W
36...39	37...40	-	-
40	41	Instrument address	R/W
41...48	42...49	-	-
49	50	Timer 1 - Type	R/W
50	51	Timer 1 - Digital Input associated to Trigger	R/W
51	52	Timer 1 - Digital Input associated to Reset	R/W
52	53	Timer 1 - Digital Output associated to Timer	R/W
53	54	Timer 1 - Enable status at startup	R/W
54	55	Timer 1 - Period Time Base (TP)	R/W
55	56	Timer 1 - ON Period Time Base (TOn)	R/W
56	57	Timer 1 - Period selection (TP)	R/W
57	58	Timer 1 - ON Period selection (TOn)	R/W
58	59	Timer 1 - Enable (TEn)	R/W
59	60	Timer 1 - Reset	R/W
60	61	Timer 1 - Event	R
61	62	Timer 1 - Status	R
62	63	Timer 1 - Trigger in memory	R/W
63	64	Timer 1 - Type	R/W
64	65	Timer 2 - Digital Input associated to Trigger	R/W
65	66	Timer 2 - Digital Input associated to Reset	R/W
66	67	Timer 2 - Digital Output associated to Timer	R/W
67	68	Timer 2 - Enable status at startup	R/W
68	69	Timer 2 - Period Time Base (TP)	R/W
69	70	Timer 2 - ON Period Time Base (TOn)	R/W
70	71	Timer 2 - Period selection (TP)	R/W
71	72	Timer 2 - ON Period selection (TOn)	R/W
72	73	Timer 2 - Enable (TEn)	R/W
73	74	Timer 2 - Reset	R/W
74	75	Timer 2 - Event	R
75	76	Timer 2 - Status	R
76	77	Timer 2 - Trigger in memory	R/W

Notes: **1.** The Word contains, in the less important portion of the byte (bits 1...6), the logical status of the 6 input ports, in the last two bits (bits 7...8) it contains the internal logical status of the to output ports (DO1 e DO2). The remaining Word part (bits 7... 16) is set to 0.



2. The frequency value measured on inputs DI1 and DI2 is expressed in Hz and the admitted range is 0.1...10 kHz.

3. While assigning or changing the PWM frequency, both DO1 Duty Cycle and DO2 Duty Cycle are reset to the "*Duty cycle DO_ at Power-ON*" parameter value, to use a different Duty Cycle value, is necessary to set it again

manually. The PWM frequency is expressed in units of 0.1 Hz, valid values are those between 0 and 10000 units (0...1 kHz).

4. The Duty Cycle is expressed as a percentage of the output activation in connection with the assigned PWM frequency, the resolution is 0.1% and the setting range 0... 1000 units (0... 100%).
5. Changing the filter value of any of the inputs, causes the instrument reset. This type of reset, initialises the outputs status and the Duty cycle to those values inserted as Power-ON defaults. The filter value represents the minimum time a logical status of the input signal must persists in order to update the connected internal logical status, it is expressed in units of 16 ms. Valid values start form 0 (filter disabled) to 255 (about 4 seconds).

19-3-2 Page 2 - Configuration

Address			
Modbus	**Jbus**	**Variable**	**Type**
96...100	97...101	-	-
101	102	Configuration code	R/W [1]
102...106	103...107	-	-
107	108	Communications protocol	R/W [2]
108	109	Baud rate	R/W [3]
109...119	110...120	-	-
120	121	Factory code (600 = Ascon)	R(W) [4]
121	122	Product Code (“**D8** ”)	R
122	123		R
123	124	Software Release (e.g. “ **00A**”)	R
124	125		R

Notes:

1. All the configuration parameters are accepted, if valid, but not brought into effect. To execute the re-configuration procedure and bring the changes into effect, the code 55AAh must be written at the address Jbus 121.
2. To select the protocol type, a value between the 2 listed in the table that follows must be assigned:

Protocol type	Serial value
Modbus	0
Jbus	1

3. To select the serial communications baud rate, a value between 0 and 3 must be assigned as shown in the following table:

Baud Rate	Serial value
1200	0
2400	1
4800	2
9600	3

4. Address Jbus 121 is read only, but if the code 55AAh (21930d) is written at this address, the configuration is brought into effect.

Chapter 20
Configuration software for γ2 and δ2 controllers

The Controller explorer **software** can be used with all the gamma**due**®, delta**due**® instruments and **XF** controlle**r**.
Instruments **C1, M1, M3** and **M4** without the RS 485 communications option can be configured using this software, but the special cable APG2SCI, (available separately), will be required to interface between the computer port and the instrument.
For instruments **C1, M1, M3** and **M4** without the RS 485 communications option, connect the special cable APG2SCI to a spare port on the computer and the crimp connectors to terminals 10 – brown and 11 – black on the instrument. The computer and the instrument should be turned off during this procedure.
For instruments **C1, M1, M3** and **M4**, terminals 10 and 11 are also the SSR drive voltage output. To avoid a communication error, open circuit the sensor input terminals, to prevent the SSR drive output from turning on. Also, for previously configured instruments, ensure that the configuration code, '[onF' and 'conF' ends in a '0' e.g. 2000, i.e. Alarm 2 is turned off and that the SSR drive voltage output is not used as main output.

20-1 Use of instruments with the RS 485 communications option

For instruments **C1, M1, M3** and **M4** with the RS 485 communications option, the connection must be made using an isolated RS 232C to RS 485 (2 wires) converter and a standard RS 232C cable.
To use instruments **C1, M1, M3** and **M4** with the RS 485 communications option using an RS 232C to RS 485 converter, connect a standard RS 232C cable between a spare port on the computer and the RS 232C port of the converter. Connect the RS 485 terminals of the converter to terminals 7 (+) and 8 (–) of the instrument. Please note that the converter must be isolated and handle the RTS signal. The **AA9HWC125GD** RS 232C to RS 485 converters, (24VDC + **AZT1300** power supply for 230VAC, available separately) are suitable to perform this function. The computer, converter and the instrument should be turned off during this procedure.
For instruments **M5, X1, X3, X5** and **XF** with the RS 485 communications option, connect a standard RS 232C cable between the computer and an isolated RS 232C to RS 485 converter as above. The computer and the converter should be turned off during this procedure.
When running RS 485 cables a long distance, up to 1200 metres, a specific data transfer cable should be used with a low capacitance per metre. As lower is the capacitance per metre, as longer can be the cable length. Suitable cables are as follows:
Belden type 9729 Impedance 100Ω Capacitance = 41pF/m
Belden type 9502 Impedance 150Ω Capacitance = 98pF/m

For instruments **M5, X1, X3, X5** and **XF** with the RS 485 communications option, connect the RS 485 terminals of the RS 232C to RS 485 converter to the terminals of the instrument as shown in the table below. The computer, the converter and the instrument should be turned off during this procedure.

Controller	Instrument terminal N°	RS-485 terminal
C1 – M1	7	+
C1 – M1	8	-
M3 – M4	7	+
M3 – M4	8	-
M5	7	+
M5	8	-
M5	9	Common
M6	7	+
M6	8	-
M6	9	Common
X1 – X3 – Q1 – Q3	1	+
X1 – X3 – Q1 – Q3	2	-
X1 – X3 – Q1 – Q3	3	Common
X5 – Q5	13	+
X5 – Q5	14	-
X5 – Q5	15	Common

For instruments **M5, X1, X3 X5, Q1**, **Q3** and **Q5** without the RS 485 communications option, connect a standard RS232C cable to a spare port on the computer and the appropriate wires to the instrument as shown in the table below. The computer and the instrument should be turned off during this procedure.

Controller	Instrument terminal N°	9-Way port Pin N°	25-Way port Pin N°
M5	7	2	3
M5	8	3	2
M5	9	5	7
M6	7	2	3
M6	8	3	2
M6	9	5	7
X1 – X3 – Q1 – Q3	1	2	3
X1 – X3 – Q1 – Q3	2	3	2
X1 – X3 – Q1 – Q3	3	5	7
X5 – Q5	13	2	3
X5 – Q5	14	3	2
X5 – Q5	15	5	7

Turn on the power to the computer and the instrument (and the RS 232C to RS485 converter if used).
For those C1, M1, M2, M3, M4 instruments without the optional communications RS485 port, connect the specific serial converter APG2SCI to an unused serial port

of the computer and the two communications wires to the instrument's logical output terminals, which must obviously be not configured as alarm or control output.

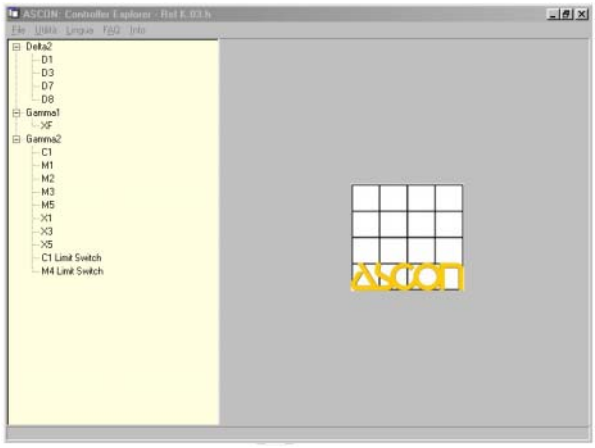
Controller	Instrument terminal N°
C1 – M1	10 +
C1 – M1	11 -
M2 – M3 – M4	10 +
M2 – M3 – M4	10 -

20-2 To load the software

Insert the CD-ROM: the installation page should open automatically if autorun is active; if not, access your CD-ROM and double click the 'Install.exe' icon file.

