Afficheur grand format

Numérique

Liaison série RS485 et RS232

D 060S – D 065S – D 100S – D 101S – D 250S

D 065S

Points forts

- **3, 4 ou 5 digits LED rouge de hauteur 57 mm, 100 mm ou 250 mm sur 1 ou 2 face(s) de lecture**
- **3, 4 ou 5 digits LED 3 couleurs rouge, vert et ambre de hauteur 57 mm sur 1 ou 2 face(s) de lecture**
- **Visibilité jusqu'à 30 m, 50 m ou 100 m**
- **3 versions :**
  Indice de protection IP41
  Indice de protection IP65
  Affichage LED haute luminosité et indice IP65
- **Directement compatible avec nos compteurs, tachymètres et indicateurs analogiques**
- **6 protocoles de communication série intégrés**
  ASCII 1, ASCII 2, ASCII 3, ISO1745, Modbus, S7-200
- **Alimentation 230 VAC**

Caractéristiques techniques

Eclairage maxi	1000 lux

Afficheur D065S avec LED 3 couleurs
La sélection de la couleur d'affichage s'effectue par programmation, le changement dans l'une des 2 autres couleurs d'affichage peut ensuite être effectuée en fonction de la valeur affichée, par exemple une valeur de défaut.

Caractères affichables
0 à 9, A, b, C, c, d, E, F, H, h, I, J, L, n, o, P, r, U, u, -, <espace>, <point>

Liaison série RS485 et RS232
Sélection par programmation
Raccordement sur connecteur Sud-D 9 pts mâle

Protocole de communication
Sélection par programmation
Nbre de bits de donnée et de bits de stop, parité

Vitesse max.	19200 bauds
Alimentation	230 VAC / 50 Hz

Consommation

D060	3,5 VA par digit
D100 – D101	4 VA par digit
D250	7 VA par digit

Dimensions - Poids

D060 – D065

Nbre de digits	4	5	6	7	8
Longueur mm	290	290	320	365	420
Poids kg	2	2	3	3	4

Hauteur = 125 mm Profondeur = 120 mm

D100 – D101

Nbre de digits	4	5	6	7	8
Longueur mm	420	505	600	684	780
Poids kg	4	5	6	7	8

Hauteur = 175 mm Profondeur = 120 mm

D250

Nbre de digits	4	5	6	7	8
Longueur mm	990	1120	1460	1690	1930
Poids kg	10	12	14	16	18

Hauteur = 370 mm Profondeur = 120 mm

Température d'utilisation	0°C … +50°C
Protection	IP41 ou IP65

Fixation
Livré avec une équerre de fixation permettant le montage en saillie ou en suspendu.

Conformité DIN EN 61010-1	Classe de protection II Surtension catégorie II Degré de pollution 2
Emission	DIN EN 61000-6-3
Choc	DIN EN 61000-6-2
Conformités	CE

User's Guide

Afficheur grand format

Numérique

Liaison série RS485 et RS232

D 060S – D 065S – D 100S – D 101S – D 250S

Références de commande

Afficheur avec indice de protection IP41

D060S. 4 ☐ ☐ 4A01000 Afficheur 57 mm
D100S. 4 ☐ ☐ 4A01000 Afficheur 100 mm
D250S. 4 ☐ ☐ 4A01000 Afficheur 250 mm

IP41

Nombre de faces d'affichage
S 1 face
D 2 faces

Nombre de digits par face d'affichage
4 4 digits
6 6 digits
8 8 digits
A 10 digits

Afficheur avec indice de protection IP65

D060S. 4 ☐ ☐ 4E01000 Afficheur 57 mm
D100S. 4 ☐ ☐ 4E01000 Afficheur 100 mm

IP65

Nombre de faces d'affichage
S 1 face
D 2 faces

Nombre de digits par face d'affichage
4 4 digits
6 6 digits
8 8 digits
A 10 digits

Afficheur avec LED haute luminosité et indice IP65

D101S. 4 ☐ ☐ 4E01000 Afficheur 100 mm

IP65

Nombre de faces d'affichage
S 1 face
D 2 faces

Nombre de digits par face d'affichage
4 4 digits
6 6 digits
8 8 digits
A 10 digits

Afficheur LED 3 couleurs rouge, vert et ambre

D065S. 4 ☐ ☐ 4 ☐ 01000 Afficheur 57 mm

Indice de protection
A Indice IP41
E Indice IP65

Nombre de faces d'affichage
S 1 face
D 2 faces

Nombre de digits par face d'affichage
4 4 digits
6 6 digits
8 8 digits
A 10 digits

D060S – D065S – D100S – D101S – D250S
OPERATION MANUAL

1. INTRODUCTION

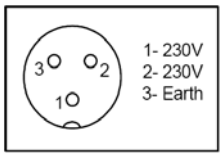
The D060S – D065S – D100S – D101S – D250S numeric displays are industrial displays with RS232 and RS485 serial interface, which can be configured to work with several protocols. All the equipments have the option to add a symbol, in text format, of a maximum of three characters. The selection of the serial interface, the parameters and the communication protocol are realised by two push buttons with a system of codes of easy programming.

