MOF 100-M485

User Manual

Rev : **MOF 100-M485 Version 2.0 E**

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1 FUNCTIONALITY OF THE IDENTIFICATION SYSTEM

The BALOGH identification system makes it possible to store and retrieve information about a object that has an RFID TAG attached. The data relating to this object is stored in the memory of the **TAG electronically**.

This data can be read and, for the TAGS with write capability, modified, remotely and without contact, with the assistance of a **transceiver** (or read/write head) suitable for the type of TAG.

The communications between the TAG and the transceiver is managed by a BALOGH **interface**.

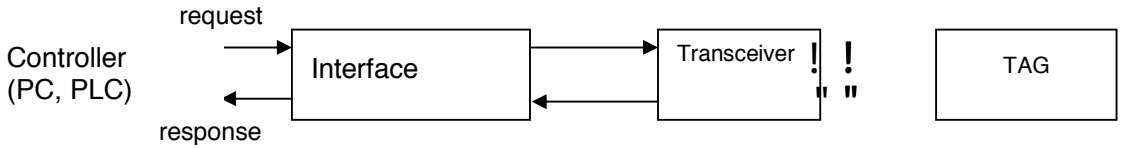
A system of reading or read-write is composed of two elements:

- Transceiver (E/R),
- Interface (Control Board).

For communications between a E/R – TAG, two technologies are possible:

- Inductive technology, the TAGS do not require any power on the TAG to communicate: they receive the energy necessary for their operation from the electromagnetic field emitted by the transceiver E/R;

The interface manages the operation of the transceiver as well as the communications with the TAG. It receives the data and interfaces with the controller (PC or PLC).



Depending on the choice of the user and the configuration of the application, BALOGH offers a wide range of interfaces:

- Access to data via parallel control boards,
- Access to data via serial connection (RS 422/485 or RS 232), with protocol (ModBus/JBus) or on a High Speed Bus Network (EtherNet, DeviceNet, ControlNet, ProfiBus-DP, InterBus-S…etc)
- A programmable interface allowing the user to manage local automation (various sensors, actuators and TAG data).

One **monobloc** functions as both the interface and the transceiver.

2 DESCRIPTION

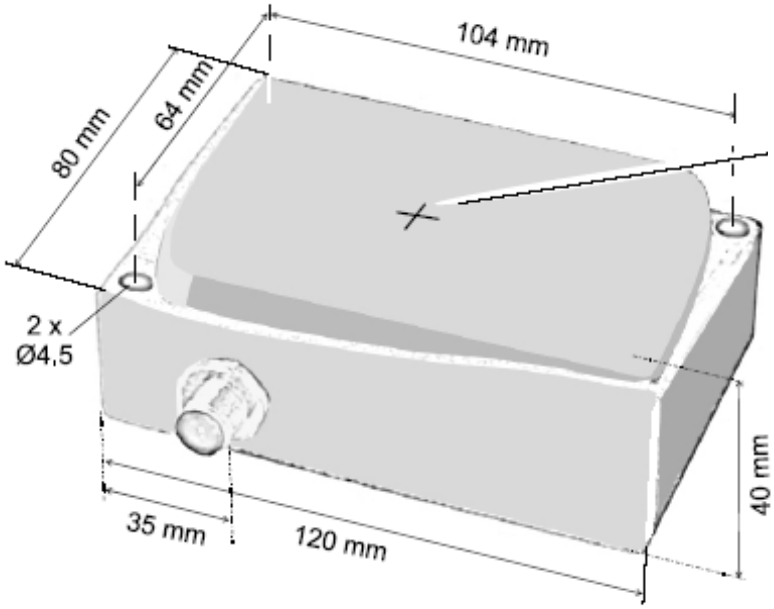
The MOF 100/M485 is a control board and transceiver (MonoBlock) allowing the reading and writing of data to passive TAGS in conformity with the ISO standard 15693 (18000-3 mode 1) TAF and TAM of BALOGH, I-Code SLI2® of Philips, Tagit® of Texas Instrument, SRF 55 of Infineon… (Other chips, to consult us).

It has a serial connection RS485 to communicate with the supervisor (PC or PLC).
Connected to a serial port RS 232 of a PC, this connection allowsfor the configuration of the MOF 100 M 485 by using a PC or the utility manager (MOF Manager).