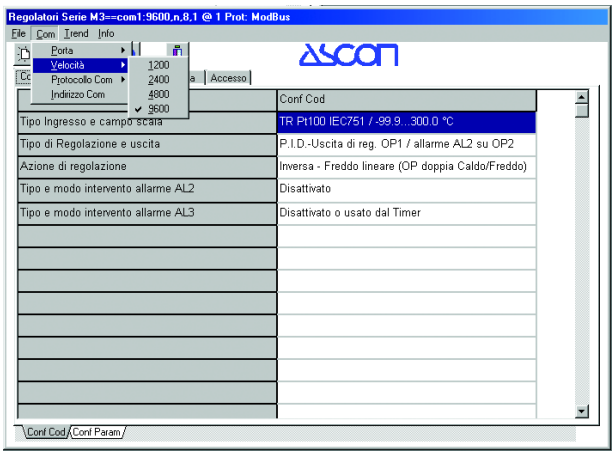
20-3 To enter the configuration software

After loading the software, enter the program by clicking: 'Start'; 'Programs'; 'Ascon DIN Controllers' and then clicking on the required instrument, e.g. 'M3'.

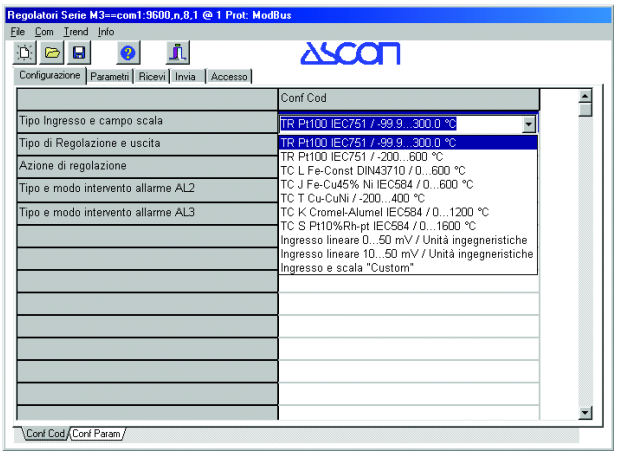


20-4 Configuration software settings

Click on '**Comms'** and '**Port'** and ensure that the port number corresponds to the one being used on the computer. Click on the correct port number if there is a check mark by the wrong setting.
Click on '**Comms'** and '**BaudRate'** and ensure that it is set to 9600 for instruments without the RS 485 communications option. For instruments with RS 485, ensure that the setting in the configuration software is the same as in the instrument. Correct if there is a check mark by the wrong value.



Click on '**Comms'** and '**Protocol'** and ensure that it is set to 'Jbus' for instruments without the RS 485 communications option. For instruments with RS 485, ensure that the setting in the configuration software is the same as in the instrument. Correct if there is a mark by the wrong setting.
Click on the tabs '**Configuration'**, '**Parameters'** and '**Access'** (as illustrated hereafter) and select the settings required.



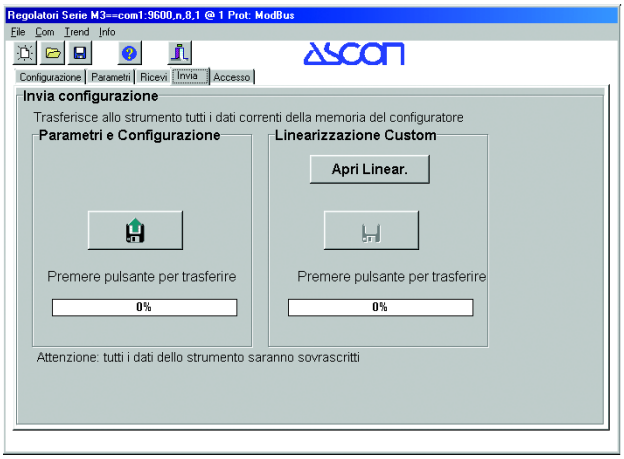
For a detailed description of all parameters, please see the instrument instruction manual.

20-5 To store the screen settings into the instrument

Click on the tab '**Download Cnf'**. Click on the floppy disk 'icon' under the heading 'Parameters and Configuration' to store the screen settings into the instrument.

20-6 To load a custom sensor configuration

Click on the tab '**Download Cnf'**. Click on '**Open'** under the heading '**Custom TC**' if it is required to load a custom sensor configuration from the selection of stored characteristics.

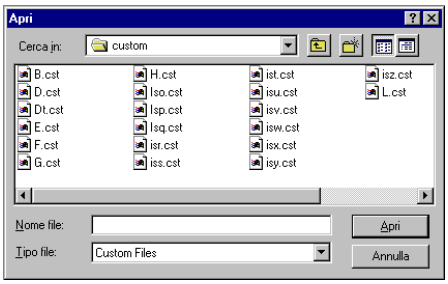


The following custom sensor file options are available:

File name	Sensor Type	Range	Instrument
A	Standard linearisation stored in the instrument		
B.cst	ΔT (2 x RTD Pt100)	-50.0…50.0°C	No M5, M6, X5, Q5
C (file-name)	"Custom" linearisation defined by extra documentation		
D.cst	Thermocouple type B	0…1800°C	
E.cst	Thermocouple type N	0…1300°C	
F.cst	RTD Pt100	0.0…200.0°C	No M5, M6, X5, Q5
G.cst	Thermocouple type E	-200…400°C	
H.cst	Input fixed value 50.0	0…100.0	No M5, M6, X5, Q5
L.cst	RTD Pt100	-99.9…600.0°C	No M5, M6, X5, Q5
M.cst	Thermocouple type J	0.0...50.0	No M5, M6
Isn.cst	IR sensor model K-80F/27C	-50...200°C	
Iso.cst	IR sensor model J-50F/10C	0...300°C	
Isp.cst	IR sensor model 5XPCHiE	120...2000°C	
Isq.cst	IR sensor model 20316PCHiE	400...700°C	
Isr.cst	IR sensor model K-80F/27C (Ascon ZIS-01/ KR 0.200)	0…200°C	
Iss.cst	IR sensor model K-440F/220C (Ascon ZIS-1X/KS 0.650 and Ascon ZIS-3X/KS 0.650)	0…650°C	
Ist.cst	IR sensor model K-340F/170C	0...650°C	
Isu.cst	IR sensor model K-280F/140C	0...400°C	
Isv.cst	IR sensor model K240F/120C	0...600°C	
Isw.cst	IR sensor model K-180F/90C	0...600°C	
Isx.cst	IR sensor model K-140F/60C	0…500°C	
Isy.cst	IR sensor model K-80F/27C	0...400°C	
Isz.cst	IR sensor model K-50F/10C	0…400°C	
Amin.cst	0…60mV no Cold Junction Comp.	0…300	No M5, M6

File name	Sensor Type	Range	Instrument
Bmin.cst	0…60mV no Cold Junction Comp.	0…500	No M5, M6
Cmin.cst	Thermocouple type K	-100…1200°C	
emin.cst	Thermocouple type W3	0…2000°C	No M5, M6, X5, Q5
fmin.cst	Thermocouple type W5	0…2000°C	
gmin.cst	Thermocouple type K	0.0…600.0°C	No M5, M6
hmin.cst	Thermocouple type J	-50.…600.0°C	
imin.cst	Thermocouple type T	-200.0…400.0°C	No M5, M6
jmin.cst	Thermocouple type K	-50.0…300.0°C	No M5, M6
kmin.cst	Thermocouple type E	0…300°C	
lmin.cst	RTD Pt100	0…300°C	
lsqmin.cst	IR sensor model 2038PCHiE	320...980°C	
lsrmin.cst	IR sensor model K-80F/220C	0.0...200.0°C	
lssmin.cst	IR sensor model K-440F/27C	0.0...650.0°C	
mmin.cst	Thermocouple type E	0…400°C	
nmin.cst	RTD Pt100	0…400°C	

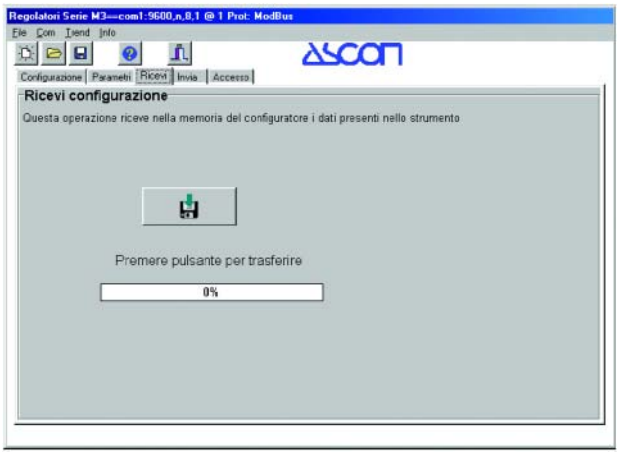
Click on the required configuration and select '**OK**'. Click on the floppy disk 'icon' under the heading '**Custom TC**' to store the new custom sensor configuration into the instrument.



