

# LIEBHERR Litronic-FMS II

## Profibus DP-interface

Description, planning, start-up

V1.0	06.05.03	Preliminary
V1.1	17.07.02	Channel statusbit 1: "Error" new
V1.2	25.09.03	Channel statusbits 4,5 "Mean,Manu" changed
V1.3	10.12.03	Material in Channelstate, material switchover by channel control word (SV $\geq$ 2.2)
V1.4	29.10.04	Changes in Chapter Planning/Configuration
V1.5	18.01.11	gsd-file changed
V1.6	16.01.18	Channel statusbit 0,1 "Manu active" in documentation reversed, adapt chapter control word system

Liebherr-Mischtechnik GmbH  
Postfach 145  
88427 Bad Schussenried  
Germany  
Tel. +49(0) 7583/949-0  
Fax. +49(0) 7583/949-399  
Web.: [www.liebherr.com](http://www.liebherr.com)

## Description

Moisture and temperature values, as well as status and error reports can be read from all 16 channels of the controller via the Profibus DP. It is also possible to initiate all control signals such as Start, Fine and Manual. This documentation supplements the Litronic-FMS II (FMS) operating instructions.

### Comments:

- The Litronic-FMS II requires upgraded module parameters for parameterisation. Up to 244 bytes capacity of parameterisation data can be achieved depending on the module configuration. The Profibus-Master must support this parameterisation data capacity.
- Product description FMS has nothing whatsoever to do with the homonymic Profibus-protocol.

## Process image

Data exchange between the control system and the Litronic-FMS is resulted via the process image. Correct parameterisation of the FMS supported by the Litronic-FMS II-software is prerequisite for fully-functioning moisture measurement.

### Input data Litronic-FMS II

The FMS-input variables are described as viewed from the FMS. As viewed from the Profibus-Master, these variables are output variables.

Thus, control of the Litronic-FMS is as follows.

Word	Byte	Data	Byte	Data
0	0	Control System High	1	Control System Low
1	2	Control Channel 1 High	3	Control Channel 1 Low
2	4	Control Channel 2 High	5	Control Channel 2 Low
3	6	Control Channel 3 High	7	Control Channel 3 Low
4	8	Control Channel 4 High	9	Control Channel 4 Low
5	10	Control Channel 5 High	11	Control Channel 5 Low
6	12	Control Channel 6 High	13	Control Channel 6 Low
7	14	Control Channel 7 High	15	Control Channel 7 Low
8	16	Control Channel 8 High	17	Control Channel 8 Low
9	18	Control Channel 9 High	19	Control Channel 9 Low
10	20	Control Channel 10 High	21	Control Channel 10 Low
11	22	Control Channel 11 High	23	Control Channel 11 Low
12	24	Control Channel 12 High	25	Control Channel 12 Low
13	26	Control Channel 13 High	27	Control Channel 13 Low
14	28	Control Channel 14 High	29	Control Channel 14 Low
15	30	Control Channel 15 High	31	Control Channel 15 Low
16	32	Control Channel 16 High	33	Control Channel 16 Low

### Control word system

The control word system monitors system control of the Litronic-FMS II. Control of the measuring channels is resulted via the channel control words (see below).

#### Control System High

7	6	5	4	3	2	1	0

#### Control System Low

7	6	5	4	3	2	1	0
						Clear Error	Init FMS

- Init FMS:** Restart FMS: FMS is re-initialised with increasing gradient (sensors are searched for, configuration data is read anew)
- Clear Error:** A current error is confirmed by rising edge; the error bit in the status word is deleted. Should further errors occur, they will be signalled via the error bit.