3 INSTALLATION

3.1 DESIGN

The MOF 100/M485 is mounted by two screws M4 (length under head ≥ 35 mm).
Mounting holes are located in two opposite corners (right distances: 104 X 64 mm).
The preferred mounting is with the connector downwards.



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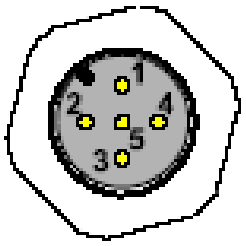
3.2 CONNECTION

The power and serial communication connection are made with the same male connector M12.

Pins	Serial & Power Connections RS485	RS232
1	+ 24 VDC	
2	Rx+ (Tx+)	Tx
3	Rx- (Tx-)	Rx
4 & 5	- 0 V	



4 TAG MEMORY MAP – TAF – TAI –TAM

TAF memory is divided into blocks of 8 bytes (Block = 8 bytes).
The total memory of the TAGS is made up of 256 blocks (Address: 0 to FF) 2K Bytes

block	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7		Access
0									2,000 Bytes 250 blocks	User Memory
:										
F9										
FA									Restricted Zone	Reserved Non-User Memory
:										
FF										

TAI memory is divided into blocks of 4 bytes (Block= 4 Bytes).
The total memory of the TAGS is made up of 32 blocks (Address 800H – 87FH) 1K Bits with a UID (unique identification code) at address 880H.

TAM memory is divided into 8 byte blocks (Block= 8 Bytes) TAM TAGS are available in 8K Byte memory (1024 Blocks) and 32K Byte memory (4096 Blocks).
8K Byte TAG memory (Address 0 – 1FFFH) and 32K Byte TAG memory (Address 0 – 7FFFH).

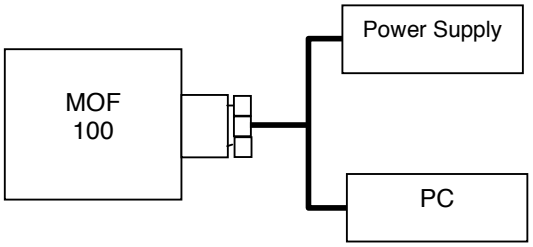
When using the BALOGH 52 kbit/s protocol with the TAM TAG data can be read or written word by word (2 Bytes).

5 CONFIGURATION AND/OR REMOTE LOADING WITH THE ASSISTANCE OF A PC

5.1 REMOTE LOADING

To connect the MOF 100 M 485 to a RS232 port of the PC use the diagram and table below :

MOF 100	Pins	PC
1	+ 24 V	
2		Rx
3		Tx
4	0 V	
5		0 V



Follow the indications of the utility ***MOF To manage*** or to consult Balogh for the procedure of remote loading.

If you do not have the utility ***MOF To manage*** use hyperterminal in text mode with 9600 bauds, No parity with Xon Xoff activated.

The file to be sent must have extension ".HEX".
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5.2 CONFIGURATION OF THE MOF-100/485

5.2.1 CONFIGURATION USING A PC AND WINDOWS HYPERTERMINAL

With hyperterminal in text mode, RS 232, 9600 bauds no parity, to send the character strings:

<P> <Adr> <Val>

<P> : To indicate Programming mode (written to E²PROM)
<Adr> : 00 or 01.
If 00 : <Val> will contain the slave address of 1 to 10 Hex.
If 01 : <Val> will contain the parity and baud rate according to the table below :

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Parity		0	0	0	0	Baud Rate	

1	1	ODD
1	0	EVEN
0	X	NONE

0	0	9600
0	1	19200
1	0	38400
1	1	76800

If bits 2, 3, 4, 5 are not zero, the MOF will default to the following parameters :
9600 bauds, ODD Parity, Slave Address of 1.

5.2.2 CONFIGURATION USING A TAG WITH PARAMETER SETTINGS « MASTER TAG»

Any ISO 15693 TAG can be used as a « master TAG ».
Each MOF-100/485 MonoBlock will require its own master TAG .
Any master TAG placed in front of its reader tells the reader the configuration that it must adopt and, at same time, recovers the contents of the registers of maintenance managed by the reader.

