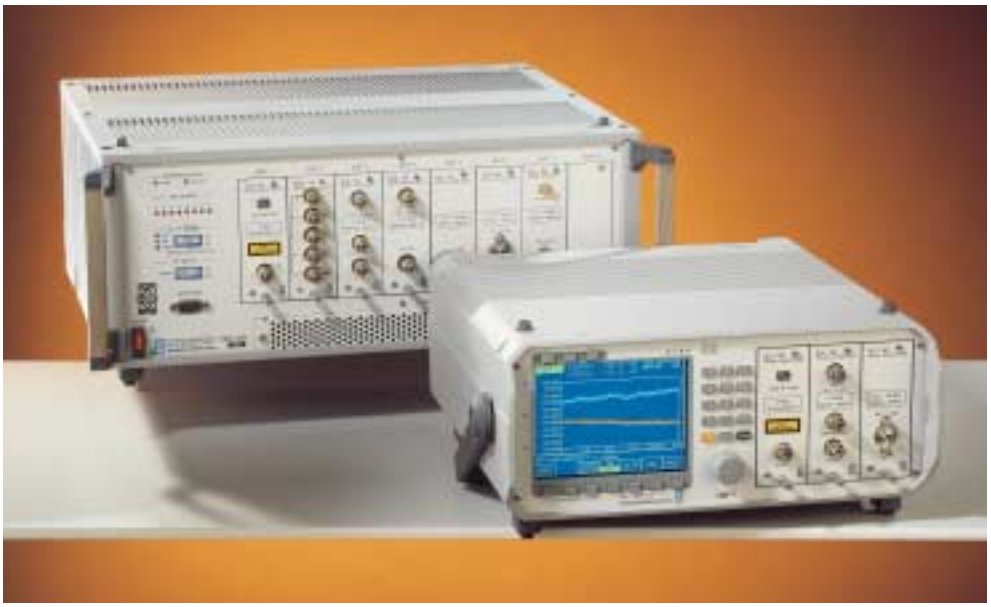
Acterna OMS-150, OMS-200
Optical Measuring System



Modular, expandable system

The OMS Optical Measuring System is an economical, future-oriented solution for most fiber optics measurements in the telecom and datacom sectors. The modular design of the system means that it can be easily adapted for different applications. A wide variety of modules is available, including sources, power meters, attenuators and reflection meters. The application software built into the OMS firmware allows execution of automatic test sequences with no additional programming work. OMS is based on a strict division between measurement and evaluation/display functions. The modules handle the measurement functions, while the mainframe evaluates the results and communicates with the outside world. With this concept the number of available modules can grow to handle new measurements.

Main application areas of OMS-150 and OMS-200

Depending on the application and the number of modules required, either the OMS-150 or the OMS-200 should be selected as the mainframe.

OMS-150

The OMS-150 is best suited to manual measurements or tests of a random sampling of DUTs (Devices Under Test). This mainframe is equipped with a high-contrast 5.5″ color TFT liquid crystal display which allows straightforward manual operation with softkeys and direct display of the results. The OMS-150 accepts up to three measurement modules and is the most economical solution for laboratory applications.

OMS-200

In production of optical components and systems, manufacturers need to automatically test as many DUTs as possible in the least possible time. The OMS-200 Optical Measuring System with its 19″ rack-mountable housing is ideal for this application: The number of possible modules is increased to eight by eliminating the manual controls and display. This means that more complex tests (or multiple concurrent tests) can be performed at a lower cost. The OMS-200 is also the right system for calibration laboratories and test shops which perform type acceptance testing using fixed test setups for many diverse measurements. The system is remotely controlled from an external computer via the IEEE 488/IEC 625 bus or the RS232/V.24 (V.28) serial interface.

Features

- *Modular, expandable system guarantees cost-effective performance*
- *Broad range of modules for different applications*
- *Main application areas are laboratories and production test departments*
- *Inexpensive, time-saving WDM mode for simultaneous measurement at 1310 and 1550 nm*
- *Large high-contrast color TFT liquid crystal display; color combinations are user-selectable*
- *Dual 1310/1550 nm laser diode source with wide range of settings from 0 to –10 dBm*
- *Variable 60 dB attenuator with monitor output for connection to a reference level meter*
- *Long-term measurements supported by built-in application software*
- *Straightforward programming with test module drivers for all common software development tools*
- *Windows application software for setting up the OMS-200*
- *Remote control via IEEE 488.2 or RS232 interface*

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Drivers for all common software development tools

LabWindows for DOS and LabWindows/CVI for Windows are widely available software tools which allow straightforward programming of instrument control and result acquisition, display and documentation functions. The drivers needed to use these software development tools are available for all modules.

