

Draft

Manual

CFD950/VME

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8 Channel
Constant Fraction Discriminator

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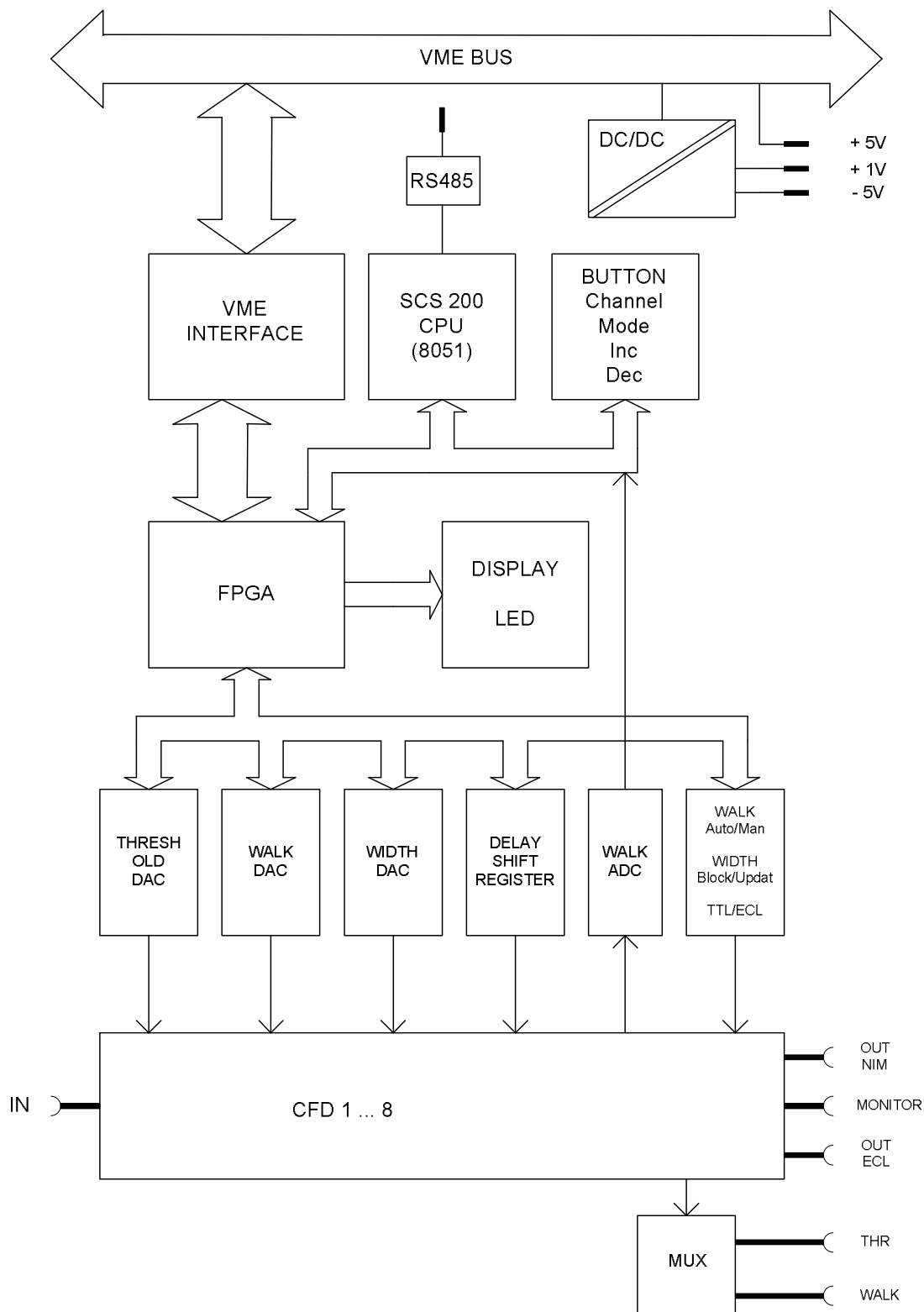
1 General description

1.1 Functional description

The Model CFD950 is a 8 Channel Constant Fraction Discriminator housed in a single VME module. The module accepts 8 negative inputs and produces 8 differential ECL outputs with a fan-out of 2 on front panel flat cable connectors and also 8 NIM outputs signal with 50 Ω impedance.

