Our Integrated Monitoring Device (IMD) is a data recorder developed according to the 21/2000 (V.18) decree of the ministry of finance and also in accordance with the technical requirements prescribed by the National Office of Measures (OMH). It can be built into the slot machines produced for Hungarian operation in conformity with the type licence. The manufacturers of the machines are able to apply easily for all main boards via serial port. The protocol of the MACHINE-IMD communication can also be downloaded from our website.

The Integrated Monitoring Device produced by Ring Games Ltd is one of the most reliable data recorder operating in slot machines. There are more than 28.000 pieces operating so far in the I. and the II. category slot machines. Our professional service background and technical colleagues are ready to solve all the emerging problems. Our staff is prepared for technical negotiations in English and German language.

The general specification information for IMDs can be found in the technical document issued by the National Office of Measures (OMH). This specification contains important information on the IMD system. This information is necessary before connecting an IMD to a slot machine.

The version for operators of the PC handling software for the Integrated Monitoring Device became gratis. The operator version can be downloaded free from our website (only in Hungarian) . The full version needed for the production and control is sent after registration for the users (in English or Hungarian).

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The Ring Games Ltd. undertakes that the program modifications, necessary because of law changes, will be made free of charge. Our company provides continuous service support for the installed products for the lifetime of the slot machines (5 years) regulated by Hungarian laws.

Communication protocol between the Ring Games IMD and slot machines

Communication standard: RS232C asynchronous serial data transmission, with ±15V or 0-5V signal levels (selected by jumpers on the Integrated Monitoring Device [IMD])
Other settings: 1 startbit, 8 databits, 1 stopbit, no parity, speed 9600bps
Type of connection: DTE-DTE full duplex, 3-wire null-modem (RxD,TxD,GND)
Power supply: 9-24V DC

Commands, data transmission

The communication of the slot machine (SM) and the IMD must be realised in a way that new game on the SM can only start when the IMD stored all the data from the previous game. In case of an IMD failure the slot machine must go to idle state immediately.

The communication commands are divided into two major groups

- Commands concerning credit

CREDIT IN counter	D3h
CREDIT OUT counter	D5h
TOTAL BET counter	DAh
TOTAL WIN counter	DCh

- Commands for diagnostics

Status inquiry	F0h
IMD identification	F1h
Counter inquiry	EEh
False communication log inquiry	E1h and E2h

With the credit command one can increase the value of the counters while the diagnostics commands are to have more information on the operation of the IMD.

The following table shows the implementation of the commands in various IMD versions.

	4 byte IMD*		5 byte IMD*	
	before	from V36	before V45	from V45
D3h	x	x	x	x
D5h	x	x	x	x
DAh	x	x	x	x
DCh	x	x	x	x
F0h	-	-	x	x
F1h	-	x	-	x
EEh	-	x	-	x
E1h and E2h	-	x	-	-

* - The 4-byte-IMD stores the counter data on four bytes, the 5-byte-IMD stores on five bytes.

Commands concerning credit

SM→IMD

Command code (1 byte), data in Hungarian Forint (3 bytes), checksum (2 bytes)

The bytes can be transmitted continuously, time between two bytes cannot be more than 400ms.

IMD→SM

If the data processing successful:

Command code (1 byte) – after 10ms delay – Command code (1 byte)

If the data processing is unsuccessful:

NOT (Command code) (1 byte) – after 10ms delay- NOT (Command code) (1 byte)

The SM cannot transmit another command between the two response bytes!

Command codes:

CREDIT IN counter	D3h
CREDIT OUT counter	D5h
TOTAL BET counter	DAh
TOTALWIN counter	DCh

Checksum calculation:

CHKSUM=NOT (command code+databyte[0]+ databyte[1]+ databyte[2])
2-byte hexadecimal number, LSB transmitted first

Data bytes

Data in Hungarian Forint: 3-byte hexadecimal number, LSB transmitted first

Example: 100 HUF coin to the SM

SM→IMD: D3h, 64h, 00h, 00h, C8h, FEh
IMD→SM: D3h delay(10ms) D3h (if the data processing successful)
or
IMD→SM: 2Ch delay(10ms) 2Ch (if the data processing unsuccessful)

Commands for diagnostics

Status inquiry - F0h

This command is created to check that the sent data is really recorded in the IMD. This is useful when the slot machine sends the counter data and there is no response from the IMD or there is a power failure at the recording phase.