5.2.2.1 Attribution de la fonction «master TAG»

1- Place the TAG in front of the reader
2- Send over the serial connection, in ASCII, the word « master ».
3- The reader must return “ack” (06) in the event of a problem the reader will return “NAK” (15)

This TAG will become TAG “master”, and has its identifier (UID) stored in the memory of the reader.
This TAG will not be accessible any more in writing from this reader.

5.2.2.2 Contents of the MASTER TAG for TAF

	Word 0		**Word 1**		**Word 2**		**Word 3**		
	(MSB)	(LSB)	MSB	LSB	MSB	LSB	MSB	LSB	
Block 0	"$E" (Slave in ASCII)	"NE" (in HEX)	"$C" (config in ASCII)	Parity/Baud Rate (in HEX)	0	0	0	0	Data sent to the reader
Block 1	Number of faults		Number of received messages		Number of messages without fault		Number of messages with fault		Data received from the reader
Block 2	/		/		/		Software Version		Data received from the reader

With each passage of the master TAG the MOF-100/485
- the 4 words of the tag block 0 reads (8 bytes) and applies the parameters if they are valid
- writes the value of the numbers and software version in the 8 following words (bloc1, bloc2)

Example starting at block 0 :
{45H, 01H, 43H, C0H, 0, 0, 0, 0} -> Slave, 1, 9600 baud, Odd parity

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5.2.3 CHANGING THE CONFIGURATION ON-LINE

To communicate in RS 485 or RS 232 at 4800 bauds, odd parity.

Controller (PC)		**MOF 100 M 485**	
Idle <character> (0H)	!		
----------	---	No Answer	
	"	<V> (56H)	Ask for Baud Rate
<0> (30h) for 9600 bauds <1> (31h) for 19200 bauds <2> (32h) for 38400 bauds <3> (33h) for 76800 bauds	!		
----------	---	----------	Time of reversal
----------	---	----------	(3 characters)
	"	<P> (50H)	Specify the parity
<E> (45H) for Even Parity <N> (4EH) for No Parity <O> (4FH) for Odd Parity	!		
	"	<ACK> (6H)	

The new configuration will be valid only after cycling power to the unit. Until then, the speed of communication remains in 4800 bauds.

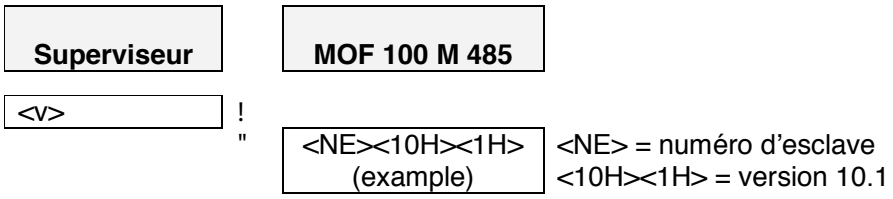
If necessary, the slave number can also be modified on-line in the following way, at speed and with the existing parity:

Superviseur		**MOF 100 M 485**	
<s> <NE>	!		1<NE<32 (20H)
	"	<ACK> (6H)	

The new slave number is active immediately.

5.3 OTHER FUNCTIONS TO ACCESS THE READER

5.3.1 IDENTIFICATION OF THE FIRMWARE VERSION



5.3.2 DEACTIVATION OF THE READER (Sleep Mode)

The MOF 100 M485 is always active, i.e. it emits an electromagnetic field at 13.56 MHz. It is possible to put the MOF-100/M485 in a sleep mode via a command using the protocol JBUS.
In sleep mode, the reader will be active only when it receives a command request to Read or Write to a TAG. After the execution of the command request, the reader returns to sleep mode.

To put the reader in sleep mode, it is necessary to write 0 to address 2000H. Writing of any value different from zero will make the reader active.

In reading however, the contents of the address 2000H will always give the state in which the reader is and will inform about a possible presence of label, and that whatever the writings made for activation or the deactivation :

Bit 0:	Presence of TAG	= 1
Bit 1:	Reader in sleep mode	= 1
Bit 2:	New TAG Bit 2 will fall down to zero only after one access in reading or writing.	= 1
Bit 3:	Indicate that the UID of the TAG is valid.	= 1
Bit 4:	indicates if master TAG	= 1

With the MOF in an active state it is not nesessary to send a request to the reader. The MOF will see the presence of a TAG and read its UID (Unique ID Number). This UID will then be stored at address words 2001 H, 2002 H, 2003 H and 2004 H, and is 8 bytes in size.
-> cf. monitoring page14

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6 READING OR WRITING TO THE TAG MEMORY

The Reading or writing to a TAG's memory must always be carried out per whole block in accordance with the following examples:

- Reading: Indicate the address of the first block and the number of blocks to reading.
- Writing: Read the blocks initially to write, modify the bytes required then to rewrite the total blocks of memory. Not Reading or Writing to the total memory in a block will result in a fault.