Drivers for other software tools such as LabVIEW or HP VEE are available, too.

Simple OMS-200 setup

Since the OMS-200 has no front-panel controls, it must be operated using an external PC or controller. As a general rule, the necessary test software is not available off the shelf. To make it easier for users to get the OMS-200 up and running, application software is included so that OMS-200 can be manually operated from a PC. The software runs under Windows 95 and 98. The operation of the system and display of results are the same as the OMS-150.

Assistance in setting up test programs

The monitor function of the OMS-200 is a useful tool when preparing the test setup and software. A terminal, or a PC with terminal software, is connected to the RS232 interface on the front panel to query status registers during program execution as well as other parameters for the individual modules. This makes it easy to detect errors which occur during program execution. Measurements cannot be initiated via this interface.

Powerful measurement modules

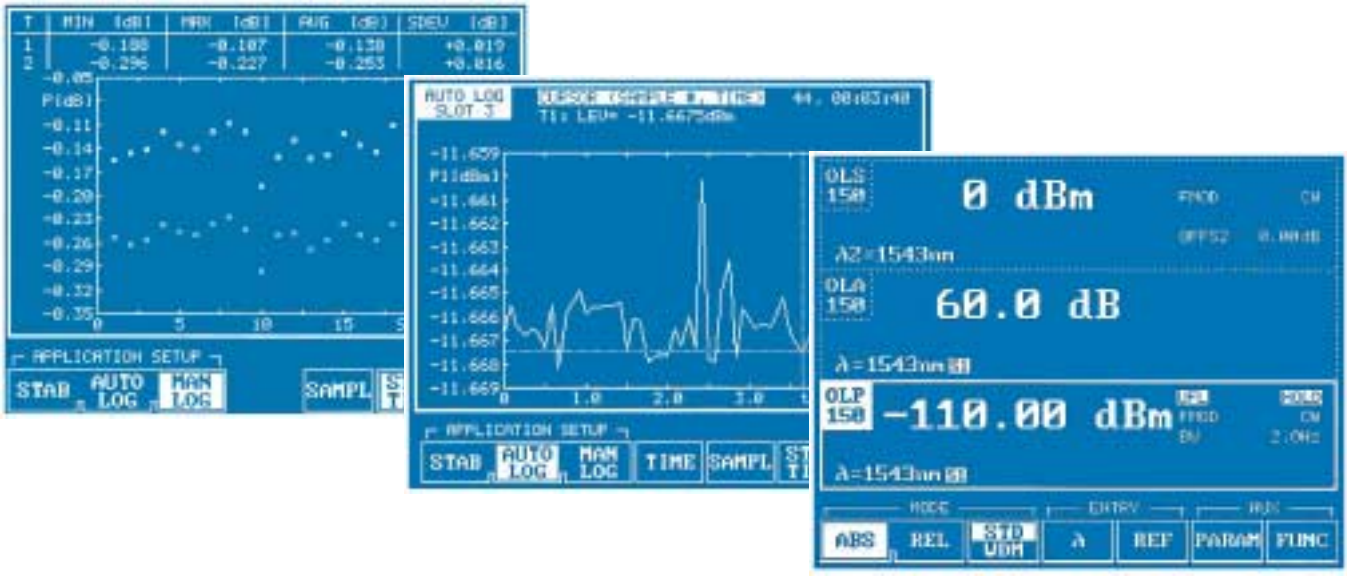
Power meters for various level ranges are available with a range of additional functions. *Laser sources* with stabilized wavelengths and output level are required for attenuation measurements and calibration tasks. Each *attenuator* module is individually calibrated and can be used for measuring the sensitivity and dynamic range of system receivers and determining system linearity. The *OBR-100 Back-Reflection Meter* provides facilities for wide dynamic range, high-linearity back-reflection measurements on connectors and components.