SM → IMD

F0 00 00 00 0F FF (6 bytes)

IMD → SM

F0 aa bb cc dd ee yy mm dd hh mm ss chklo chkhi (14 bytes)

aa -	1byte counter, incremented after each successful data storage. If aa=0xFF then after incrementation aa=0x00. Set to 0 after IMD production then increments continuously. Must be read after the machine startup for synchronization.
bb -	Command code of the last stored data (0xD3 or 0xD5 or 0xDA or 0xDC)
cc,dd,ee -	Forint value of the last stored data, cc-lobyte, ee-hibyte
yy mm dd hh mm ss -	Actual IMD real time clock data in BCD format (independent from the stored data – year, month, day, hour, minute, second)
chklo, chkhi -	Checksum low and high byte. Calculation is same as in the data sending.

IMD identification - F1h

This command returns the serial number of the IMD and a unique slot machine manufacturer ID. Concerning the manufacturer ID please contact us before ordering.

SM → IMD

F1 00 00 00 0E FF (6 bytes)

IMD → SM

F1 aa bb cc dd chklo chkhi (7 bytes)

aa - manufacturer ID low byte
bb - manufacturer ID high byte
cc - IMD serial number low byte
dd - IMD serial number high byte

Counter inquiry - EEh

This command returns the actual value of IMD counters

SM → IMD

EE 00 00 00 11 FF (6 bytes)

IMD → SM

-----5 byte IMD (V45)

EE + 30 bytes counter data + 2 bytes chksum (33 bytes)

Counter data:

IN0 IN1 IN2 IN3 IN4 OUT0 OUT1 OUT2 OUT3 OUT4 BET0 BET1 BET2 BET3 BET4 WIN0 WIN1 WIN2 WIN3 WIN4 WINMAX0 WINMAX1 WINMAX2 WINMAX3 WINMAXHOUR WINMAXMINUTE PLAY0 PLAY1 PLAY2 PLAY3

where IN0 = 0^{th} byte (LSB) of the IN counter

-----4 byte IMD (V36)

EE + 26 bytes counter data + 2 bytes chksum (29 byte)

Counter data:

IN0 IN1 IN2 IN3 OUT0 OUT1 OUT2 OUT3 BET0 BET1 BET2 BET3 WIN0 WIN1 WIN2 WIN3 WINMAX0 WINMAX1 WINMAX2 WINMAX3 WINMAXHOUR WINMAXMINUTE PLAY0 PLAY1 PLAY2 PLAY3

In case of internal memory checksum error (counter cannot be read)

11h delay(10ms) 11h

False communication log inquiry - E1h and E2h

The IMD stores the invalid serial data received from the machine (invalid checksum, less than 6 bytes received, invalid command code). These two commands returns these stored data.

The IMD stores the last eight such events. The E1h command returns the first four events, the E2h returns the last four events. After the 8^{th} event the event with the oldest date is overwritten.

SM → IMD

E1 00 00 00 1E FF (6 bytes) or
E2 00 00 00 1D FF (6 bytes)

IMD → SM

E1 or E2 + 4 * 16 bytes event log data+ 2 bytes checksum (67 bytes)

One event log contains

1 byte	number of received bytes +
6 bytes	received bytes +
5 bytes	date of receiving in BCD format (year, month, day, hour, minute) +
2 bytes	checksum for the event log +
2 bytes	don't care (16 bytes)

Error handling

If the IMD responds with error bytes the data should be sent once again. If the response is error again the machine must go to idle state not allowing any more game to play.

If the IMD does not respond during the reponse timeout (400ms) the machine must go to idle state immediately as well.

IMD presence test

There is no specific command to test the IMD however the following sequence will test the IMD without overwriting any counter data.