### Control word channel

The control word channel monitors control of the moisture measuring channels (1..16)

#### Control Channel n High

7	6	5	4	3	2	1	0
				Material^8	Material^4	Material^2	Material^1

#### Control Channel n Low

7	6	5	4	3	2	1	0
			Manu Moisture	Fine Channel	Start Channel	Init Channel	Disable Channel

- Disable Channel:** Deactivate channel: The actual channel is deactivated, thus no measurement is resulted. The measured value outputs remain unchanged. This channel is restarted if Disable is cleared again.
- Init Channel:** Restart channel
- Start Channel:** **Start batch measurement.** Echo is resulted in the status word
- Fine Channel:** **Fine switch-over:** Switch-over to fine curve.  
Caution: Fine curve must be configured!
- Manu Moisture:** Manual value output: The manual value deposited in the FMS is submitted in place of the measured moisture value
- Material^1**  
**Material^2**  
**Material^4**  
**Material^8** Material switchover hexadecimal (SV>=2.2)

**Output data Litronic-FMS II**

The FMS-ouput variables are described as viewed from the FMS. As viewed from the Profibus-Master, these variables are input variables.

Status and measured values are thus transferred to the control system.

Word	Byte	Data	Byte	Data
0	0	Status System High	1	Status System Low
1	2	Error-Nibble 1,2	3	Error-Nibble 3,4
2	4	Moist Channel 1 High	5	Moist Channel 1 Low
3	6	Status Channel 1 High	7	Status Channel 1 Low
4	8	Temperature Channel 1 High	9	Temperature Channel 1 Low
5	10	Channel 2 High	11	Channel 2 Low
6	12		13	
7	14		15	
8	16	Channel 3 High	17	Channel 3 Low
9	18		19	
10	20		21	
11	22	Channel 4 High	23	Channel 4 Low
12	24		25	
13	26		27	
14	28	Channel 5 High	29	Channel 5 Low
15	30		31	
16	32		33	
17	34	Channel 6 High	35	Channel 6 Low
18	36		37	
19	38		39	
20	40	Channel 7 High	41	Channel 7 Low
21	42		43	
22	44		45	
23	46	Channel 8 High	47	Channel 8 Low
24	48		49	
25	50		51	
26	52	Channel 9 High	53	Channel 9 Low
27	54		55	
28	56		57	
29	58	Channel 10 High	59	Channel 10 Low
30	60		61	
31	62		63	
32	64	Channel 11 High	65	Channel 11 Low
33	66		67	
34	68		69	
35	70	Channel 12 High	71	Channel 12 Low
36	72		73	
37	74		75	
38	76	Channel 13 High	77	Channel 13 Low
39	78		79	
40	80		81	
41	82	Channel 14 High	83	Channel 14 Low
42	84		85	
43	86		87	
44	88	Channel 15 High	89	Channel 15 Low
45	90		91	
46	92		93	
47	94	Channel 16 High	95	Channel 16 Low
48	96		97	
49	98		99	

**Status word system**

**Status System High**

7	6	5	4	3	2	1	0

**Status System Low**

7	6	5	4	3	2	1	0
						Error	Busy

**Busy:** System busy, e.g. when booting (sensor search)  
**Error:** Error -> comparable with Error-Nibbles

**Error word**

**Error-Nibble 1,2**

7	6	5	4	3	2	1	0
Type				Number			

**Error-Nibble 3,4**

7	6	5	4	3	2	1	0
Para1				Para2			

**Type:** Error type  
**Number:** Error number  
**Para1:** Parameter 1  
**Para2:** Parameter 2

The above values are described in the Litronic-FMSII operating instructions. It is imperative that the error parameters Para 1, 2 are submitted upwards of 0 at the Profibus interface as opposed to the flash code, thus as the parameter is submitted, the error parameter should be incremented by 1 respectively.

**Moisture value**

**Moist Channel n**

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Moist Channel n															

**Moist Channel n** Moisture value x 100  
 Data type: UINT16 (no preceding symbol)  
 Example: 14.6% -> 1460d, 0x05B4h

**Channel status**

**Status Channel n High**

7	6	5	4	3	2	1	0
Temperature active	Test active	.	.	Material^8	Material^4	Material^2	Material^1

**Status Channel n Low**

7	6	5	4	3	2	1	0
Hi-Warning	Lo-Warning	Manu active	Mean active	Fine active	Start active	Error	Disabled

