

# Measure<sup>IT</sup> Uvisor System User Manual

Measure<sup>IT</sup> Uvisor

## MFD Multi Flame Detector Control Unit



Industrial<sup>IT</sup>  
enabled™

**ABB**

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# 1 SAFETY SUMMARY

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## Electrostatic Sensitive Device

This device requires special handling precautions as described in the installation section.

## General Warnings

### Equipment environment

All components, whether in transportation, operation or storage must be in a noncorrosive environment.

### Electrical shock hazard during maintenance

Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing. There are AC and DC connections inside the cabinet. These electrical connections, if exposed, present a shock hazard that can cause injury or death.

## Specific Warnings



Refer to paragraph 8.4.1 for specific warning on the selection of the parameter set.

Refer to section 10.2 for specific warning on configuring the parameters.



Refer to paragraph 7.5 for specific warning on circuit breakers.

## 2 INTRODUCTION

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### 2.1 WHO SHOULD READ THIS MANUAL

System engineers and technicians should read this manual before installing and operating the product.

Do not install / operate this product before having carefully read this manual.

### 2.2 OVERVIEW

Experience in flame control and monitoring of large steam generating plants has driven ABB to develop a fully programmable multiple flame detection system.

Uvisor MFD takes advantage of the proven reliability of the existing MFD.SA providing new feature to enhance the performance.

Uvisor MFD is the control unit of an advanced flame detector system designed for utility and industrial multi-burner furnaces to detect and discriminate the operating burner flame.

Uvisor MFD behaves as a true “**Two-Systems-in-One**”, processing simultaneously the flame signals carried by two flame scanners regardless the sensor spectral range (Ultraviolet or Infrared) or the electrical signal type (amplitude/frequency modulated signal or pulse rate signal).

It can achieve a stable flame-ON status and a reliable discrimination at various load rates thanks to a proven algorithm, which analyses the flame’s flicker spectrum and tunes consequently the basic parameters of the amplifier.

The Uvisor MFD provides the “**Individual channel maintenance power-OFF**” utility thus to offer a cost effective application options where simultaneous and independent control for burner and pilot flame or two burners flame scanners are required.

Uvisor MFD is electrically and functionally compatible with the existing MFD.SA

Uvisor MFD process simultaneously flame signals from two scanners on two separate channels. Each channel can be configured to use two different techniques to detect the flame. Based on the flame scanner types, these techniques are:

- **Flicker frequency receiver**
- **Pulse counter receiver**

The two channels can be used independently, one from the other, to drive the associated flame relay, they can also be connected in logical OR/AND to generate one unique flame status.

Whether the two channels are logical interconnected (AND & OR), then the second channel relay is available to output a secondary “flame-ON” status.

NOTE: in this manual the flame relay are also referred to as flame-ON relay, depending on the context.

Each channel can be independently tuned. Four set-up files per channel can be selected from remote (BMS) to get the best tuning at the various burner/boiler operating condition. Tuning parameters are secured on non-volatile memory.

Acquisition, processing, display and control functions of the Uvisor MFD are microprocessor based. Safety and reliability of the flame control process is assured by the hardware and firmware Fail-Safe characteristics and by the diagnostic tasks constantly operating.

Uvisor MFD provides enhanced feature to ease the tune-up, to supervise the flame quality, to speed-up diagnosis:

- Separate analogue output. One for each flame scanner.
- Automatic parameter setting.
- Connection to a local Monitoring Station through RS232 which features:
  - Real time flame signal trends and archive on scroll diagram.
  - View parameters from the unit.
  - Download new firmware releases.
- Flame flickers spectrum analysis (with burner on/off and difference plot out).
- Connection to a remote SCADA through RS485 network
- Separate **raw signal** from the flame scanners suitable for PC standard Sound-Board. Unconditioned flame signal is rendered for further flame performance analysis.
- One thermocouple input and related alarm output to measure the temperature of the hot side of the flame scanner and to prevent it from overheat.
- Multilanguage graphic display. Icon user-friendly command options.

## 2.3 RELATED PRODUCTS

The Uvisor System consists of the control unit Uvisor MFD, the Rack Mounting Unit and one or two of the following flame scanners:

- UR600 IR Mod 1000
- UR600 UV Mod 1000
- UR600 UV-EXT Mod 1000
- UR460 Mod UVIR
- UR450 Mod 5002 UV

For Uvisor MFD installation in MFD.SA Rack Mounting Units, the Rack Adapter is available.

## 2.4 NOMENCLATURES , PART NUMBERS AND REF. DOCUMENTS

Multi Flame Detector - Control Unit

Measure IT Uvisor MFD	P/N	EC-BOM-G009HLA012
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Flame scanners

Measure IT Uvisor UR600 IR Mod. 1000	P/N	EC-BOM-G009HLA101
	User Manual	EC-DOC-G009MAN101

Measure IT Uvisor UR600 UV Mod. 1000	P/N	EC-BOM-G009HLA102
	User Manual	EC-DOC-G009MAN102

Measure IT Uvisor UR600 UV-EXT Mod. 1000	P/N	EC-BOM-G009HLA103
	User Manual	EC-DOC-G009MAN102

Measure IT Uvisor UR460 Mod. UVIR	P/N	EC-BOM-G009HLA004
	User Manual	EC-DOC-G009MAN004

Measure IT Uvisor UR450 Mod. 5002 UV	P/N	EC-BOM-G009HLA002
	User Manual	EC-DOC-G009MAN002

Measure IT Uvisor MFD Rack Adapter	P/N	EC-BOM-G009HLA028
	Instructions	EC-DOC-G009MAN028

Measure IT Uvisor MFD Rack Mounting Unit	P/N	EC-BOM-G009MEC008
	Instructions	N/A (see <i>Figure 4</i> , <i>Figure 5</i> )

### 3 ENVIRONMENT SPECIFICATIONS

Property/Applied Standards	Characteristic/Value
<b>Safety Specifications</b>	
Design to EN 61010-1 (IEC 61010-1)	
Class of installation	I
Overvoltage category	II
Pollution degree	2
Protection (EN 60529)	IP20
<b>Environmental</b>	
Ambient Operating temperature (EN/IEC 60068-2-1/2/14)	0° to 60°C
Ambient Storage and transportation temp. (EN/IEC 60068-2-1/2/14)	-25°C / 85°C
Relative humidity (EN/IEC 60068-2-3)	40°C, RH 93%
Vibration sinusoidal operating (IEC 654-3 Severity Class VH3) (IEC 60068-2-6)	Frequency range: 5 ÷ 150 Hz, Acceleration: 10m/s <sup>2</sup> peak constant (Displacement: 9.9 mm peak at 5Hz, 0.01 mm peak at 150Hz)
Shock operating (IEC 60068-2-27)	Acceleration: 15G - Duration of pulses: 11 ms duration (half sine wave) - Three shocks in each direction (6 pulses in each axis)
<b>Isolation</b>	
(EN 61010-1 (IEC 61010-1), IEC 60) between each circuit and all other circuits and ground	
Insulation resistance test (At 500 Vdc, t >5s)	>100 Mohm
Dielectric test (Vac 1 min.)	AC mains, Flame and watch dog contacts: 2300 Vac DC mains: 1000Vac RS485, CHs analogue outs, CHs set select. Local RS232, High temp. alarm. : 500 Vac
Impulse voltage (1.2/50µs, 3 pulses pos. and 3 neg.)	AC mains, Flame and watch dog contacts: 4250 Vp (5000 Vp / 1 pulse pos. and 1 pulse neg. on AC main) DC mains: 2000Vp RS485, CHs analogue outs, CHs set select. Local RS232, High temp. alarm. : 850 Vp



<b>Electromagnetic Compatibility</b>	
<b>Immunity tests</b> (EN 61000-6-2, EN 51082-2)	
Power frequency magnetic field test (IEC 61000-4-8)	30 A/m cont., 300 A/m for 1s
Radio frequency electromagnetic field test (Amplitude modulated) (IEC 61000-4-3, ENV 50140)	10V/m, 27÷1000 MHz 80% Amplitude Modulated (1 KHz, sin.)
Radio frequency electromagnetic field test (Pulse modulated) (IEC 61000-4-3, ENV 50204)	10V/m, 900 MHz, 1800 MHz 50% duty cycle, 200 Hz rep. freq.
Electrostatic discharge test (IEC 61000-4-2)	6 kV contact 8 kV air
Surge test (IEC 61000-4-5)	1,2/50µs, 2 kV line to earth, 1 kV line to line
Fast transient test (IEC 61000-4-4)	2 kV, 1 kV RS485
Common mode radio frequency electromagnetic field test (IEC 61000-4-6)	10 Vrms 0,15 ÷ 80MHz / 80% AM (1KHz)
Uvisor – MFD System Voltage dips and interruptions test (IEC 61000-4-11)	<i>AC power supply:</i> 100% reduction: 70 ms 230 Vac, 60 ms 120 Vac - Criterion A 30% reduction 10 ms - Criterion B 60% reduction 100 ms - Criterion C >95% interruption 250 periods/5s - Criterion C  <i>DC Power Supply:</i> 100% reduction 20 ms - Criterion A 60% reduction 100 ms - Criterion A 100% interruption 50 ms - Criterion C
Uvisor – MFD System Slow voltage variations test (IEC 61000-4-11)	<i>AC and DC power supply:</i> V nom. + 20 % - Criterion A V nom. - 20 % - Criterion A

<b>Emission tests</b> (EN 61000-6-4 / EN 51081-2)	
Radiated emission test (CEI EN 55011)	Class A 40 dB (µV/m) QP to 30÷230 MHz @ 10m 47 dB (µV/m) QP to 230=1000 MHz @ 10m
Uvisor – MFD System (AC mains): Conducted emission test (CEI EN 55011)	Class A 79 dB (µV/m) QP, 66 dB (µV/m) AV 0.15÷0.50 MHz 73 dB (µV/m) QP, 60 dB (µV/m) AV 0.5÷5 MHz 73 dB (µV/m) QP, 60 dB (µV/m) AV 5÷30 MHz

<b>CE mark declaration</b>	<p>This product complies with the following Directives/Standards for CE marking.</p> <p><b>EMC Directive 89/336/EEC</b>  EN 50081-2: 1994  EN 61000-6-4: 2001  EN 50082-2: 1995  EN 61000-6-2: 1999</p> <p><b>Low Voltage Directive 73/23/EEC</b>  EN 61010-1: 2001</p>
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## 4 CERTIFICATIONS

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### 4.1 CSA CERTIFICATION

In accordance with the requirements of the following standards:

- CAN/CSA-C. 22.2 N. 199 “Combustion safety controls and solid-state igniters for gas-and oil-burning equipment”.
- CAN/CSA 60730-1 for software (Class “C”, Type 1 action).

### 4.2 FM CERTIFICATION

In accordance with the requirements of the following standards:

- FMRC (Factory Mutual Research Corporation) Class N. 7610 – “Approval standard for combustion safeguards and flame sensing systems”.

## 5 TECHNICAL SPECIFICATIONS

### 5.1 POWER SUPPLY

Power Supply Voltage	<b>AC</b>	120÷220 Vac +/- 20% 45÷65 Hz 30 VA (6A / 5 ms in-rush current)
	<b>DC</b>	24Vdc +/- 20% 22 W (24A / 2 ms in-rush current)

### 5.2 OUTPUTS

Contacts rating	<p>Channel 1, 2 Flame relay and watch dog relay</p> <ul style="list-style-type: none"> <li>- 1 SPDT standard VDE0110</li> <li>- 250 Vac 3A <math>\cos(\varphi) \geq 0.4</math> 750W cycles <math>\geq 100,000</math></li> <li>250 Vdc 300 mA 66W</li> </ul> <p>Temperature alarm</p> <ul style="list-style-type: none"> <li>- 1 SPST standard VDE0110</li> <li>- 100 Vac 0.3A <math>\cos(\varphi) \geq 0.4</math> 30W cycles <math>\geq 100,000</math></li> </ul>
Scanner Power Supply	<ul style="list-style-type: none"> <li>- 24Vdc refereed to common for "Bias" and "Blind" signals</li> <li>- Short circuit and overload protected</li> </ul>
Bias Contact Power Supply	<ul style="list-style-type: none"> <li>- 24Vdc refereed to common</li> <li>- Short circuit and overload protected</li> </ul>
Analogue outputs	<ul style="list-style-type: none"> <li>- Two analog outputs configurable as follow: <ul style="list-style-type: none"> <li>0÷10V (R out = 600 <math>\Omega</math>)</li> <li>4÷20 mA (R load &lt; 500 <math>\Omega</math>) <ul style="list-style-type: none"> <li>▪ Flame signal reading +/- 30 dB</li> <li>▪ Galvanically isolated</li> <li>▪ Protected against short circuit</li> </ul> </li> </ul> </li> </ul>
Flame raw signals	- Two outputs available: 0 dBV output level

### 5.3 INPUTS

Channel Set up	<ul style="list-style-type: none"> <li>- Nr. 2 digital inputs (opto coupled), for each channel, to allow selection of one out of four different set of parameters <ul style="list-style-type: none"> <li>▪ Off: &lt; 5 Vdc</li> <li>▪ On: &gt; 16 Vdc (4.5 mA typical). Vin max. 24Vdc</li> </ul> </li> </ul>
Thermocouple	- Nr. 1 Thermocouple input type "J"

#### 5.4 MECHANICAL SPECIFICATION

Dimensions	<ul style="list-style-type: none"><li>- Height: 3 Units, 5.06" (128.4 mm)</li><li>- Width: 21 TE, 4.19" (106.3 mm)</li><li>- Depth: 6.3" (160 mm)</li><li>- Degree of protection: IP20 (CEI EN 60529)</li></ul>
Weight	<ul style="list-style-type: none"><li>- 1.2 Kg approx.</li></ul>
Installation	<ul style="list-style-type: none"><li>- 19" Rack mounting</li></ul> <p>(See Figure 4. MFD Rack installations. Front and top view)</p>

#### 5.5 COMPATIBLE UVISOR FLAME SCANNERS

Flicker type	<ul style="list-style-type: none"><li>- UR600 IR Mod. 1000 (Direct view and with fiber optic extension)</li><li>- UR600 UV Mod. 1000 (Direct view)</li><li>- UR600 UV/EXT Mod. 1000 (With fiber optic extension)</li></ul>
Pulse type	<ul style="list-style-type: none"><li>- UR450 Mod. 5002 UV (Direct view)</li></ul>
Dual Sensor	<ul style="list-style-type: none"><li>- UR460 Mod. UVIR/DV (Direct view)</li><li>- UR460 Mod. UVIR/EF/ER (With fiber optic extension)</li></ul>

# 6 PHYSICAL DESCRIPTION

## 6.1 PRODUCT PARTITIONING

Uvisor MFD is a single module enclosed in a metallic container to be installed in a Rack Mounting Unit (up to four MFDs can be installed in a single Rack Mounting Unit). The Uvisor MFD has two channels; it can be connected to two flame scanners or to one dual-sensor flame scanner (UR460).

