User Manual

ABB i-bus® EIB
Current Module SM/S 3.16.30

Intelligent Installation Systems

SM/S 3.16.30

ABB i-bus® EIB

EIB

I_n = 16 A AC
U_n = 230 V AC

ABB STOTZ-KONTAKT
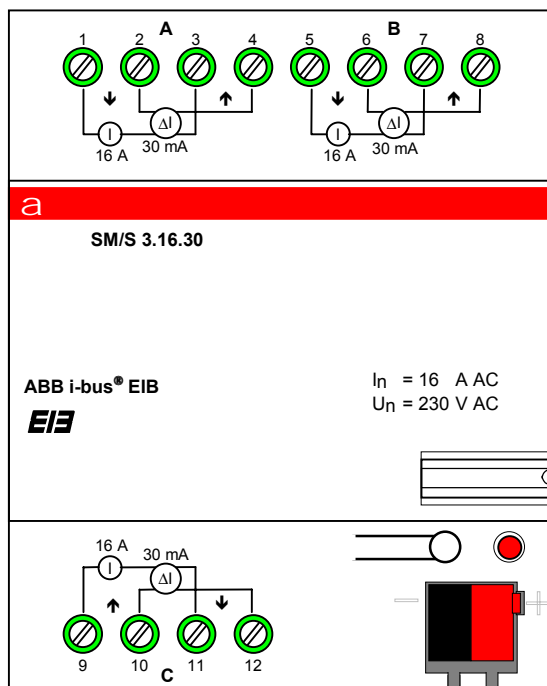
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1   Device characteristics

1.1   Introduction

The Current Module SM/S 3.16.30 allows the measurement of load and/or residual current in 3 independent, potential free measurement circuits.
The actual value of the load or residual current is sent over the ABB i-bus® EIB as a 1-byte telegram. In addition, threshold values can be parameterized causing 1-bit switching telegrams to be sent should the current exceed or go below these levels.

The Current Module SM/S 3.16.30 is to be used exclusively for the purpose of load and residual current <u>measurement</u>.

It is not permissible, together with switching actuators, to use this device in place of the specified primary protection devices (miniature circuit breakers or residual current circuit breakers)!

1.2   Connection Diagram
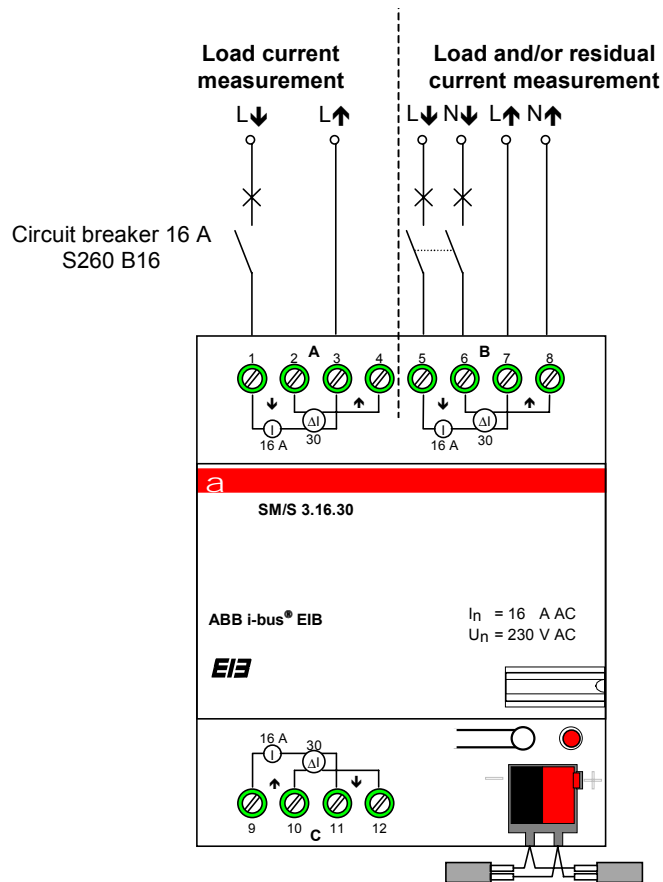
1.3   Measurement range

The Current Module SM/S 3.16.30 has a rated current per measurement circuit of max. 16 A for load currents and max. 30 mA for residual currents. The device can, however, measure overload currents up to an absolute maximum of 25 A for short periods of time (< 1 hr, max. one measurement circuit per device). The load and residual current measurement values are transmitted over the ABB i-bus® EIB in the form of 1-byte telegrams. The table below shows the relationship between the measured current values and the transmitted 1-byte value.