Stable measurements and data logging

The built-in applications software for the OMS Optical Measuring System provides for long-term stability measurements and single measurements. Power stability measurements are mainly required on transmitter modules. The system makes continuous measurements during the intervals into which the presettable overall measurement time is divided. The minimum and maximum results in each interval are evaluated. For automatic single measurements, only one measurement is made per interval. The results are shown graphically on the display. They can be output to a printer or plotter via the IEEE 488 or RS232 interfaces. Output as a table is also possible if a printer is used. It is also possible to log data by triggering measurements manually; the results obtained are stored and displayed graphically.

Traceable calibration

The modules for the OMS Optical Measuring System are calibrated against standards traceable to those of the Federal German Bureau of Standards (Physikalisch-Technische Bundesanstalt, PTB), this traceability being equivalent and exchangeable with the standards of other national metrology institutes such as NIST (USA) or the NPL (UK). Acterna is an accredited calibration center member of the German Calibration Service (DKD).



Modules (overview)

Power Meter Modules OLP-xxx

Version	Wavelength range	Input power range	Operating modes CW[1]	AC[2]	WDM[3]
OLP-130	800 to 1600 nm	–90 to +27 dBm	■	■	■
OLP-150	800 to 1700 nm	–90 to +13 dBm	■	■	■

Optical Source Module

Version	Wavelength range	Output power/setting range	Stability	Modulation frequencies	Operating modes CW[1]	AC[2]	WDM[3]	DUAL[4]
OLS-150	1310, 1550 nm (LD)	0 dBm (CW)/+0.5 dB, –10 dB	±0.005 dB (typ.)	270 Hz/330 Hz/1 kHz/2 kHz	■	■	■	■

Attenuator Module

Version	Wavelength range	Attenuation range	Attenuation setting
OLA-150	1260 to 1600 nm	2 to 65 (60) dB	Continuous setting or with selectable step width.

Back-reflection Meter Module

Version	Wavelength range	Display range	Applications
OBR-100	1250 to 1600 nm	0 to –70 dB	Measurements on fiber optic connectors and components; WDM mode.

1) Power Meters: Average measurement; Sources: Continuous wave
2) Modulated light operation for frequency-selective signal evaluation
3) Wavelength division multiplex operation with modulated light (270 Hz, 330 Hz).
4) Wavelength division multiplex operation with continuous wave light (CW).

Specifications for OMS-150 and OMS-200 Mainframes

OMS-150

Module housing for up to three fiber optical test modules.
Modules can be fitted in any combination or arrangement.
Automatic module detection.

Display . . . . . TFT color LCD graphic display, 320 × 256 pixels, 5.5″; 5 color combinations selectable
Operation . . . . . function keys, number keypad and rotary control

Ambient temperature (including plug-in-modules)
Operating range . . . . . 0 to +50 °C
Storage and transport. . . . . –40 to +70 °C
Dimensions (w × h × d) in mm . . . . . 349 × 159 × 357
Weight (with no modules installed) . . . . . approx. 6.1 kg

OMS-200

Module housing for up to 8 fiber optical test modules.
Modules can be fitted in any combination or arrangement.
Automatic module detection.

Monitor function
Status and parameter query; no control over test functions
Connection of RS-232 terminals or PCs with terminal software
Interface (front panel) . . . . . to RS232 (V.24, V.28) 9-pin subminiature D connector

Ambient temperature
Operating range . . . . . +5 to +40 °C
Transport . . . . . –40 to +70 °C
Storage . . . . . –5 to +45 °C
Dimensions (w × h × d) in mm. . . . . 477 × 199 × 434
Weight (with no modules installed) . . . . . approx. 8.8 kg

Common Specifications for OMS-150 and OMS-200

Remote control
Interfaces. . . . . <IEC 625>/IEEE 488.2 RS-232 (V.24/V.28)
Command language . . . . . SCPI

Power supply
AC line voltage . . . . . 100 to 240 V ±10%
AC line frequency . . . . . 50/60 Hz ±5%

Electromagnetic interference
(including plug-in modules) . . . . . Conforms to CE requirements
EMI/RFI generation . . . . . to EN 50081-1:1992 (CISPR 22 Class B)
EMI/RFI susceptibility . . . . . to EN 55082-1:1992 61010-1

