U-ML2

Fiber Optic

Feeder manager relay for DC systems

Protection

Complete Feeder Protection with a wide range of protection and control functions

Display Navigation

4.3" Touchscreen display with improved intuitive UI controls and easy to use graphic menus

Integration

Easy connection with Microelettrica transducers through Fiber Optic. Possibility to increase I/O by additional expansion modules.

Communication

IEC 61850, IEC 60870-5-103, Modbus RTU, Modbus TCP, NTP protocols

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SYSTEM CHARACTERISTICS

U-ML2 is a protection relay that includes several communication protocols and a programmable logic for external apparatus supervision.
The relay has advanced algorithms to better protect all the DC equipment.
It measures current and voltage from the transducers (from Microelettrica transducers MHIT or other generic transducers) connected using Fiber Optic Cables. This protection relay can be used for protection of DC Substations in combination with High-Speed Circuit Breakers for Railway and wayside applications.
Real time measurements can be read continuously from the display or other serial and Ethernet based communication protocols including **IEC61850**.
Relay Parameters can be set using the **touchscreen** HMI or through connection with a PC and Microelettrica MSCom software.

HMI	
Display	4.3" touchscreen
LEDs	10 programmable leds with labels
Front port	USB-Mini B for connection with PC
Buttons	Open, Close and Reset

LOCAL I/O	
Analog Inputs Measurement	Copper wire connection for: V_L, V_V, In, 10In, Vg, Ig
Digital Input Measurement	I (In) and V (V_L)
Digital Inputs	4 (dry contact)
Output relays	6

REMOTE I/O (EXPANSION BOARDS)	
Configuration	Possibility to install up to 2 boards
Standard boards	Digital inputs: 10 (Vdi 24-110Vdc or 220Vdc) Output relays: 4
Thyristor board*	Digital inputs: 10 (Vdi 24-110Vdc or 220Vdc) Output relays: 4 (High-speed Thyristor output)

*** Thyristor board could be installed only as first expansion board (max 1)**

COMMUNICATION PORTS	
Ports	1 x RS485 1 x RJ45

FUNCTIONS

Protection and Control functions description

ANSI Code	Function Description
Protection	
3	Accomulation of Arc Energy / IRF
7	Rate of Change Current di/dt
21	Underimpedance
80 (27)	DC Undervoltage
60FL	Analog Input Diagnostic Current
45 (59)	DC Overvoltage
49	Thermal image
76 (50/51)	DC Overcurrent
50BF	Breaker Failure
67	Directional Overcurrent
51N/64	Ground/Earth Fault
82 (79)	DC Autoreclosing
Control	
69	Lock C/B reclosure
73	Automatic Line Test (1 Line, optional 2 Lines)
74TCS	Trip Circuit Supervision
77	Energy Counter Pulse Wh
85	Auxiliary C/B remote commands
85/94	Remote Trip
86	Lockout
89/30	Diagnostic C/B, switches position and status

T> (49)

Thermal image element with prealarm.

I>, 2I>, 3I>, 4I> (51/67)

Four Overcurrent elements, directional or not directional.

Iis (50/76/67)

Instantaneous current element, directional or not directional.

1delta-I, 2delta-I, 1di/dt, 2di/dt (7)

Two current Step elements for sudden change, and two current Rate of rise elements.

Rapp, Iapp (21)

One Impedance monitoring element and one current monitoring element, using di/dt dependance.

1Ig, 2Ig (51N/64)

Two Frame fault elements to prevent electric shock.

RCL (82)

Automatic Reclosure for DC with reclaim time.

1U<, 2U< and UL< (27)

Two Undervoltage elements and one Line Voltage presence element.

1U>, 2U> (59)

Two Overvoltage elements.

Wi (3)

Accumulation of arc energy and C/B alarm maintenance level.

BrkFail (50BF)

Breaker Failure, main C/B line current extinction check.

Dia-I (60FL)

Diagnostic analog inputs current.

Wh (77)

Energy counter Pulse.

I>> (76/54)

Self-Trip to individuate the C/B spontaneous trip.

TCS (95/74)

Trip Circuit Supervision.

Oscillo

Oscillographic recording for Dynamic Disturbance Recorder.