Each channel can be turned on or off via VME by using a mask register (Pattern of Inhibit).

1.2 Block diagram



1.3 Technical specification table

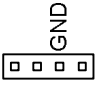

Packing	6U-high, 1U-wide VME unit
Power requirements	+12V, 0.85A -12V, 2.0A +5V, 1.1A or +12V, 2.85A +5V, 1.1A
Inputs	8 inputs LEMO (negative polarity, 50Ω impedance)
Max input voltage	-5V
Min detectable signal	-5mV
Threshold range	0 mV to -1023 mV (1 mV step, 10-bit)
Constant fraction	20%
Delay	Selectable in 500ps steps (16 steps) max 8.5ns
Outputs	8 outputs with a fan-out of 2 ECL, 110Ω impedance 8 NIM logic signal, 50Ω impedance LEMO
Output time walk	+/- 25ps for input signals in the range from -50mV to -5V
Propagation delay	Delay + 3.5ns +/- 200ps
Output pulse width	5ns to 50ns
Walk	Automatic adjustment of input offset and low frequency input noise of +/- 150mV
Monitor	Permits observation of the constant-fraction shaped signal through a LEMO connector on the front panel. Output impedance, 50Ω.
Control inputs	Pushbutton for channel, mode, increment and decrement
Control outputs	Threshold and Walk, front-panel test point (2mm)
Displays	LED's for channel, mode, walk, RS485/DTACK, 4-character 5x7 alphanumeric display
Bus	RS485, connector on the front panel. VME Bus

2 Technical Specification

2.1 Power requirements

The power requirements of the Mod. CFD950 are as follows:

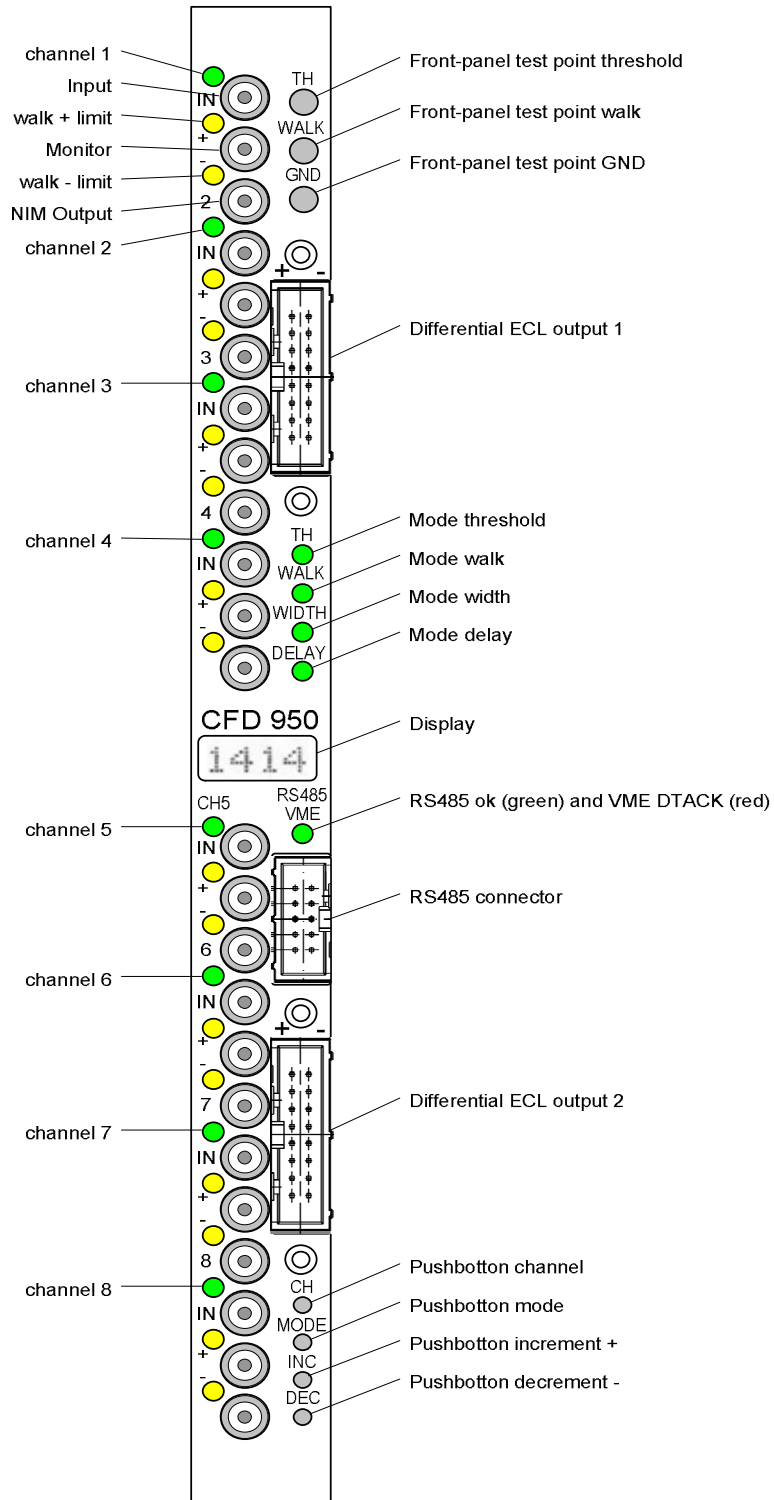
Table: Power requirements

Jumper J11	-12V  +12V	-12V  +12V
+12V	0.85A	2.85A
-12V	2.0A	
+5V	1.1A	1.1A

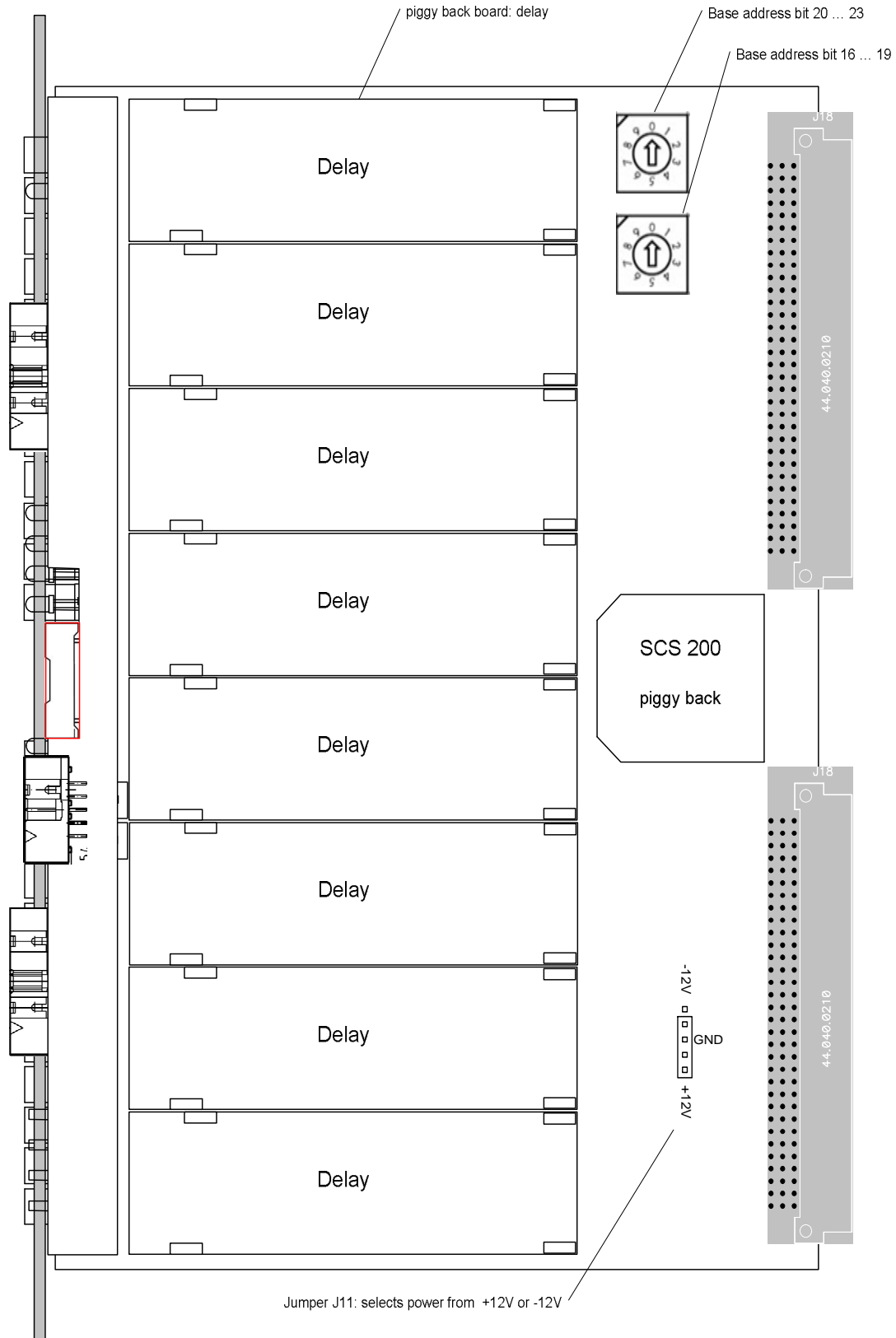


2.2 Front Panel

2.2.1 Front panel location



2.2.2 Board location



2.3 External connectors

2.3.1 INPUT connectors

INPUT CHANNELS: Mechanical specification:
8 LEMO 00 type connectors.
Electrical specifications:
Negative polarity, 50 Ω impedance.
Max input voltage: -5V.
Min detectable signal: -5mV.

2.3.2 OUTPUT connectors

OUTPUT CHANNELS: Mechanical specification:
2 Header 3M, 8+8 pin connectors
Electrical specifications:
Differential ECL level on 110 Ω impedance, pulse width
adjustment from 5ns to 50ns, updating or blocking mode.

OUTPUT NIM: Mechanical specification:
8 LEMO 00 type connectors.
Electrical specifications:
Updating or blocking mode, fast negative NIM signal.
Amplitude -700mV on 50 Ω impedance.

OUTPUT MONITOR: CF Monitor permits observation of the constant-fraction
shaped signal through a LEMO connector on the front panel.
Output impedance, 50 Ω .

2.4 Other components

2.4.1 Pushbutton

CHANNEL: Pushbutton for channel, selects channel 1 to 8 and monitors with a green LED.

