

In addition to protection functions, Micrologic 5 offers all the functions of Power Meter products as well as operating assistance for the circuit breaker:

- Display of settings
- Measurement functions:
 - Energy (E)
- Alarms
- Time stamped histories and event tables
- Maintenance indicator
- Communication



Micrologic E measurement functions are made possible by Micrologic intelligence and the accuracy of the sensors. They are handled by a microprocessor that operates independent of protection functions.

Display



Micrologic LCD

The user can display all the protection settings and the main measurements on the LCD screen of the trip unit.

- Instantaneous rms current measurements
 - Micrologic E voltage, frequency and power measurements and energy metering
- To make the display available under all conditions and increase operating comfort, an external power supply is recommended.

It is indispensable to:

- Display faults and interrupted current measurements
- Use all the functions of Micrologic E (e.g. metering of low power and energy values)
- Ensure operation of the communication system

The external power supply can be shared by several devices.

FDM121 display unit

An FDM121 switchboard display unit can be connected to a Micrologic trip unit using a prefabricated cord to display all measurements on a screen. The result is a veritable 96 x 96 mm Power Meter.

In addition to the information displayed on the Micrologic LCD, the FDM121 screen shows demand, power quality and maximeter/minimeter values along with alarms, histories and maintenance indicators.

The FDM121 display unit requires a 24 V DC power supply. The Micrologic trip unit is supplied by the same power supply via the cord connecting it to the FDM121.


PC screen

When the Micrologic, with or without an FDM121 switchboard display unit, is connected to a communication network, all information can be accessed via a PC.



Measurements

Instantaneous rms measurements

The Micrologic E continuously display the RMS value of the highest current of the three phases and neutral (Imax). The navigation buttons  can be used to scroll through the main measurements.

In the event of a fault trip, the current interrupted is memorised.

Measures phase, neutral, ground fault currents plus voltage, frequency and power measurements

Maximeters / minimeters

Every instantaneous measurement provided by Micrologic E can be associated with a maximeter/minimeter. The maximeters for the highest current of the 3 phases and neutral, the demand current and power can be reset via the trip unit keypad, the FDM121 display unit or the communication system.

Energy metering

The Micrologic E also measures the energy consumed since the last reset of the meter. The active energy meter can be reset via the keypad and the FDM121 display unit or the communication system.

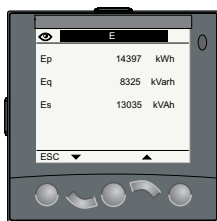
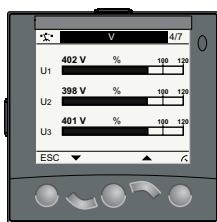
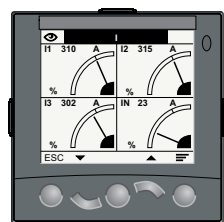
Demand and maximum demand values

Micrologic E also calculates demand current and power values. These calculations can be made using a block or sliding interval that can be set from 5 to 60 minutes in steps of 1 minute. The window can be synchronised with a signal sent via the communication system. Whatever the calculation method, the calculated values can be recovered on a PC via Modbus communication.

Ordinary spreadsheet software can be used to provide trend curves and forecasts based on this data. They will provide a basis for load shedding and reconnection operations used to adjust consumption to the subscribed power.

Power quality

Micrologic E calculates power quality indicators taking into account the presence of harmonics up to the 15th order, including the total harmonic distortion (THD) of current and voltage.