SM→IMD: D3h, 00h, 00h, 00h, 2Ch, FFh

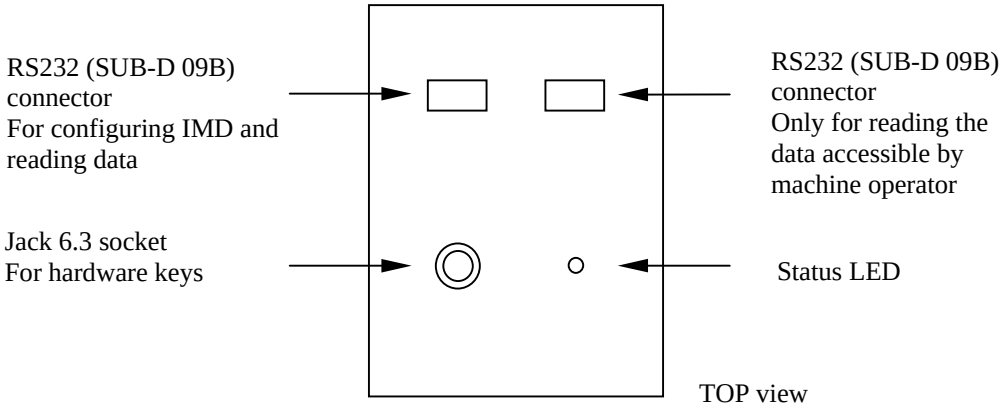
response

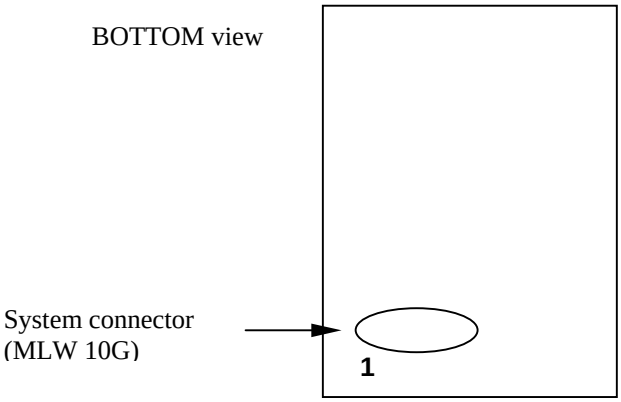
IMD→SM: D3h delay(10ms) D3h

Timing specifications

IMD power-up time	1.9 s
Byte timeout (sent by slot machine)	400 ms
Typical IMD response time	100 ms
IMD response timeout	400 ms