NOTE: in this manual the flame relay are also referred to as flame-ON relay, depending on the context.

## 6.2 HARDWARE BLOCK DIAGRAM

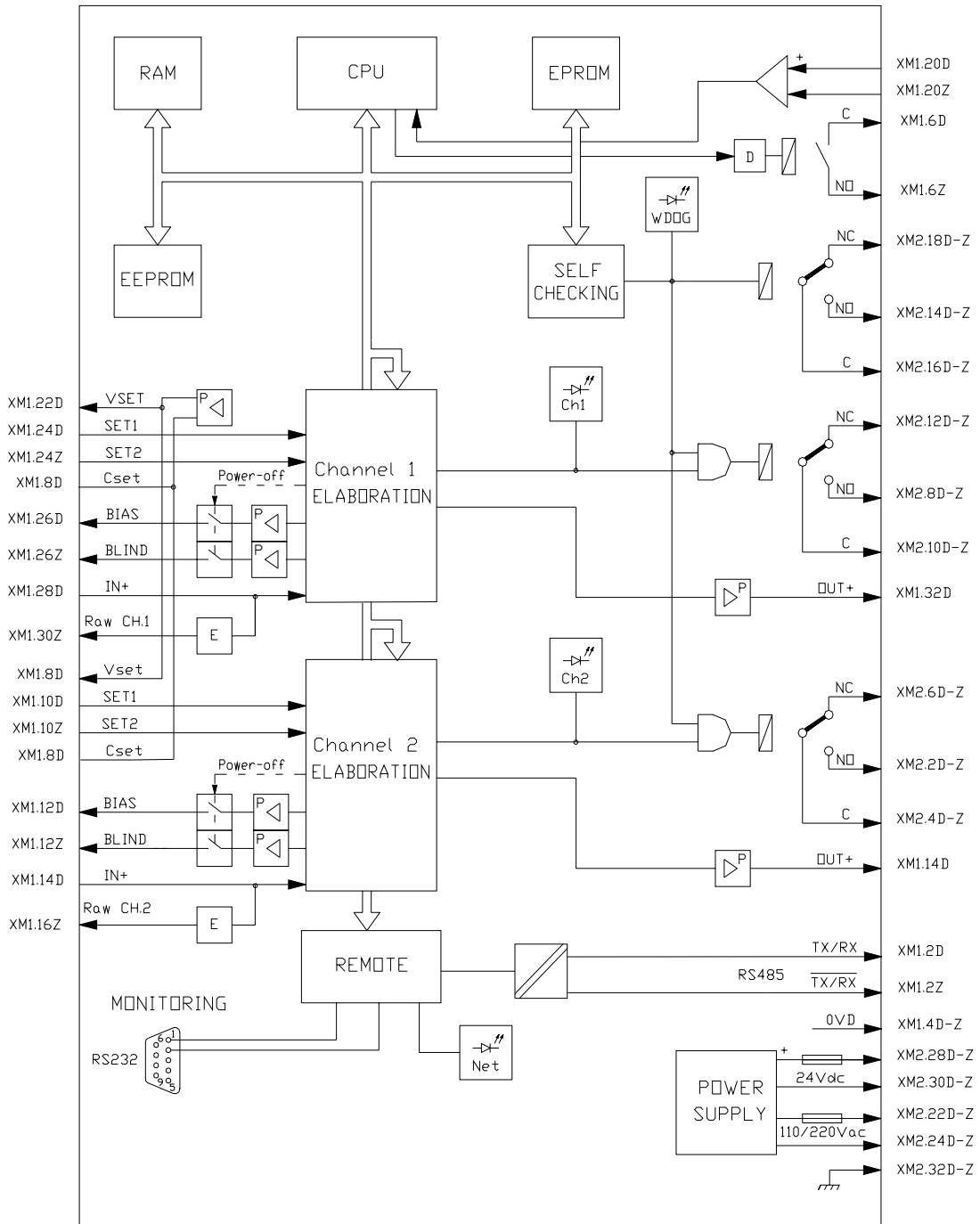


Figure 1. MFD Functional Block diagram

### 6.3 FRONT PANEL



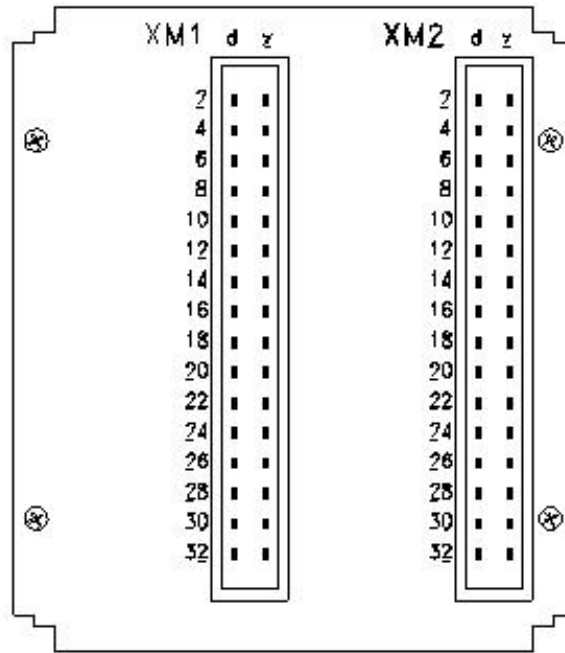
Figure 2. MFD Front panel

#### Legend

1	LED CH-1	When turned-ON it indicates that the CH.1 flame relay is energized
2	LED CH-2	When turned-ON it indicates that the CH.2 flame relay is energized
3	DISPLAY	Alphanumeric 2x16 characters LCD. Graphic
4	MENU KEYPAD	Allow to browse the MFD menus and to configure the operating parameters
5	DB9 CONNECTOR "COM"	RS232 isolated serial interface When "NET" LED (8) is turned-ON the MFD is accessed by the network
6	SET UP MODE TOGGLE	Enable/disable the set-up function. When LED is flickering set-up is enabled
7	SAFE LED	When turned-ON it indicates the MFD has no failure and the relevant Watch Dog relay is energized

Note: depending on the FW revision, the LCD display content might look slightly different from the above figure

## 6.4 CONNECTORS PIN ASSIGNMENT



MFD rear view

XM1	d	z
2	+ RX/TX	- RX/TX
4	0VD	0VD
6	TC-NO	TC-C
8	VSET_2	CSET_2
10	SET1_CH2	SET2_CH2
12	BIAS_2	BLIND_2
14	SIGNAL_2	COMM
16	SHIELD_2	RAW_S2
18	AO_2+	AO_2-
20	+TCJ	-TCJ
22	VSET_1	CSET_1
24	SET1_CH1	SET2_CH1
26	BIAS_1	BLIND_1
28	SIGNAL_1	COMM
30	SHIELD_1	RAW_S1
32	AO_1+	AO_1-

XM2	d-z
2	R2_NO
4	R2_C
6	R2_NC
8	R1_NO
10	R1_C
12	R1_NC
14	WD_NO
16	WD_C
18	WD_NC
22	N - Vac
24	L - Vac
28	+ Vdc
30	- Vdc
32	GND



## 6.4.1 Signals at XM1 connector

Signals for channel 1 Scanner

Pin	Mnemonic	Description
26d.	BIAS_1	Supply (24V)
26z.	BLIND_1	Self-check (24V)
28d.	SIGNAL_1	Signal input
28z.	COMM	Common
30d.	SHIELD_1	Shield
30z.	RAW_S1	Raw signal (Hot)

Signals for Channel 1 Analog Outputs

Pin	Mnemonic	Description
32d.	AO_1+	Analog output, plus
32z.	AO_1-	Analog output, minus

Signals for channel 1 Set selection

Pin	Mnemonic	Description
22d.	VSET_1	24V Output
22z.	CSET_1	Common
24d.	SET1_CH1	bit 1 of Set Selection (24V input)
24z.	SET2_CH1	bit 2 of Set Selection (24V input)

Signals for Communications

Pin	Mnemonic	Description
2d.	+RX/TX	RS485 straight balanced line
- 2z.	-RX/TX	RS485 negated balanced line
- 4d/z	OVD	Serial line gnd

Signals for channel 2 Scanner

Pin	Mnemonic	Description
12d.	BIAS_2	Supply (24V)
12z.	BLIND_2	Self-checking (24V)
14d.	SIGNAL_2	Signal input
14z.	COMM	Common
16d.	SHIELD_2	Shield
16z.	RAW_S2	Raw signal (Hot)

Signals for channel 2 Analog Outputs

Pin	Mnemonic	Description
18d.	AO_2+	Analog output, plus
18z.	AO_2-	Analog output, minus

Signals for channel 2 Set selection

Pin	Mnemonic	Description
8d.	VSET_2	24V Output
8z.	CSET_2	Common
10d.	SET1_CH2	bit 1 of Set Selection (24V input)
10z.	SET2_CH2	bit 2 of Set Selection (24V input)

Signals for J Thermocouple

Pin	Mnemonic	Description
20d.	+TCJ	Thermocouple J (iron)
20z.	-TCJ	Thermocouple J (constantan)
6d.	TC-NO	Over Temperature Alarm
6z.	TC-C	Over Temperature Alarm

## 6.4.2 Signals / power supply at XM2 connector

Power Supply

Pin	Mnemonic	Description
22d/z.	N:	120 ÷ 220VAC
24d/z.	L:	
28d/z.	+	24Vdc
30d/z.	-	
32d/z.	GND	Earth

Watch-Dog relay (supervision)

Pin	Mnemonic	Description
14d/z.	WD_NO	Operation OK (Fused)
16d/z.	WD_C	Central
18d/z.	WD_NC	Alarm

Channel 1 Flame relay

Pin	Mnemonic	Description
8d/z.	R1_NO	Flame present (Fused)
10d/z.	R1_C	Central
12d/z.	R1_NC	Flame missing

Channel 2 Flame relay

Pin	Mnemonic	Description
2d/z.	R2_NO	Flame present (Fused)
4d/z.	R2_C	Central
6d/z.	R2_NC	Flame missing

## 6.5 ACCESSORIES

The "Rack Adapter" is available for installing the Uvisor MFD in place of the previous model MFD.SA (the Rack Mounting Unit is deeper and the electrical connection are different).

Rack Adapter has P/N: EC-BOM-G009HLA028.

## 7 INSTALLATION

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Uvisor MFD is designed for standard rack installation (see *Figure 4*, *Figure 5*).

To meet EMC requirements it is mandatory to strictly follow the recommendations given in paragraph 7.5 “CABLING and GROUNDING”.

### 7.1 AIR FLOW REQUIREMENTS

The cabinet must allow an air flow, natural or forced, depending on the environmental conditions and on other aspects.

The Uvisor MFD is specified in the range of 0÷60 °C (MFD environment temperature i.e. cabinet interior in proximity of the MFD). Therefore, depending on the following parameters:

- number of MFD installed in the same cabinet
- dimensions of the cabinet
- amount of natural air flow
- maximum temperature of the site where the cabinet is installed
- presence of other power dissipating equipments in the same cabinet (i.e. power supply)

there could be the need to install a forced ventilation systems in the cabinet.

### 7.2 ESD REQUIREMENTS

Please observe the following paragraphs and wear an anti-ESD wrist strap (or equivalent system) when installing or replacing MFD.

### 7.3 SPECIAL HANDLING

MFD requires the care normally used to move an electronic device (avoid mechanical stress and shocks).

Observe the following steps needed to handle the electronic circuitry.

1. Before opening the MFD container, wear a wrist straps connected to ground.
2. Keep the wrist strap for all the time in which you operate with the MFD container opened
3. When an MFD is replaced, keep the new module in the static shielding bag until up you start the replacement operation. Put the replaced module in the static shielding bag.
4. Before opening a bag containing an assembly with semiconductors, touch it to the equipment housing or a ground to equalize charges.
5. Handle assemblies by the enclosure; avoid touching the connector pins.