	Byte value	Load current	Residual current
Measurement zero value	0 (0_h)	0 A	0 mA
Measurement end value (Theoretical)	255 (FF_h)	25.5 A	51.0 mA
Resolution	1-bit	0.10 A	0.20 mA
Tolerance (±) (sinus)	± 5 bits	± 0.51 A (2%)	± 1.02 mA (2%)
Measurement end value (Physical)	242 ($F2_h$)	24.2 A	48.4 mA

If the actual current value is greater than the physical measurement end value of the Current Module, i.e. > 24.2 A or 48.4 mA, the byte value 255 (FF_h) is sent as an 'overload' signal. When using digital displays where a scaling factor of 25.5 can not be programmed, the factor 26 should be used. The displayed value will have an increased error of + 2%.

Warning: Sustained currents that are greater than the rated load current, i.e. > 16 A, can damage or destroy the device!
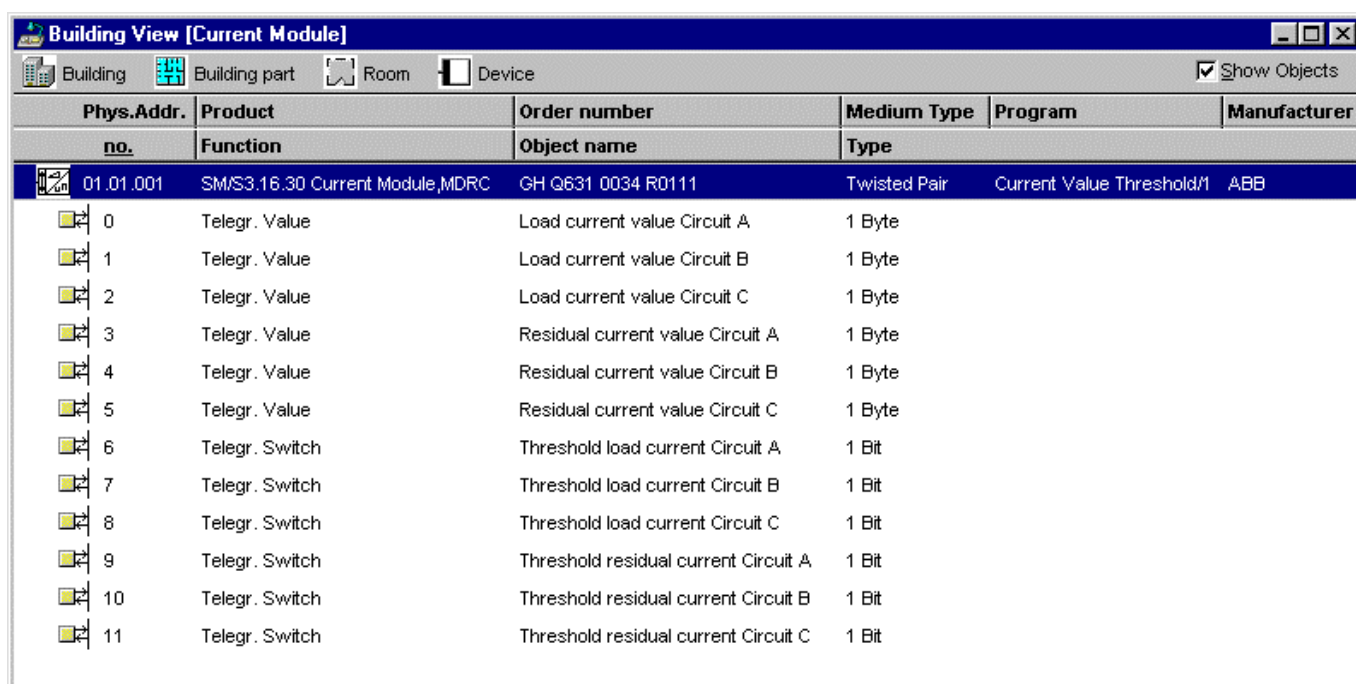
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2 Application software