L/R CB Cmds (72/86)

Local/Remote and main Circuit Breaker handler.

CB-L (69)

Lock Circuit Breaker reclosure command configuration.

LT (73)

Automatic Line Test calculating line resistance from current and voltage or from upstream and downstream voltage.

Dia C/B (89/30)

Diagnostic Circuit Breaker, monitoring incongruence in position of auxiliary contacts.

auxRCmds (85)

Auxiliary Circuit Breaker remote commands with configuration of command timers.

ADDITIONAL FEATURES

PLC Functionality

Intertripping function could be programmed and used in order to generate and acquire signal through other substations. It is possible to configure intertripping input/output with physical contact or with digital GOOSE messages for IEC61850 protocol.

Control

- Opening circuit breaker supervision
- Breaker command (Front button for Open/Close operation)
- Breaker failure
- Maintenance parameter detection (mechanical operations, arc contact…)

Communications

- Embedded operating system
- Modbus RTU
- Modbus TCP/IP (Ethernet based)
- IEC60870-5-103 (serial based RS485)
- IEC61850 Rev.2
- Time sync (NTP)
- Remote file transfer (FTP)
- Web server
- RJ45 Ethernet port
- USB-Mini B front connection for relay programming through configuration software.

Recordings

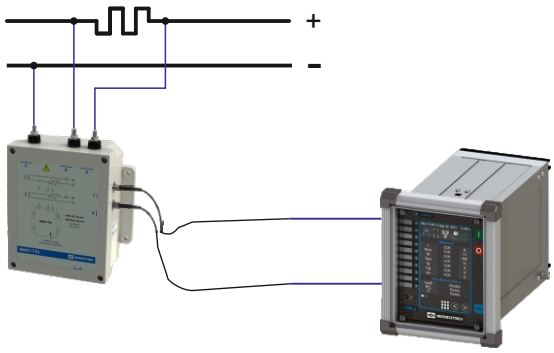
- Event recording, rising or falling signals
- Event recording for protection tripping
- Possibility to save event and waveforms on internal hard drive.
- Possibility to save waveform in COMTRADE format on internal hard drive.

Software

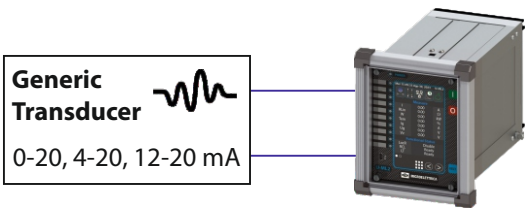
- Commissioning software MSCom (Windows OS)
- CID Builder for IEC61850 configuration (Windows OS)