Instrument safety class . . . . . Class I, IEC/EN

Specifications for OMS-150 and OMS-200 Modules

Optical Power Meter Modules

	OLP-130	**OLP-150**
Wavelength range	800 to 1600 nm	750 to 1700 nm
Photodiode	InGaAs, fiber coupled	InGaAs, 3mm; directly irradiated
Power measurement		
Display range	−90 to +27 dBm	−90 to +13 dBm
Display units	dBm or Watt, dB	
Resolution		
Manual operation	0.001 dB/0.001 pW	
Remote control	0.0001 dB/0.001 pW	
Optical interface		
Measuring adapter	for FC, SC, DIN, ST, E-2000, etc., Adapter BN 2060/00.xx	for FC, SC, DIN, ST, E-2000, etc., Adapter BN 2014/00.xx
Connectable fiber type	9/125 to 50/125 µm, NA ≤ 0.22[4]	9/125 (SM) to 100/140 µm (MM), NA ≤ 0.3
Return loss (if angled PC connectors are used)	> 50 dB (typical)	> 50 dB (typical)
Max. input power	+27 dBm	+13 dBm
Signal evaluation		
Unmodulated light, CW	Measurement of unmodulated and modulated light (average value display)	
Modulated light, FMOD: 270 Hz, 330 Hz, 1 kHz, 2 kHz	Selective measurement of modulated light (square wave signals with duty cycle 1:1 and modulation depth 100 %), display of peak value	
Modulated light, WDM	Selective power measurement at two wavelengths simultaneously, characterized by modulation frequencies of 270 and 330 Hz	
Measurement uncertainty[1] (incl. aging)	0.14 dB (±3,3 %)	0.09 dB (±2 %)
Total measurement uncertainty		
CW measurement[2]		
1200 to 1600 nm	±0.20 dB ±20 pW[5] (−75 to +21 dBm)	±0.16 dB ±1.6 pW (−80 to +8 dBm)
850 to 1200 nm	±0.22 dB ±100 pW[5] (−70 to +21 dBm)	±0.26 dB ±12 pW (−70 to +8 dBm)
750 to 850 nm	—	±0.26 dB ±24 pW (−70 to +8 dBm)
Measurement of modulated light[3]		
1200 to 1600 nm		±0.17 dB (−70 to +8 dBm)
850 to 1200 nm		±0.27 dB (−65 to +8 dBm)
750 to 850 nm	—	±0.27 dB (−62 to +8 dBm)
Linearity		
CW measurement[2]		
1200 to 1600 nm	±0.030 dB ±20 pW (−60 to +21 dBm)[6]	±0.03 dB ±1.6 pW (−80 to +8 dBm)
850 to 1200 nm	±0.030 dB ±100 pW (−60 to +21 dBm)[6]	±0.03 dB ±12 pW (−70 to +8 dBm)
750 to 850 nm	—	±0.03 dB ±24 pW (−70 to +8 dBm)
Measurement of modulated light[3]		
1200 to 1600 nm	±0.035 dB (−55 to +21 dBm)[7]	±0.07 dB (−75 to +8 dBm)
850 to 1200 nm	±0.035 (−50 to +21 dBm)[7]	±0.07 dB (−65 to +8 dBm)
750 to 850 nm	—	±0.07 dB (−62 to +8 dBm)
Warm-up time to meet specifications	30 min	
Traceability	to PTB	
Recommended calibration interval	1 year	
General specifications		
Dimensions (w × h × d) in mm	38 × 102 × 288	38 × 102 × 288
Weight	approx. 850 g	approx 650 g

1) At reference conditions: −20 dBm ±0.5 dB (CW), 1310 nm ±1 nm, +23 °C, 30 to 70 % rel. humidity (9/125 µm single mode fiber, DIN connector for OLP-130).
2) 30 to 70 % rel. humidity; ZEROING at measuring temperature, ±0.5 °C (bandwidth 0.5 Hz, wavelength 1300 to 1650 nm for OLP-150)
3) 30 to 70 % rel. humidity; modulation frequency 270 and 330 Hz; 1200 to 1650 nm for OLP-150.
4) When 50/125 µm multimode fibers are connected, the error specifications are valid only under mode equilibrium.
5) For measurements on multimode fibers, add ±0.3 dB. – 6) Add ±0.007 dB at measurement values > +17 dBm. – 7) Add ±0.015 dB at measurement values > +17 dBm.

