MAKING MODERN LIVING POSSIBLE

Instruction

VLT® FC Series Drives Leakage Current Monitor Module

VLT®
THE REAL DRIVE

1.1 VLT® Leakage Current Monitor Module

1.1.1 Intended Use

The AC/DC sensitive leakage current monitoring modules RCMB20-500-01 and RCMB35-500-01 are used for fault current monitoring in applications, where frequency converters are used, and direct and/or alternating fault currents are likely to occur.
Each module has to be installed and connected in the cable connection compartment in front of the mains input of the frequency converter.
Both variants of the modules provide an output signal 4...20 mA proportional to the frequency related leakage current.

1.1.2 Warning

Only intended for use to protect equipment and not for personal protection.

CE

Table 1.1 Approval

1.1.3 Device Features

- AC/DC sensitive measured value acquisition
- Frequency range 0…500 Hz
- Measuring current transformer, inside diameter 20 mm/35 mm
- Measuring range 500 mA
- Measuring time ≤ 180 ms
- Supply voltage 24 V DC
- Analogue output current 4…20 mA
- CT connection monitoring using cyclical test current
- LEDs: power On LED, alarm LED

1.1.4 Functional Description

After switching the supply voltage on, the multi-colour LED shows a green light and the leakage current monitoring module carries out a self test.
The leakage current monitoring module measures both AC and DC currents. The r.m.s. value is calculated by summing up the DC components included in the leakage current and the AC components that are below 500 Hz. A current signal of 4…20 mA in proportion to the r.m.s value is provided at the module output. The analogue value is updated at the latest every 20 ms.

Every two seconds, the leakage current monitoring module cyclically tests the connection to the measuring current transformer and the correct functioning of the AC and DC measurement. In addition, the supply voltage is monitored continuously. If a fault occurs, the multi-colour LED flashes red and the analogue DC output current is 20 mA.

1.1.5 Alarm LED Indicating Operation and Fault

LED continuously lights green = normal operating condition
LED flashes red = fault
Examples of possible faults:
connection fault, current transformer fault, module fault etc.

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1.1.6 Installation and Connection

⚠WARNING

Ensure safe isolation from supply in the installation area. Observe the installation rules for live working. Failure to observe the rules may result in physical injury and damage to property.