20-7 To clone several instruments

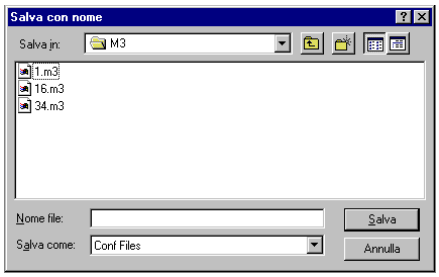
To clone several instruments from one that has been programmed with required values, connect this instrument to the computer according to the instructions above. Click on the tab 'Upload Cnf'. Click on the floppy disk 'icon' under the heading 'Upload Configuration', to copy the instrument settings onto the screen. Turn off the power to the instrument, un-plug it from its housing, plug-in a new instrument and turn on the power. Click on the tab 'Download Cnf'. Click on the floppy disk 'icon' under the heading 'Parameters and Configuration' to store the

screen settings into the instrument. Another new instrument can be plugged in and the floppy disk 'icon' clicked again if required.



20-8 To store the screen settings as a file

To store the screen settings as a file, which can be saved as a permanent record and used at a later date to copy into another controller, click on 'File' and then 'Save', or click on the save 'icon' at the top of the window. In either case, a 'Save as' window will open, with a highlighted file name shown as *.m3 (for M3 controller), *.m4 (for M4 controller), *.c1 (for C1 or M1 controllers), *.m5 (for M5 controllers), etc. Over-type the * with the filename required, leaving the .m3, .c1, etc. as the file extension, as in normal Windows® practice. Click 'OK'. In any case the program sets automatically the suffix of the corresponding instrument.



Simultaneously to the saving of the binary format of the configuration, the program writes, with the same path, a text file which includes the configuration parameters.

Example:

Address	Description	Value
7	Overshoot Control	1.00
30	Setpoint Low Limit	0
31	Setpoint High Limit	9999
35	Setpoint Ramp Up	0.1
36	Setpoint Ramp Down	0.1
6	Proportional Band	50
8	Integral Time	50
9	Derivative Time	100
5	AL1 alarm threshold	100
13	AL2 alarm threshold	250

Address	Description	Value
6	AL1 Hysteresis	5
15	AL2 Hysteresis	5
37	Filter Time constant	Off
38	Input Shift	0
33	Control Output High Limit	100.0
10	Cycle time	20
41	Communication Address	1
109	Baud Rate	9600
108	Communication Protocol	JBus
0	Tune	Stop
0	Input Type and Range	TR Pt100 IEC751 / -99.9…300.0°C
105	N° of Decimals	0
104	Engineering Units	Centigrade Degrees
0	Control mode – Output configuration	PID – Control OP2 / alarm AL2 on OP1
0	Type of Control and Safety	Reverse (AL1 active) – Safety 0%
0	Alarm 2 type and function	Absolute
106	Low Range for Engineering Units	0
107	High Range for Engineering Units	9999
113	Conf Pass	33
102	Conf Pass	0
4	Set Point	200

20-9 To recall a previously stored file

To recall a **previously stored file**, click on ‘File’ and then ‘Open’, or click on the open ‘icon’ at the top of the window. In either case, an ‘Open’ window will appear, which will list all previously stored file names with the file extension appropriate to the controller as listed above. Click on the file required and then click ‘OK’. The file can be downloaded to a controller if required, as described above.

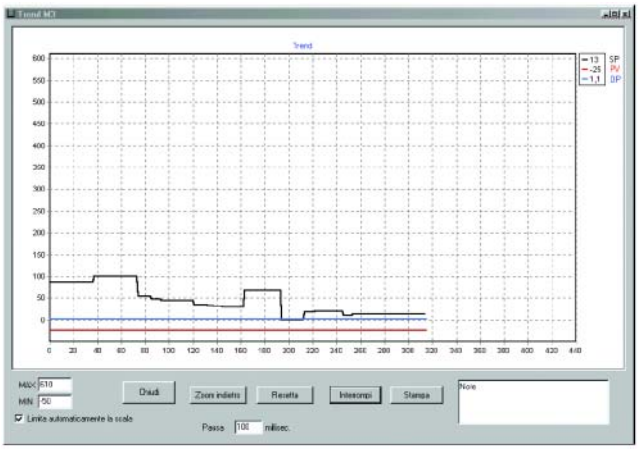
20-10 Printing the configuration

To print the present configuration of the instrument: select “file” from the main window, select “Print Conf” from the menu.

The following will be printed: all the configuration tab sheets; all the parameter tab sheets; the Access page. The printing will be equal to the “print screen”.

20-11 Trend Menu *(all the controllers)*

The trend menu is available on the main page of the configuration software. The trend menu allows to dislay the time trend of the process variable (PV), of the Set point and of the Output of the connected instrument on a graphic page. The time scale is available as “number of acquisitions”.



Functions of the buttons:

- **Close**: Return to the configuration software main window;
- **Zoom out**: Displays from the start of the data acquisition till the present time. The time scale is changed automatically;
- **Reset**: The data acquisition starts again. The old data are lost.;
- **Stop**: The data acquisition is stopped. The old data are maintained.;
- **Print**: The trend page displayed is printed;

MAX: Trend scale High Limit;
MIN: Trend scale Low Limit;
The trend scale can be set by using the “MAX” and “MIN” values.
Enable scale limits change: if enabled, the scale is automatically expanded in case one of the monitored variables exceeds the trend scale “MAX” / “MIN” limits;
Timeout: Intime interval between two acquisitions from the instrument (milliseconds);

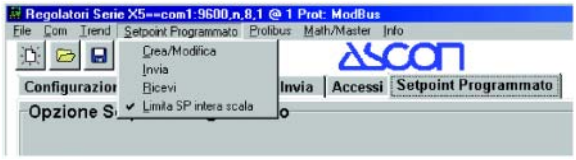
Note: Area available for the user notes. Notes can be printed. Notes are lost when the configuration software is closed.
When the configuration software is closed all trend data and notes are lost.

20-12 Programmed setpoint *(only if the program option is present)*

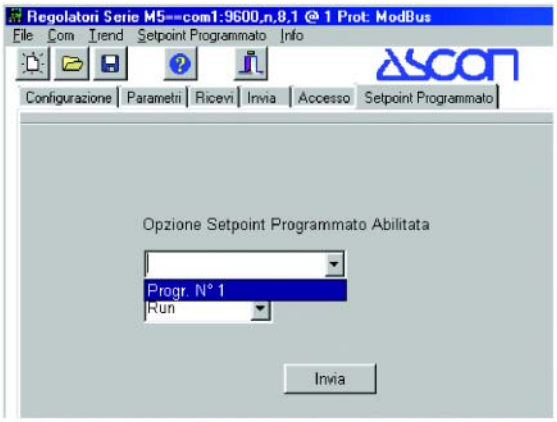
20-12-1 M5 Controller

New program

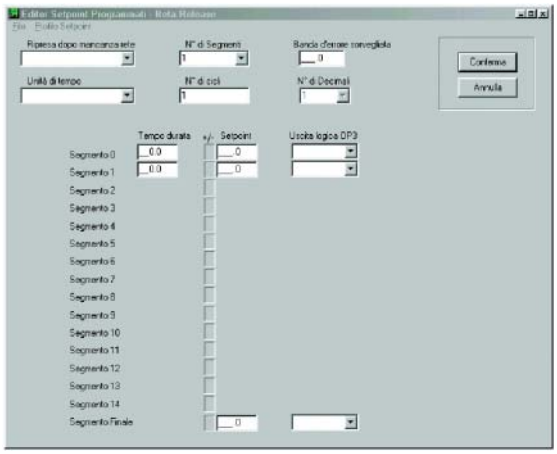
1. Configure the serial communications parameters.
2. Select “Programmed Setpoint” on the tool bar, the Programmed Setpoint menu is displayed:



the commands to select the program status appear in the “Programmed Setpoint”:



From the “Programmed Setpoint” menu select Edit.



New Setpoint programs can be created and saved in this window or already existing programs can be loaded from the File Menu for any modifications.

To create a new program:

1. Select one of the items of the “Restart after power off” parameter;
2. Select an item of the “time units” parameter;
3. Select the number of segments of the program (minimum 1, maximum 14);
4. Select the number of program cycles (from 0 to 9999, where 0 indicates infinite cycles) and enter the “Allowed deviation” value.

The number of decimals, as previously set in the Input Conf. Window, is displayed.
To limit the Setpoint on ~~to~~ the full programmed setpoint range, select "Use SP Limits" from the Programmed setpoint menu.

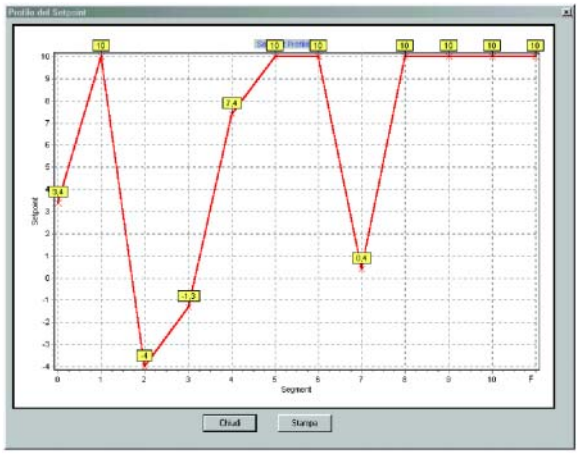
For each segment set:

- Time
- Setpoint value
- Digital Output OP3 status.