2.1 Communication objects

The application software "Current Value Threshold/1" has in total 12 communication objects: six 1-bit and six 1-byte objects.
Each of the 3 measurement circuits have:
- one 1-byte communication object for the load current value,
- one 1-byte communication object for the residual current value,
- one 1-bit communication object for the load current threshold signal and
- one 1-bit communication object for the residual current threshold signal.

All communication objects are "output"-type objects. Each communication object can be assigned a single group address.

| Building View [Current Module]					
🏢 Building 🏢 Building part Room Device					☑ Show Objects
Phys.Addr.	**Product**	**Order number**	**Medium Type**	**Program**	**Manufacturer**
no.	**Function**	**Object name**	**Type**		
01.01.001	SM/S3.16.30 Current Module,MDRC	GH Q631 0034 R0111	Twisted Pair	Current Value Threshold/1	ABB
0	Telegr. Value	Load current value Circuit A	1 Byte		
1	Telegr. Value	Load current value Circuit B	1 Byte		
2	Telegr. Value	Load current value Circuit C	1 Byte		
3	Telegr. Value	Residual current value Circuit A	1 Byte		
4	Telegr. Value	Residual current value Circuit B	1 Byte		
5	Telegr. Value	Residual current value Circuit C	1 Byte		
6	Telegr. Switch	Threshold load current Circuit A	1 Bit		
7	Telegr. Switch	Threshold load current Circuit B	1 Bit		
8	Telegr. Switch	Threshold load current Circuit C	1 Bit		
9	Telegr. Switch	Threshold residual current Circuit A	1 Bit		
10	Telegr. Switch	Threshold residual current Circuit B	1 Bit		
11	Telegr. Switch	Threshold residual current Circuit C	1 Bit		

2.2 Parameter window: General

Via the parameter window „General", the parameter "Accuracy of RMS measurement value" can be set. This setting affects the time taken to make a current measurement and also the accuracy of the measurement when measuring non sinusoidal currents. There are three possible settings „normal", „increased" and „high" which apply universally to all measurement circuits. If the parameter setting "Accuracy of the RMS measurement value" is altered, the help text „Suitable for" and „Duration of a measurement cycle" automatically changes accordingly (see diagram).

normal: The setting „normal" has the shortest measurement time and is suitable for measurement in circuits with simple ohmic loads, e.g. incandescent lamps or heating elements. The length of a measurement cycle, i.e. the time taken before the same measurement is repeated, is equal to 3.3 sec multiplied by the number of activated measurement circuits.

increased: The setting „increased" is suitable for load circuits with mixed consumer loads, e.g. PC's together with lighting circuits. The length of a measurement cycle is equal to 6.6 sec multiplied by the number of activated measurement circuits.