Micrologic 5 / 6 integrated Power Meter functions				Display		
				E	Micrologic LCD	FDM121 display
Display of protection settings						
Pick-ups (A) and delays	All settings can be displayed	I _r , t _r , I _{sd} , t _{sd} , I _i , I _g , t _g	■	■		
Measurements						
Instantaneous rms measurements						
Currents (A)	Phases and neutral	I ₁ , I ₂ , I ₃ , I _N	■	■		■
	Average of phases	I _{avg} = (I ₁ + I ₂ + I ₃) / 3	■	-		■
	Highest current of the 3 phases and neutral	I _{max} of I ₁ , I ₂ , I ₃ , I _N	■	■		■
	Ground fault (Micrologic 6)	% I _g (pick-up setting)	■	■		■
	Current unbalance between phases	% I _{avg}	■	-		■
Voltages (V)	Phase-to-phase	U ₁₂ , U ₂₃ , U ₃₁	■	■		■
	Phase-to-neutral	V _{1N} , V _{2N} , V _{3N}	■	■		■
	Average of phase-to-phase voltages	U _{avg} = (U ₁₂ + U ₂₁ + U ₂₃) / 3	■	-		■
	Average of phase-to-neutral voltages	V _{avg} = (V _{1N} + V _{2N} + V _{3N}) / 3	■	-		■
	Ph-Ph and Ph-N voltage unbalance	% U _{avg} and % V _{avg}	■	-		■
	Phase sequence	1-2-3, 1-3-2	■	■		■
Frequency (Hz)	Power system	f	■	■		■
Power	Active (kW)	P, total / per phase	■	■		■
	Reactive (kVAR)	Q, total / per phase	■	■		■
	Apparent (kVA)	S, total / per phase	■	■		■
	Power factor and cos φ (fundamental)	PF and cos φ, total and per phase	■	-		■
Maximeters / minimeters						
	Associated with instantaneous rms measurements	Reset via Micrologic or FDM121 display unit	■	-		■
Energy metering						
Energy	Active (kWh), reactive (kVARh), apparent (kVAh)	Total since last reset Absolute or signed mode ⁽¹⁾	■	■		■
Demand and maximum demand values						
Demand current (A)	Phases and neutral	Present value on the selected window	■	-		■
		Maximum demand since last reset	■	-		■
Demand power	Active (kWh), reactive (kVAR), apparent (kVA)	Present value on the selected window	■	-		■
		Maximum demand since last reset	■	-		■
Calculation window	Sliding, fixed or com-synchronised	Adjustable from 5 to 60 minutes in 1 minute steps	■	-		(2)
Power quality						
Total harmonic distortion (%)	Of voltage with respect to rms value	THDU, THDV of the Ph-Ph and Ph-N voltage	■	-		■
	Of current with respect to rms value	THDI of the phase current	■	-		■

(1) Absolute mode: E absolute = E out + E in; Signed mode: E signed = E out - E in.

(2) Available via the communication system only.

Additional technical characteristics

Measurement accuracy

Accuracies are those of the entire measurement system, including the sensors:

- Current: Class 1 as per IEC 61557-12
- Voltage: 0.5 %
- Power and energy: Class 2 as per IEC 61557-12
- Frequency: 0.1 %

Micrologic measurement capabilities come into full play with the FDM121 switchboard display. It connects to Compact NSX via a simple cord and displays Micrologic information. The result is a true integrated unit combining a circuit breaker and a Power Meter. Additional operating assistance functions can also be displayed.



FDM121 display.



Surface mount accessory.



Connection with FDM121 display unit.

FDM121 switchboard display

The FDM121 is a switchboard display unit that can be integrated in the Compact NSX100 to 630 A system. It uses the sensors and processing capacity of the Micrologic trip unit. It is easy to use and requires no special software or settings. It is immediately operational when connected to the Compact NSX by a simple cord. The FDM121 is a large display, but requires very little depth. The anti-glare graphic screen is backlit for very easy reading even under poor ambient lighting and at sharp angles.

Display of Micrologic measurements and alarms

The FDM121 is intended to display Micrologic 5 measurements, alarms and operating information. It cannot be used to modify the protection settings. Measurements may be easily accessed via a menu.

All user-defined alarms are automatically displayed. The display mode depends on the priority level selected during alarm set-up:

- High priority: a pop-up window displays the time-stamped description of the alarm and the orange LED flashes
- Medium priority: the orange "Alarm" LED goes steady on
- Low priority: no display on the screen

All faults resulting in a trip automatically produce a high-priority alarm, without any special settings required.

In all cases, the alarm history is updated.