### 7.4 UNPACKING AND INSPECTION

1. Examine the hardware immediately for shipping damage.
2. Notify the nearest ABB sales office of any such damage.

3. File a claim for any damage with the transportation company that handled the shipment.
4. Use the original packing material and container to store the hardware.
5. Store the hardware in an environment of good air quality, free from temperature and moisture extremes.

## 7.5 CABLING AND GROUNDING

### Grounding.

Each MFD must be grounded separately by connecting XM2 pin 32-d/z to the ground. The connection shall be done using a yellow-green cable (sect. 2,5 sq.mm). Max length is 3 meters.

### System cabling.

All connections will be executed using the cables types described in par. 5.6 of this manual, following the recommendations of par. 7.5, 7.6, 7.7 and shielding connection indicated in the table below.

The shield connection to ground must be as short as possible.



Uvisor MFD does not provide on-board circuit breakers.

Additional circuit breakers for individual or group of equipments has to be installed and easily accessible by the operator for maintenance. Please refer to "Technical Specification" for the proper sizing of the mains breaker(s).

Port # Figure 3	Signal type	Cable Type	Shielding requirements
1, 2	Scanners	Shielded cables (4 conductors plus shield each)	Cable shield grounded to MFD side (terminal 30D and 16D). Shield not grounded at scanners side.
3	AC supply	Unshielded cable (2 conductors)	
4	DC supply	Unshielded cable (2 conductors)	
5 a,b,c	Relay	Unshielded cable (3 conductors)	
6 a,b	Analog Outputs	Shielded cable (2 conductors)	Cable shield grounded only to MFD side (Cabinet system ground bar).
7	RS485	Shielded cable	Cable shield grounded both side: MFD side (terminal 4D-Z and system ground bar) and PC side (RS485/RS232 converter).
8 a, b	SET (digital inputs for param. set selection)	Unshielded cable (3 conductors)	
9	TC	TC type "J"	
10	Temp. alarm	Unshielded cable (2 conduct.)	
11 a, b	Raw signal	Shielded cable (2 conductors)	Cable shield grounded only to MFD side (Cabinet system ground bar).
12	RS232	Unshielded cable (3 Conduct.)	

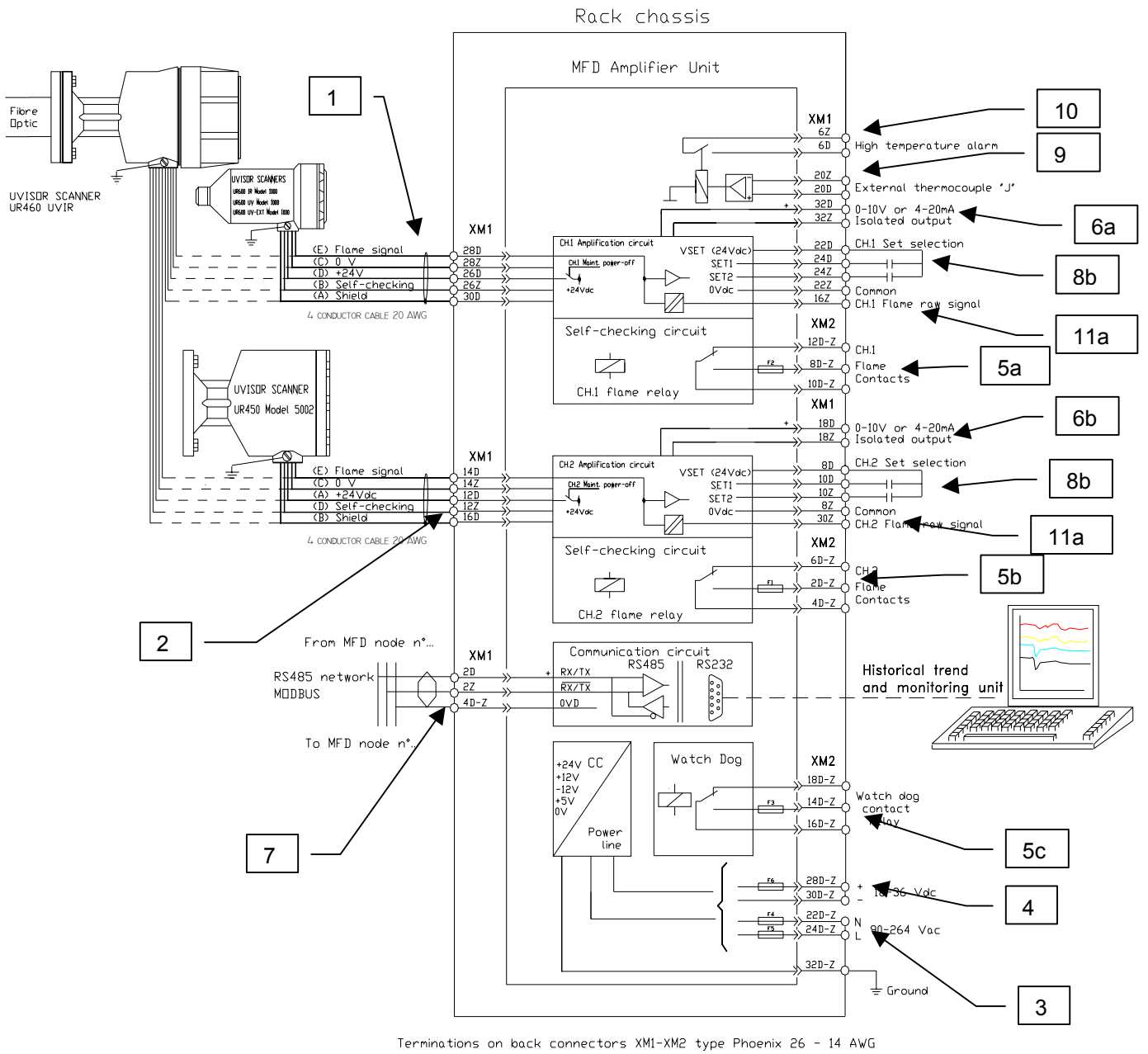


Figure 3. MFD Port assignment

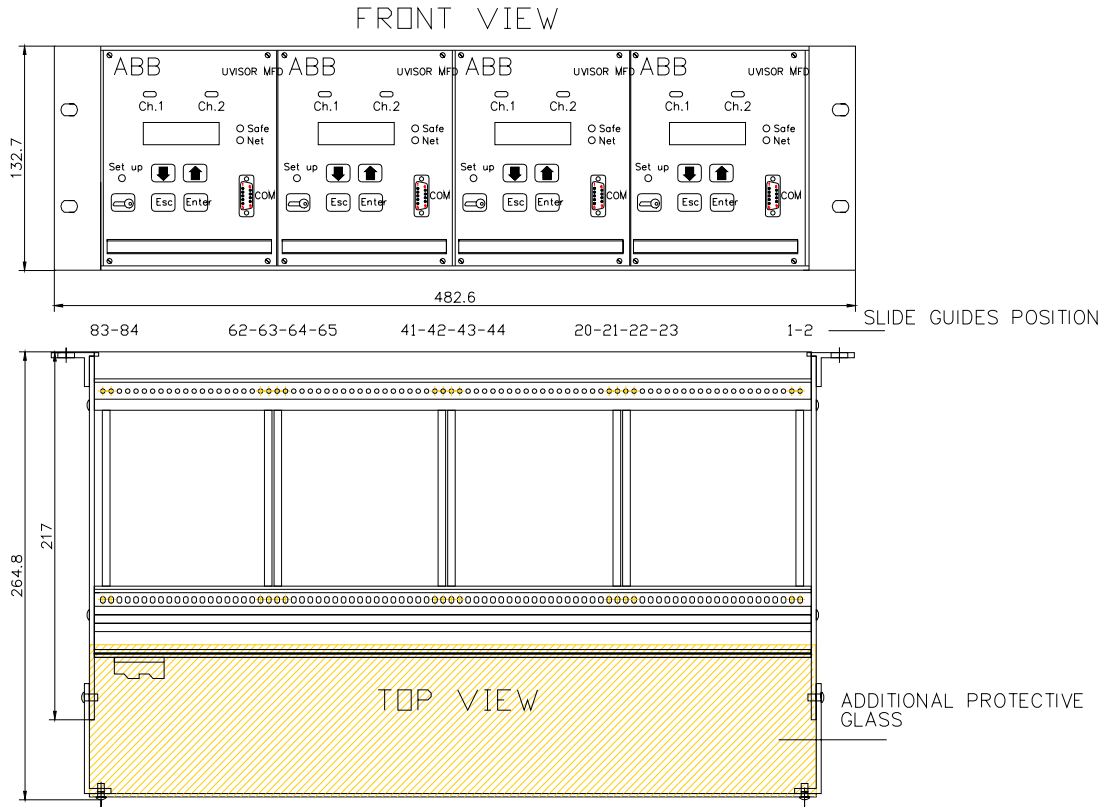
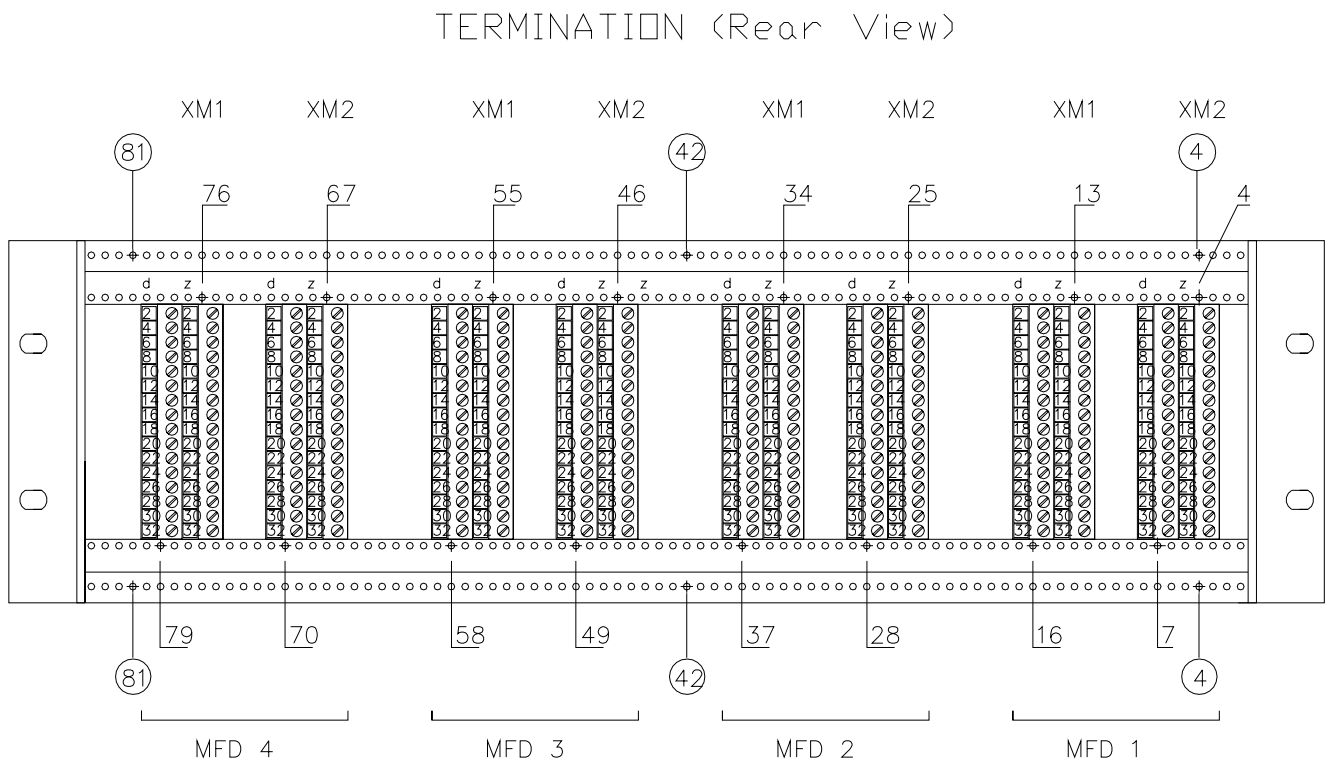


Figure 4. MFD Rack installations. Front and top view



REAR VIEW. Back plane with Phoenix screw type terminal connection for conductors AWG 26-14.