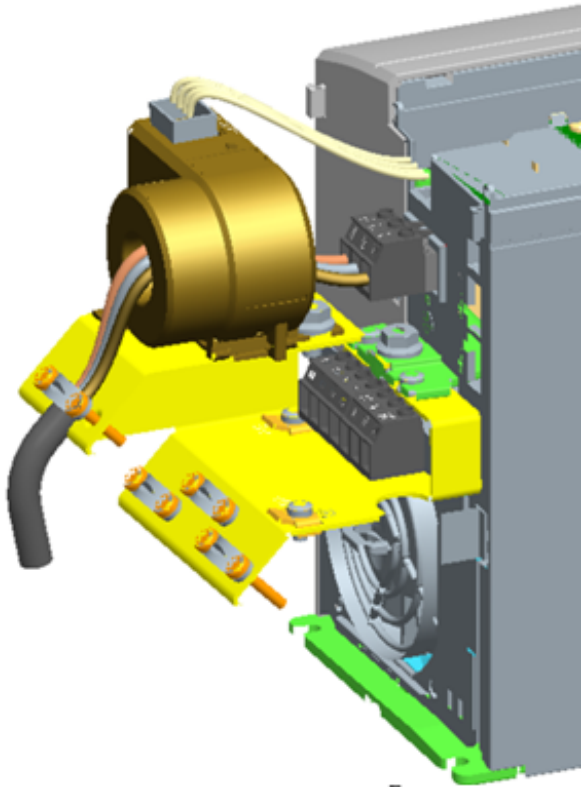

Illustration 1.1 Installation Example 1

Illustration 1.2 Installation Example 2

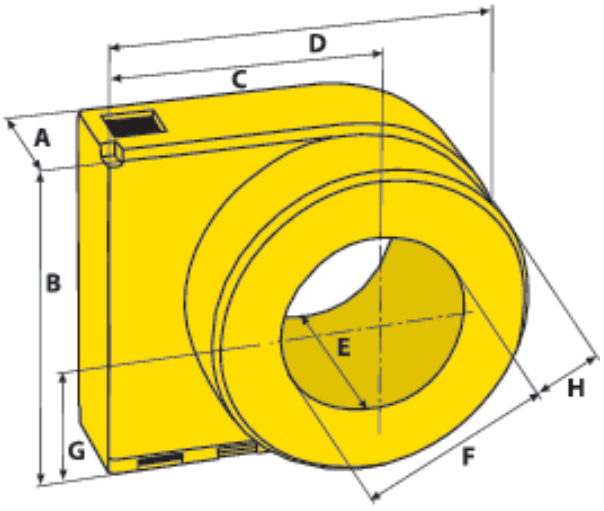

Illustration 1.3 Dimension Diagram

Type	A	B	C	D	E	F	G	H
Sensor RCMB20	30	56.3	50	76.4	48.5	ø 20	29.8	16.4
Sensor RCMB35	30	79.2	62	99.5	55	ø 35	41.7	20

Table 1.2 Legend to *Illustration 1.3*

All dimensions are in mm!

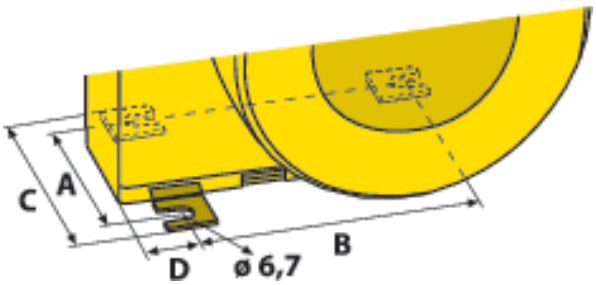

Illustration 1.4 Screw Mounting with Mounting Brackets (diagonal)

Type	A	B	C	D
Sensor RCMB20	47	29	63	20.35
Sensor RCMB35	47	48.5	63	12.85

Table 1.3 Legend to *Illustration 1.4*

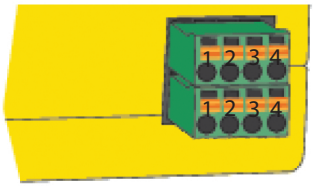

Illustration 1.5 Position of the Terminals

Control terminal connectors can be unplugged from the RCWB for ease of installation

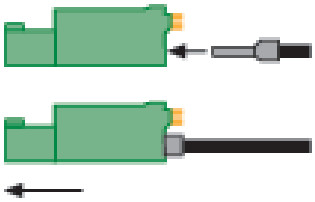

Illustration 1.6 Connecting of the Conductors

1. Insert the bared control wire into the contact.
2. Ensure the contact is firmly established and not loose. Loose control wiring can be the source of equipment faults or less than optimal operation.

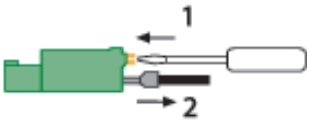

Illustration 1.7 Disconnecting of the Conductors

Open the contact by inserting a small screwdriver into the slot above the contact, as shown in *Illustration 1.7*.

Illustration 1.8 Wiring the Plug-in Terminal XK1

Terminal (pin assignment)	Colour	Sensor
a (A1)	black	GND (U_S)
b (A2)	-	-
c (A3)	white	DC 4...20 mA
d (A4)	blue	GND (DC 4...20 mA)
e (B1)	red	+24 V (U_S)
f (B2)	-	-
g (B3)	-	-
h (B4)	-	-

Table 1.4 Legend to *Illustration 1.8*

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Wiring diagram

Connect the leakage current monitoring module according to the wiring diagram. The output current in proportion to the leakage current I_A must be made available to the frequency converter.