If power to the FDM121 fails, all information is stored in the Micrologic non-volatile memory. The data can be consulted via the communication system when power is restored.

Status indications and remote control

When the circuit breaker is equipped with the BSCM module, the FDM121 display can also be used to view circuit breaker status conditions:

- O/F: ON/OFF
- SD: trip indication
- SDE: Fault-trip indication (overload, short-circuit, ground fault)

Main characteristics

- 96 x 96 x 30 mm screen requiring 10 mm behind the door (or 20 mm when the 24 volt power supply connector is used)
 - White backlighting
 - Wide viewing angle: vertical $\pm 60^\circ$, horizontal $\pm 30^\circ$
 - High resolution: excellent reading of graphic symbols
 - Alarm LED: flashing orange for alarm pick-up, steady orange after operator reset if alarm condition persists
 - Operating temperature range -10°C to $+55^\circ\text{C}$
 - CE / UL marking
 - 24 V DC power supply, with tolerances $24\text{ V} - 20\%$ (19.2 V) to $24\text{ V} + 10\%$ (26.4 V)
- When the FDM121 is connected to the communication network, the 24 V is supplied by the communication system wiring system
- Consumption 40 mA

Mounting

The FDM121 is easily installed in a switchboard.

- Standard door cut-out 92 x 92 mm
- Attached using clips

To avoid a cut-out in the door, an accessory is available for surface mounting by drilling only two 22 mm diameter holes.

The FDM121 degree of protection is IP54 in front. IP54 is maintained after switchboard mounting by using the supplied gasket during installation.

Connection

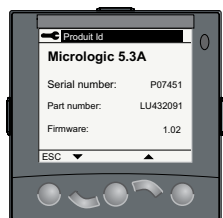
The FDM121 is equipped with:

- A 24 V DC terminal block:
 - Plug-in type with 2 wire inputs per point for easy daisy-chaining
 - Power supply range of $24\text{ V} - 20\%$ (19.2 V) to $24\text{ V} + 10\%$ (26.4 V)
- Two RJ45 jacks

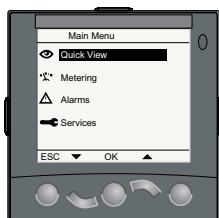
The Micrologic connects to the internal communication terminal block on the Compact NSX via the pre-wired NSX cord. Connection to one of the RJ45 connectors on the FDM121 automatically establishes communication between the Micrologic and the FDM121 and supplies power to the Micrologic measurement functions. When the second connector is not used, it must be fitted with a line terminator.



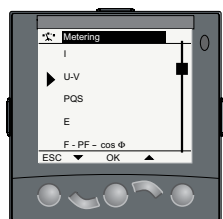
- 1 Escape
- 2 Down
- 3 OK
- 4 Up
- 5 Context
- 6 Alarm LED



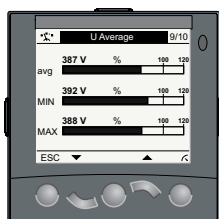
Product identification



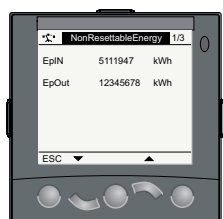
Quick view



Metering: sub-menu



Metering: U average



Metering: meter



Services

Navigation

Five buttons are used for intuitive and fast navigation.

The "Context" button may be used to select the type of display (digital, bargraph, analogue).

The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.) Other languages can be downloaded.

Screens

Main menu

When powered up, the FDM121 screen automatically displays the ON/OFF status of the device.

- Quick view
- Metering
- Alarms
- Services.

When not in use, the screen is not backlit. Backlighting can be activated by pressing one of the buttons. It goes off after 3 minutes.

Fast access to essential information

- "Quick view" provides access to five screens that display a summary of essential operating information (I, U, f, P, E, THD, circuit breaker On / Off)

Access to detailed information

- "Metering" can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values
- Alarms displays active alarms and the alarm history
- Services provides access to the operation counters, energy and maximeter reset function, maintenance indicators, identification of modules connected to the internal bus and FDM121 internal settings (language, contrast, etc.)