Figure 5. MFD Rack installation, rear view

## 7.6 ELECTRICAL CONNECTIONS

### 7.6.1 Connection of two flame scanners - type UR450 Mod 5002 UV

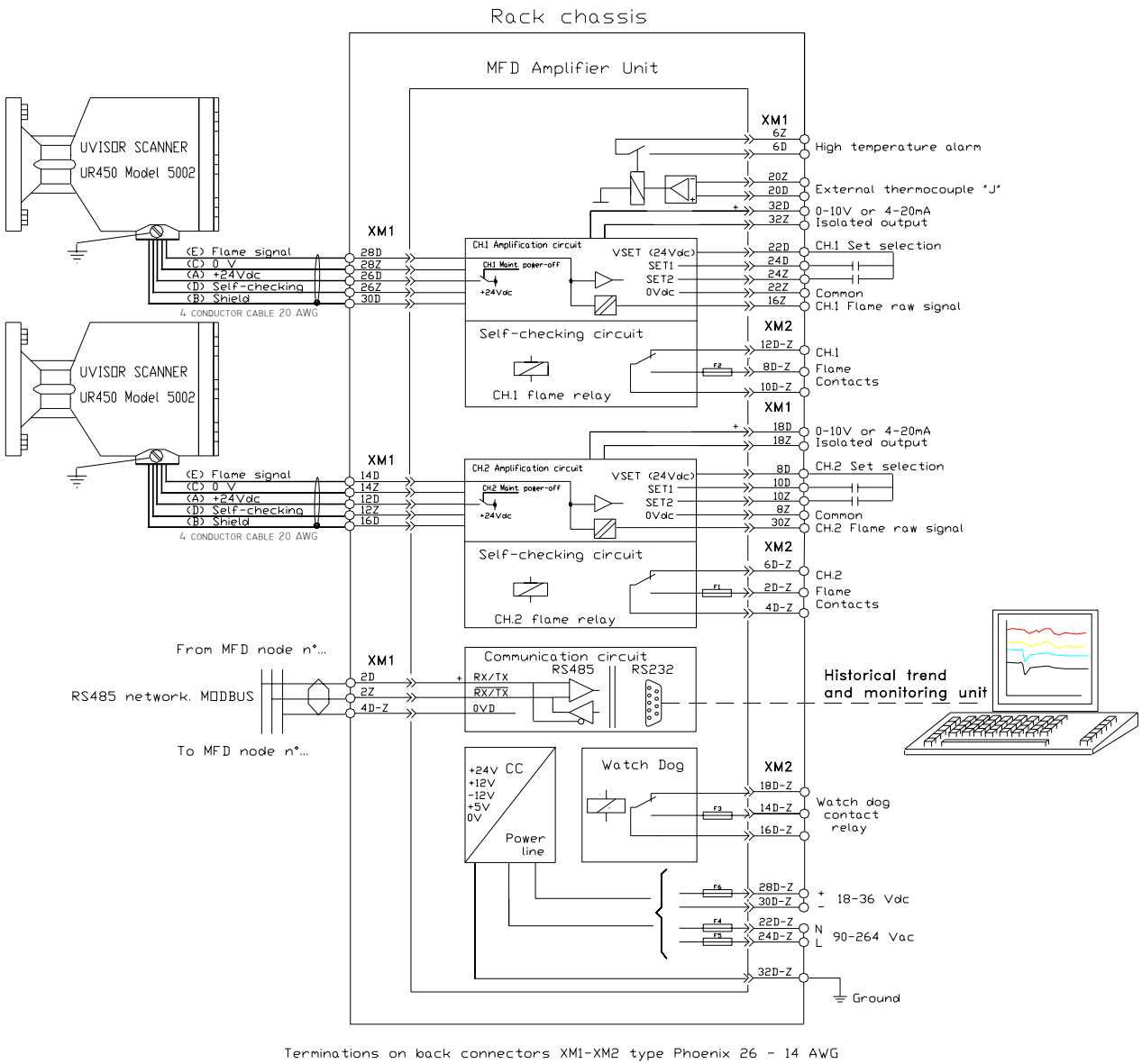


Figure 6. Uvisor MFD connection with two Uvisor scanners type UR450 Mod. 5002 UV

## 7.6.2 Connection of two flame scanners - type UR600 IR/UV/UV-EXT Mod 1000

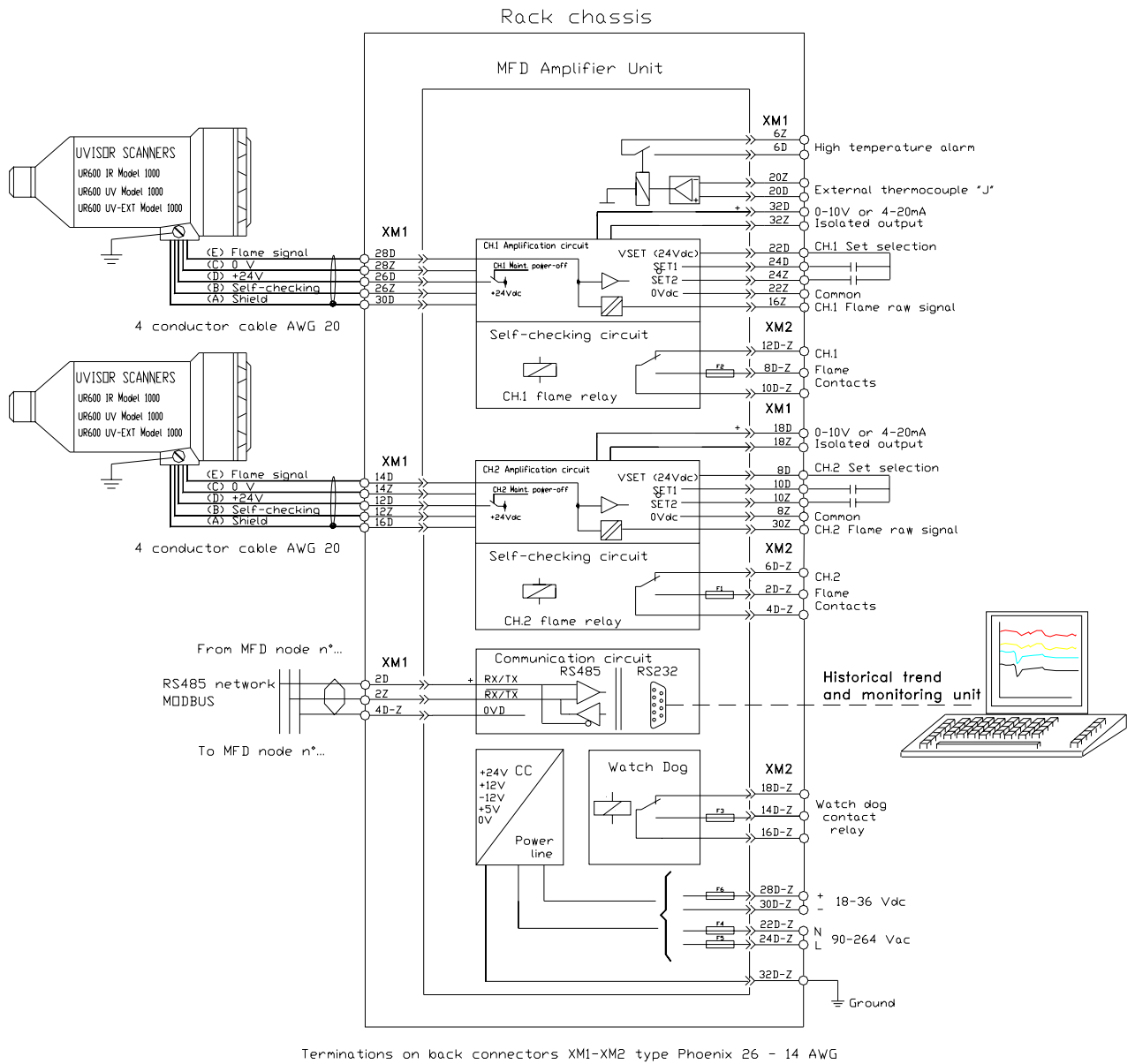


Figure 7. Uvisor MFD connection with two Uvisor scanners type UR600 IR/UV/UV-EXT Mod. 1000

### 7.6.3 Connection of two scanners, one UR450 and one UR600 IR/UV/UV-EXT

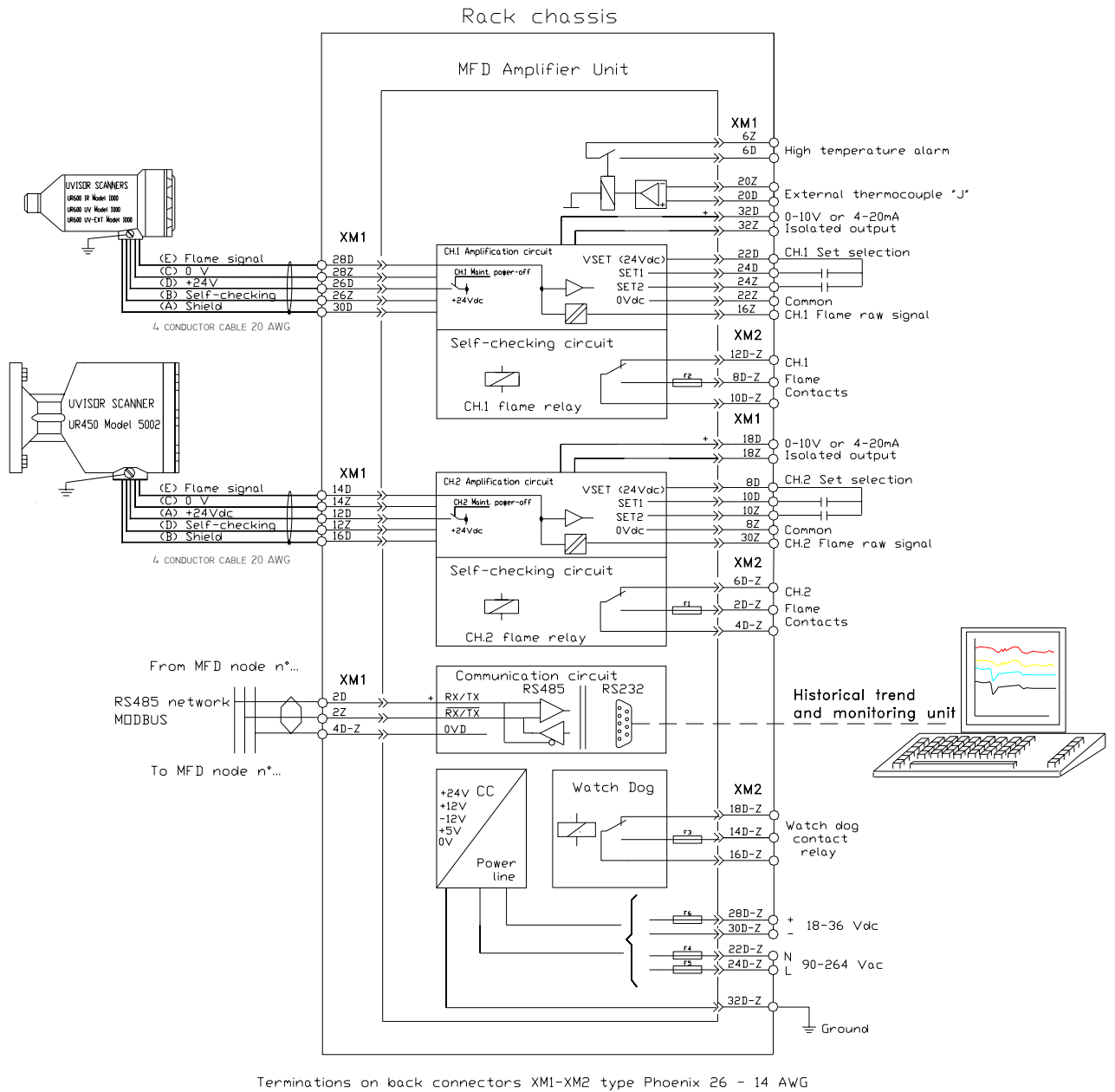


Figure 8. Uvisor MFD connection with one scanner type UR600 IR/UV/EXT Mod. 1000 and one type UR450 Mod. 5002 UV