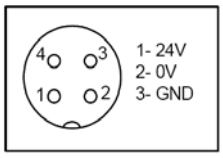
2. INSTALLATION

There are some considerations to take into account before installing D060S – D065S – D100S – D101S – D250S.
The displays must neither be fixed to places close to vibration nor to places which exceed the limits of temperature and humidity specified in the display characteristics.

2.1. Power supply.

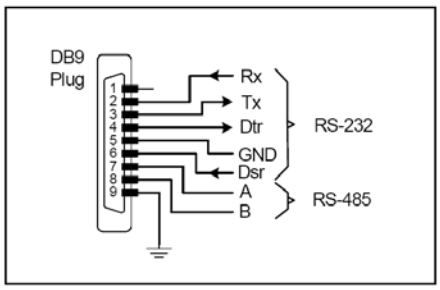
Power supply must be 100 VAC to 240 VAC, 50/60 Hz or optional 24VCC. The protection fuse is 2A.
The section of the power supply conductors is in keeping with the consummation.
The earth conductor must be minimum 1.5 mm^2.
The supply connector is located at the bottom of the equipment.





2.2. Serial interface.

D060S – D065S – D100S – D101S – D250S series displays accept two types of serial input RS232 and RS485. The same connector is used for both inputs (type DB-9), and is located at the bottom of the equipment. The selection of the series line type is done programming the parameters.



3. Operation

3.1. Initial reset.

Before connecting the display to the network, it must be checked that all connections have been set properly and that the display have been firmly placed. Every time the display is connected to the supply network, there is an initial reset, which checks all the segments of the display. The test consist on the sequential lightening of all digits with value "8", all digits with value "0" and at last of all decimal points.

Three situations can happen from that point:
a) The display receives data by the serial line and shows it.
b) The display does not receive data and the time without data is 0. It keeps on showing the decimal points.
c) The display does not receive data and the time without data is not 0. Once the time without data is over, it shows a hyphen in every digit.

3.2. Programming the parameters.

D060S – D065S – D100S – D101S – D250S displays can be adapted to the demands of any customer through the parameters programming. The parameters which can be configured are:
- Display direction on network
- Communication protocol
- Transmission baud rate, data bits, parity, stop bits.
- Type of serial line RS232 or RS485
- Time-out reception.

Three digits displays or more:
The three digits on the right of the display are used to program the parameters. The third digit from the right, which has a decimal point activated, indicates the parameter number. The other two digits indicate the parameter value. The digit in flashing is the one that can be modified.
Two digits displays:
The two digits of the display are used to program the parameters. The digit of the left which has a decimal point activated indicates the parameter number. The digit in flashing is the one that can be modified with the advance key

3.2.1. Enter to modify parameters.
To enter into the sequence for modifying parameters, one must press and hold the key "7->5" for three seconds. After this time the first parameter will be displayed showing the most significant digit in flashing mode.

After this moment there are two possible options:
- To modify the parameter values.
  Through the key advance, the values and the number of parameters can be selected one after another. The key “+” must be pushed to modify the selected digit, which increases the selected digit value to the maximum value. The following push is the minimum value.
- To select another parameter.
  The third digit must be selected (set in flashing) by means of the key "7-> 5" and then select the following parameter by means of the key "+".

.
3.2.2. Exit to modify parameters.
To exit the modify parameter sequence select the parameter 9 and push «7-> 5»

3.2.3. Function of every parameter.

3.2.3.1. Parameter 1: Display address.
It configures the display address on network. This value is used in RS232 and RS485. The address range is between 0 and 99.

3.2.3.2. Parameter 2: Communication protocol.
It selects the communication protocol. The protocols available are in chapter 4.

3.2.3.3. Parameter 3: Transmission baud rate, data bits, parity and stop bits.
The parameters of the series line are codified in the following table:

Code	Baud rate	Data bits	Parity	Stop bits
01	4800 Bauds	7 bits	No parity	1
02	9600 Bauds	7 bits	No parity	1
03	19200 Bauds	7 bits	No parity	1
04	4800 Bauds	8 bits	No parity	1
05	9600 Bauds	8 bits	No parity	1
06	19200 Bauds	8 bits	No parity	1
07	4800 Bauds	7 bits	Even	1
08	9600 Bauds	7 bits	Even	1
09	19200 Bauds	7bits	Even	1
10	4800 Bauds	8bits	Even	1
11	9600 Bauds	8bits	Even	1
12	19200 Bauds	8bits	Even	1
13	4800 Bauds	7bits	Odd	1
14	9600 Bauds	7bits	Odd	1

15	19200 Bauds	7bits	Odd	1
16	4800 Bauds	8bits	Odd	1
17	9600 Bauds	8bits	Odd	1
18	19200 Bauds	8bits	Odd	1
19	4800 Bauds	7 bits	No parity	2
20	9600 Bauds	7 bits	No parity	2
21	19200 Bauds	7 bits	No parity	2
22	4800 Bauds	8 bits	No parity	2
23	9600 Bauds	8 bits	No parity	2
24	19200 Bauds	8 bits	No parity	2
25	4800 Bauds	7 bits	Even	2
26	9600 Bauds	7 bits	Even	2
27	19200 Bauds	7bits	Even	2
28	4800 Bauds	8 bits	Even	2
29	9600 Bauds	8 bits	Even	2
30	19200 Bauds	8bits	Even	2
31	4800 Bauds	7 bits	Odd	2
32	9600 Bauds	7 bits	Odd	2
33	19200 Bauds	7bits	Odd	2
34	4800 Bauds	8 bits	Odd	2
35	9600 Bauds	8 bits	Odd	2
36	19200 Bauds	8bits	Odd	2

ATTENTION:
If you are using the S7-200 protocol, the baud rate 4800 is not valid. If a code with 4800 bauds is programmed a baud rate of 9600 bauds is set.