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high: The setting „high" has the longest measurement time and is most suited to circuits with electronic or non-linear loads that draw non sinusoidal currents, e.g. dimmers and electronic ballast's, or electronically controlled loads, for example, motors. The length of a measurement cycle is equal to 10 sec multiplied by the number of activated measurement circuits.
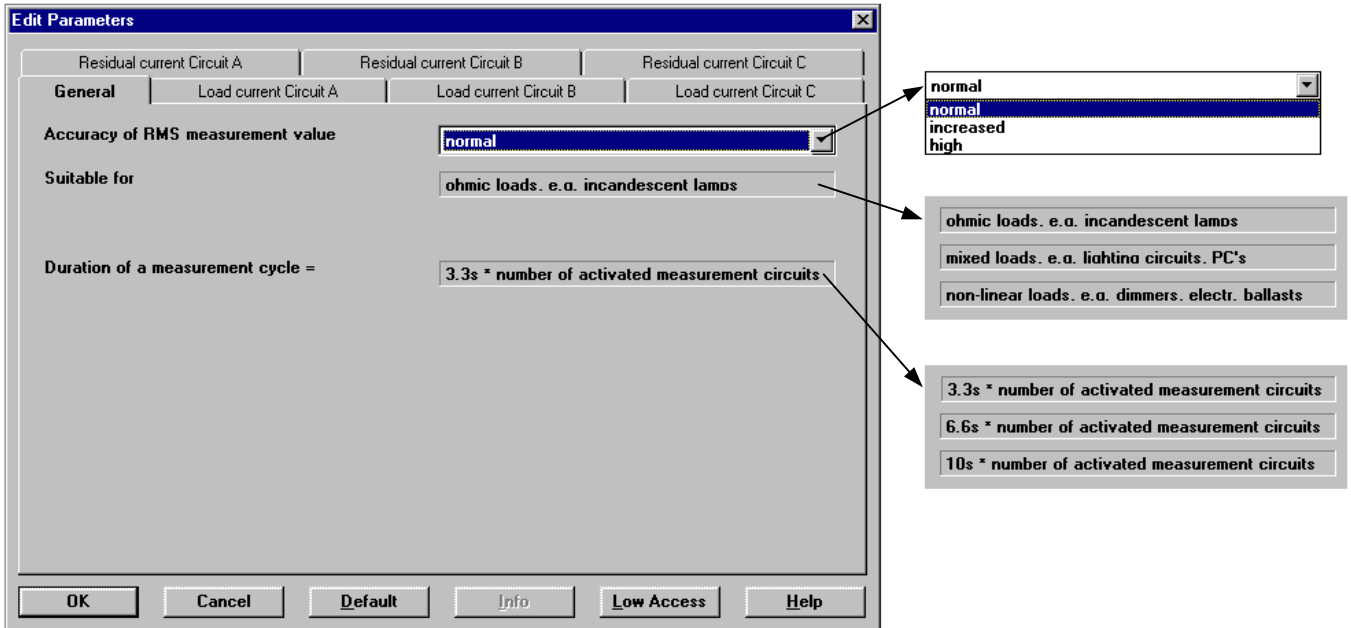
2.3   Parameter window: Load / Residual current Circuits A,B,C

For each measurement circuit A, B and C the parameters for load and residual current measurement can be configured separately from one another. Each measurement circuit has the following parameter options: „Function", „Send measurement value on change of more than", „Upper threshold value" and „Lower threshold value".

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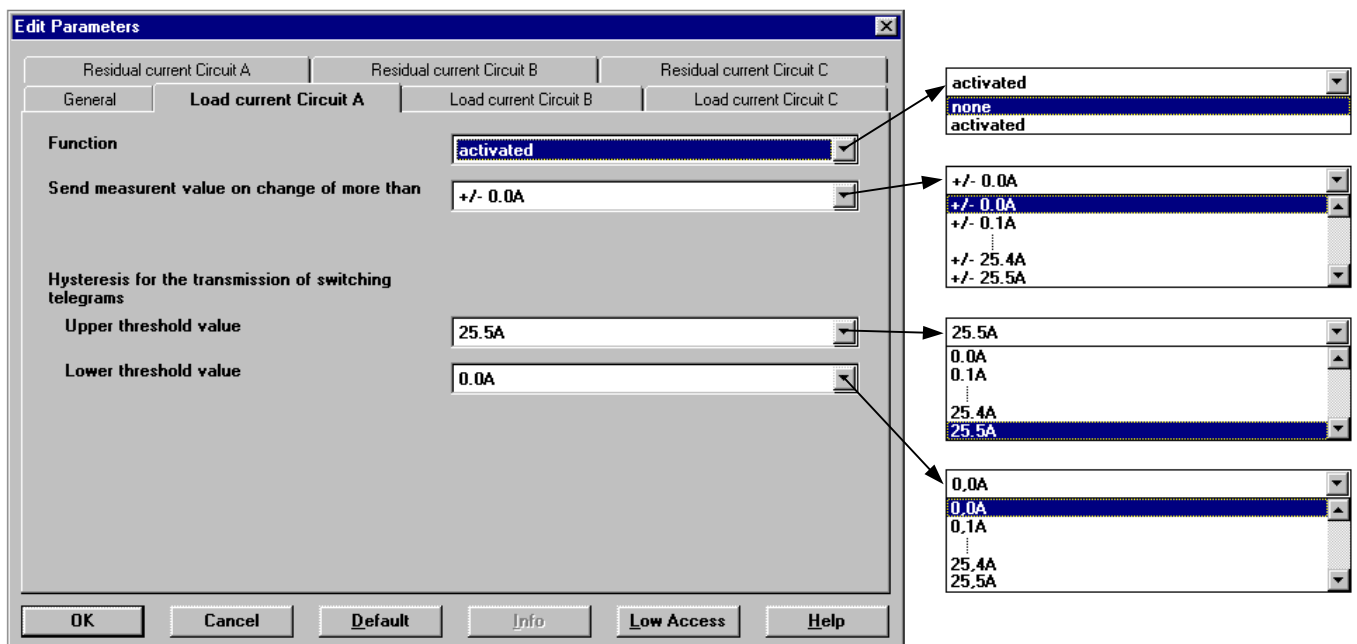
Function: Measurement of the load or residual current in each of the respective measurement circuits can be configured „none" or „activated".