### 7.6.4 Connection of one dual-sensor flame scanner - type UR460 Mod UVIR

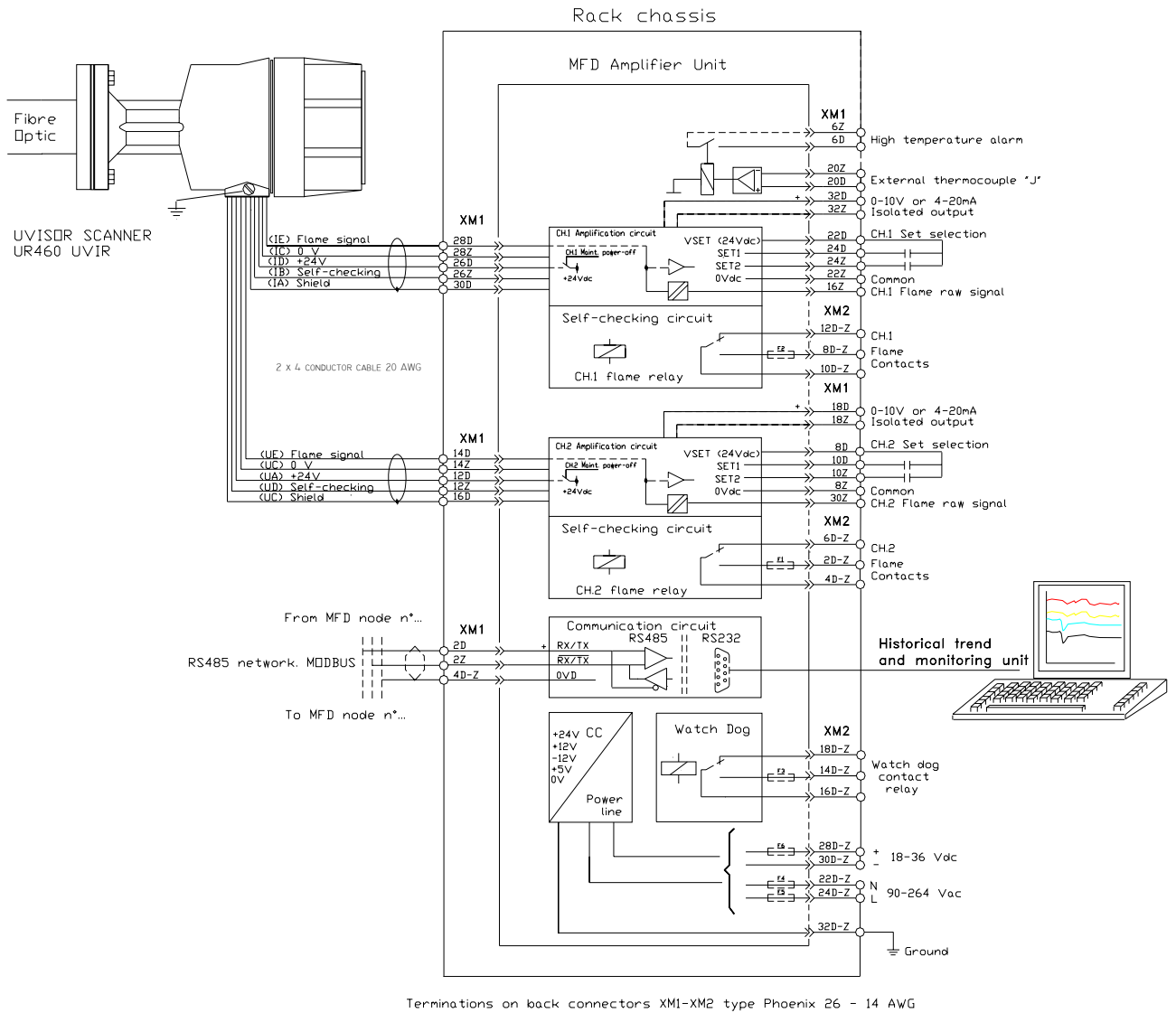


Figure 9. Uvisor MFD connection with one Uvisor dual-sensor scanner type UR460 Mod UVIR

## 7.7 CONNECTING CABLES

MFD <-----> UR450 Mod 5002 UV	Connections between the MFD amplification unit and the scanner UR450 will be made as shown in Figure 6 <ul style="list-style-type: none"> <li>- Recommended maximum distance is 1.000 feet (300 m)</li> <li>- Separate path from power cables</li> <li>- Recommended conductor specification as shown in following paragraph</li> </ul>
MFD <-----> UR600 IR/UV/UV-EXT Mod 1000	Connections between the control unit MFD and the scanner type UR600 will be made as shown in Figure 7 <ul style="list-style-type: none"> <li>- Recommended maximum distance is 1.000 feet (300 m)</li> <li>- Separate path from power cables</li> <li>- Recommended conductor specification as shown in following paragraph</li> </ul>
MFD <-----> UR460 Mod UVIR	Connections between the MFD amplification unit and the scanner UR460 will be made as shown in Figure 9 <ul style="list-style-type: none"> <li>- Recommended maximum distance is 1.000 feet (300 m)</li> <li>- Separate path from power cables</li> <li>- Recommended conductor specification as shown in following paragraph</li> </ul>

## 7.8 CABLE SPECIFICATION

### 7.8.1 Scanner – MFD connecting cable

For all connections shown, use four-pole, flexible, shielded, fire-retardant cable

#### Conductors

Number	4
Cross section	0.55 sq.mm
Insulation	PVC 221°F (105°C) AFUMEX 158°F (70°C)

#### External Sheath

Insulation	PVC 221°F (105°C) AFUMEX 158 °F (70°C)
Characteristics	Fire-retardant, resistant against oils and abrasion

#### Cable characteristics

Capacity	300pF/m max (Conductor/Shield)
Capacity	200pF/m max (Conductor/ Conductor)
Operating voltage	300V
Insulation voltage	1500V (Conductor/Shield)
Shield	Composition tinned copper plait Covering ≥90%

### 7.8.2 Cable for serial links

Connections between the MFD amplification unit and the supervision will be made as shown in figure 13 (RS232) and 14 (RS485) complying with the following requirements for distance and type of cable:

RS232 link maximum connection distance: 15 meters (50 feet)

RS485 link maximum connection distance: 600 meters (1800 feet)

running on separate path from power cables.

The type of cable used shall be bipolar, flexible, shielded, Fire-retardant cable and shall meet the following characteristics:

#### Conductors

Number	2
Cross section	0.35 sq.mm
Insulation	PVC 221°F (105°C) AFUMEX 158°F (70°C)

#### External Sheath

Insulation	PVC 221°F (105°C) AFUMEX 158 F (70°C)
Characteristics	Fire-retardant, resistant against oils and abrasion

#### Cable characteristics

Capacity	70pF/m max (Conductor/Shield)
Capacity	70pF/m max (Conductor/ Conductor)
Operating voltage	300V
Insulation voltage	1500V (Conductor/Shield)
Shield Composition	tinned copper plait Covering ≥90%

### 7.8.3 Supply and other connections

Connections for power supply will be made with cable suitable for the power requirement and for the maximum ambient temperature given in the Specification.

For analogue outputs, a standard 2-pole shielded cable can be used. Recommended cross section: 1 sq mm, 50 meters (150 feet) max length.

## 8 FUNCTIONAL DESCRIPTION

**Uvisor MFD** simultaneously processes flame signals from two full independent channels. Each channel can process flame signal carried either by a:

➤ **“Flicker output flame scanners”**

- UR600 IR Mod 1000
- UR600 UV Mod 1000
- UR460 Mod UVIR (IR section)

or by a:

➤ **“Pulse output flame scanners”**

- UR450 Mod 5002 UV
- UR460 Mod UVIR (UV section)

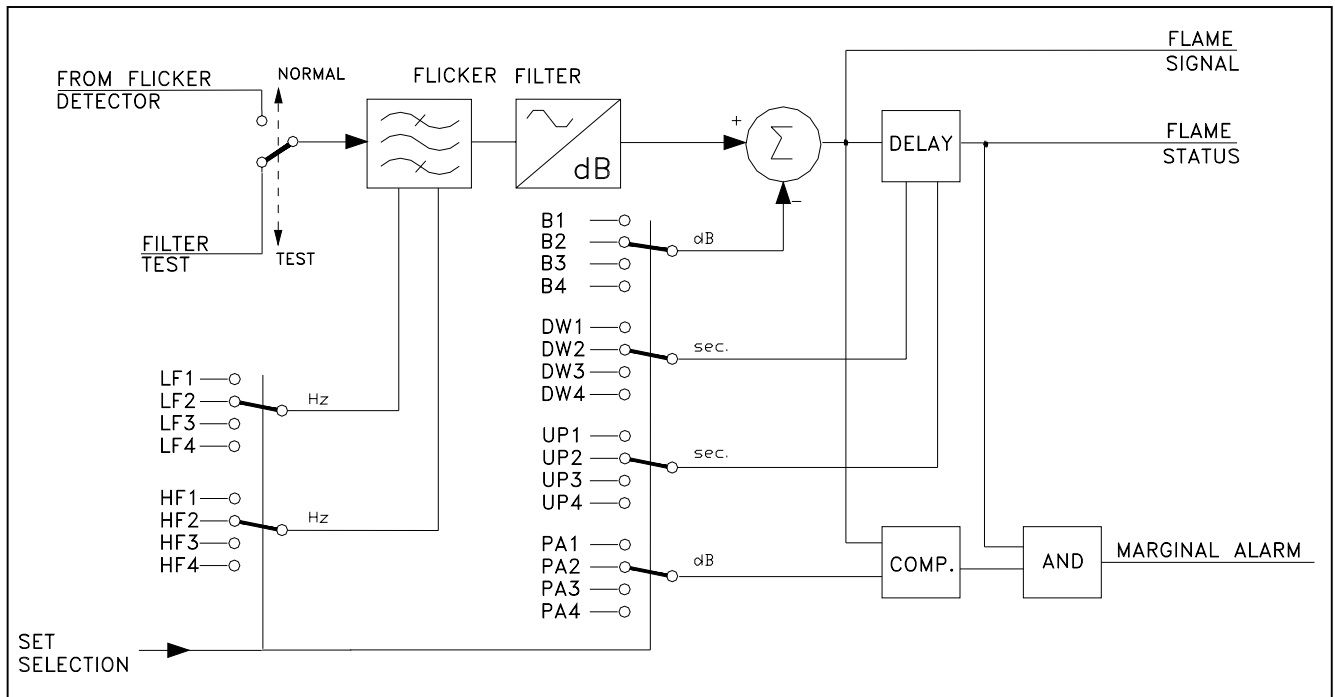


Figure 10. Block diagram of the frequency analyzer function “Flicker amplifier”

### 8.1 FLICKER AMPLIFIER

The flame signal detection is based on the effect known as “Flicker effect”, detected by a scanner sensitive to IR radiation.

As shown in the block diagram of Figure 10, the signal carried from the flame scanner, consisting in a frequency range, is applied to a programmable digital filter.

Both gain and frequency cut-OFF of filters are programmable. The filter parameters are microcontroller managed by using the soft-computing technique. A logarithmic converter (dB converter) is used to increase the dynamic range.

The final result is a large dynamic range, very stable signal and enhanced discrimination.

The absolute signal is compared to the background value to give the flame signal strength output; this signal is then used to generate the binary flame status signal and the marginal alarm.

Since flicker frequency response varies primarily with the type of fuel burned, the different zones of the flame and the combustion techniques (i.e. low NOx burner), the band-pass filter cut-OFF frequency can be selected among the following combinations.

LF - 16 step from 20 to 640 Hz for the low-cut off frequency.

The filter bandwidth can be selected in 5 steps: 0,5 – 1 – 2 – 4 – 8 so the high frequency is determinate according to the following multiplication factors:

$$HF = 1,5 * LF$$

$$HF = 2 * LF$$

$$HF = 3 * LF$$

$$HF = 5 * LF$$

$$HF = 9 * LF$$

The wide range of available values allows the filter to be tuned to flames of different types of burners and/or fuels, or follow different detection criteria as individual discrimination (high frequencies) or fireball (low frequencies).

Search of the best parameters for the bandpass filter and background value can be processed according to two methods:

**MANUAL SET** The parameter values can be set, any time, entering new value in the suitable menu options (password protected).

**AUTOTUNING** The optimized parameters, LF, HF and B, are entered on the base of highest ratio resulting from the process scan of the "Flame-ON" and "Flame-OFF" patterns.

While the target burner flame is OFF, the "SCAN FLAME OFF" option instructs the processor to analyse the frequency spectrum in the sight of the scanner, sampling all the combinations of the programmable filter. Each combination is kept for a time sufficient to the signal stabilization and the flame signal value is subsequently stored.

During this task the flame relay is forced OFF.

While the target burner flame is ON, the "SCAN FLAME ON" option repeats the scanning task.

During this task the flame relay is forced ON.

Each scan takes about 20 seconds. When both sequences are completed, the "AUTOTUNE SET" option enables the MFD processor to calculate the optimum value of the pass-band (LF and HF value of the programmable filter) and the attenuation value (parameter B). AUTOTUNE will select the running parameters to achieve the maximum flame signal reading compatible to the safest discrimination between FLAME ON and FLAME OFF.

## 8.2 PULSE COUNTER

The "Pulse Counter" amplifier (see block diagram of Figure 11) applies to:

- "Gas discharge tube" UV flame scanner. The processor evaluates the flame signal on the basis of pulse rates induced across the electrodes of the UV tube when ultraviolet radiation is detected.
- Solid-state IR or UV sensor. The processor evaluates the flame signal on the basis of a pulse stream generated as function of flame intensity and frequency available at the sensor. This technique must be used when the sensor is pre-conditioned as "Pulse output".

The incoming pulses are counted on a time base. Special function as floating average and count depended time unit allow to get a stable measurement with a fast flame tracking.

A logarithmic converter (dB converter) is used to deal with signals of high dynamic range.

The absolute signal is compared to the background value to give the flame signal strength; this signal is used to generate the flame status binary signal and marginal alarm.