The **TAM TAG** block memory can be read and written word (2 bytes) by word in accordance with the following examples:

- Reading: Indicate the address of the first block and the number of blocks to reading.
- Writing: To read the memory blocks initially to write, modify the bytes concerned then to rewrite the total blocks of memory to the TAG.

In addition, the **TAM#** can be read/written following the standards ISO 18000-3 mode 1 and ISO 15693, and also by using the protocol BALOGH 52kb (which makes it possible to communicate faster between the TAG and MOF).

6.1 READING/WRITING TO A TAG WITH JBUS® / MODBUS® RTU PROTOCOL

Jbus/Mobus RTU is a standard of communication multipoint directed words (2 bytes).

For the TAF TAG, the number of words to read or write to the TAG must always correspond to the number of block(s), and thus must be a multiple of 4 for the TAF TAG.

The TAM TAG, does not have this limitation concerning the number of words for reading or writing, starting with word 1.

Only the following functions of Jbus/Mobus RTU protocol are implemented:

- Function 3 or 4 : Reading of (N) words
- Function 16 (10H) : Writing of (N) words

The length of the data is limited to 120 words per command or 30 blocks (of 8 bytes).

For the TAGS type TAF 2K or TAM 2K, the address range for reading or writing is between 0 and 1FF Hex.

APPENDEX A : USING JBUS ® / MODBUS ® RTU

OVERVIEW

Jbus/Modbus RTU is a standard of communication multipoint directed words (2 bytes).

The Master sends requests to the slave. They are called" functions". Only the following functions are implemented:

- function 3 or 4: reading of (N) words
- function 16 (10H): writing of (N) words.

COMMUNICATION FORMAT

The format for commands:

NE	CF	Message	CRC 16
1 byte	1 byte		2 octets

NE : Slave number under protocol JBUS: the slave answers only to commands with this number, which is relfected in the reply for the reader.

CF : Function Code (3, 4, 16 or error code)

CRC16 : Cyclic Redundancy Code verifying communications was successful .

TAG MEMORY

In the TAG memory, the first word is consists of the first two bytes of block 0, the second word of two following, etc

The two functions can be carried out only per block, therefore you must use a multiple number of words 2, 4 or 8 according to the type of TAG ISO 15693.

READING OF (N) WORDS:

REQUEST:

NE	CF	Ad	n	CRC 16
		2 Bytes	2 Bytes	

AD : address of the 1st block with reading (in words): 0, 4, 8,…, **996**

N : number of words to reading: 4, 8, 12,…, **40**

!

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REPONSE :

NE	CF	BC 1 Byte	D_1 2 Bytes			D_n 2 Bytes	CRC 16

BC : Number of bytes read are 2n (1 byte)
D_1 : value of the first word read
D_N : value of the last word read

WRITING OF (N) WORDS:

REQUEST:

NE	CF	Ad 2 Bytes	n 2 Bytes	BC 1 Byte	D_1 2 Bytes			D_n 2 Bytes	CRC 16

CF: 16 (10h)
AD: address of first block to be written (in words): 0, 4,…, **996**
N: number of words to be written: 4, 8,…, **40**
BC: a number of bytes (BC=2n)
D_1 : first value to be written
D_N : last value to be written

REPONSE :

NE	CF	Ad 2 Bytes	n 2 Bytes	CRC 16

ERROR MESSAGE

When a fault is received, the slave will respond with this message:

NE 1 Byte	CD 1 Byte	EC 1 Byte	CRC 16 2 Bytes

CD: Function Code requested increased by 128.
EC: Error Code:

- 1: Incorrect function
- 2: Incorrect addresses MOF 100/M485
- 8: Fault in communications with the TAG.

Note : In the event of an incorrect CRC16, the slave does not respond to the request.