TRANSDUCERS CONNECTION

Connection with MHIT transducers



Connection with Generic transducers



MICROELETTRICA

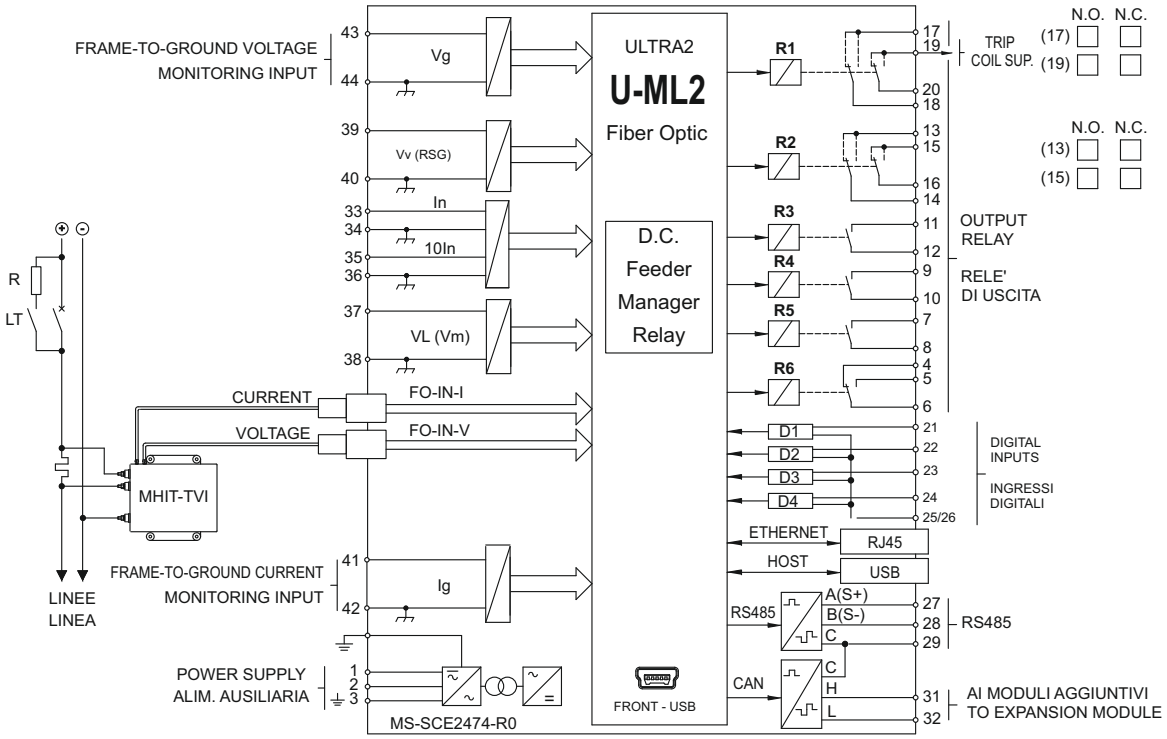
ACCURACY AND MEASUREMENT

ACCURACY	
Current	1% reading value from 0,1 to 1,2 In
	2% reading value on other measuring range
Voltage	1% reading value from 0,1 to 1,2 Vn
	2% reading value on other measuring range
MEASUREMENT INPUT	
Current	0 - ±20mA (±25mA max) = 0 – In (1,25In)
	0 - ±20mA (±25mA max) = 0 – 10In (12,5In)
Voltage	0 - ±20mA (±40mA max) = 0 – Vn (2Vn)