Send measurement value on change of more than: The measured current value is sent as a 1-byte telegram over the ABB i-bus® EIB. In order to prevent unnecessary telegram transmission, for example, in installations where the current oscillates around an average value, (e.g. low frequency ripple), this parameter allows the measurement circuit to be configured such that the measured value is only sent when the current has changed by a defined amount compared to the last sent value. If the setting +/- 0.0A is programmed, the measured value is sent every measurement cycle. Notice: If large values for the current difference are set, the actual current value can vary greatly from the last sent value.

Upper threshold value / Lower threshold value: 1-bit switching telegrams are sent via ABB i-bus® EIB, when, as shown below, both upper and lower threshold levels are crossed one after the other in the same direction. The threshold values can be set as parameters.
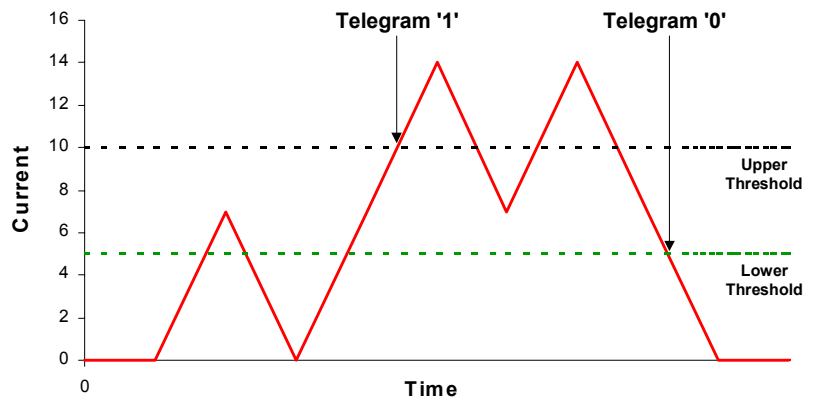

3   Application Examples

3.1   Display of operational status:

The Current Module can be used to display the actual operational status of electrical consumers, independent of whether they are EIB devices or not. The operational status of the load is obtained indirectly by measuring the load current.
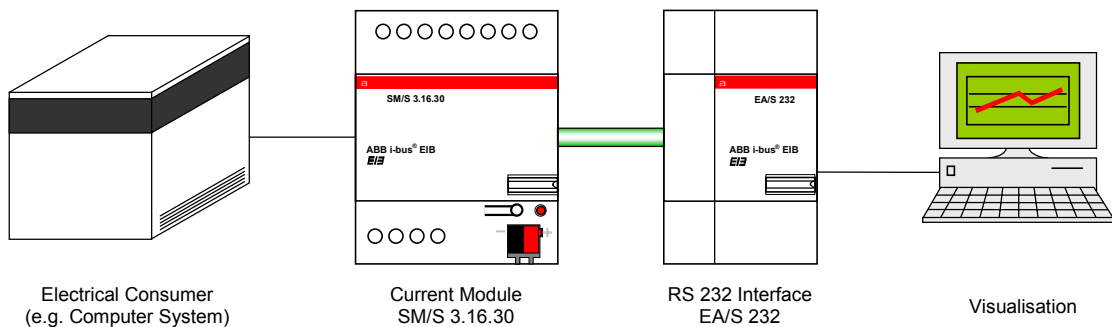
If, as in the example below, the circuit current should exceed both threshold levels, an „On" telegram is sent. If the current value goes below the pre-defined thresholds, an „Off" telegram is transmitted. These "On", "Off" telegrams can be displayed, e.g. on a display panel by means of a tableau unit or the universal concentrator.