At the end of the setting press:

- ***Confirm*** : to validate the entered data
- ***Cancel***: to quit the screen without saving
- ***Print***: to print the window containing the entered data.

Or **select** Setpoint Profile from the menu to:
Display the window of the setpoint profile built on the basis of the data entered in the "Edit" window:

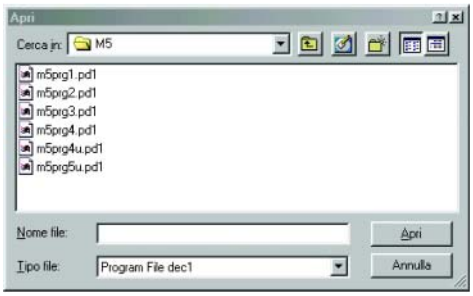


Press "Print" to print the window.

Download the program into the instrument

By selecting **"**Download" on the "Programmed Setpoint" menu, the Setpoint program can be downloaded to the M5 instrument. The following window will be displayed:

By selecting the Confirm button the following window will be displayed:

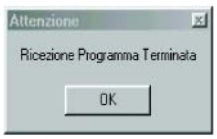


Once the download phase is completed the following window will be displayed:

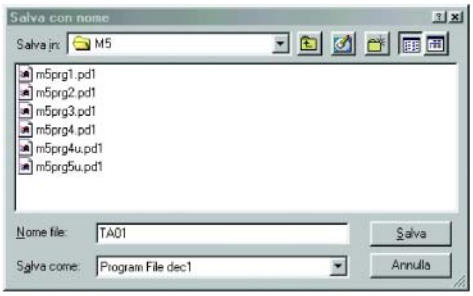
Uploading the program from the instrument

By selecting **"**Upload" on the "Programmed Setpoint" menu the Setpoint program can be uploaded from the M5 instrument. The following window will be displayed:

When the upload is completed the following window will be displayed:



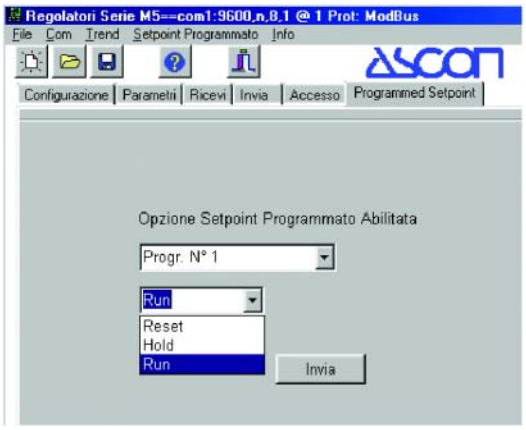
and then:



where a name can be assigned to the file which will contain the uploaded program.

Programmed setpoint tab

The Programmed setpoint tab contains the commands to run, hold or reset the program.

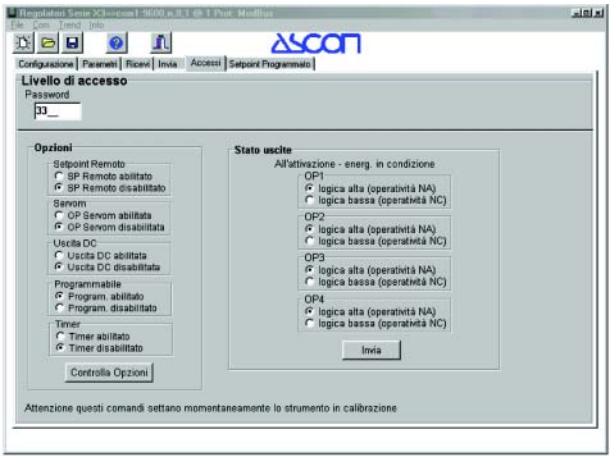


Select the corresponding command and press "Send" to execute it.

20-12-2 X3 and Q3 controllers

New program

1. Configure the serial communications parameters.
2. Check if the controller is equipped with the “Programmed setpoint” option:

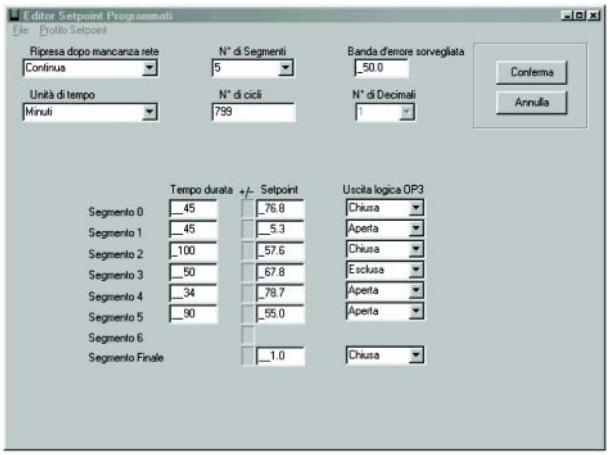


To check the active options:

1. Select the “Access” tab;
2. Press “Options Check”. If the Programmed Setpoint option is present “Program Enabled” will be shown;
3. Select the “Upload” tab and verify the configuration.

In the Configuration – Conf Codes 2 card, select Programmable in the Setpoint Type parameter.

When the selection has been made the Programmed Setpoint menu is enabled. From the “Programmed setpoint” menu select “Edit”.



New Setpoint programs can be created and saved in this window or already existing programs can be loaded from the File Menu for any modifications.

To create a new program:

1. Select one of the items of the “Restart after power off” parameter;
2. Select an item of the “time units” parameter;
3. Select the number of segments of the program (minimum 1, maximum 6);
4. Select the number of program cycles (from 0 to 9999, where 0 indicates infinite cycles) and enter the “Allowed deviation” value.

The number of decimals, as previously set in the Input Conf. Window, is displayed.
To limit the Setpoint on the full programmed setpoint range, select “Use SP Limits from the Programmed setpoint menu.

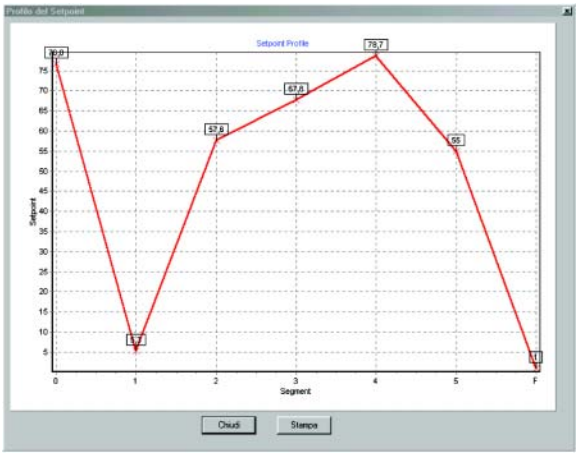
For each segment set:

- Time
- Setpoint value
- Digital Output OP3 status.

At the end of the setting press:

- ***Confirm***: to validate the entered data
- ***Cancel***: to quit the screen without saving
- ***Print***: to print the window containing the entered data.

Or **select** “Setpoint Profile” from the menu to
Display the window of the setpoint profile built on the basis of the data entered in the “Edit” window:

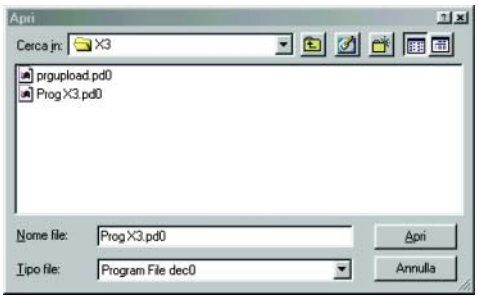


Press “Print” to print the window.

Download the program into the instrument

By selecting **“**Download” on the “Programmed Setpoint” menu, the Setpoint program can be downloaded to the X3 and Q3 instrument. The following window will be displayed:

By selecting the OK (Confirm?) button the following window will be displayed:



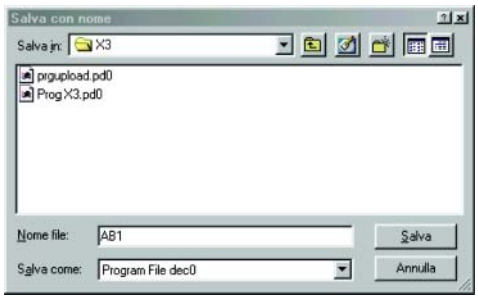
Once the download phase is completed the following window will be displayed:

Uploading the program from the instrument

By selecting **"Upload**" on the "**Programmed Setpoint**" menu the Setpoint program can be uploaded from the X3 and Q3 instrument. The following window will be displayed:

When the upload is completed the following window will be displayed:

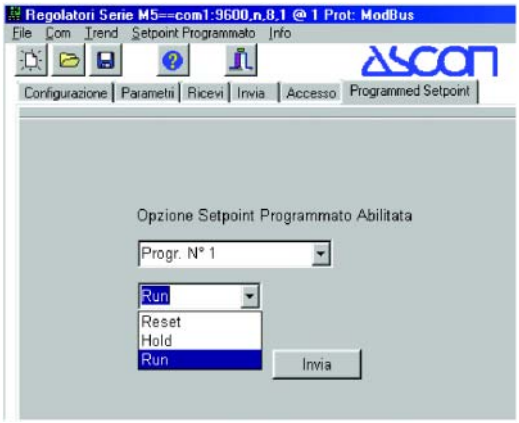
and then:



where a name can be assigned to the file which will contain the uploaded program.