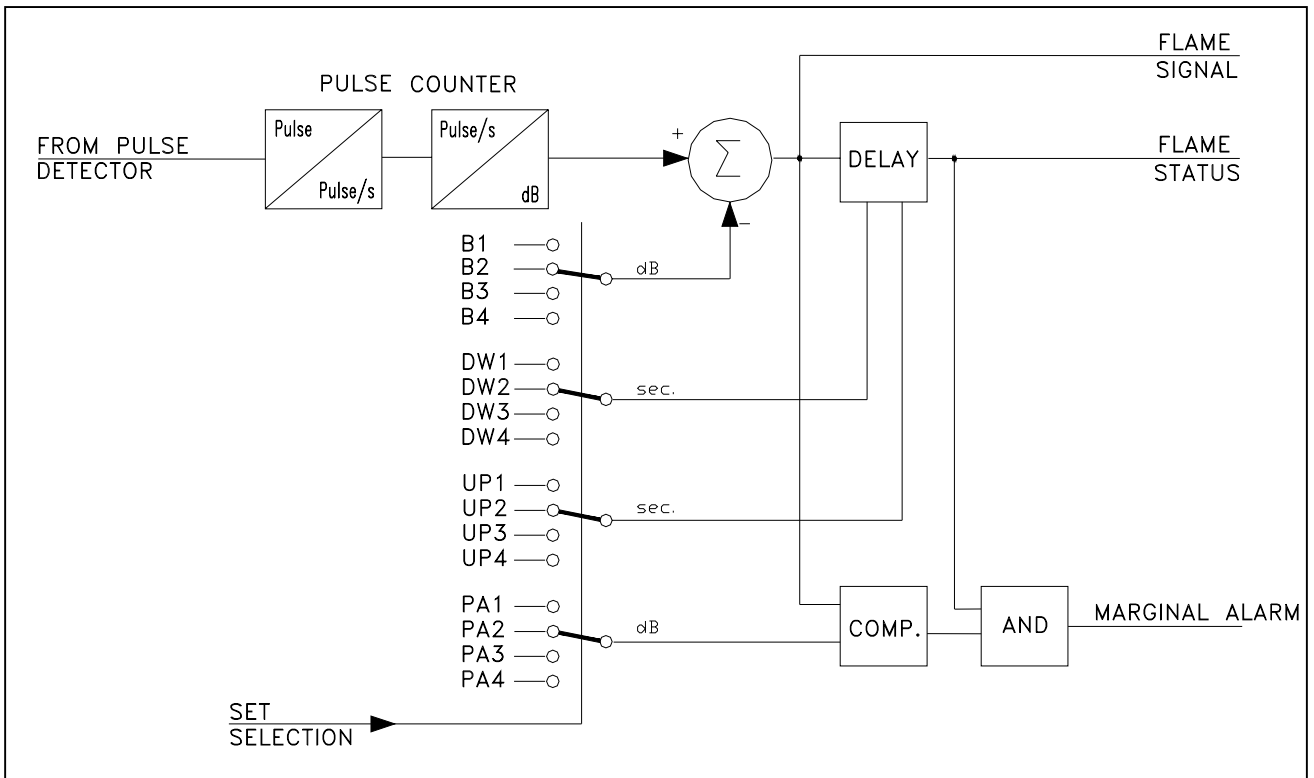


Figure 11. Block diagram of the pulse counter function for the UV channel

### 8.3 FLAME STATUS AND MARGINAL ALARM

The MFD provides, for each channel, the following outputs, computing results of the flame signals received from the flame scanners:

- Flame signal strength (Analog / digital)
- Flame status (binary)
- Marginal alarm (binary)

The marginal alarm and the flame status are used, internally, to drive the related relays.

The flame signal strength value is available on:

- the front panel display, in dB units and graphic sliding bar representation
- the two serial links, RS232 on the front panel and RS485 on the rear connector XM1
- in analog mode, 0-10V or 4-20mA on the rear connector XM1

Flame signal equal to 0 dB means that the target flame value is equal to the background value (the “spurious” signal coming from adjacent / opposite flames).

A positive flame signal (+dB) means the flame value is greater than background value, flame status and flame relay are turned ON (energized).

A negative flame signal means the flame value is lower than background value, flame status and flame relay are turned OFF (de-energized).

As a general rule, a good discrimination (capability to sense the target flame only and to discard signals from other flames) is obtained when the display shows a flame signal greater than +15dB when the target flame is actually ON (flame present) and lower than -10dB when the target flame is OFF.

The analog mode output is available as a voltage signal (0-10V) or as a current signal (4-20mA). Three corresponding ranges are programmable:

- -30dB to +30dB (where 0dB = 5V or 12 mA)
- 0dB to +20dB (0dB = 0V or 4mA; +20dB = 10V or 20 mA)
- 0dB to +30dB (0dB = 0V or 4 mA; +30dB = 10V or 20 mA)

The flame signal output is filtered with the time constant function of the “drop out” time parameter (“DW”).

The marginal alarm is generated (corresponding to binary status OFF or relay de-energized) when the flame status is ON, and the flame signal is lower than the second threshold parameter “PA”.

The flame status and marginal alarm information are also available on serial link.

Both channels flame relays are forced to drop whenever the Watchdog relay de-energize (Fail to safe).

Channel 1 and channel 2 Flame Relays can be configured as follows:

- Selective flame ON/OFF signaling: each flame signal drives the respective flame status relay
- CH.1 OR CH.2: channel 1 flame relay energizes when either CH.1 OR CH.2 flame status is ON
- CH.1 AND CH.2: channel 1 flame relay energizes when both CH.1 AND CH.2 flame status are ON

In both cases where the two channels are logical interconnected, the CH.2 flame relay act as a marginal alarm flame relay following the logical configuration applied for the main flame relay (AND / OR).

The following figure shows the connections.

Figure 12 shows the block diagram. The block “LOG” can be configured as AND or as OR function.

The LED Ch.1 and Ch.2, located on front panel, always indicate the flame relay status.

When the option “Lock relay ON” (see Configuring and operating) is applied, the associated Ch.1/2 LED is flashing.

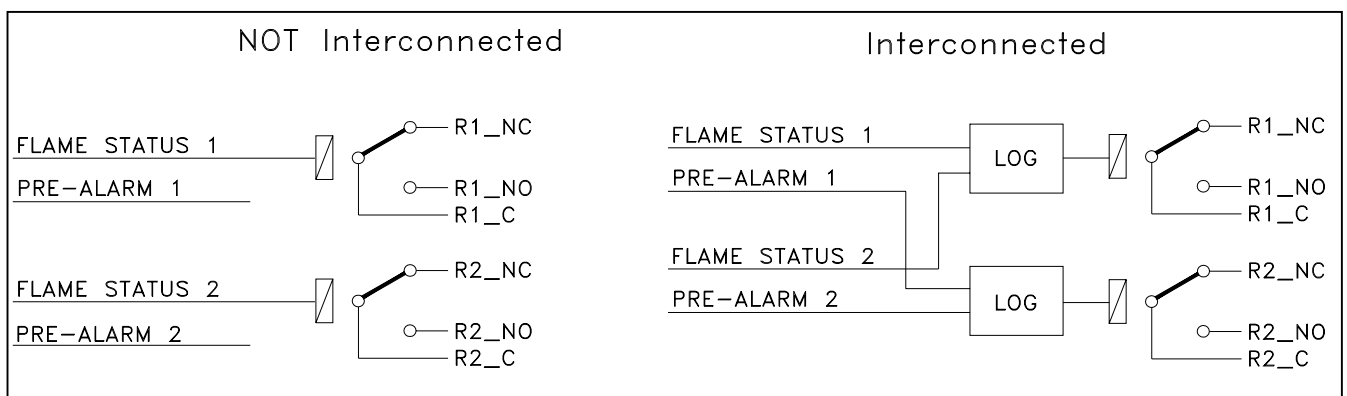


Figure 12. Diagram of the interconnection relays

## 8.4 PARAMETER FILE SET-UP

Four (4) files of operating parameters are available for each channel.

Through externally available voltage-free contacts or 24Vdc logic levels, available on the connector XM1, a remote system (BMS) can dynamically select one of the four files of parameters, contributing to optimise the MFD at associated burner operating modes.

Each operating file includes the following parameters:

“Pulse” input mode:

TAG	Description	Range	Default setting			
			SET1	SET2	SET3	SET4
B	Background, attenuation value expressed in dB	range 0 to +99 dB	20dB	30dB	60dB	60dB
Dw	Flame relay drop-out time delay	range 1 to 5 sec.	1 sec	1 sec	1 sec	1 sec
Up	Flame relay energization time delay	range 1 to 9 sec.	0 sec	0 sec	0 sec	0 sec
PA	Marginal flame alarm, threshold on the flame signal	range 1 to 40 dB	10dB	10dB	10dB	10dB

“Flicker” input mode:

When the channel is configured in “Flicker” mode the following additional parameters are available:

TAG	Description	Range	Default setting			
			SET1	SET2	SET3	SET4
LF	Low cut-OFF frequency	range 20 to 640 Hz	100 Hz	160 Hz	160 Hz	160 Hz
HF	High cut-OFF frequency	range 30 to 2500 Hz	900 Hz	1440 Hz	1440 Hz	1440 Hz

The parameter file set-up can be selected only through SET1 and SET2 inputs on the terminal block (connector XM1).

Supply voltage can be taken from the VSET output (24Vdc) or from a remote equipment using Cset (0V) as reference.

Based on the logic level on SET1 and SET2 inputs of each channel, one of the four file is selected.

SET1 Input	SET2 Input	Selected parameter file
24Vdc	Open	Set 1
Open	24Vdc	Set 2
24Vdc	24Vdc	Set 3
Open	Open	Set 4

### 8.4.1 Safety recommendation

The MFD selects the active parameters file according to the logic status of the inputs SET1 and SET2 (see table above).

The user might instruct the BMS to select one file among the others on the basis of the boiler / burner operating environment such as:

- Burner / Boiler load
- Fuel selected
- Burner in startup / shutdown / scavenging sequence
- Pulverized loading / emptying sequence
- Pilot in operation
- ...





To improve the safety behavior against the flame failure, the user is requested to prove the flame failure response under any selected file of parameters.

ABB recommends to configure the MFD parameters files as follows:

- SET1 (corresponding to inputs: 24d – 10d = ON; 24z – 10z = OFF) for high sensitivity settings
- SET2 (corresponding to inputs: 24d – 10d = OFF 24z – 10z = ON) alternative high sensitivity settings
- SET3 (corresponding to inputs: 24d – 10d = ON; 24z – 10z = ON) for low sensitivity settings
- SET4 (corresponding to inputs: 24d- 10d = OFF; 24z – 10z = OFF) alternative low sensitivity settings

The above method will lead the MFD to switch over to a lower sensitive setup (SET3 or SET4) in the event of failure of SET1 and/or SET2 MFD binary inputs and/or BMS binary outputs and/or interconnecting cables.

The setup parameter default values are shown in the tables above. User can restore anytime the default setup entering the “Restore setup?” option of the Main Menu and confirming (with ENTER key) the panel display prompt (ref. “Menu Structure” par. 10.2 next in this manual).

## 8.5 DIAGNOSTIC

The whole diagnostic tasks of the MFD are signaled by the “SAFE” LED indication on the front panel. One SPDT relay contact is available on the rear connector to interface other systems. “SAFE” relay driver is “Fail to safe”. The “SAFE” relay and relevant LED turn-ON when MFD passes the diagnostic tests at power-up.

Fail-safe circuitries de-energize the “SAFE” relay as soon as a fatal error in the diagnostic tests occurs.

Note: the SAFE relay is also referred to as WDOG relay.

The MFD unit performs on-line diagnostics task issuing error messages in case of failure (see Diagnostic Messages Reference Table next).

If the error detected does not inhibit the operation of the whole unit, only the failed section is disabled and the “SAFE” LED on the front panel flickers. The “SAFE” relay is deenergized only in case of failure affecting all functions; in that case the flame relays eventually ON are de-energized too.

These errors are also communicated via the network, if available, to the supervision and listed on the “EVENT LIST” of the MFD Monitor software, if running.

### Scanner self check

While operating, the unit performs a cyclic diagnostic task to prevent the flame scanners from unsafe operation.

Diagnostic techniques are specific to the type of sensor: IR/UV “Solid state” or “High sensitive discharge tube” types.

The “Solid state” photo-resistor or photo-diode sensors are intrinsically fail-safe, as they react only to the flame presence, giving an AC signal (flickering) to the control unit. Diagnostic test of the IR/UV solid-state sensor scanners is carried out removing the sensor’s bias voltage and checking for spurious signals driven from the scanner up to the control unit.

The UV discharge tube may fail in a way of non reacting to the presence of UVs (fail to safe) or in a way of self-discharging even in absence of any source of flame (unsafe). Diagnostic test of the UV scanner is carried out driving an electromechanical shutter to blind the UV sensor.

On both scanner types, the diagnostic task proves the following:

- Electrical integrity of the self-checking devices.
- The flame signal drops to zero after the check command is initiated.

Congruent error messages are displayed if the flame signal does not drop to zero within a fix time or in case of short circuit of the self-checking devices or wires.

Both errors cause the **respective channel flame relay** to de-energize.