3.2.3.4. Parameter 4: Type of serial line.
It selects one of the two types of serial line available.
Type 1: RS232 serial line
Type 2: RS485 serial line

3.2.3.5. Parameter 5: Time-out reception.
It programs a period of time to wait until receive correct data. The warning is shown once the time programmed is exceeded. Every time new data is received correctly, the time is set to 0. The code "00" (without timing) does not produce any warning.

Code	Delay	Code	Delay
00	No delay	11	1 min.
01	2 s	12	2 min.
02	4 s	13	5 min.
03	6 s	14	10 min.
04	8 s	15	20 min.
05	10 s	16	40 min.
06	14 s	17	1 hour
07	20 s	18	2 hours
08	26 s	19	5 hours
09	30 s	20	10 hours
10	40 s	21	25 hours

3.2.3.6. Parameter 6:
It is an assistant for other parameters.

3.2.3.7. Parameter 7:
It is an assistant for other parameters.

3.2.3.8. Parameter 8:
It is an assistant for other parameters.

3.2.3.9. Parameter 9:
It is an assistant for other parameters.

3.2.3.10. Parameter A:
It is an assistant for other parameters.

3.2.3.11. Parameter B:
Display with colour option. See paragraph 4.9.

3.2.3.12. Parameter C:
Display with colour option. See paragraph 4.9.

3.2.3.13. Parameter D:
Display with colour option. See paragraph 4.9.

3.2.3.14. Parameter E:
Display with colour option. See paragraph 4.9.

3.2.3.15. Parameter nr, r1, r2, r3:
Display with colour option. See paragraph 4.9.

3.2.3.16. Parameter F:
Exit modify parameters
Push the key "7-> 5" to exit the option modifies parameters. Before exiting the parameters are saved.
Push the key "+" until reaching the parameter to be modified to keep on modifying parameters.

4. Communication protocol

The codes corresponding to the protocols presently introduced are:

5.1	Code 1: ASCII-1
5.2	Code 2: ISO 1745
5.3	Code 3: ModBus
5.4	Code 4: Host-Link Slave from Omron
5.5	Code 5: ASCII-2
5.6	Code 6: Host-Link Master from Omron
5.8	Code 8: S7-200 from Siemens
5.9	Code 9: ASCII-3

4.1. Code 1: ASCII-1.

It is the protocol to communicate with indicators equipments series.
It can be used with RS232 and RS485 series line. It selects the direction of indicators equipment between address 0 and 99.
The characteristics of the series line are: 8 data bits, without parity and 1 stop bit. The baud rates able to be configured are: 4800, 9600 and 19200 bauds.

Example of configuration for a display in address 03

Display address = 03	Parameter 1	03
Protocol ASCII-1	Parameter 2	01
Serial line: 9600 bauds	Parameter 3	02
Type of serial line = RS485	Parameter 4	02
Time-out reception data = 6 seconds	Parameter 5	03

4.2. Code 2: ISO 1745.

It is the protocol according to ISO 1745 rule, but applied to communication with the indicators equipments series.
The characteristics of the serial line are: 7 data bits, even parity and one stop bit. The baud rates able to be configured are: 4800, 9600 and 19200 bauds. D060S – D065S – D100S – D101S – D250S display works as a master and the indicator equipment works as a slave.

The message sent is the following sequence of characters:

SOH	D	d	C	C	ETX	BCC
01 hex 01 ASCII	High Address	Low Address	00 hex 00 ASCII	44 hex 68 ASCII	03 hex 03 ASCII	CRC

The address bytes must be sent in hexadecimal format.
If the address of the equipment is 15, it must be sent D=31 hex and d=35 hex.

The calculation of CRC is done as follows:
OR-exclusive of all the bytes included between STX (not included) and ETX (included) must be carried out.
If the byte obtained is higher or equal to value 20 hex (32 ASCII), this value must be taken as CRC
If the byte obtained is lower than the value 20 hex (32 ASCII), 20 hex (32 ASCII) must be added to obtain CRC.

The answering message must be the following sequence of characters:

SOH	D	d	STX	X.. .X	ETX	BCC
01 hex 01 ASCII	High Address	Low Address	02 hex 02 ASCII	Data	03 hex 03 ASCI	CRC

The address bytes must be sent in hexadecimal format.
If the address of the equipment is 15, D=31 hex and d= 35 hex have to be sent.
The calculation of CRC is done the same way as for the message sent.