Programmed setpoint

The Programmed setpoint tab contains the commands to run, hold or reset the program.

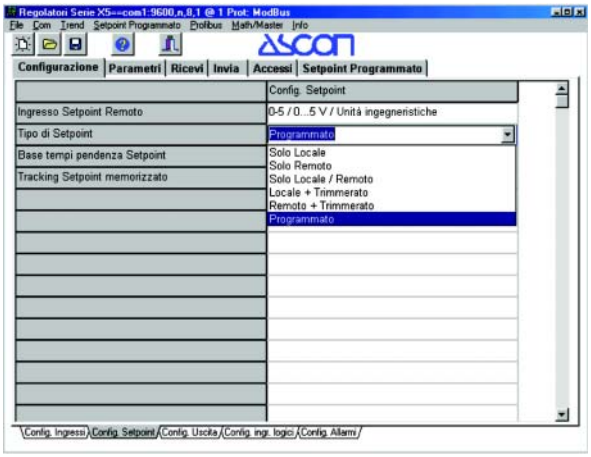


Select the corresponding command and press “Send” to execute it.

20-12-3 X5 and Q5 controllers

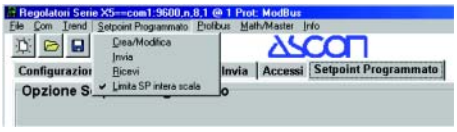
New program

1. Configure the serial communications parameters;
2. Select the “Upload” tab: if the instrument has the program option, select Configuration tab, then Setpoint conf. tab. Under the”Setpoint type” Programmed can be selected;

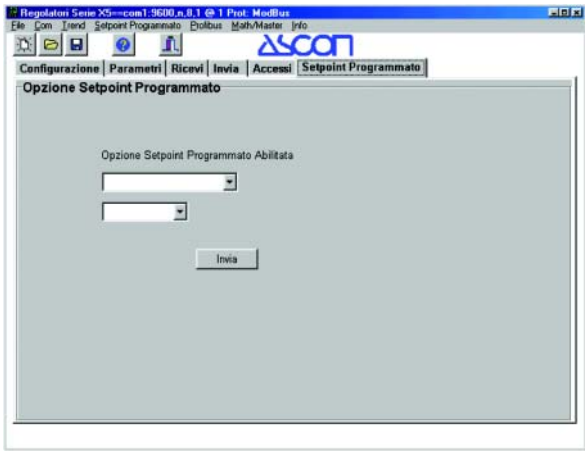


3. select the “Programmed setpoint” tab:

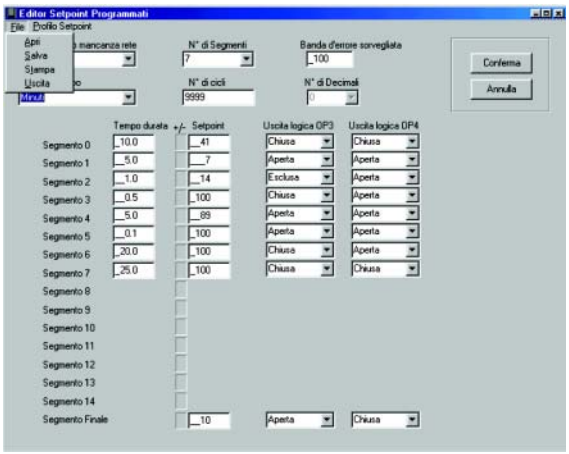
The “SPProgram” menu is displayed:



and the commands to select the program status appear in the “Programmed Setpoint” tab:



From the “SPProgram” menu select Edit.



New Setpoint programs can be created and saved in this window or already existing programs can be loaded from the File Menu for any modifications.

To create a new program:

1. Select one of the items of the “Restart after power off” parameter
2. Select an item of the “time units” parameter
3. Select the number of segments of the program (minimum 1, maximum 14)
4. Select the number of program cycles (from 0 to 9999, where 0 indicates infinite cycles) and enter the “Allowed deviation” value.

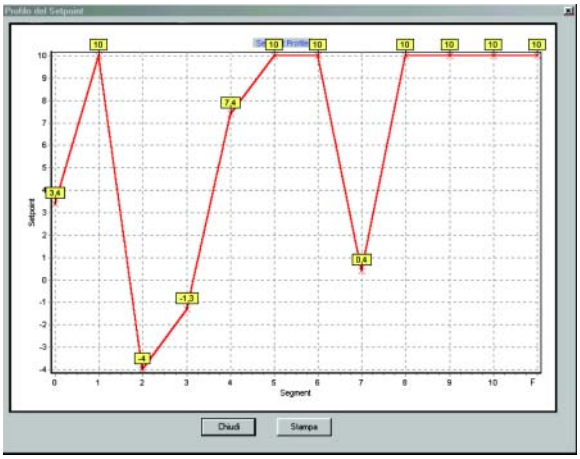
The number of decimals, as previously set in the Input Conf. Window, is displayed.
To limit the Setpoint on the full programmed setpoint range, select “Use SP Limits” from the Programmed setpoint menu.
For each segment set:

- Time
- Setpoint value
- Digital Output OP3 status.

At the end of the setting press:

- ***Confirm***: to validate the entered data
- ***Cancel***: to quit the screen without saving
- ***Print***: to print the window containing the entered data.

Or **select** “Setpoint Profile” from the menu to display the window of the setpoint profile built on the basis of the data entered in the “Edit” window:

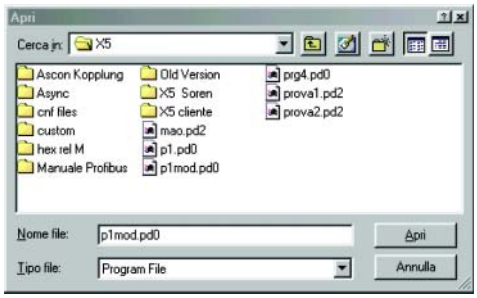


Press “Print” to print the window.

Download the program into the instrument

By selecting **“**Download” on the “Programmed Setpoint” menu, the Setpoint program can be downloaded to the X5/Q5 instrument. The following window will be displayed:

By selecting the OK (Confirm?) button the following window will be displayed:



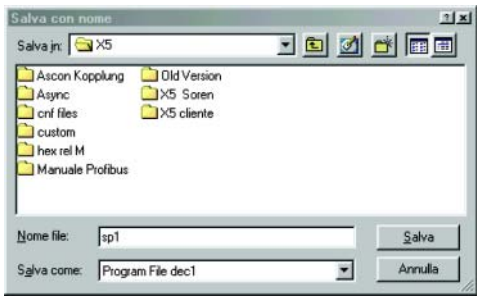
Once the download phase is completed the following window will be displayed.

Uploading the program from the instrument

By selecting **"**Upload" on the "Programmed Setpoint" menu the Setpoint program can be uploaded from the X5/Q5 instrument. The following window will be displayed:

When the upload is completed the following window will be displayed:

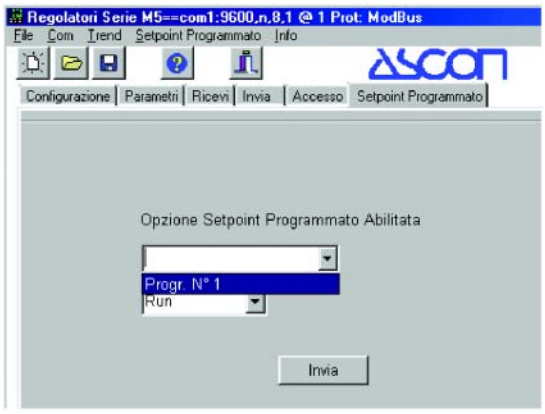
and then:



where a name can be assigned to the file which will contain the uploaded program.

Programmed setpoint tab

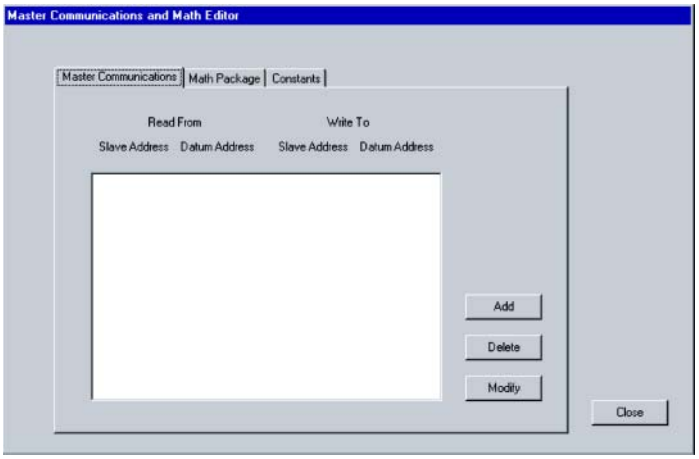
The Programmed setpoint tab contains the commands to run, hold or reset the program.



Select the corresponding command and press "Send" to execute it.

20-12-4 **Configuration of the Master communications** (X5 and Q5 only)

Select the menu "Math/Master". Is displayeded the window "Master Communications and Math Editor".
Select the card "Master Communications"



To insert a new connection activate the button "Add".

Select in the list "Slave Address" under "Read From" the address of the device from which a parameter wants to be read.