Integrated Monitoring Device – Technical data





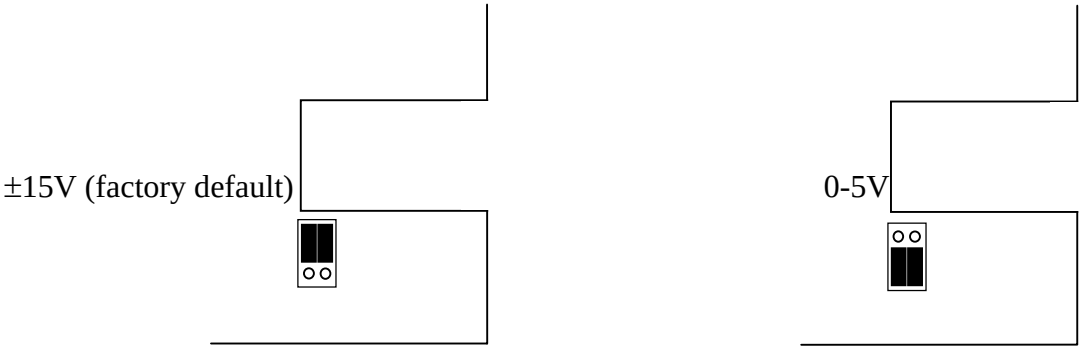
System connector

1. TXD (output, to slot machine)
2. RXD (input, from slot machine)
3. GND
4. VCC (9-24V DC)
5. GND

6, 7, 8, 9, 10 NC

Signal levels on system connector (RXD,TXD): 0-5V or ±15V

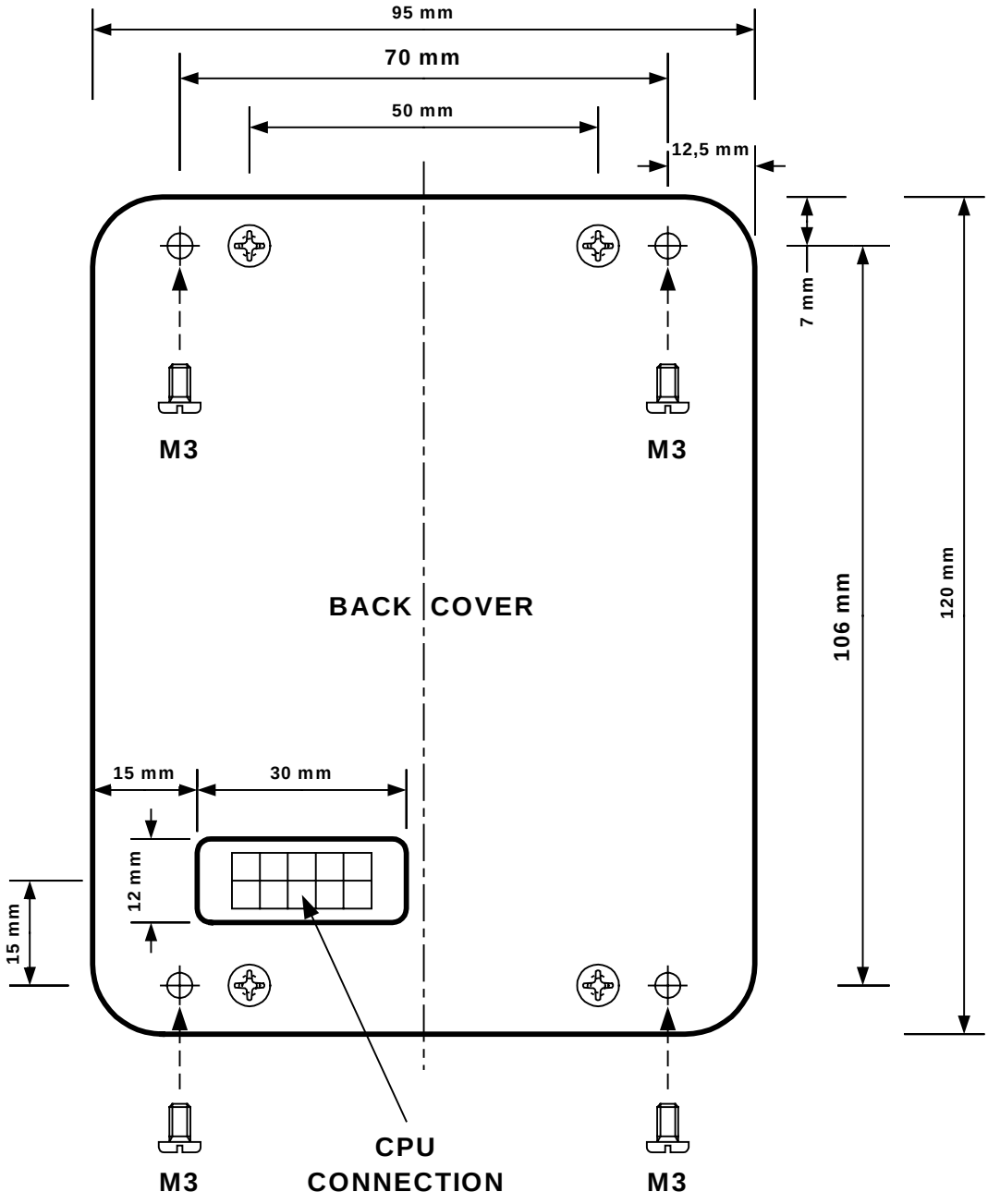
Setting with JMP1 és JMP2 jumpers

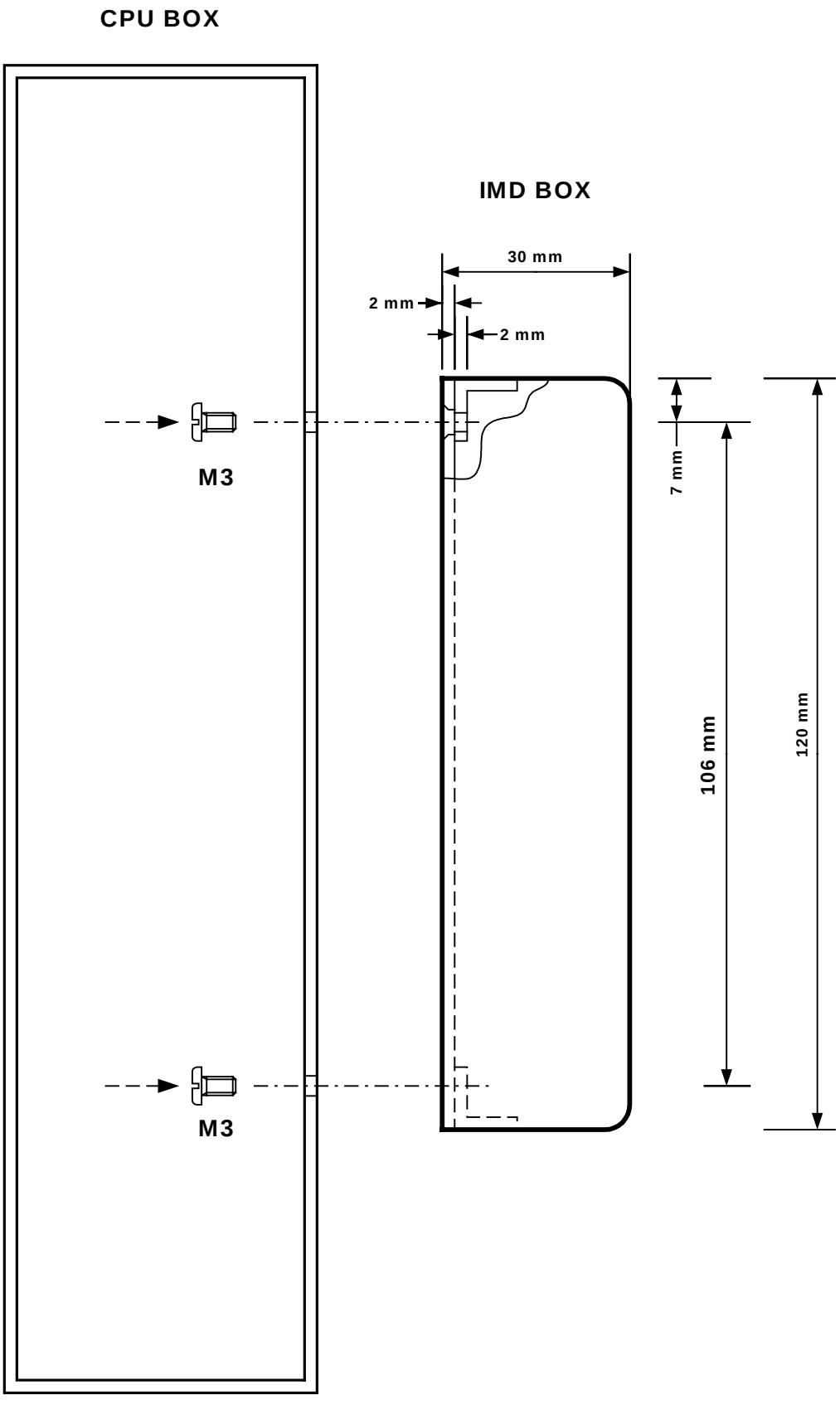


Status LED: at startup flashes twice (one short then one long) – the IMD startup OK
at read or write operation LED flashes once
at receiving data from the slot machine LED flashes once

IMD specification data can be found in a paper named Technical requirements issued by the National Office of Measures.

Integrated Monitoring Device – Mechanical data




CPU BOX
IMD BOX
30 mm
2 mm
2 mm
M3
M3
7 mm
106 mm
120 mm