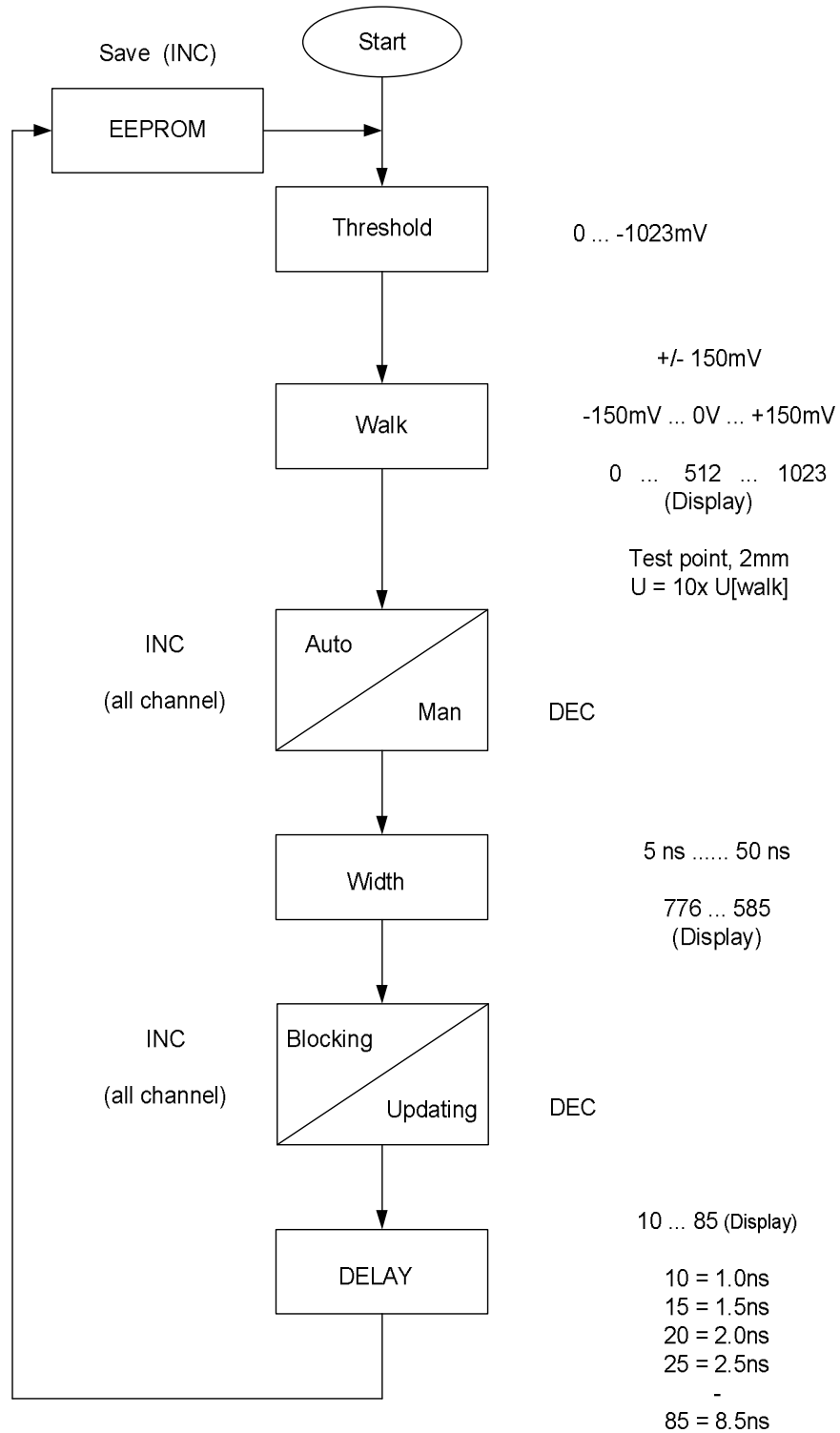
MODE: Pushbutton for mode

Threshold:	0 to 1023mV	
Walk:	+/- 150mV	(table on 2.5.3)
Walk:	Auto or Man	
Width:	5ns to 50ns	(table on 2.5.4)
Width:	blocking or updating	
Delay:	1ns to 8.5ns	
PROM:	Save to EEPROM	

INCREMENT: Pushbutton for increment (value)

DECREMENT: Pushbutton for decrement (value)

2.4.2 Mode sequence



2.4.3 Measurement

TRESHOLD:	A front-panel test point monitors the discriminator threshold setting. Output impedance, 1 k Ω .
WALK:	A front-panel test point monitors the walk setting. The test point voltage is 10x the actual walk setting. Output impedance, 1 k Ω .
GND:	GND Front-panel test point provides a convenient ground connection for test probes.

2.4.4 Display and front panel LED's

Channel:	Typ: green LED Function: It lights up when selected. Ch 1 ... 8
Walk +:	Typ: yellow LED Function: It lights up when limited > +150mV.
Walk -:	Typ: yellow LED Function: It lights up when limited > -150mV.
TH threshold:	Typ: green LED Function: It lights up when threshold mode is selected.
Walk:	Typ: green LED Function: It lights up when walk mode is selected.
Width:	Typ: green LED Function: It lights up when width mode is selected.
Delay:	Typ: green LED Function: It lights up when delay mode is selected.
Display:	Typ: 4-character 5x7 alphanumeric display Function: It indicates the channel, status and values.
RS485/VME:	Typ: green / red LED RS485: It lights up when the bus is ready. (green) VME: It lights up during a VME access. DTACK (red)