Example of configuration for display in address 01:

Display address = 01	Parameter 1	01
Protocol ISO1 745	Parameter 2	02
Serial line: 9600 bauds	Parameter 3	02
Type of serial line = RS232	Parameter 4	01
Time-out reception data = 2 seconds	Parameter 5	01

4.3. Code 3: Modbus.

It is the protocol according to Modbus specifications mode RTU.
This protocol is widely used in the industrial area and it is easily adaptable to several types of instruments.

Protocol Modbus uses the silences in the transmission to indicate the beginnings and endings of the messages. A silence is the time equal or higher than the time required to transmit 3 characters. There is a different time for every baud rate transmission. It is not possible to begin a transmission when another one have just end. It is necessary to w ait the time required for a transmission of three characters.

The display always works in slave mode with this protocol. Once a message has just been received with the display address, a message with the results of transmission will be sent.

The message received must be the following sequence of characters

Addr.	Func.	Cont.	Posi.	Words High	Words Low	Bytes num	Value	Low CRC	High CRC
	10 hex	01 hex	00 hex						

Addr: Display address. Hexadecimal value between 0 and 63.
Func: Always value 10 in hexadecimal
Cont: Always value 01 in hexadecimal
Posi: Always value 00 in hexadecimal
Words High: it is the high weight of the number of words (2 bytes) from the value field
Words Low: it is the low weight of the number of words (2 bytes) from the value field
Bytes num.: it is the number of bytes from the value field. It is twice the number of words.
Value: Data to display. They must be in hexadecimal format and they must be an even number of characters. Value can be used to adjust the number of characters to an even number. The first character sent is set on the right of the display.

Answer from the display

When the display receives a message sent to it (to its address), it returns a message, which indicates whether it has received it correctly or not.

Correct answer

Addr.	Fonc.	Cont.	Posi.	Words High	Words Low	Low CRC	High CRC
	10 hex	01 hex	00 hex				

Address: Display address. Hexadecimal value between 0 and 63
Func: Always value 01 in hexadecimal.
Cont: Always value 01 in hexadecimal.
Posi: Always value 00 in hexadecimal.
Num.Pal. A: It is the same value as the one received.
Num.Pal. B: It is the same value as the one received.
CRC: It is calculated using the same method as in the transmission.

Incorrect answer - Transmission error.

Addr.	Error	Error Code	Low CRC	High CRC
	90 hex			

Address: Display address. Hexadecimal value between 0 and 63
Func: Always value 90 in hexadecimal
Error code: 01: Error in the heading from the received message
02: Error of CRC in the received bloc
05: Error in the number of bytes received.
CRC: It is calculated using the same method as in the transmission.

Valid characters: The characters allowed are:

08 hex = Beginning of flashing	28 hex = Dash up
09 hex = End of flashing	2C hex = Decimal point in the following character
16 hex = Dash down	2E hex = Decimal point in the following character
20 hex = Space	2D hex = Dash in the middle

30 hex = number 0	34 hex = number 4	38 hex = number 8
31 hex = number 1	35 hex = number 5	39 hex = number 9
32 hex = number 2	36 hex = number 6	
33 hex = number 3	37 hex = number 7	

41 hex = letter A	48 hex = letter H	68 hex = letter h
42 hex = letter b	4A hex = letter J	69 hex = letter i
43 hex = letter C	4C hex = letter L	6E hex = letter n
44 hex = letter d	50 hex = letter P	6F hex = letter o
45 hex = letter E	55 hex = letter U	72 hex = letter r
46 hex = letter F	63 hex = letter c	75 hex = letter u

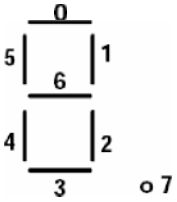
Colour Option:
In the displays with the option colour, the colour may be modified using a command. Character X (58 hexa) followed by the colour code force the display to use that colour. While using colour control by code, parameters B and D must be equal to 20 and colour control depending on displayed value must not be used.

The colour codes are:

Red Colour = 0	Green Colour = 1	Yellow Colour = 2

Beginning and ending of flashing code are used to set in flashing a character, several characters or all characters. Beginning of flashing code must be set before the first character in flashing and the end of flashing code must be set after the last character in flashing.

7E hex character allows activating directly the segments and the decimal point.
It is used to display non-codified symbols.
It is used as follows:
1. Two bytes must be sent for every character to display.
2. The first byte is 7E hex character.
3. All the bits =1 of he second byte activate directly a segment, according to the following distribution.



Example 1. Bits 0, 6 and 3 must activate the three horizontal dashes. There fore, byte 49 hex (01001001) must be sent.
Example 2. Bits 1, 2, 4, 5, and 7 must activate the two horizontal bars and the decimal point. Therefore, byte B6 hex (10110110) must be sent.

CRC calculation.
The calculation of CRC is done from all the characters of the message except from the two ones belonging to CRC. The following process is done to calculate CRC:

1. Value FFFF hexa must be assigned to CRC register.
2. OR-exclusive must be done between the CRC register and the first byte of the message and assign it to CRC.
3. Shift 1 bit to the right in the register CRC setting to zero MSB and move the left bit to the carry bit.
4. If the carry bit is zero, return to 3.If the carry bit is one, do an OR-exclusive of CRC register with value A001 hex and assign it to CRC.
5. Repeat 2 and 3 until completing a total of 8 shifts to process the byte.
6. Repeat 2 and 5 for the rest of bytes of the message
7. Set the obtained CRC at the end of the message, so that the low byte is in the first place.