STANDARD

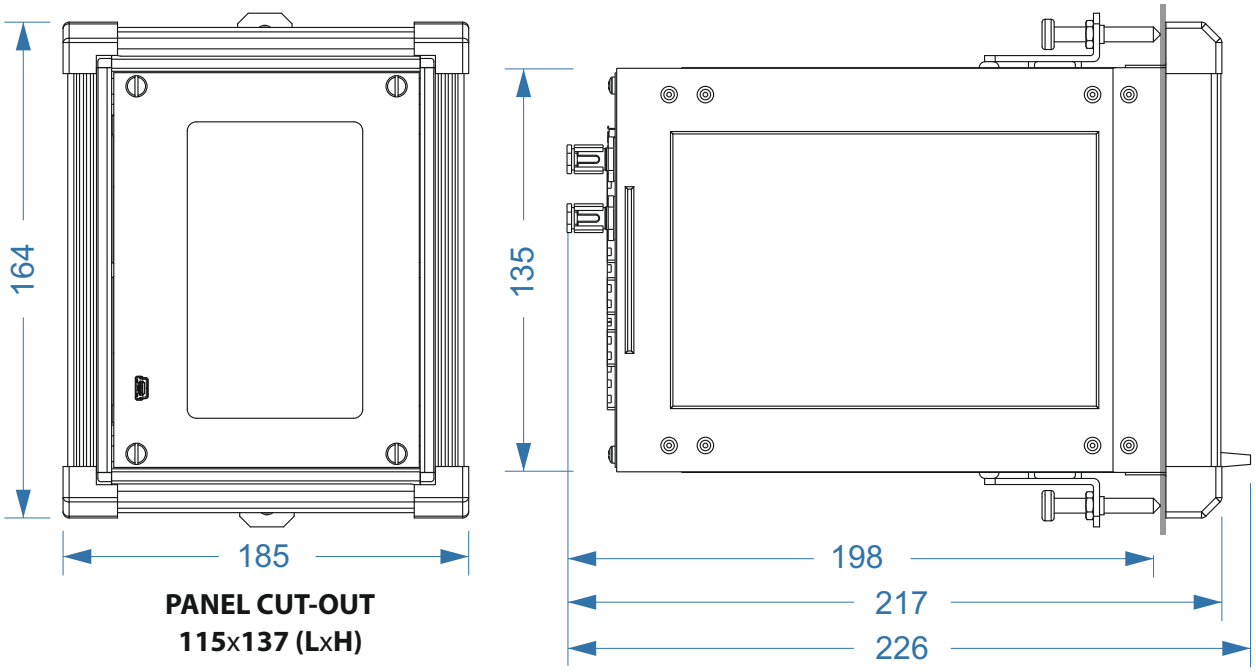
Environmental Reference Standard (IEC 60068)					
Operation ambient temperature		EN 60870-2-2	class C1(3k5) -10°C/+55°C		
Environmental testing	(Cold)	IEC60068-2-1			
	(Dry heat)	IEC60068-2-2			
	(Change of temperature)	IEC60068-2-14			
	(Damp heat)	IEC60068-2-78	+40°C ; R.H.<=93% no condensation		
Resistance to vibration and shock		IEC60255-21-1	10-500Hz ; 1g		
		IEC60255-21-2			
CE EMC Compatibility (EN50081-2 - EN50082-2 - EN50263)					
Electromagnetic radiated and conducted emission		EN55022	industrial environment		
Electrostatic discharge test		IEC61000-4-2	level 4	6kV contact / 8kV air	
Radiated electromagnetic field immunity test		IEC61000-4-3	level 3	80-2000MHz	10V/m
				900MHz/200Hz	10V/m
Electrical fast transient/burst (Fast Transient)		IEC61000-4-4	level 3	2kV, 5kHz	
Surge immunity test		IEC61000-4-5	level 4	2kV(c.m.), 1kV(d.m.)	
Conducted disturbances immunity test		IEC61000-4-6	level 3	0.15-80MHz	10V/m
Power frequency magnetic test		IEC61000-4-8		1000A/m	
Pulse magnetic field		EC61000-4-9		1000A/m, 8/20µs	
Damped oscillatory magnetic field		IEC61000-4-10		100A/m, 0.1÷1MHz	
Pulse magnetic field		EC61000-4-9		1000A/m, 8/20µs	
Voltage interruptions		IEC61000-4-11			
Oscillatory waves (Ring waves)		IEC61000-4-12	level 4	4kV(c.m.), 2kV(d.m.)	
Common-mode disturbances in the		IEC61000-4-10	level 4		
Frequency range 0Hz to 150kHz					
HF disturbances test with damped		IEC60255-22-1	level 3	400pps, 2,5kV(c.m.), 1kV(d.m.)	
Oscillatory wave (1MHz burst test)					
Degrees of protection provided by enclosures (IEC60529)					
IP Rating		Front	IP54		
		Rear	IP20		

WIRING DIAGRAM



OVERALL DIMENSIONS

U-ML2 without additional boards



PANEL CUT-OUT
115x137 (LxH)

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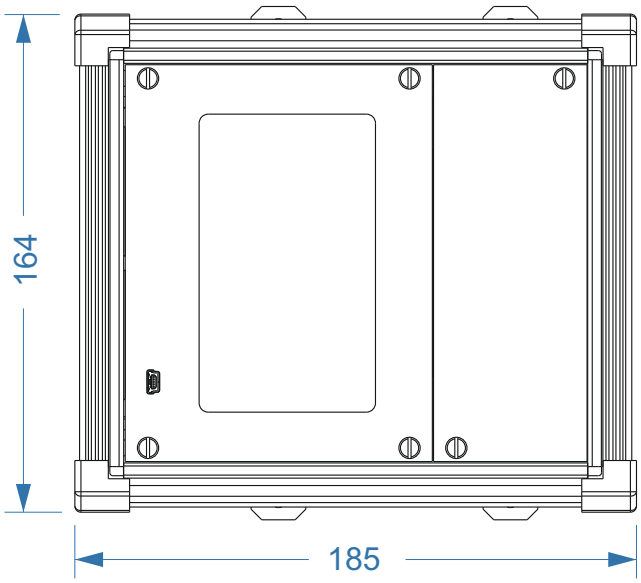
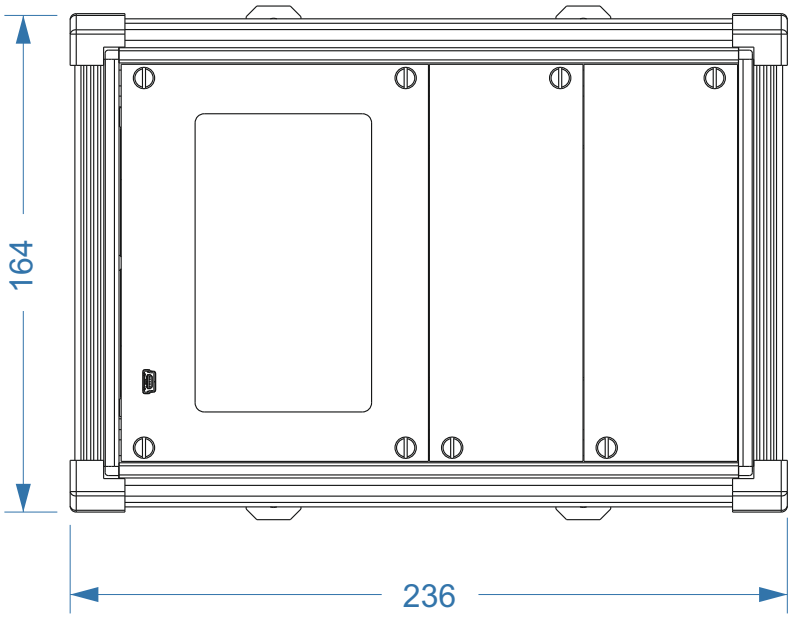
U-ML2 with 1 additional board