2.4.5 Switches

Rotary switches

They allow to select module's VME address; Fig. 2.2.2

2.5 RS485, SCS 200 Module

2.5.1 Commands (help)

Available commands:	addr <addr>	Set address
	flash	Flash parameters into EEPROM
	info [-a]	Retrive node info [all variables]
	ping <addr> [r]	Ping node and set address [repeat mode]
	read <index> [r]	Read node variable [repeat mode]
	reboot	Reboot addressed node
	reset	Reboot whole MSCB system
	sa <addr> <gaddr>	Set node and group address of addressed node
	scan [r] [a]	Scan bus for nodes [repeat node] [all]
	write <index> <value> [r]	Write node variable

2.5.2 Variables

All parameters value are saved in the SCS 200 EEPROM

<u>index</u>	<u>parameter</u>		<u>value</u>	<u>hex</u>	<u>unit</u>
0	+1.0V	16bit U	987	(0x03DB)	millivolt
1	+2.5V	16bit U	1004	(0x03EC)	millivolt
2	+3.3V	16bit U	970	(0x03CA)	millivolt
3	-5.0V	16bit U	917	(0x0395)	millivolt
4	Voltage4	16bit U	0	(0x0000)	millivolt
5	Voltage5	16bit U	0	(0x0000)	millivolt
6	Voltage6	16bit U	0	(0x0000)	millivolt
7	Walk	16bit U	1240	(0x04D8)	millivolt
8	BUTTON	8bit U	60	(0x3C)/00111100)	byte
9	CHANNEL	8bit U	7	(0x07/00000111)	byte
10	MODE	8bit U	0	(0x00/00000000)	byte
11	THR_CH1	16bit U	50	(0x0032)	millivolt
12	THR_CH2	16bit U	50	(0x0032)	millivolt
13	THR_CH3	16bit U	50	(0x0032)	millivolt
14	THR_CH4	16bit U	50	(0x0032)	millivolt
15	THR_CH5	16bit U	50	(0x0032)	millivolt
16	THR_CH6	16bit U	50	(0x0032)	millivolt
17	THR_CH7	16bit U	50	(0x0032)	millivolt
18	THR_CH8	16bit U	50	(0x0032)	millivolt
19	WALK_CH1	16bit U	523	(0x020B)	millivolt
20	WALK_CH2	16bit U	508	(0x01FC)	millivolt
21	WALK_CH3	16bit U	521	(0x0209)	millivolt
22	WALK_CH4	16bit U	511	(0x01FF)	millivolt
23	WALK_CH5	16bit U	512	(0x0200)	millivolt
24	WALK_CH6	16bit U	513	(0x0201)	millivolt
25	WALK_CH7	16bit U	511	(0x01FF)	millivolt
26	WALK_CH8	16bit U	515	(0x0203)	millivolt
27	WIDTH_C1	16bit U	694	(0x02B6)	millivolt
28	WIDTH_C2	16bit U	687	(0x02AF)	millivolt
29	WIDTH_C3	16bit U	685	(0x02AD)	millivolt
30	WIDTH_C4	16bit U	692	(0x02B4)	millivolt
31	WIDTH_C5	16bit U	690	(0x02B2)	millivolt
32	WIDTH_C6	16bit U	690	(0x02B2)	millivolt
33	WIDTH_C7	16bit U	694	(0x02B6)	millivolt
34	WIDTH_C8	16bit U	685	(0x02AD)	millivolt
35	DELAY_C1	8bit U	4	(0x04/00000100)	byte
36	DELAY_C2	8bit U	4	(0x04/00000100)	byte
37	DELAY_C3	8bit U	4	(0x04/00000100)	byte
38	DELAY_C4	8bit U	4	(0x04/00000100)	byte
39	DELAY_C5	8bit U	4	(0x04/00000100)	byte
40	DELAY_C6	8bit U	4	(0x04/00000100)	byte
41	DELAY_C7	8bit U	4	(0x04/00000100)	byte
42	DELAY_C8	8bit U	4	(0x04/00000100)	byte
43	WALK_A_M	16bit U	65535	(0xFFFF)	byte
44	WIDTH_BU	16bit U	0	(0x0000)	byte

2.5.3 Walk

Setting MAN walk: The walk is adjustable on 10-bit from +/- 150mV and the chosen value is applied to selected channel.