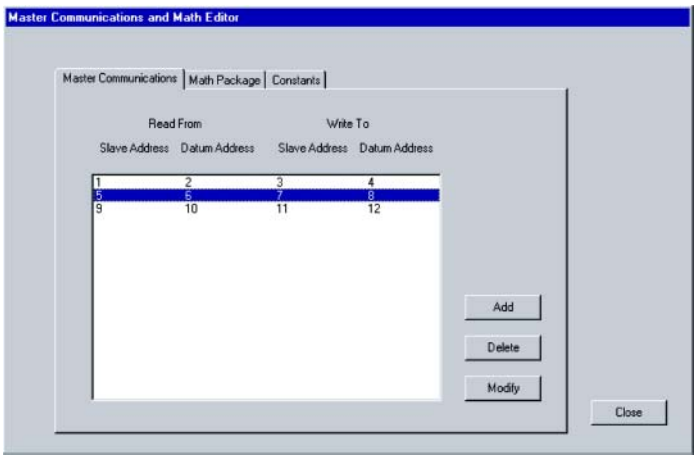
Note: The admitted addresses are between 1 and 247; 256 is the address of the device master.
Select in the list "Datum Address" under "Read From" the address of the parameter that wants to be read on the device.

Note: The admitted addresses are between 1 and 256 (modbus) or between 0 and 255 (jbus); besides are visualized the variable (VAR_1..VAR_16) and the constants configurated (CONST_1..CONST_16).
Select in the list "Datum Address" under "Write To" the address where you want to transfer the parameter.

Notes:
1. The admitted addresses are between 1 and 247; 256 is the address of the device master; 0 is the BROADCAST address for transfer the parameter to all the connected devices!
2. The admitted addresses are between 1 and 256 (modbus) or between 0 and 255 (jbus); besides are visualized the variable configurated (VAR_1..VAR_16).

Press the button "OK" for confirm the immission or press the button "CANCEL" for cancel the immission.

To modify the values of a connection previously introduced, select it with a click of the mouse.

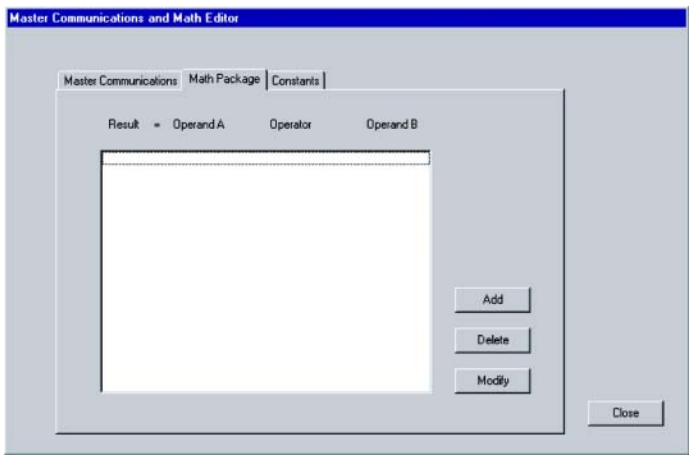


Press the button "Modify".
Is visualized the window "Master Communications Edit" with the values of the selected connection.

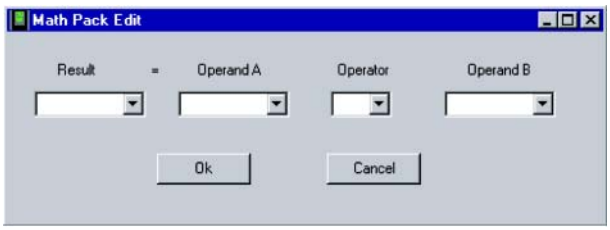
Modify the values as in demand, acting in the same way for the insertion of a new connection.
At the end press the button "OK" to confirm the modifications or press the button "CANCEL" to cancel it.
To eliminate a connection previously introduced, select it with a click of the mouse in the same way for the modification and press the button "Delete".
At the end of the configuration of the Master communications, press the button "CLOSE" to return to the window of the configurator.

20-12-5 Configuration of the mathematical/logics operations (X5 and Q5 only)

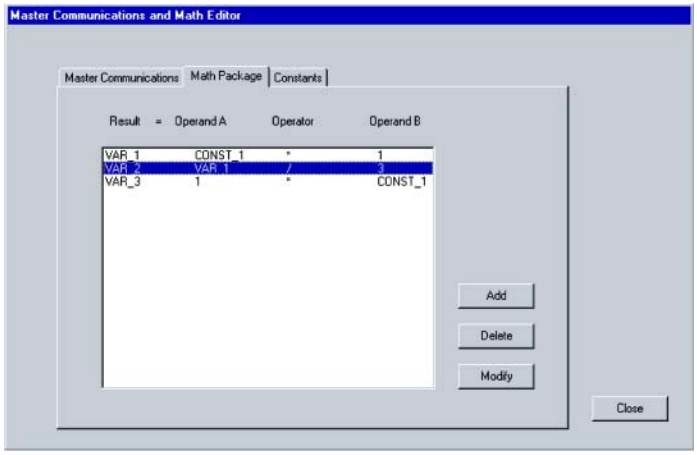
Select the menu "Math/Master." The "Master Communications and Math Editor" window appears .
Select the card "Math Package".



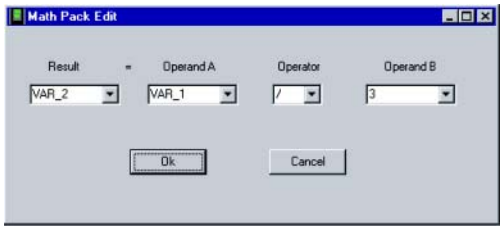
To insert a new operation activate the button "Add".



Select in the list "Result" the address of the variable in which the result of the operation wants to be memorized: the admitted addresses are between 1 and 256 (modbus) or between 0 and 255 (jbus); besides are visualized the variable (VAR_1..VAR_16) to disposition.
Select in the list "Operand A" the address of the parameter that wants to be used like first operand: the admitted addresses are between 1 and 256 (modbus) or between 0 and 255 (jbus); besides are visualize the variabled (VAR_1..VAR_16) and the constants configured (CONST_1..CONST_16).
Select in the list "Operator" the symbol of the desired operation; the possible operations are: sum (+), subtraction (-), multiplication (*), division (/), greater than (>) and less than (<).
Select in the list "Operand B" the address of the parameter that wants to be used like second operand: the admitted addresses are between 1 and 256 (modbus) or between 0 and 255 (jbus); besides are visualized the variable (VAR_1..VAR_16) and the constants configured (CONST_1..CONST_16).
Press the button "OK" confirm the immission or press the button "CANCEL" to cancel the immission.
For modify the operands of an operation previously introduced, select it with a click of the mouse.



Press the button "Modify".
Is visualized the window "Math Pack Edit" with the values of the selected operation.

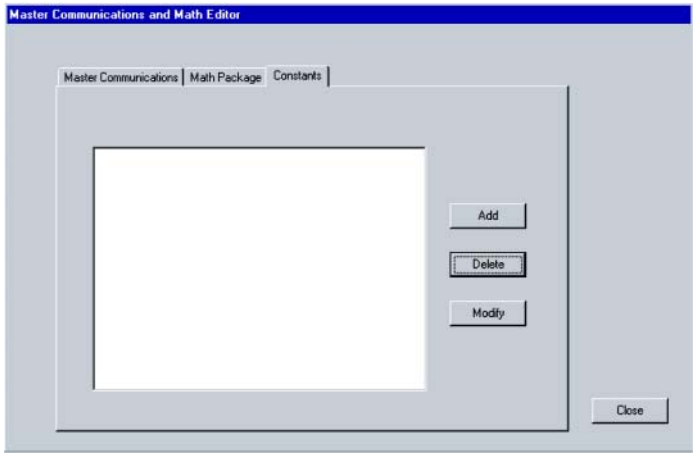


Modify the values as in demand, acting in the same way for the insertion of a new operation.
At the end press the button "OK" to confirm the modifications or press the button "CANCEL" to cancel it.

To eliminate an operation previously introduced, select it with a click of the mouse like for the modification and press the button "Delete".
At the end of the configuration of the mathematical packet, press the button "Close" to return to the window of the configurator.

20-12-6 Numerical constants configuration (X5 and Q5 only)

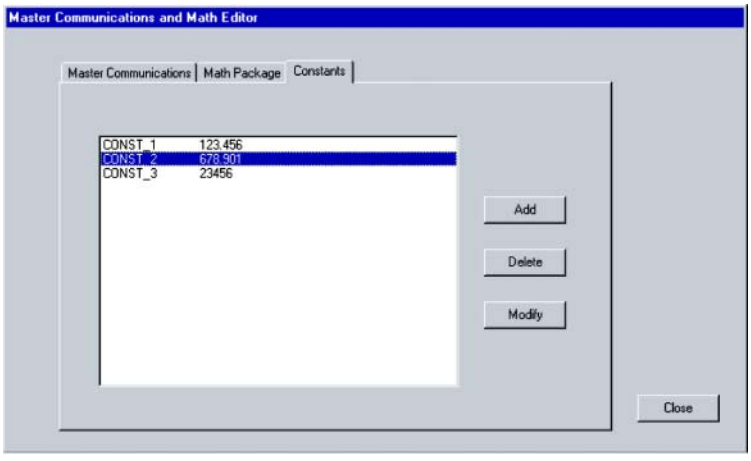
Select the menu "Math/ Master." The window appears "Master Communications and Math Editor".
Select the card "Constants".