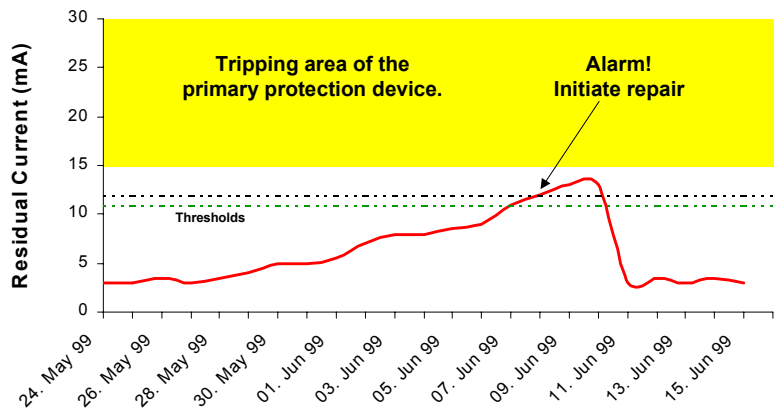| Electrical Consumer (e.g. washing machine) | Current Module SM/S 3.16.30 | Universal Concentrator UK/S 32.1 | Display Panel |

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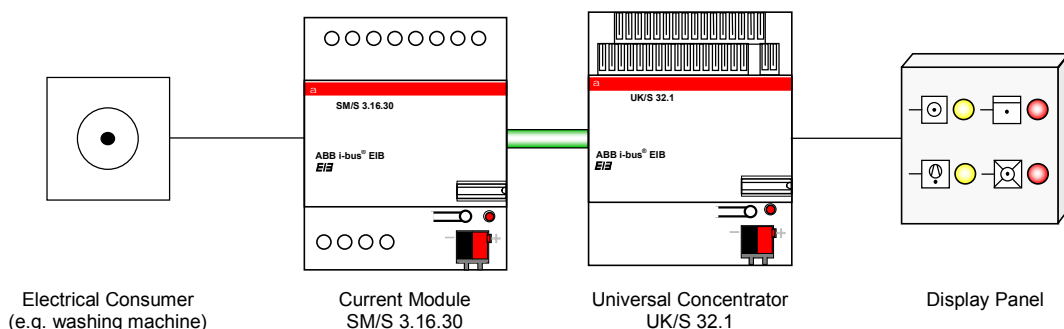
3.2 Trend analysis

Trend analysis can be used to monitor the operational status of electrical installations over longer periods of time. The data produced from such an analysis can give early warning of a possible problem and be used as the basis for planning and initiating inspection or repair work before failure of the installation occurs.

Current measurement values are sent whenever, for example, increases in the residual current are detected. These telegrams can be evaluated using a PC and displayed as trend curves, allowing changes in the installation over longer periods of time to be clearly seen. Together with the information over the operational status of the electrical consumers, i.e. which loads are active and when, a defective consumer can be quickly and easily identified.

| Electrical Consumer (e.g. Computer System) | Current Module SM/S 3.16.30 | RS 232 Interface EA/S 232 | Visualisation |