Example 1:

Number of display digits = 8		
Display address = 10	Parameter 1	10
Protocol = Modbus	Parameter 2	03
Serial line: 9600 bauds. 8 bits. Even parity. 1 Stop bits	Parameter 3	11
Serial line type = RS485	Parameter 4	02
Time-out reception data = 10 seconds	Parameter 5	05

Data to display:

7	6	5	4	3	2	1	0

Sequence sent to the display. Values in hexadecimal

10	10	01	00	00	04	08	30	31	32	33	34	35	36	37	0E	7E

Example 2:

Number of display digits = 8		
Display address = 01	Parameter 1	01
Protocol = Modbus	Parameter 2	03
Serial line: 9600 bauds. 8 bits. Even parity. 1 Stop bits	Parameter 3	11
Serial line type = RS485	Parameter 4	02
Time-out reception data = 10 seconds	Parameter 5	05

Data to display:

			-	6	7.	8	9

Sequence sent to the display. Values in hexadecimal

01	10	01	00	00	04	08	39	38	2C	37	36	2D	20	20	BB	B7

4.4. Code 4: Host-Link Slave of Omron.

This protocol connects with Omron PLC using Host-link protocol.
5 consecutive DM are used. The first one must be in an address divisible for 100 (DM0000, DM0100, DM0200... DM5400).
DMs can be programmed from DM00 to DM9900, a total of 99. However, it must be taken into account that DMs are able to be used in every PLC type.

This DM configuration can be used in displays of a maximum of 12 digits.
The function of every DM is:

DMxx00: Values corresponding to digits 9 to 12. Digit 12 is the highest weight.
DMxx01: Values corresponding to digits 5 to 8
DMxx02: Values corresponding to digits 1 to 4. Digit 1 the lowest weight.

xx corresponds to hundreds and thousands of DM number. This code is programmed in parameter 6.

DMxx00				DMxx01				DMxx02			
12	11	10	9	8	7	6	5	4	3	2	1

DMxx03: It is reserved. Do not use decimal point position.
DMxx04: Position of the decimal point. In the three lowest weight digits, the decimal point to be activated is codified.

All the bits to 1 activate a point in the display in this DM. The decimal point is activated on the right of the selected digit.
Characters "A", "B", "C" and "D" are displayed as "A", "b", "C", and "d".
Character "E" is displayed "-"
Character "F" is displayed as an unlighted digit: space character.

Example:

Display address = 01	Parameter 1	01
Host-Link Slave of Omron Protocol	Parameter 2	04
Serial line: 9600 bauds. 7 bits. Non parity. 2 bits	Parameter 3	26
Type of serial line = RS232	Parameter 4	01
Time-out reception data= 20 seconds	Parameter 5	07
Selection n of DMx100 Example: (DM100)	Parameter 6	01

DM0000 = 8542
DM0001 = 7311
DM0002 = 2069
DM0004 = 0004

In a 10 digits display:

4	2	7	3	1	1	2	0.	6	9

In a 6 digits display:

1	1	2	0.	6	9

Selection of the DM number
The DM number is selected by parameter 6 of the display configuration. The value of parameter 6 must be multiplied for 100 to obtain the DM number. Example: Parameter 6= 24: number of DM2400.

Display address
The display address must be equal to address specified in the PLC settings.

4.5. Code 5: ASCII-2.

This protocol permits easy communication with any unit that features a serial line and that can have the protocol configured, as with a computer, a PLC Omron working in RS232 mode, etc. Another possibility is to connect various displays from the same unit on a RS485 network.

With this protocol, the display works in slave mode, which is to say the display waits to receive a message and once received, it will show the value as long as it conforms. The screen may be configured in order to be able to adapt to a multitude of protocols that use the ASCII format.

In order to understand how the protocol can be configured, the terms used are described below:

Transmission block: This is formed by all the bytes necessary in order to be able to display a value. For each transmission block correctly received, the display will update itself with a new value. Each block is made up of three parts: The header, the data tablet and the block end.

Block header: This is used to identify the beginning of the block. One can choose between 4 formats or no header.

Data tablet: This contains the information that should be displayed. Through parameters 8 and 9, it is possible to select the part of the block that you desire to be displayed.

Block end: This is used to identify the complete delivery of the block. One can choose between 6 types of block ends.

Parameter 6: Start of block selection.
00: @ AH AL E D. (Host-Link from Omron). AH Address high. AL Address low.
01: 02h Value 2 hexadecimal.
02: 02h AH AL Value 2 hexadecimal + display address. AH Address high. AL Address low.
03: 02h AL AH Value 2 hexadecimal + display address. AL Address low. AH Address high.
04: No start of block
For value greater than 04 the block is rejected.

Parameter 7: End of block selection.
00: *CR (Host-Link de Omron). Hexadecimal 2Ah 0Dh.
01: 03h Value 3 hexadecimal.
02: CR LF. Hexadecimal 0Dh 0Ah.
03: LF CR. Hexadecimal 0Ah 0Dh.
04: CR. Hexadecimal 0Dh.
05: LF. Hexadecimal 0Ah.
For value greater than 05 the block is rejected.