## Diagnostic Messages Reference Table

Diagnostic Task	Freq.	Error ID	Error code	WDOG Relay	Flame Relay CH-1	Flame Relay CH-2	Recovery action
Microcontroller operation	On-line	02	Clk	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	03	COP	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	04	OpC	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	05	SWI	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	06	ExN	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	07	ExI	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	08	RTI	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	09	Tm0	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	0A	Tm1	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	0B	Tm2	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	0C	Tm3	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	0D	Tm4	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	0E	Tm5	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	0F	Tm6	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	10	Tm7	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	11	TmO	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	12	P1A	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	13	P1A	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	14	SPI	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	15	SC0	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	16	SC1	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	17	ATD	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	18	CAN	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	19	KGH	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	1A	DwC	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	1B	P1A	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	1C	CAN	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	1D	CAN	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	1E	CAN	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	1F	CGM	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	20	Menu	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	21	Stck	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	22	Set	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	23	RAM	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	24	er85	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	25	CPU	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	27	Task	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	28	Eprom	DROP	DROP	DROP	Replace MFD unit
Microcontroller operation	On-line	30	Microproc. fail	DROP	DROP	DROP	Replace MFD unit
MFD power supply	On-line	31	Power fail	DROP	DROP	DROP	Replace MFD unit

			V+				
MFD power supply	On-line	32	Power fail V-	DROP	DROP	DROP	Replace MFD unit
MFD power supply	On-line	33	Power fail Vset	DROP	DROP	DROP	Replace MFD unit
Scanner temperature	On-line	34	Det. High Temp	ON	Free	Free	Establish cooling air flow
MFD fail safe	On-line	35	Watch dog fail	DROP	DROP	DROP	Replace MFD unit
CH.1 Scanner power	On-line	38	Det1 Power fail	ON LED flickers	DROP	Free	Check scanner wiring
CH.1 Scanner self check	Cyclic	39	Det1 Blind fail	ON LED flickers	DROP	Free	Check scanner wiring
CH.1 Wire checking	On-line	3A	Det1 Wire fail	ON LED flickers	DROP	Free	Check scanner wiring
CH.1 Filter Fail	Cyclic	3E	CH1 Filter Fail	ON* LED flickers	DROP	Free	Replace MFD unit *(Whether it occurs on both channels WD relay drops)
MFD Fail safe	On-line	3F	CH1 Relay driver	DROP	DROP	DROP	Replace MFD unit
CH.2 Scanner power	On-line	40	Det2 Power fail	ON LED flickers	Free	DROP	Check scanner wiring
CH.2 Scanner self check	Cyclic	41	Det2 Blind fail	ON LED flickers	Free	DROP	Check scanner wiring
CH.2 Wire checking	On-line	42	Det2 Wire fail	ON LED flickers	Free	DROP	Check scanner wiring
CH.2 Filter Fail	Cyclic	46	CH2 Filter Fail	ON* LED flickers	DROP	Free	Replace MFD unit *(Whether it occurs on both channels WD relay drops)

## 9 POWER - UP

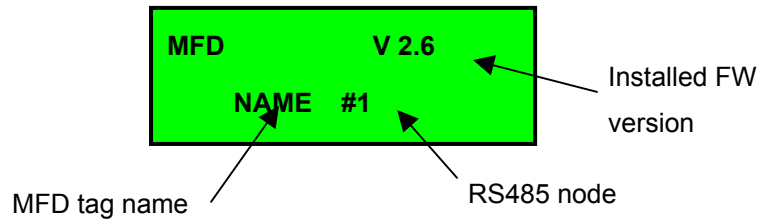
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Uvisor MFD is delivered with on-board firmware already installed.

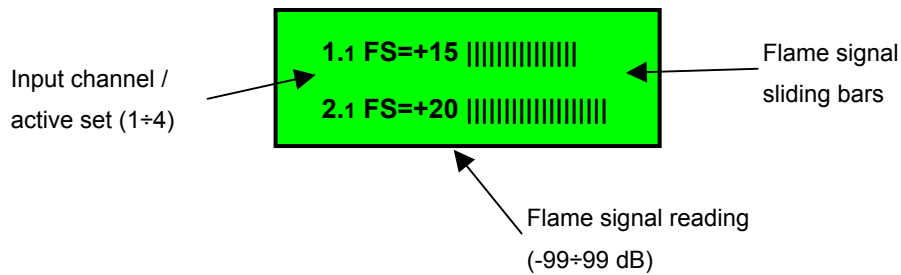
No circuit breaker or external fuses are provided on-board.

At power-up, Uvisor MFD turns-ON the graphic display backlight and runs the diagnostic test.

When diagnostic is passed, the display shows the module basic information as follows:



After 1 minute, if no one is accessing the keyboard, the MFD turns-OFF the backlight and the graphic display shows the flame status overview.



The graphic display backlight will turn-ON whenever the keyboard is accessed or at the occurrence of alarm; in this case the backlight turn-OFF takes a much longer time (approx. 10 minutes).

# 10 CONFIGURING AND OPERATING

## 10.1 KEYPAD / DISPLAY

Uvisor MFD provides, on the faceplate, a back lighted graphic display and a soft keypad to review and program the operating parameters.

Up/Down arrows, Enter and Esc keys allow to browse and view the menu option and the operating parameters:



- To browse the options
- To increase/decrease the selected parameters



- To confirm the new option
- To confirm the command



- To cancel the choice and return to previous option.
- To abort the command

To edit / modify the active operating parameters the user has to enter the **Set-up** mode.

Two set-up modes are available:

- Configuration Set-up
- Extended configuration set-up

The following table shows the two set-up modes. To enable the set-up mode press the access key, digit the correspondent **“Access code”** at the display prompt, followed by **[Enter]**.

Whether the access code is not successfully entered within 10 second the set-up procedure is aborted.

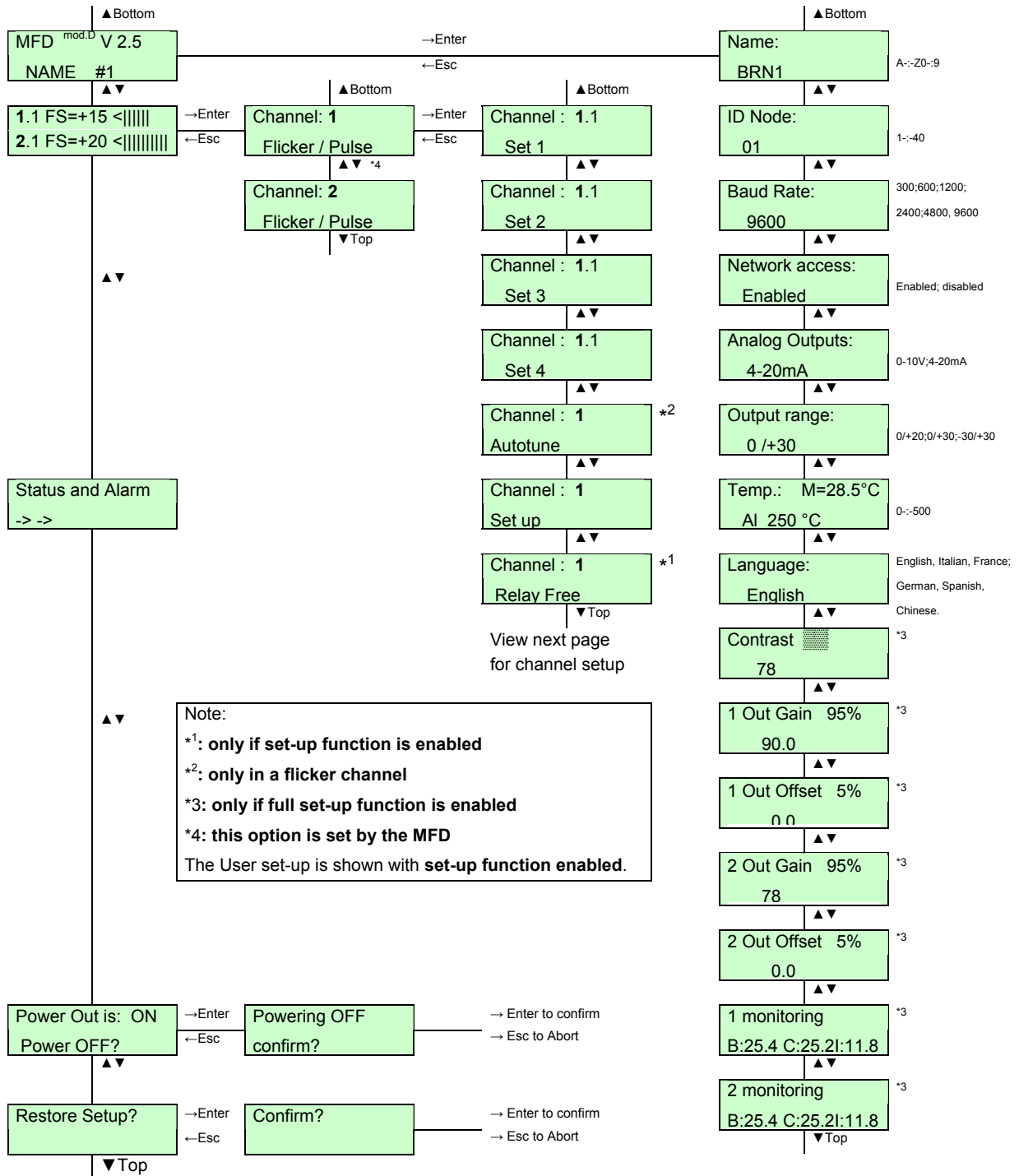
Set-up mode	Configurable parameter	Access Key	Access code	LED status
Configuration	<ul style="list-style-type: none"> <li>▪ MFD name and address</li> <li>▪ Menu language</li> <li>▪ Analogue outputs selection</li> <li>▪ Output power-OFF</li> <li>▪ Channel 1 set-up ↳Parameter File 1-2-3-4 Set-up</li> <li>▪ Channel 2 set-up ↳Parameter File 1-2-3-4 Set-up</li> </ul>		Yes. Mandatory	Slow rate flashing
Extended Configuration	<ul style="list-style-type: none"> <li>▪ The configuration above</li> <li>▪ LCD contrast adjustment</li> <li>▪ Analogue output CH.1 zero and span</li> <li>▪ Analogue output CH.2 zero and span</li> </ul>		Yes. Mandatory	Fast rate flashing



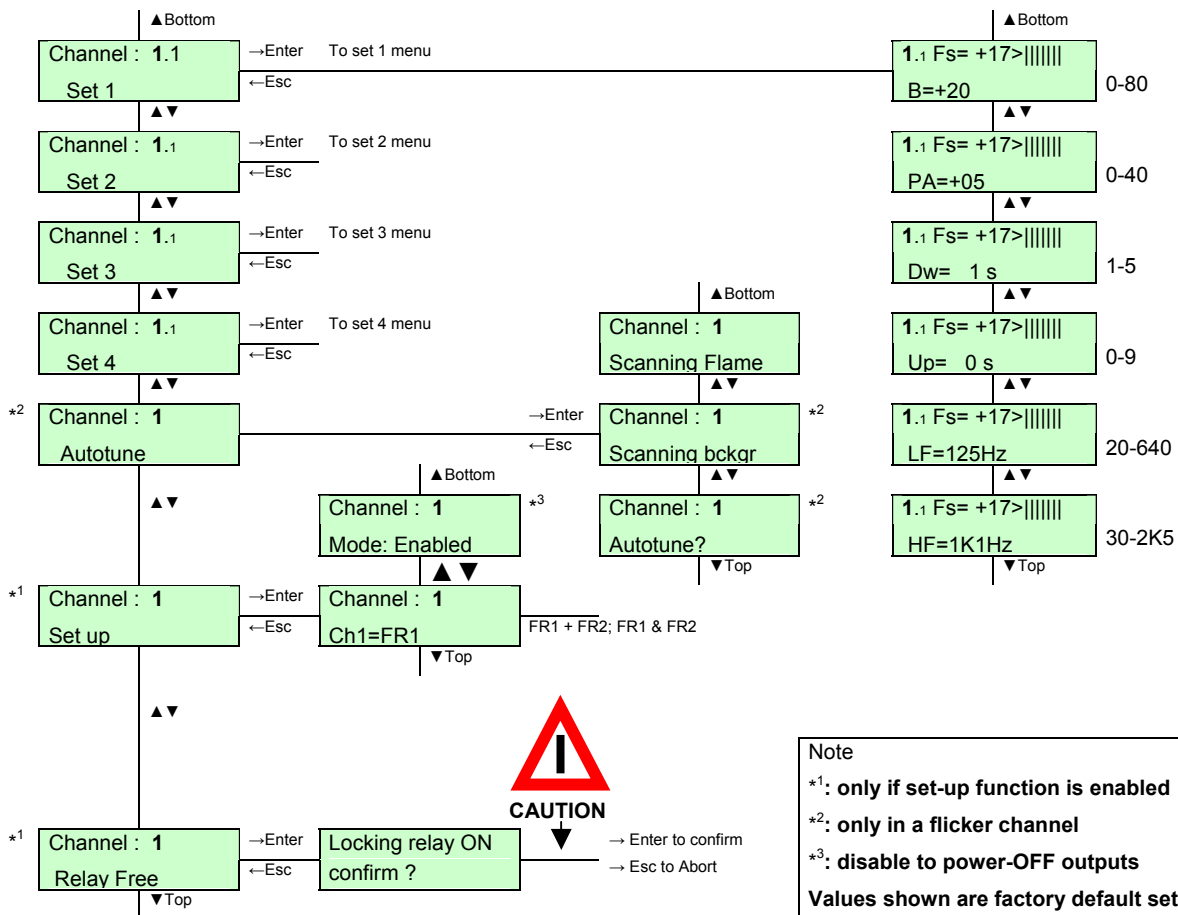
Operating parameters set-up must be in charge to AUTHORIZED personnel only. Improper data entered might compromise the safety behaviour of the equipment.

## 10.2 MENU STRUCTURE

### MAIN MENU



## Channel SET-UP MENU (only channel 1 is shown)



Flame relay lock-ON affects the safety behaviour of the equipment. This utility is intended to be used for scanner maintenance and must be carried out by AUTHORIZED personnel only. Free the flame relay in normal operation.

### 10.3 SAVING CONFIGURATION VALUES FOR FUTURE REFERENCE

At the end of the configuration, take a note of the parameters values for future reference (as in case of MFD replacement).



# 11 COMMUNICATION

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## 11.1 INTRODUCTION

The MFD can send data to external data acquisition or supervisory systems through two built-in serial ports.

On the back plane, a screw-type connector, the RS-485 port is available for multi-drop network, while, on the front panel, a DB9 female connector is available for the RS-232 local monitoring.