MOF STATUS

In normal mode (Active), the MOF 100/M485 carries out a search for TAG recurringly.

Any TAG entering the transmission zone is detected, the UID is read and its value memorized in the MOF 100/M485 with addresses 2001 H with 2004 H; status can be retrived by issuing a read command:

REQEST:

NE	CF	Ad 2 Bytes	n 2 Bytes	CRC 16

AD : address in words: 2000 H

N : number of words to read: 5

!

REPONSE:

NE	FC	BC 1 Byte	D_1 2 Bytes			D_n 2 Bytes	CRC 16

BC : a number of bytes read (2n)

D_1 : value of the first word read

D_N : value of the last word read

	D_1	D_2	D_3	D_4	D_5
address MOF 100	2000 h	2001 h	2002 h	2003 h	2004 h

D_1 : word of status:
[bit 7 = 0] => command in progress
[bit 7 = 1] => command complete

Bit n°	4	3	2	1	0
= 0	TAG ??	DATA NOT VALID	OLD DATA	NORMAL MODE	NO TAG
= 1	MASTER TAG	DATA VALID	NEW DATA	SLEEP MODE	TAG PRESENT

The MSB of the word of address 2000H memorizes the value of the last fault.

Note: the bit 2 toggles back to (0) as soon as the data is read once.

In the sleep mode, requests are necessary to activate the MOF to start the reading or the writing.

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ANNEXE B : TABLE ASCII

décimal	octal	hexadécimal	caractère	décimal	octal	hexadécimal	caractère
0	00	0	NUL	64	100	40	@
1	001	01	SOH	65	101	41	A
2	002	02	STX	66	102	42	B
3	003	03	ETX	67	103	43	C
4	004	04	EOT	68	104	44	D
5	005	05	ENQ	69	105	45	E
6	006	06	ACK	70	106	46	F
7	007	07	BEL	71	107	47	G
8	010	08	BS	72	110	48	H
9	011	09	HT	73	111	49	I
10	012	0A	LF	74	112	4A	J
11	013	0B	VT	75	113	4B	K
12	014	0C	FF	76	114	4C	L
13	015	0D	CR	77	115	4D	M
14	016	0E	SOH	78	116	4E	N
15	017	0F	SI	79	117	4F	O
16	020	10	DLE	80	120	50	P
17	021	11	DC1	81	121	51	Q
18	022	12	DC2	82	122	52	R
19	023	13	DC3	83	123	53	S
20	024	14	DC4	84	124	54	T
21	025	15	NAK	85	125	55	U
22	026	16	SYN	86	126	56	V
23	027	17	ETB	87	127	57	W
24	030	18	CAN	88	130	58	X
25	031	19	EM	89	131	59	Y
26	032	1A	SUB	90	132	5A	Z
27	033	1B	ESC	91	133	5B	[
28	034	1C	FS	92	134	5C	\
29	035	1D	GS	93	135	5D	]
30	036	1E	RS	94	136	5E	^
31	037	1F	US	95	137	5F	_
32	040	20	SP	96	140	60	`
33	041	21	!	97	141	61	a
34	042	22	"	98	142	62	b
35	043	23	#	99	143	63	c
36	044	24	$	100	144	64	d
37	045	25	%	101	145	65	e
38	046	26	&	102	146	66	f
39	047	27		103	147	67	g
40	050	28	(	104	150	68	h
41	051	29	)	105	151	69	i
42	052	2A	*	106	152	6A	j
43	053	2B	+	107	153	6B	k
44	054	2C	,	108	154	6C	l
45	055	2D	-	109	155	6D	m
46	056	2E	.	110	156	6E	n
47	057	2F	/	111	157	6F	o
48	060	30	0	112	160	70	p
49	061	31	1	113	161	71	q
50	062	32	2	114	162	72	r
51	063	33	3	115	163	73	s
52	064	34	4	116	164	74	t
53	065	35	5	117	165	75	u
54	066	36	6	118	166	76	v
55	067	37	7	119	167	77	w
56	070	38	8	120	170	78	x
57	071	39	9	121	171	79	y
58	072	3A	:	122	172	7A	z
59	073	3B	;	123	173	7B	{
60	074	3C	<	124	174	7C	|
61	075	3D	=	125	175	7D	}
62	076	3E	>	126	176	7E	~
63	077	3F	?	127	177	7F	DEL