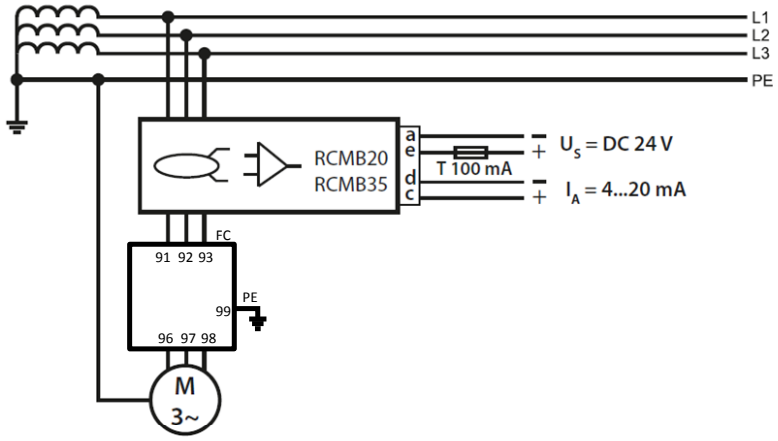

Illustration 1.9 Wiring Diagram

1.1.7 Commissioning

⚠CAUTION

Before commissioning,ensure that the RCM is properly connected. A minimum distance of 25 mm between the primary conductor and the control cable has to be permanently assured.

1.1.8 Technical Data for Sensor RCMB20/RCMB35

Insulation coordination acc. to IEC 60664-1/IEC 60664-3	
Rated insulation voltage	AC 800 V
Rated impulse voltage/pollution degree	12 kV/2
Overvoltage category	CAT III
Protective separation (reinforced insulation) between primary conductor and the measurement electronics	
Voltage tests according to IEC 61010-1	6.88 kV

Supply voltage	
Supply voltage U_s	24 V DC
Operating range of U_s	20.4...28.8 V
Ripple U_s	≤ 1 %
Power consumption	≤ 2.5 VA

Measuring circuit	
Measuring current transformers RCMB20/RCMB35, inside diameter	20 mm/35 mm
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristics according to IEC 62020 and IEC/TR 60755	AC/DC sensitive, Type B
Rated frequency	0...500 Hz
Measuring range AC/DC	0...500 mA
Nominal current at 3 N AC	32 A/80 A
Relative uncertainty for DC (RCMB20/RCMB35)	± 5%
Relative uncertainty for 10...30 Hz	± 10 %
Relative uncertainty for 30...400 Hz	± 3.5%
Relative uncertainty for 400....500 Hz	± 20%
Resolution measuring circuit	2 mA
Test winding	yes

Time response	
Response delay t_{on}	0 s
Delay on release t_{off}	≤ 1 s
Operating time t_{ae} at $I_{\Delta n}$	≤ 180 ms
Response time t_{an}	= t_{ae} + t_{on}
Recovery time tb	≤ 300 ms

Displays	
LED constantly illuminated in green = operation indicator	flashes red = fault (output current > 20 mA

Outputs	
Current output	4...20 mA proportional to the leakage current
Current output, resolution	IΔn = 31.25 x (analogue output current - 4 mA)
Load	≤ 300 Ω

Environment/EMC	
EMC	IEC 60947-2
Operating temperature	-25...70 °C

Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)

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Classification of mechanical conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	.3M4
Transport (IEC 60721-3-2)	2M3
Storage (IEC 60721-3-1)	
Chemical stresses acc. to IEC 60721	1M3
Stationary use (IEC 60721-3-3)	3C4

1.1.9 Connection

Primary conductor	
RCMB20	≤ 4 x 10 mm^2 or 3 x 16 mm^2
RCMB35	≤ 4 x 35 mm^2 or 3 x 50 mm^2

Connector XK1	
Connection type	pluggable spring-cage terminals

Connection properties	
Rigid	0,2...2,5 mm^2 (AWG 24...14)
Flexible without ferrules	0,2...2,5 mm^2 (AWG 24...14)
Flexible with ferrules	0,2...1,5 mm^2 (AWG 24...16)
Stripping length	10 mm
Opening force	50 N

General data	
Operating mode	continuous operation
Position	any position
Degree of protection, internal components (DIN EN 60529)	IP40
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94 V-0
Screw mounting	M5 with mounting brackets
DIN rail mounting acc. to	IEC 60715

1.1.10 Standards

The leakage current monitoring module is designed in accordance with the DIN EN 62020 standard

Code number	Enclosure	Inside diameter	Supply voltage U_S*
130B5645	A2-A3	20 mm	DC 20.4...28.8 V
130B5764	B3	20 mm	DC 20.4...28.8 V
130B5765	B4	35 mm	DC 20.4...28.8 V
130B6226	C3	35 mm	DC 20.4...28.8 V
130B5647	C4	35 mm	DC 20.4...28.8 V
* Absolute values of the voltage ranges			

Table 1.5 Ordering Details

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