## 11.2 THE MFD MONITOR

ABB has developed the MFD Monitor, an optional PC based tool designed to interface and supervise Uvisor SYSTEM.

“MFD Monitor” allows long-term monitoring/archiving of multi-burner furnace plants; it is also a comfortable tool to view the operating parameter of each Uvisor MFD.

“MFD Monitor” plots and saves the spectral analysis of the each burner flame flicker, contributing in combustion quality assessment.

### Main Feature

- Up to 80 flame scanner signals input per serial COM.
- Self-configuring RS-485 network.
- Upload plot and save flicker spectral response
- Sliding bar presentation of the whole flame signals with dynamic/adjustable flame quality level.
- Extended on-line diagnostic view.
- Internal (Control unit) and external (flame scanner head) temperature display and alarm
- Events list of the whole system connected
- Windows 9x, NT, 2000 compatible

## 11.3 CONNECTION TO SUPERVISION

Whenever a number of MFDs, implementing a whole flame monitoring system, (see figure 14) are “daisy chained”, it is mandatory to use RS-485 communication port available on the back plane screw type connector (see MFD pin-out above).

Whether the supervision station is supported by a personal computer, an RS485 / RS232 adapter is typically applied.

## 11.4 SERIAL CONNECTIONS

### 11.4.1 RS-232 connection (Front)

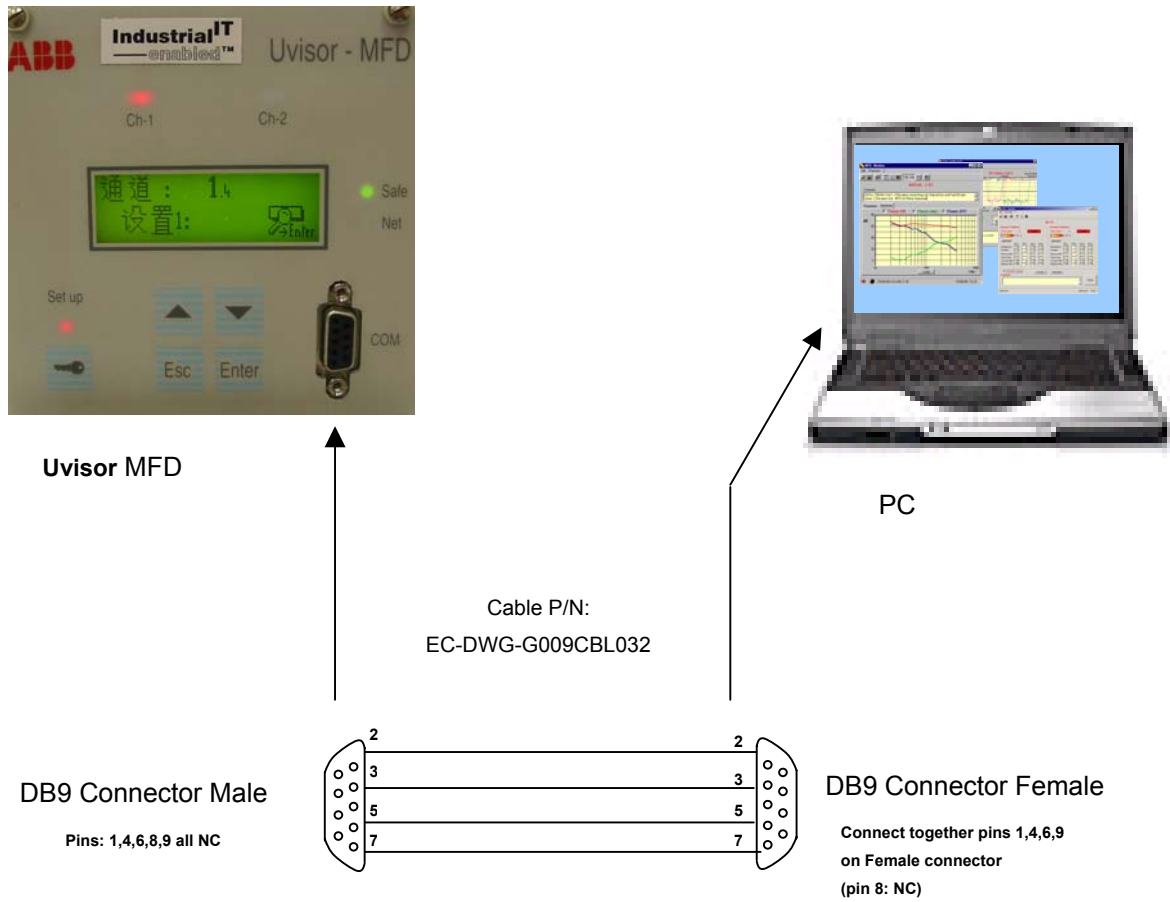


Figure 13. RS-232 cable connections

### 11.4.2 RS-485 connection (Rear)

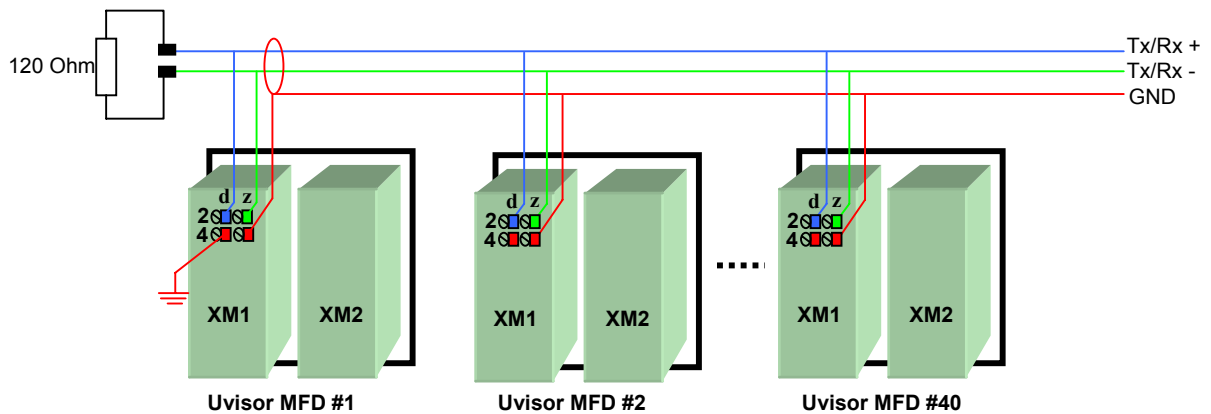


Figure 14. RS-485 connections

## 12 TROUBLESHOOTING

Trouble	Investigate	Action
1. "SAFE" LED and "Watch-dog" relay do not turn-ON at power-up.	<ul style="list-style-type: none"> <li>a) Make sure power supply is within the limits given in "Specification"</li> <li>b) Make sure power supply wiring is correct</li> <li>c) Make sure main processor is running. Check the display messages and follow the Diagnostic Message Reference Table.</li> </ul>	<ul style="list-style-type: none"> <li>a) Provide correct power source</li> <li>b) Provide power supply wiring</li> <li>c) Replace the MFD.</li> </ul>
2. "SAFE" LED flickers and CH.1 or CH.2 LED turned-OFF.	<ul style="list-style-type: none"> <li>a) Failure is affecting CH.1 or CH.2 flame scanners. Check the display messages to trace the failure occurred and follow the Diagnostic Message Reference Table.</li> </ul>	<ul style="list-style-type: none"> <li>a) Provide better grounding</li> <li>b) Increase parameter "B", background, of the respective channel's active set</li> <li>c) Replace the electromechanical shutter (Only for UR460 and UR450 flame scanners)</li> <li>d) Replace the sensitive phototube (Only for UR460 and UR450 flame scanners)</li> <li>e) Power-OFF the related channel and replace the flame scanner</li> </ul>
3. "SAFE" LED flickers	<ul style="list-style-type: none"> <li>a) The thermocouple is detecting high temperature on the scanner side. Check scanner-cooling airflow.</li> <li>b) Check high temperature alarm threshold.</li> </ul>	<ul style="list-style-type: none"> <li>a) Remove obstruction or sharp bends in the cooling air hose. Clean air inlet filters</li> <li>b) Follow the configuration instruction to adjust the high temperature alarm</li> </ul>
4. CH.2 turns-ON when CH.1 does, regardless its flame input	<ul style="list-style-type: none"> <li>a) View channels set-up</li> </ul>	<ul style="list-style-type: none"> <li>a) CH.1 + CH.2 set-up is enabled. Enter in set-up mode and change to CH.1    CH.2</li> </ul>
5. CH.1 does not turn-ON, regardless its flame input, unless CH.2 turns- on.	<ul style="list-style-type: none"> <li>a) View channels set-up</li> </ul>	<ul style="list-style-type: none"> <li>a) CH.1 &amp; CH.2 set-up is enabled. Enter in set-up mode and change to CH.1    CH.2</li> </ul>
6. CH.1 or CH.2 LED flicker and respective flame relay is energized.	<ul style="list-style-type: none"> <li>a) View channel set-up</li> </ul>	<ul style="list-style-type: none"> <li>a) CH.1 or CH.2 flame relay is locked.</li> </ul>
7. MFD does not communicate over the serial link	<ul style="list-style-type: none"> <li>a) View MFD set-up</li> </ul>	<ul style="list-style-type: none"> <li>a) Enter in set-up mode and adjust communication baud-rate, and node number.</li> </ul>
8. CH.1 / CH.2 flame relays do not turn-ON.	<ul style="list-style-type: none"> <li>a) Target burner flame unstable or out of sight.</li> <li>b) Flame scanner viewing lens dirty</li> <li>c) Flame scanner poor sensitivity</li> <li>d) Tuning not optimised</li> </ul>	<ul style="list-style-type: none"> <li>a) Call for burner maintenance</li> <li>b) Follow scanner maintenance instruction.</li> <li>c) Provide scanner test locally</li> <li>d) Refer to Configuring and Operating. Enter in set/up mode and check parameters: <ul style="list-style-type: none"> <li>▪ "B" Background. Decrease to increase sensitivity.</li> <li>▪ "LF" Low cut-OFF filter. Lower the value to increase pass-band.</li> </ul> </li> </ul>

## 13 MAINTENANCE

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Uvisor MFD does not require periodic maintenance.

## 14 REPAIR AND REPLACEMENT

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### 14.1 REPAIR

Uvisor MFD has no replaceable parts. In case of faults, replace the whole unit.

Do not try to replace the internal parts of the Uvisor MFD.

In case of fault, please follow the indications given in section 12 of this manual. If the MFD must be replaced, follow the instructions given in the following.

### 14.2 REPLACEMENT

To replace Uvisor MFD, follow these steps:

- If the menus are still accessible from the front panel, take note of parameter setting; otherwise find out the original parameters saved at time of previous installation (see paragraph 10.3)
- require intervention of BMS responsible personnel in order to avoid unwanted burner trips
- unscrew the 4 retaining screws at the corners of the front panel
- unplug the Uvisor MFD (hot removal is allowed)
- insert the replacement unit (hot insertion is allowed)
- lock the 4 screws at the corners of the front panel
- configure the parameters of the new MFD as noted in the first step or, perform a complete calibration and tuning again.
- require intervention of BMS responsible personnel in order to restore the BMS status.

## 15 END OF LIFE-CYCLE

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Uvisor MFD is manufactured with materials that do not require special treatments. It does not contain radioactive materials.

Uvisor MFD does not contain batteries.

Local regulations might apply to the disposal of electronic assemblies.

## 16 SUPPORT SERVICES

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ABB Energy Automation will provide assistance in the operation and repair of its products. Requests for sales or application services should be made to your nearest sales or service office. ABB Energy Automation can also provide installation, repair and maintenance contract services.

When ordering, use nomenclature or part numbers and part descriptions from equipment manuals. Parts without a description must be ordered from the nearest sales or service office. Recommended spare parts lists, including prices are available through the nearest sales or service office.

ABB Energy Automation has modern training facilities available for training your personnel. On-site training is also available. Contact your nearest ABB Energy Automation sales office for specific information and scheduling.

Additional copies of this instruction, or other instructions, can be obtained from the nearest ABB Energy Automation sales office at a reasonable charge.

Repairing items should be sent to ABB Energy Automation Spa workshop at the address given in the last page.

## 17 ORDERING CODES

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Purchase order must specify the full model number for each component of the system.

PART NUMBER	ORDERING CODE	PRODUCT NAME	DESCRIPTION
EC-BOM-G009HLA012	84503-S-2002000	Measure <sup>IT</sup> Uvisor MFD	Multi flame detector - control unit
EC-BOM-G009MEC008	84532-S-2002003	Rack Mounting Unit	Four (4) slots mounting cage compatible with 19" racks, complete with guides, strips and screw-type rear connectors.
EC-PI-G009UTL020	84503-S-2002002	MFD Monitor Windows 9x, NT, 2000	Software for flame signal monitoring and flame frequency analysis.
EC-DWG-G009CBL032	84503-S-2002004	PC – MFD serial cable	RS-232 serial cable to connect the Uvisor MFD to the PC communication port.
EC-BOM-G009MEC028	84503-S-200-2001	Rack Adapter	Plug-in adapter module to allow insertion of Uvisor MFD in a MFD.SA Rack Mounting Unit



## **MFD User Manual EC-DOC-G009MAN012-D.doc**

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