**Disabled** no measurement from this channel  
**Start active:** Start active  
**Fine active:** Fine active  
**Manu active:** 0: Moisture automatic value output; 1: Moisture manual value output

- Mean active:** Mean value calculation active; also active with "currently measuring" operation type
  
- Lo-Warning:** lower warning threshold reached or fallen short of (prepared)
- Hi-Warning:** upper warning threshold reached or fallen short of (prepared)
- Material^1..8** current material 0..15 (SV>=2.2)
  
- Test active** Test operation active (e.g. test image, take sample)
- Temperature active** Temperature measurement authorized

**Material temperature**

**Temperature Channel n**

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Temperature Channel n															

**Temperature Channel n** Temperature value °C x10  
 Data type: INT16, Bit 15 is preceding symbol  
 Example: 25.2°C -> 252d, 0x00FCh

## Planning/configuration

To implement the FMS in a Profibus network, the nodes must be correctly configured.  
For further information see (German):

- **WAGO Manual 750-121 "PROFIBUS DP/FMS, PROFIBUS DP"**
- **WAGO Supplement to the manual 750-121 "PROFIBUS DPV1 750-333 / 750-833"**

or (English):

- **WAGO Manual PROFIBUS**
- **WAGO Supplement to the manual** Fieldbus Coupler 750-833, Programmable Fieldbus Controller 750-833

Obtainable under [www.wago.com](http://www.wago.com).

### GSD-file

The GSD-file **WAGOB756.GSD** from WAGO is necessary for planning. Also obtainable under [www.wago.com](http://www.wago.com).

### Configuration

The order of the terminals must be configured in accordance with the Litronic-FMSII operating instructions!

The configuration is accepted via a planning tool (dependent upon the Profibus-Master).  
The available hardware is first selected:

#### 1.) 750-833 No PI Channel

#### 2.) PFC 750-653 RS485-Interface (imperative that PFC 750-653 is selected, not 750-653...)

In the event that analagous outputs have been entered for example, and configured in FMS, they will also be configured as PFC-module.

Should additional terminals become available which are not used by FMS, they will be integrated as standard (without PFC...). It is imperative that the plugging order is noted!

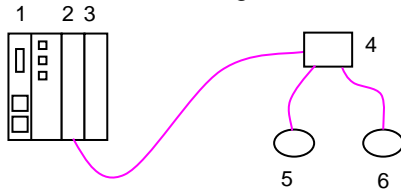
#### 3.) The quantity of **moisture measuring data (PFC-inputs and outputs)** being transferred is then determined.

The following table gives information concerning the number of bytes to be transferred, depending on the number of moisture measuring channels:

Number of <b>measuring channels</b> (n)	Number of <b>PFC-input</b> bytes (n*2+2)	Number of <b>PFC-output</b> bytes (n*6+4)
1	4	10
2	6	16
3	8	22
4	10	28
5	12	34
6	14	40
7	16	46
8	18	52
9	20	58
10	22	64
11	24	70
12	26	76
13	28	82
14	30	88
15	32	94
16	34	100

## Example

Moisture measuring with 2 channels.



1. Controller 750-833/000-002
2. RS485 750-653/000-020
3. Terminal clamp 750-600
4. Bus plug socket
- 5,6. Litronic FMS sensor 2

Parameterisation:

**750-833 No PI Channel**  
**PFC 750-653 RS485-Interface**  
**6 Byte PFC-Inputs**  
**16 Byte PFC-Outputs**

## Start-up

For start-up of the Profibus-network, moisture measuring of the FMS must be deactivated (operation type switch in middle position).

As soon as the Profibus is functioning fault-free, the FMS-function can be activated (operation type switch in upper position)

Diagnosis of the input/output data can be carried out with the Litronic-FMSII-PC-software under *System-diagnosis*.

Tip: For start-up, the respective measuring channels can be configured to manual value output, in order that a moisture value can be made available, even without connected sensors.

To guarantee correct functioning of the FMS, special attention must be paid to correct triggering of the Start/Fine signals. The test image function of the Litronic-FMSII PC-software is perfectly suitable for carrying out checks.