OLS-150 Optical Laser Source (Plug-in Module)

Optical source type . . . . . Dual FP laser, Peltier-cooled, both signals led through a coupler to a common output
Wavelengths[1] . . . . . 1310 nm ±15 nm / 1550 nm ±15 nm
Spectral bandwidth (RMS) . . . . . <2.5 nm / <4 nm

Transmit operating modes

Unmodulated light
- CW . . . . . 1310 nm or 1550 nm
- DUAL . . . . . 1310 nm and 1550 nm simultaneously

Modulated light . . . . . 1310 nm or 1550 nm, modulated with 270 Hz, 330 Hz, 1 kHz or 2 kHz (duty cycle 1:1, modulation depth 100%); 1310 nm (270 Hz) and 1550 nm (330 Hz) simultaneously
Modulated light, WDM (both individually modulated wavelengths are transmitted simultaneously)

Output power (power values per wavelength)

Unmodulated light . . . . . 0 dBm (laser class 1 to IEC 825-1)
Modulated light (average value) . . . . . −3 dBm
Setting range (level offset) . . . . . +0.5 dB/−10 dB
Resolution . . . . . 0.01 dB

Total output power uncertainty [2]
at nominal power (level offset 0 dB),
- unmodulated and modulated light . . . . . −0.5 dB/+0.45 dB

for any arbitrary level offset,
- unmodulated light . . . . . ±0.6 dB
- modulated light . . . . . ±0.7 dB

Stability
- Short-term stability (15 min, T = constant) . . . . . ±0.005 dB (typical)
- Long-term stability (6 h, ΔT = ±3 K) . . . . . ±0.05 dB

Optical interface

Measuring adapter . . . . . for FC/PC, SC/PC, ST, DIN, E-2000, etc., Adapter BN 2060/00.xx
Connectable fiber type . . . . . 9/125 µm (SM) to 100/140 µm (MM)
Warm-up time to meet specifications (T <+40 °C) . . . . . 1 hour
Traceability . . . . . to PTB
Recommended calibration interval . . . . . 1 year

General specifications

Dimensions (w × h × d) in mm . . . . . 38 × 102 × 288
Weight . . . . . 750 g

1) Measured center wavelength is indicated in the display.
2) 30 to 70% rel. humidity, coupled into SM fiber (9/125 µm) via DIN connector.

OLA-150 Optical Attenuator (Plug-in Module)

Wavelength range

Setting range . . . . . 1260 to 1600 nm
Resolution . . . . . 1 nm
Standard wavelengths . . . . . 1310 nm and 1550 nm

Attenuation range

1260 to 1360 nm . . . . . Insertion loss to 65 dB
1360 to 1600 nm . . . . . Insertion loss to 60 dB
Resolution . . . . . 0.01 dB
Setting . . . . . absolute in dB or relative to reference value in dBr
Setting time for any given attenuation value . . . . . <3 s
Function . . . . . continuous, bi-directional
Insertion loss . . . . . <2.5 dB
Repeatability of attenuation setting[1] . . . . . ±0.1 dB (typically ±0.05 dB)
Linearity[2] . . . . . ±(0.2 dB +0.3% of attenuation value in dB)
Total attenuation uncertainty[3] . . . . . ±0.8 dB
Shutter isolation (pos. OFF) . . . . . >80 dB (typically >100 dB)
Monitor output . . . . . 10 dB tap

Optical interfaces

Measuring adapter . . . . . for FC/PC, SC/PC, ST, DIN, E-2000... Adapter BN 2060/00.xx
Connectable fiber type . . . . . 9/125 µm (SM)
Return loss . . . . . >35 dB (typically 40 dB)
Max. input power . . . . . +20 dBm
Warm-up time to meet specifications . . . . . 5 minutes
Traceability . . . . . to PTB
Recommended calibration interval . . . . . 1 year

General specifications

Dimensions (w × h × d) in mm . . . . . 38 × 102 × 288
Weight . . . . . 980 g

1) Without disconnecting f.o. connectors, at constant ambient conditions, 30 to 70% rel. humidity
2) Without disconnecting f.o. connectors, deviation of used wavelength max. ±50 nm rel. to 1310 nm or 1550 nm, 30 to 70% rel. humidity.
3) Including DIN connectors, deviation of used wavelength max. ±50 nm rel. to 1310 nm or 1550 nm, 30 to 70% rel. humidity. The total attenuation uncertainty may increase by ±0.3 dB (typically) for other connector types (FC, SC, ST).