Parameter 8: Skip characters.
This permits skipping of characters in the data block in order to be able to select a value within a phrase. An example to help understand the operation would be:
Supposing that we have a weighing unit that, upon ending a cycle, has sent the following phrase through the serial line: «The weight is 193.8kg». To be able to display the weight, we must extract only the value 193.8 from the text. The way to do this is by SKIPPING the characters in the text (the spaces, periods and commas count as characters). In this case, there are 14. This is the value that should be programmed.

Parameter 9: Value position.
Some units, upon transmitting the information though the serial line, first send the lowest digit of weight, while others first send the highest digit of weight. This parameter permits the correct display of the values in adapting itself to all units.

Inverted presentation.
Values between 01 and 09: The digit that is in position on (01 to 09) of the data tablet is placed in the digit on the right side of the display. The next digits on the screen are to be placed on the left.

Example data block	1	7	6	3	2	8	4	5	9

Parameter 9: 04									
Displayed value on 6 digit's equipment				9	5	4	8	2	3
Displayed value on 4 digit's equipment						4	8	2	3

Parameter 9: 02									
Displayed value on 6 digit's equipment				4	8	2	3	6	7
Displayed value on 4 digit's equipment						2	3	6	7

In these examples, it has been assumed that parameter 8 (skipping characters) was equal to 0, for which the entire data tablet is valid. Depending on the number of digits of the unit (4 and 6 in the example), more or less digits may be displayed, but the digit on the right will always stay the same.

Normal presentation.
Values between 11 and 19: In order to obtain the initial digit position, 10 should be subtracted from the parameter value. Digit 1n (1 to 9) of the data is placed in the digit on the right of the display. The preceding digits on the screen will be placed on the left.

Example data block	1	7	6	3	2	8	4	5	9

Parameter 9: 18									
Displayed value on 6 digit's equipment				6	3	2	8	4	5
Displayed value on 4 digit's equipment						2	8	4	5

Parameter 9: 14									
Displayed value on 6 digit's equipment						1	7	6	3
Displayed value on 4 digit's equipment						1	7	6	3

Parameter 9: 16									
Displayed value on 6 digit's equipment				1	7	6	3	2	8
Displayed value on 4 digit's equipment						6	3	2	8

In these examples, it has been assumed that parameter 8 (skipping characters) was equal to 0, for which the entire data tablet is valid. Depending on the number of digits of the unit (4 and 6 in the example), more or less digits may be displayed, but the digit on the rights will always stay the same.

If Parameter 9 has a value equal to 0 or 10, or is higher than 19, the block is rejected and the received value is not displayed.

Parameter A: Reply message
After receiving a transmission block, the display may be programmed so that it sends a reply message.

The options are:
Value 00: No reply is sent.
Value 01: The same reply is always sent: © AH AL E D 0 * CR
Where AH and AL are the high and low addresses respectively.
E D 0 *: the letters E, D, the number 0 and the symbol *.
CR: Carriage return.
ODh: Hexadecimal value OD.
Value 02: A reply block is sent that is formed by the block header, the code ACK (O6h), and the block end.
The block header and block end are the same ones that are programmed for receiving.

Example 1: To send a message from a computer

Display address = 8	Parameter 1	08
Communication protocol = ASCII-2	Parameter 2	05
Serial line: 9600 Bauds. 8 bits. Parity even. 2 bits stop	Parameter 3	29
Type of serial line: RS232	Parameter 4	1
Time-out reception: 6 seconds	Parameter 5	03
Start of block: 02h AH AL	Parameter 6	02
End of block: CR (0Dh)	Parameter 7	04
Skip characters= 0	Parameter 8	00
Value position = 7. Normal presentation	Parameter 9	17
Reply message = No reply	Parameter A	00

Transmission block send

ASCII	2	0	8		3	5	8	9	6	4	CR
Hex	02	30	38	20	33	35	38	39	36	34	0D

Displayed value on 4 digits equipment

8	9	6	4

Displayed value on 8 digits equipment

		3	5	8	9	6	4

Example 2: To send a message from a scale.

Display address = 14	Parameter 1	14
Communication protocol = ASCII-2	Parameter 2	05
Serial line: 9600 Bauds. 8 bits. Parity even. 2 bits stop	Parameter 3	29
Type of serial line: RS485	Parameter 4	2
Time-out reception: 6 seconds	Parameter 5	03
Start of block: 02h AH AL	Parameter 6	04
End of block: CR (0Dh) LF (0Ah)	Parameter 7	02
Skip characters= 5 (Peso=)	Parameter 8	05
Value position = 5. Normal presentation	Parameter 9	15
Reply message = No reply	Parameter A	0

Transmission block send

ASCII	P	o	i	d	s		1	5	,	8	kg		CR	LF
Hexa	50	6F	69	64	73	20	31	35	2C	38	6B	67	0D	0A

Displayed value on 4 digits equipment

	1	5.	8

With parameter 8 = 5, the first 5 characters are skipped in the data tablet. In this example, as it is a block with no header, it corresponds to the first 5 characters of the transmission block.
With parameter 9 = 15, it is indicated that the data will be displayed in the same order in which it was received (normal presentation) and that the first digit on the right of the display will be the character that is in position 5 (15-10) after skipping the characters indicated in parameter 8.