Activate the button "Add" for **insert a new constant**.

Select one of the 16 constants (CONST_1_CONST_16) to define in the list and insert his value in the underlying window.

Note: In the case of real values pay attention to the symbol shaped in Windows like decimal separator: point for the UKEnglish versions, comma for the others!
Press the button "OK" to confirm the immission.
Press the button "CANCEL" to cancel the immission.
To **modify the value of a constant** previously introduced, select it with a click of the mouse.



Press the button "Modify".
Is visualized the window "Constants Editor" with the value of the selected constant.

Insert the new value requested

Note: It is not possible modify the name of the constant.
At the end press the button "OK" to confirm the modifications or press the button "CANCEL" to cancel it.
To eliminate a constant previously inserted, select it with a click of the mouse like for the modification and press the button "Delete".
At the end of the configuration of the mathematical packet, press the button "Close" to return to the window of the configurator.

20-12-7 Reading/writing of the configuration of the mathematical packet in the device (X5 and Q5 only)

Downloading the configuration of the mathematical packet and of the master communications comes effected automatically when you take place the download of the configuration and of the parametrizzation (see what explained above).

20-12-8 Save the configuration of the mathematical packet on files (X5 and Q5 only)

Saving on files the configuration of the mathematical packet and of the master communications comes effected automatically when you take place the saving of the configuration and of the parametrizzation (see what explained above).

20-12-9 Definition of the Profibus parameters (X5 and Q5 only)

The definition of the parameters consists to define the packet of supervision of the PLC or of the PC: define the parameters that will be read and write.
This phase is done using the software of configuration of the Profibus. This software cretes two file:

1. One for the master: the GSD file
2. One for the regulator X5

The GSD file of the master must be used in the software of configuration of the same master.
The file for the instrument X5 must be sended by serial comunication to the regulator.
For perform the software of configuration of the Profibus, after have started the Gamma2 Configurator, it is necessary select the Configuration voice from the Profibus menu (see figure 1).

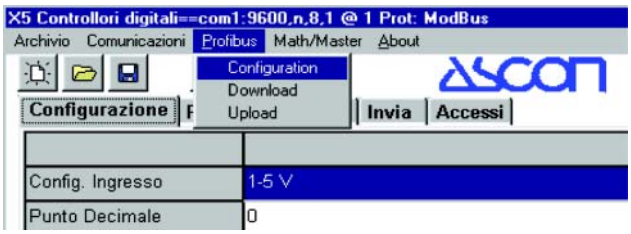


Figure 1

It comes as visualized the principal window of the program.
From the menu File select:
New to create a new configuration;
Opento open a created configuration previously (see figure 2).

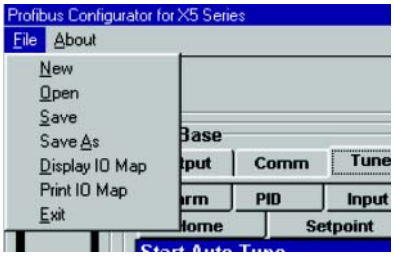


Figure 2
If the Open voice is selected appears the following window (see figure 3).

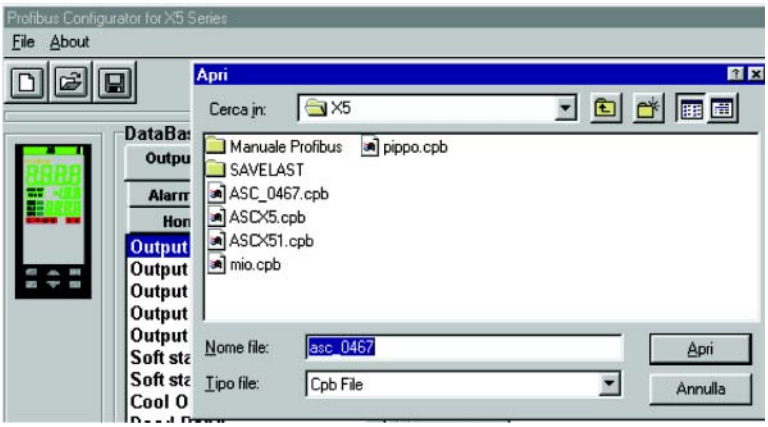


Figure 3
Select the desired line and press the button Open.

20-12-10 How to insert the parameters in the configuration

(X5/Q5 controllers only)
From the Data Base of the variable select the parameter interested with a click of the left key of the mouse.

If the selected parameter will be red press the button > set under the Read writing.

If the selected parameter will be written press the button > set under the Write writing (see figure 4).

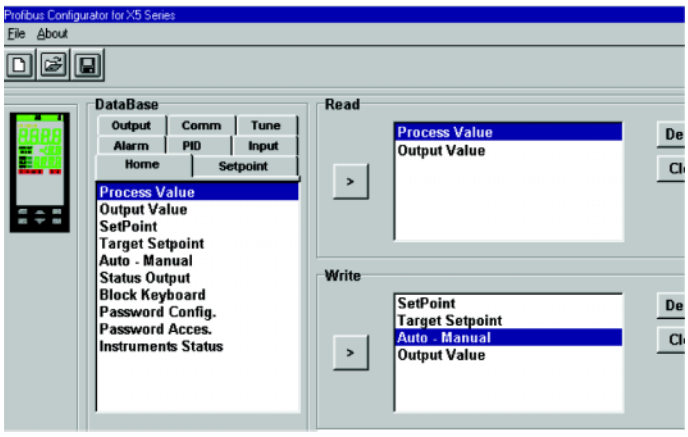


Figure 4

To eliminate a parameter inserted select the parameter and press the Delete button (see figure 5):

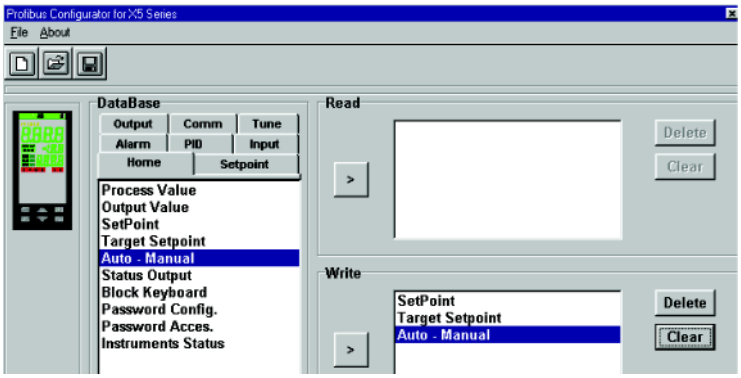


Figure 5

For eliminate all the inserted parameters press the Clear button (see figure 6):

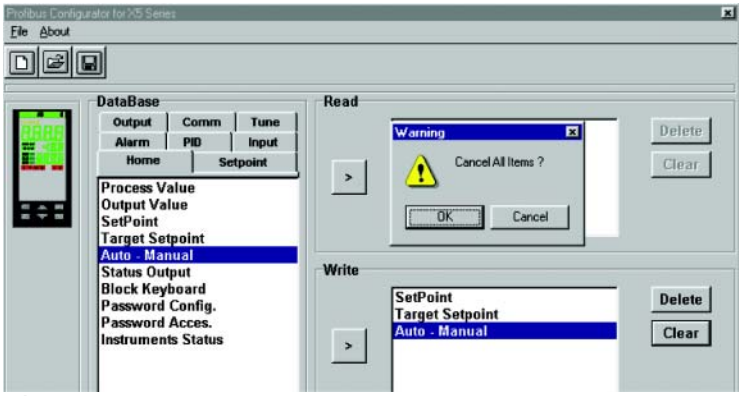


Figure 6

Confirm pressing the OK button or annul the operation pressing the Cancel button.

20-12-11 Parameters of the Data Base *(X5/Q5 controllers only)*

The available parameters divided for groups follow.

Home parameters (figure 7):

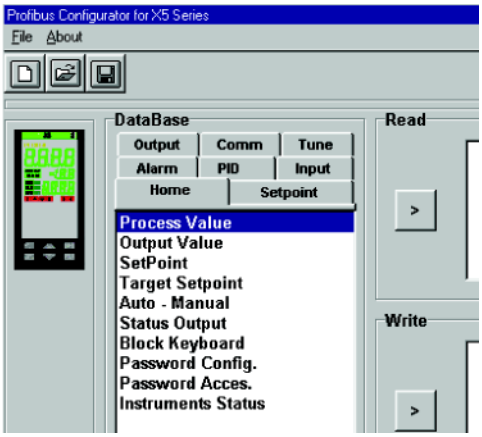


Figure 7

Parametri Setpoint (figura 8):

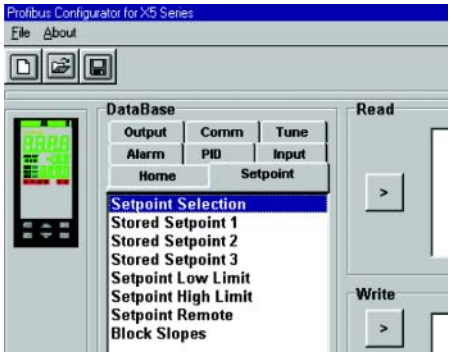


Figure 8

Parameters Alarm (figura 9):