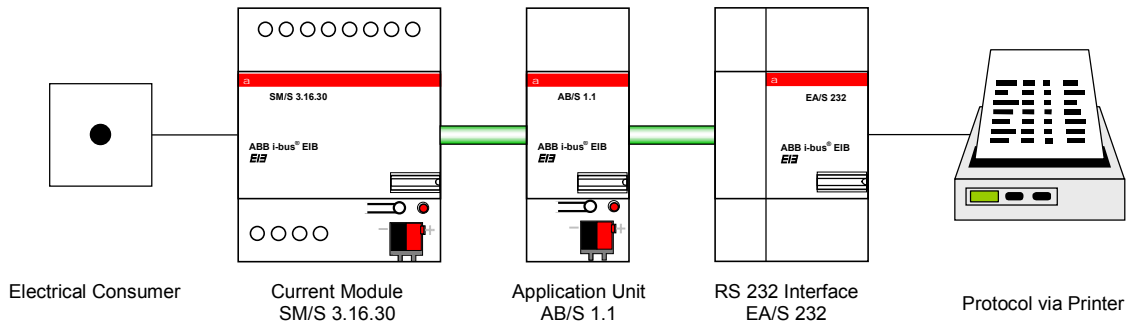Example: Residual current measurement in a computer room


Example : Monitoring of a 2.5 kW drying oven
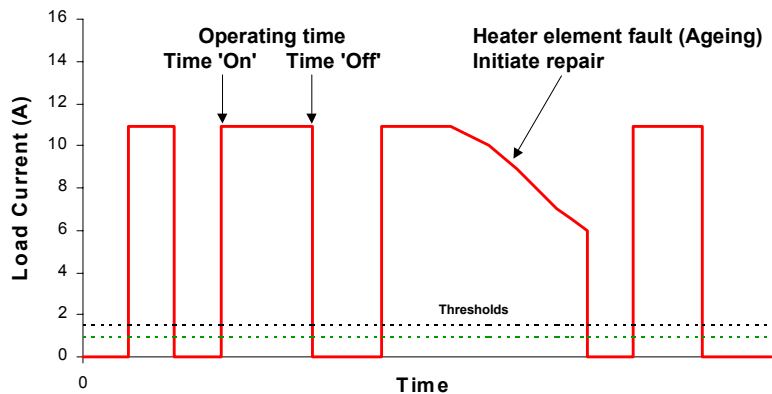
3.3 Generating Protocols

For the monitoring of electrical systems where a protocol is required, measurement values (load and/or residual current) can be used, for example, to create load / time profiles for specified electrical consumers. Measurement values can be processed by the application unit and then routed to a printer.

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| Electrical Consumer | Current Module SM/S 3.16.30 | Application Unit AB/S 1.1 | RS 232 Interface EA/S 232 | Protocol via Printer |

3.4 Reading and displaying actual measurement values

Actual measurement values (load and/or residual current) can be continuously updated from the Current Module and displayed on a LCD-display allowing constant real-time monitoring of the installation.

| Electrical Load (e.g. Machine) | Current Module SM/S 3.16.30 | LCD-Display LD/W |
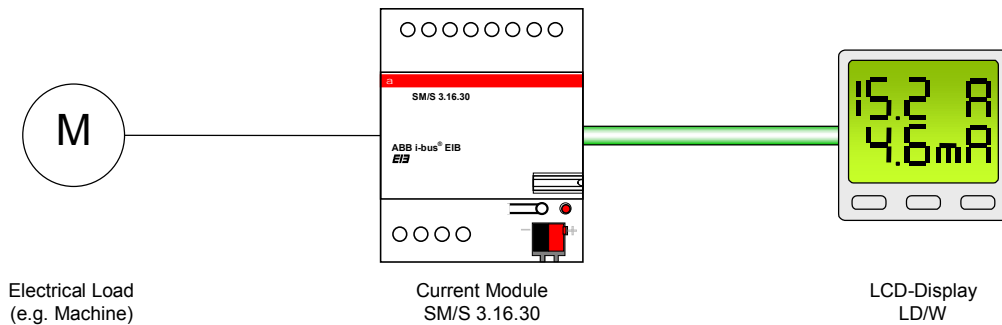
3.5 Operating hours

The Current Module can also be used to record the operating duration of electrical consumers and help plan inspection and maintenance schedules, e.g. filter change in air conditioning after 2000 hours.

| Electrical Consumer | Current Module SM/S 3.16.30 | Binary Output AT/S 4.6.2 | Operating Hours Counter |