Colour option
Displays that have colour option may change the display colour by command. Character X (88 ASCII) is the command that is used to select the colour but the colour code position depends on the value of parameter 9.

If parameter 9 is greater or equal than 11 and lower or equal than 19, the colour code must be set before the command character X (88 ASCII). Example: Parameter 9 = 12 : Set to green colour: 1 X (49 88 ASCII)

If parameter 9 is greater or equal than 01 and lower or equal than 09, the colour code must be set after the command character X (88 ASCII). Example: Parameter 9 = 03 : Set to yellow colour: X 2 (88 50 ASCII)

While using colour control by code, parameters B and D must be equal to 20 and colour control depending on displayed value must not be used.

The colour codes are:

Red Colour = 0	Green Colour = 1	Yellow Colour = 2

Troubleshooting
This protocol is very flexible and therefore has many parameters to configure. If the programmed parameters do not match with the block received, communication is not possible. Some points to check if correct communication is not occurring are specified below.

1. Upon sending a transmission block, the display continues showing dashes.
   - Check parameter 1: Display address. The address of the display is only used if the block header is equal to 0, 2 or 3.
   - Check parameter 2: Protocol selected.
   - Check parameter 3: Characteristics of the serial line.
   - Check parameter 4: Type of serial line configured.
   - Check parameters 6 and 7: Types of header and ending blocks. - Check that parameter 9 is > O and within the valid margins.

2. Upon sending a transmission block, the display stays blank.
   - Parameter 8 could be wrongly configured. - Parameter 9 could be wrongly configured.

3. Upon sending a transmission block, the digits are displaced.
   - Parameter 8 could be wrongly configured. - Parameter 9 could be wrongly configured.
   - Parameter 6 could be wrongly configured. Value 1, 2 or 3 has been programmed and the raster sent does not correspond to the programmed value.

4. Upon sending a transmission block, the value is correctly displayed, but then dashes are immediately displayed.
   - Parameter 5 is programmed to a very low value. See section 3.2.3.5.

4.6. Code 6: Host-Link Master of Omron.

This protocol connects with Omron PLC using Host-link protocol and TXD command.
The PLC is the master and the display does not respond.

In this protocol only the command TXD (or equivalent) is used from the PLC.
The operation of this protocol is similar to Code 4. The differences are:

	Code 4	Code 6
Register type	DM	DM, HR, IR, LR
Register address	Multiple of 100	Any address
Register name	5	5
Decimal point, negative sign, ASCII characters	Yes	Yes

Data to be displayed must be set in 5 consecutive registers (DM, HR, etc) considering that rightist display digit is the most significant digit in the register. (Inverted order)

This register configuration must be used in displays up to 12 digits.

The meaning of each register is : In this example we used the register HR0037

HR0037: Values for digits 9 to 12. The 12 position is the most significant digit.
HR0038: Values for digits 5 to 8.
HR0039: Values for digits 1 to 4. The 1 position is the less significant digit.

HR0037				HR0038				HR0039			
12	11	10	9	8	7	6	5	4	3	2	1

HR0040: Reserved. Do not use.
HR0041: Position of the decimal point. The three les significant digits are used to codify the decimal point. Each one of the set bits in this register activate a point in the display. The decimal point is set to the right of the digit.

Example 1: Display the content of HR0037, HR0038 and HR0039

Number of display digits = 6		
Display address = 03	Parameter 1	03
Protocol Host-Link Master from Omron	Parameter 2	06
Serial line: 9600 bauds. 7 bits. Even parity. 2 bits	Parameter 3	26
Type of serial line = RS485	Parameter 4	02
Time-out reception data = 6 seconds	Parameter 5	03

PLC Values. Because a 6 digit display is used in this example the value of HR0037 is not significant.
x = Not significant in this example.

HR0037			
X	X	X	X

HR0038			
X	X	9	2

HR0039			
8	3	7	5

HR0040			
X	X	X	X

HR0041			
X	0	0	2

Value displayed

9	2	8	3	7.	5

4.7. Code 8. S7-200 from Siemens

This protocol connects with Siemens PLC S7-200. Using this protocol the display always is master in the PPI network.

The function of each parameter are:

Display address in PPI network	Parameter 1	> 2
Siemens Protocol S7-200	Parameter 2	8
Baud rate. See 4.2.3.3	Parameter 3	11 or 12
Serial line type	Parameter 4	2
Timeout reception. See 4.2.3.5	Parameter 5	00 to 21
Slave address in PPI network	Parameter 6	00 to 15
Lower byte data address	Parameter 7	00 to 99
High byte data address	Parameter 8	00 to 99

Parameter 1: In parameter 1 the display address into PPI network must be codified.
The address range must be between 0 and 99, but all equipments must have a different address. A value greater than 2 is strongly recommended because values 0, 1 and 2 usually are used.
Parameter 2: Must be equal to 8.
Parameter 3: Baud rate. For 9600 bauds, codify 11. For 19200 Bauds, codify 12.
Parameter 4: Must be equal to 2.
Parameter 5: Time-out reception data. See paragraph 3.2.3.5.
Parameter 6: Slave address into PPI network. Usually the PLC has address 2 but any value between 00 and 15 is valid.
Parameters 7 and 8: Register data address into the PLC. Only the V area may be used. The display will read 12 consecutives bytes beginning at the address indicated in parameters 7 and 8.