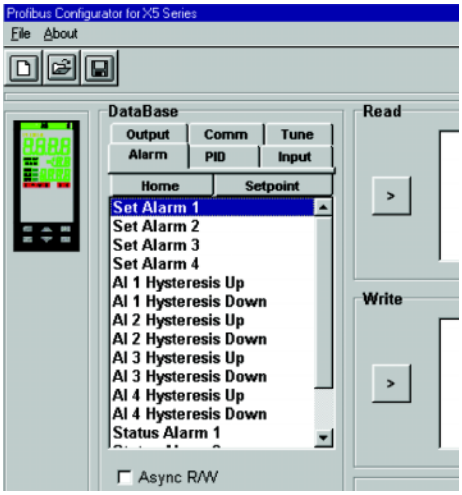


Figure 9

PID Parameters (figure 10):

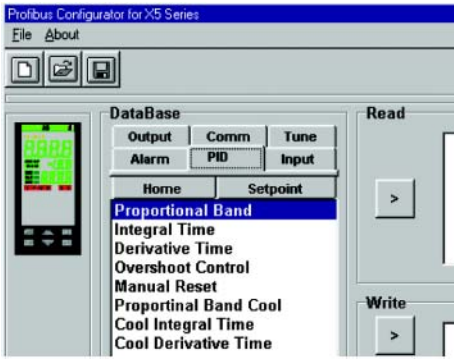


Figure 10

Input Parameters (figure 11):

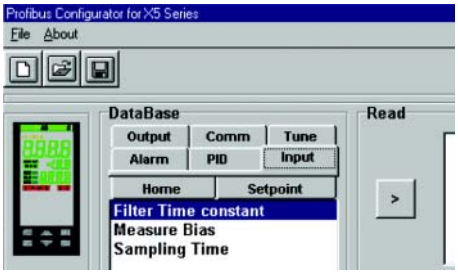


Figure 11

Output Parameters (figure 12):

Figure 12
Communication Parameters (figure 13):

Figure 13
Tune Parameters (figure 14):

Figure 14
It is also possible display the map of the selected parameters.
From the menu file select the Display I/O Map voice (figure 15).

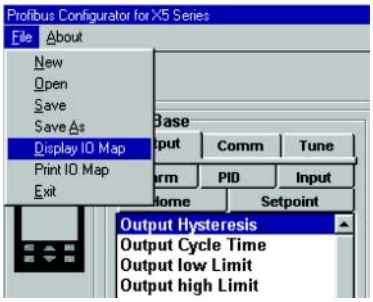


Figure 15

Will displayed the following window (figure 16):

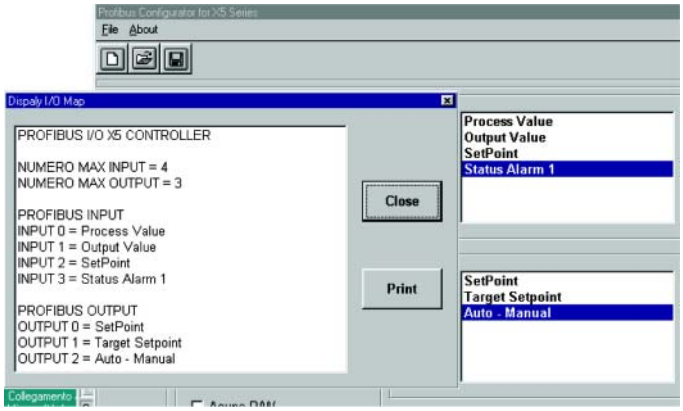


Figure 16

It is possible print the map of the selected parameters pressing the Print button or selecting the Print I/o Map voice from the menu File (figure 17):

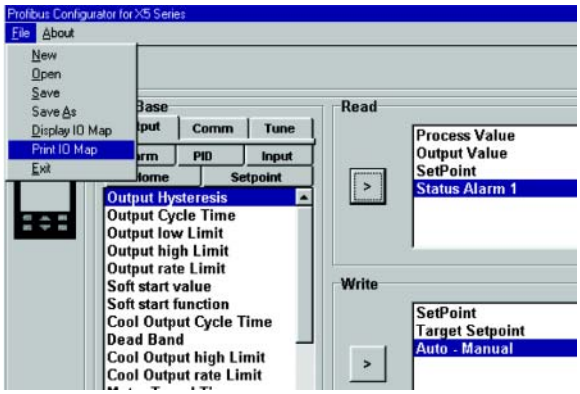


Figure 17

Selecting the option Async R/W are enabled the asyncronous services of the Profibus (figure 18):

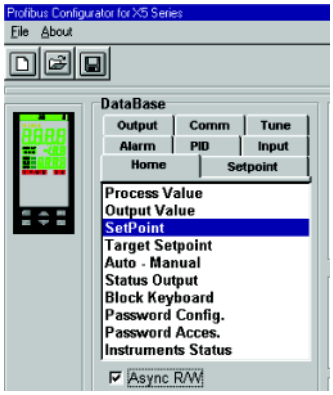


Figure 18

20-12-12 How to save the configuration (X5/Q5 controller only)

From the menu File select the Save voice or Save As (figure 19):

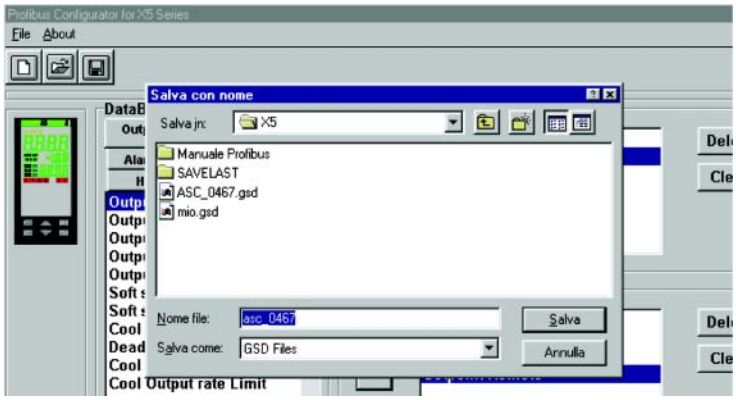


Figure 19

Insert the name of the line and press the button Save.

20-12-13 How to send the configuration of the Profibus parameters

(X5/Q5 controllers only)

To send the configuration of the Profibus parameters it is sufficient select the Download voice from the Profibus menu of the Configuratore of the instrument X5 and Q5 (see figure 20):

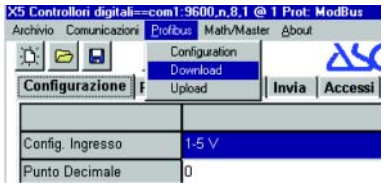


Figure 20

It will come visualized the following window (figure 21):

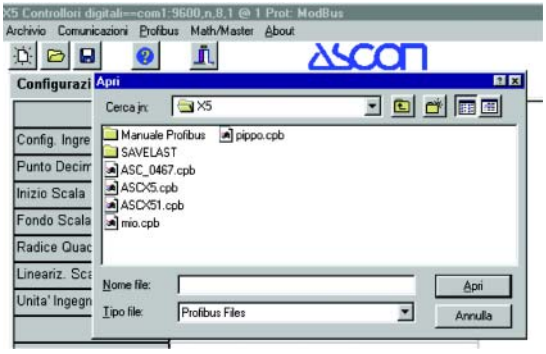


Figure 21

Select the file of the configuration to send and press the button Open.
The configuration will come as sent to the instrument.

20-12-14 How to receive the configuration of the Profibus parameters

(X5/Q5 controllers only)

To receive the configuration of the Profibus parameters from the tool X5 it is sufficient select the Upload voice from the Profibus menu of the Configurator of the instrument X5 (see figure 22):

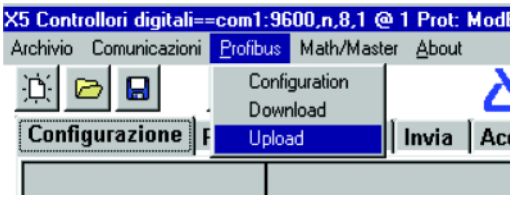


Figure 22

It will come visualized the following window (figure 23):

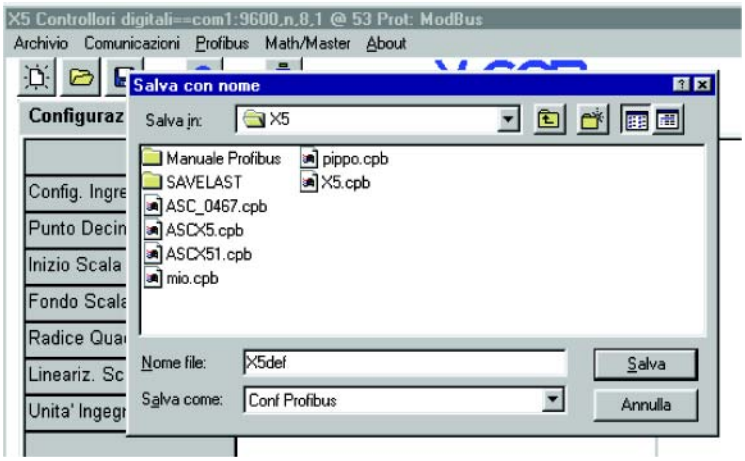


Figure 23

Insert the name of the desired file and press the button Save.

The file is now available to have visualized and modified through the software of configuration of the Profibus