MODBUS – Interface to HB-THERM (Protocol 14)

1 Introduction

This manual includes only the specific part of the HB-THERM and FANUC Roboshot interface. The basic technical requirements are according to the standard of MODBUS interface.

2 Hardware Requirements

Communication speed: 9600 Baud

Maximum communication interval time: Time to send 3 byte data

Other requirements are same as standard.

3 Protocol Requirements

3.1 Generally

The MODBUS is operated in the RTU-Mode.

3.2 Structure

The following functions are required:

	Function code	Comments
1	0x03	READ (n WORDs)
2	0x06	WRITE (1 WORD)
3	0x08	MAINTENANCE, LOOPBACK TEST
4	0x10	WRITE (n WORDs)

Example:

Setting temperature 123.4 °C → 1234 → 0x04 0xD2 : 2 bytes (1 word)

Setting temperature -123.4 °C → -1234 → 0xFB 0x2E : 2 bytes (1 word)

3.2.1 Message structure Function 0x03 (READ 1 Word)

Unit address	Function code 03	Register Address		Number of Words read		CRC	
1 byte	1 byte containing $03	MSB	LSB	MSB	LSB	MSB	LSB

Example: Read actual main line temperature of Unit address 1

Unit address	Function code 03	Register Address		Number of Words read		CRC	
0x01	0x03	0x00	0x65	0x00	0x01	0x94	0x15

Example: Read actual power output of Unit address 5

Unit address	Function code 03	Register Address		Number of Words read		CRC	
0x05	0x03	0x00	0x66	0x00	0x01	0x65	0x91

3.2.2 Message structure Function 0x06 (WRITE 1 Word)

Unit address	Function code 06	Register Address		Data		CRC	
1 byte	1 byte containing $06	MSB	LSB	MSB	LSB	MSB	LSB

Example: Write operating mode "Controlling" on Unit address 12

Unit address	Function code 06	Register Address		Data		CRC	
0x0C	0x06	0x00	0x02	0x00	0x72	0xA9	0x32

Example: Write setting temperature "123.4" on Unit address 9

Unit address	Function code 06	Register Address		Data		CRC	
0x09	0x06	0x00	0x01	0x04	0xD2	0x5B	0xDF

4 Transfer Data Requirements

Address	Bit	Description	Status
0001		Setting temperature	
		-99.9 – 999.9 °C	
0002		Operating mode	
		'r' Controlling (normal mode)	72H
		Feedback: 'r' controlling (normal mode)	
		'p' Cooling to safety switch-off temperature and switching off	70H
		Feedback: 'k' cooling to safety switch-off temperature 'p' switched off	
		'k' Cooling and switch off	6BH
		Feedback: 'k' cooling to switch-off temperature 'p' switched off	
		's' Mould evacuation and switching off	73H
		Feedback: 's' evacuating the mould 'p' switched off	
		'a' Cooling, mould evacuation and switching off	61H
		Feedback: 'a' cooling to switch-off temperature 's' evacuating the mould 'p' switched off	
0003		Minimum idle time in ms	
		0 – 100 ms	
0004 - 0010		Reserve	
0101		Actual temperature	
		-99.9 – 999.9 °C	
0102		Power output	
		-100 – 100 %	
0103		Status Word *Feedback operating mode*	
	0	Remote mode	0=machine 1=unit
	1	Heat sensor mode	0=external 1=internal
	2	Inadmissible set point received	=1
	3	Reserve	
	4	Common alarm (detail in alarm)	=1
	5 - 7	Reserve	
	8-15	'r' Controlling (normal mode)	72H
		'p' Unit OFF	70H
		'k' Cooling and switch off	6BH
		's' Mould evacuation	73H
		'a' Cooling, mould evacuation and switching off	61H

Address	Bit	Description	Status
0104		Status Word *Feedback alarm*	
	0	Heat sensor failure	=1
	1	Heater failure	=1
	2	Cooler failure	=1
	3	Level low	=1
	4	Flow rate low	=1
	5	Heater over temperature	=1
	6 - 7	Reserve	
	8	Pump failure	=1
	9	Phase failure	=1
	10	System failure	=1
	11 - 15	Reserve	
0105 - 0110		Reserve	

Notes:

- The response may take a few milliseconds longer than the minimum idle time given in <0003>. The default setting on the unit is 0 ms.
- The Status Word *Feedback operating mode* <0103> gives the actual operating mode. Because of cool-down time or timer function of the unit, it may differ from the 'Operating mode' set under <0002>.