The 12 digits will be shown as:

N+0	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	N+11
						↓	↓	↓	↓	↓	↓
						1	2	3	4	5	6

The DTA function converts a double integer to ASCII, leaving the result in 12 bytes for mat and the less significant digit in n+11.

4.8. Code 9. ASCII-3

With this protocol is easy to communicate with counters with the counter protocol and serial line option. Only is possible to use the serial line RS485. With this protocol the display is always a master.

Parameter 6: Counter address.
Parameter 7: Line number. See counter manual.
Parameter 8: Decimal point position. See the following table:

Value	Deci. point
00	0
01	0.0
02	0.00
03	0.000
04	0.0000
05	000.00.0

Transmission block sent

	STX	AH	AL	LH	LL	ETX
Hexa	02	Counter		Line		03

STX: Start of block. Code 02 hexa
AH: Counter address high. Value in ASCII.
AL: Counter address low. Value in ASCII.
LH: Line number high. Value in ASCII.
LL: Line number low. Value in ASCII.
ETX: End of block. Code 03 hexa.

Transmission block received

	STX	AH	AL	LH	LL	M	-	XXXXX	ETX	CR
Hexa	02	Counter		Line		Mode	Sign	Data	03	0D

STX: Start of block. Code 02 hexa
AH: Counter address high. Value in ASCII.
AL: Counter address low. Value in ASCII.
LH: Line number high. Value in ASCII.
LL: Line number low. Value in ASCII.
M: Counter status. Not used by display.
- : Data sign: It is only send if value is negative. Code 2D hexa.
Data: Requested data in ASCII code with the maximum number of digits, except if the value is negative.
ETX: End of block. Code 03 hexa.
CR: End of transmission: Code 0D hexa.

Example

Protocol = ASCII-3	Parameter 2	09
Serial line: 4800 Bauds. 7 bits. Even Parity. 1 stop bit	Parameter 3	07
Serial line type: RS485	Parameter 4	2
Time-out reception data: 6 seconds.	Parameter 5	03
Counter address	Parameter 6	02
Line: Principal counter	Parameter 7	01
Decimal point. 00000.0	Parameter 8	01

4.9. COLOUR OPTION.

The colour option allows you to modify automatically the display colour according to the present value. The possible colours are: Red, Green and Yellow.

In order to be able to manage the colour 2 internal bits are used, they change depending on display value. Eight parameters are needed to set up the levels. Four parameters are used to define the activation form and the activation level. The other four allow defining the colour according to a combination of the 2 internal bits.

4.9.1. Parameters to define the internal bit r1.

To set up the internal bit r1 parameters B and C are used.
Parameter B is used to set up the activation form and delay or hysteresis.
Parameter C is used to set up the trigger level. The most significant digit allow setting up a negative value.

PARAMETER B

Left digit	Control bit		Right digit	Set/Reset
0	ON if Value> Parameter C		0	No delay I No hysteresis
1	ON if Value < Parameter C		1	Delay 1 s
2	Always off		2	Delay 2s
			3	Delay4s
			4	Delay6s
			5	Delay 1Os
			6	Hysteresis = 2
			7	Hysteresis = 4
			8	Hysteresis = 8
			9	Hysteresis = 12

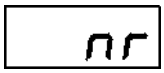
4.9.2. Parameters to define the internal bit r2.
To set up the internal bit r2 parameters D and E are used.
Parameter D is used to set up the activation form and delay or hysteresis.
Parameter E is used to set up the trigger level. The most significant digit allow setting up a negative value.

PARAMETER D

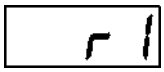
Left digit	Control bit		Right digit	Set/Reset
0	ON if Value> Parameter E		0	No delay I No hysteresis
1	ON if Value < Parameter E		1	Delay 1s
2	Always off		2	Delay 2s
			3	Delay 4s
			4	Delay 6s
			5	Delay 10s
			6	Hysteresis = 2
			7	Hysteresis = 4
			8	Hysteresis = 8
			9	Hysteresis = 12

4.9.3. Parameters to define the colour.
To define the colour the 2 internal bits (r1 and r2) are used.

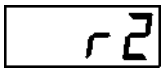
The following parameters are used to define colours.



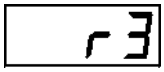
Colour if internal bits are OFF. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.



Colour if internal bit r1 is ON. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.



Colour if internal bit r2 is ON. To change the colour push 7->5 key. Upon pressing + the next parameter is shown.



Colour if internal bits r1 and r2 are ON. To change the colour push 7 >5 key. Upon pressing + the next parameter is shown.

4.9.4. Work with only one colour.
To work always with only one colour set up the following parameters:

Parameter	Value
B	20
C	0
D	20
E	0
nr	colour
r1	colour
r2	colour
r3	colour

Parameters C and E may have any value.
Parameters nr, r1, r2 and r3 should have the same colour.
Independently of work colour, the parameters set up always uses RED colour.