PANEL CUT-OUT
165x137 (LxH)

U-ML2 with 2 additional board



PANEL CUT-OUT
217x137 (LxH)

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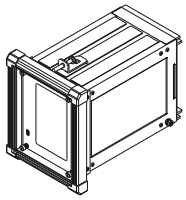
ORDERING CODES

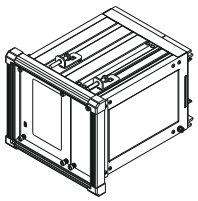
U-ML2 without additional boards

Vaux	Ordering Code
24-110 Vac/dc	**UML2F11000**
90-220 Vac/dc	**UML2F12000**



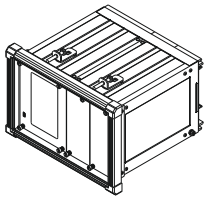
U-ML2 with 1 additional board

Vaux	Additional board	VDI	Ordering Code
24-110 Vac/dc	1 x Standard board	24-110 Vdc	**UML2F11A00**
24-110 Vac/dc	1 x Thyristor board	24-110 Vdc	**UML2F11B00**
90-220 Vac/dc	1 x Standard board	24-110 Vdc	**UML2F12A00**
90-220 Vac/dc	1 x Thyristor board	24-110 Vdc	**UML2F12B00**
90-220 Vac/dc	1 x Standard board	220 Vdc	**UML2F12C00**
90-220 Vac/dc	1 x Thyristor board	220 Vdc	**UML2F12D00**



U-ML2 with 2 additional boards

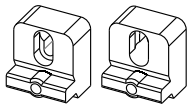
Vaux	Additional board	VDI	Ordering Code
24-110 Vac/dc	2 x Standard board	24-110 Vdc	**UML2F11AA0**
24-110 Vac/dc	1 x Thyristor board, 1 x Standard board	24-110 Vdc	**UML2F11BA0**
90-220 Vac/dc	2 x Standard board	24-110 Vdc	**UML2F12AA0**
90-220 Vac/dc	1 x Thyristor board, 1 x Standard board	24-110 Vdc	**UML2F12BA0**
90-220 Vac/dc	2 x Standard board	220 Vdc	**UML2F12CC0**
90-220 Vac/dc	1 x Thyristor board, 1 x Standard board	220 Vdc	**UML2F12DC0**



All configurations detailed above include accessories for **Flush mounting**.

For **Surface mounting** as in LV switchboards, an additional mounting kit is required:

Surface mounting kit	Ordering Code
Kit for U-ML2 without additional boards	**E2B0000001**
Kit for U-ML2 with 1 or 2 additional boards	**E2B0000002**



For custom configuration please contact Microelettrica.

The technical specifications reported are not binding and they should be agreed in the contract.

For further technical information on our products visit www.microelettrica.com

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