OBR-100 Optical Back-Reflection Meter Module

Wavelength range . . . . . 1250 to 1600 nm
Display range . . . . . 0 to −70 dB
Display units . . . . . dB, %
Resolution
- Manual operation . . . . . 0.001 dB
- Remote control . . . . . 0.0001 dB

Relative measurement uncertainty[1]
- 0 to −50 dB . . . . . ≤ ±0.25 dB
- −50 to −60 dB[2] . . . . . ≤ ±0.35 dB

Total measurement uncertainty[1), 4)]
- 0 to −50 dB . . . . . ≤ ±0.35 dB
- −50 to −60 dB[3] . . . . . ≤ ±0.45 dB

Reference reflector uncertainty . . . . . ±4 %
Optical input/output
- Source input . . . . . Adapter BN 2060/00.xx
- Test port . . . . . Angled connector, interchangeable

Fiber type . . . . . 9/125 µm

General specifications

Dimensions (w × h × d) in mm . . . . . 38 × 102 × 288
Weight . . . . . approx. 780 g
Recommended calibration interval . . . . . 1 year

Accessories included:

Reference reflector and adapter for test port with various types of connector: see OMS-150 ordering information.

1) For input levels ≥ −10 dBm.
2) Add 0.3 dB at measurement values < −60 to −65 dB.

Ordering Information

OPT-150 Optical Performance Tester **BN 2207/15**
(complete, consisting of OMS-150, OLP-150, OLS-150, OLA-150; measuring adapters to be ordered separately)

OMS-150 Mainframe **BN 2207/05**

OMS-200 Mainframe **BN 2241/01**
"OMS-200 remote operation" software for Windows 95

Optical modules
(without measuring adapters):

Power Meter Modules
OLP-130 **BN 2201/04**
OLP-150 **BN 2201/05**

OLS-150 Optical Source Module **BN 2202/05**

OLA-150 Optical Attenuator Module **BN 2206/05**

OBR-100 Back-reflection Meter Module[1] **BN 2232/01**

Included with each OBR-100 ordered[2]:

– Reference reflector with HRL-10/DIN connector	BN 2232/90.01
Test adapter HRL-10/DIN for Test Port	BN 2060/00.50
or	
– Reference reflector with FC-APC connector	BN 2232/90.03
Test adapter FC-APC	BN 2060/00.51
or	
– Reference reflector with SC-APC connector	BN 2232/90.04
Test adapter SC-APC	BN 2060/00.58
On request (not included in standard delivery package)	
Reference reflector for OBR-100	BN 2232/90.0x

1) Without measuring adapter
2) To be specified in order

IEEE 488
IEC 625
RS-232

Options

Calibration report
(only when ordered with the module concerned)

for OLP-130/-150	BN 2201/00.01
for OLS-150	BN 2202/00.01
for OLA-150	BN 2206/00.01
for OBR-100	BN 2232/90.02

Accessories

Measuring adapters
To operate the optical modules, adapters for the connector system are required (2 adapters for OBR-100, 3 adapters for OLA-150, 1 adapter for OLS-150 and OLP-130/-150).

for optical modules	BN 2060/00.xx
for OLP-150	BN 2014/00.xx
for OBR-100 (Test Port) APC adapter	BN 2060/00.5x
Measuring Cables	K 31xx, K 30xx
Couplers For detailed ordering information refer to the separate data sheet on optical adapters and cables.	S 31xx
SW drivers (LabWindows DOS/CVI, LabVIEW, HP VEE, 3.5″ floppy disk)	BN 2241/95.99
Optical connector cleaning tape	BN 2229/90.07
Connecting cable for IEC 625 interface bus (with IEEE 488 connectors, length 1.2 m)	K 420
RS232/V.24 interface cable (Zero modem, 2 × 25-way/9way D connectors [f], length 3 m)	K 764
ABK-30 Storage case for optical accessories	BN 2126/30
TPK-960/3 Carrying Case	BN 960/00.05
SD-930 Front and back panel covers (OMS-150)	BN 0960/00.01
19″ rack mounting for OMS-150	BN 2203/00.07

Note: Specifications, terms and conditions are subject to change without prior notice

FO/EN/D156/0601/AE, repl. 1315

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