The walk value is set via the pushbutton or RS485 Bus and shown on the display (0 to 1023) with a intermediate value. A front panel test point monitors the walk setting.

Table: **display:** **value:**

0	-150mV
512	0mV
1023	+150mV

Setting AUTO walk: Automatic adjustment of input offset and low frequency input noise of +/- 150mV.

2.5.4 Width

Setting the width: The output pulse width is adjustable on 10-bit from 5ns to 50ns and the chosen value is applied to selected channel.

The width value is set via the pushbutton or RS485 Bus and shown on the display (0 to 1023) with a non-linear relation for intermediate value.

Table: **width:** **display:**

5ns	776 +/- 5
10ns	742 +/- 5
20ns	690 +/- 5
30ns	644 +/- 5
40ns	609 +/- 10
50ns	586 +/- 10

2.5.5 Updating / Blocking Mode

Selectable function: Selectable functions between updating and blocking mode for the output pulse width.

In the blocking mode, a second input pulse will generate no output pulse if it arrives within the output pulse width caused by a previous input pulse. In the updating mode, a second input pulse arriving within the output pulse width from a previous pulse will extend the output pulse, from the time of arrival, by a length.

The model CFD950 is shipped from the factory in the updating mode.

2.6 Power ON status

Power ON status: At power ON the values of all the channel's parameter are seting in the module.
All parameter value are saved in the SCS 200 EEPROM.

Shown on the 4- digit display: **PSI, → CFD, → 950, → V1.1**

3 VME Interface

3.1 Addressing

The CFD 950 module works in A32 mode.

AM = 09 Extended user data access

The modules Base address is fixed by internal rotary switches into the main board.

The Base address can be selected in the range:

C200 0000 to C2FF 0000 A32 mode

The Base address "C2" is fixed in the FPGA.

3.2 Address Map

The Base address can be selected in the range:

% C200 0000 < - > % C2FF 0000 A32 mode AM = 09

ADDRESS		REGISTER	TYPE	AM
Base +	00	Threshold register Ch. 1	Write	09
Base +	02	Threshold register Ch. 2	Write	
Base +	04	Threshold register Ch. 3	Write	
Base +	06	Threshold register Ch. 4	Write	
Base +	08	Threshold register Ch. 5	Write	
Base +	0A	Threshold register Ch. 6	Write	
Base +	0C	Threshold register Ch. 7	Write	
Base +	0E	Threshold register Ch. 8	Write	
Base +	10	Walk register Ch. 1	Write	
Base +	12	Walk register Ch. 2	Write	
Base +	14	Walk register Ch. 3	Write	
Base +	16	Walk register Ch. 4	Write	
Base +	18	Walk register Ch. 5	Write	
Base +	1A	Walk register Ch. 6	Write	
Base +	1C	Walk register Ch. 7	Write	
Base +	1E	Walk register Ch. 8	Write	
Base +	20	Width register Ch. 1	Write	
Base +	22	Width register Ch. 2	Write	
Base +	24	Width register Ch. 3	Write	
Base +	26	Width register Ch. 4	Write	
Base +	28	Width register Ch. 5	Write	
Base +	2A	Width register Ch. 6	Write	
Base +	2C	Width register Ch. 7	Write	
Base +	2E	Width register Ch. 8	Write	
Base +	30	Delay register Ch. 1	Read / Write	
Base +	32	Delay register Ch. 2	Read / Write	
Base +	34	Delay register Ch. 3	Read / Write	
Base +	36	Delay register Ch. 4	Read / Write	
Base +	38	Delay register Ch. 5	Read / Write	
Base +	3A	Delay register Ch. 6	Read / Write	
Base +	3C	Delay register Ch. 7	Read / Write	
Base +	3E	Delay register Ch. 8	Read / Write	
Base +	40	Walk register, Auto / Manuel	Read / Write	
Base +	42	Width register, Blocking / Updating	Read / Write	
Base +	44	Inhibit Ch 1 to 8	Read / Write	
Base +	70	Version / Base address	Read only	