

MACHEREY-NAGEL

# Safe sampling and screening for veterinary viruses



## NucleoProtect® VET

- Powerful inactivation reagent for veterinary diagnostics
- Reliable stabilization of DNA/RNA
- Safe transport and accurate molecular analysis of blood and swab samples



# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

## NucleoProtect® VET

DNA / RNA stabilization and sample inactivation for molecular testing

### Safe and easy sampling

NucleoProtect® VET products are intuitive, single-step storage and transport systems for collection of swab or blood specimens.

### Reliable test results

The reagent removes virulence while reliably preserving nucleic acids in the sample. Sample stabilization increases accuracy and precision of molecular tests, reduces variability, and brings standardization and comparability between laboratories to a new level.

### Simplifying logistics

The nucleic acid stabilizer makes cold chain logistics obsolete and allows shipment and storage at ambient temperatures.

### User protection

Effective inactivation of infectious viruses reduces the risk of laboratory-acquired infections and spread of diseases.

### Time saving

NucleoProtect® VET samples can be transferred directly to pre-analytical nucleic acid extraction procedures which streamlines diagnostic testing and laboratory routines.

### Secure traceability

Both swab and blood tubes come with double barcode labels with peel-off section for definitive sample tracking and management (including human readable text).

For accurate  
molecular test  
results

Proven  
inactivation  
of high risk  
viruses



# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

## NucleoProtect® VET Blood Tube

Format	Blood collection tube pre-filled with 4.0 mL NucleoProtect® VET reagent, box of 50 tubes
Sample material	1.6 mL animal whole blood (ruminants, swine, poultry, equine, companion animals)
Tube diameter	Ø 13 mm
Features	<ul style="list-style-type: none"><li>▪ Compatible with different sizes of standard Luer cannulas (cannulas not included)</li><li>▪ Definitive sample identification and simplified sample management through pre-labeled peel-off barcodes</li><li>▪ Secondary sealing caps available</li></ul>
Reference number	REF 740755



## NucleoProtect® VET Swab Tube

Format	Screw cap swab collection tube pre-filled with 1.5 mL NucleoProtect® VET reagent, including sterile, individually packed flocked swabs, box of 50 tubes and 50 swabs
Sample material	Animal swab smears such as oral, throat, nasal or pharyngeal swabs
Tube diameter	Ø 13 mm
Swab length	150 mm (predetermined breaking point at 80 mm)
Features	<ul style="list-style-type: none"><li>▪ Predetermined breaking point in the swab shaft for a safe and hygienic workflow</li><li>▪ Collection tube cap features integral swab capture – no manual handling of swab shaft required</li><li>▪ Definitive sample identification and simplified sample management through pre-labelled peel-off barcodes</li><li>▪ Secondary sealing caps available</li></ul>
Reference number	REF 740760



## NucleoProtect® VET Reagent

Format	50 mL bottled NucleoProtect® VET reagent 500 mL bottled NucleoProtect® VET reagent
Sample material	Stabilization of animal whole blood or swab specimens
Volume	50 mL or 500 mL
Features	Flexibility – Bulk solution of NucleoProtect® VET reagent for filling into transport or storage vessels
Reference number	REF 740750.50 REF 740750.500



# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

## Product features



### Barcode sample tracking

Secure sample tracking by double barcode labels with peel-off section. The peel-off part is self-adhesive and can be transferred to sample request forms.

**Barcode:** Code 128 with embedded human readable text.



### Easy blood sampling

The product design allows gentle collection of animal blood samples according to the aspiration technique; the blood samples are immediately mixed and stabilized with the pre-filled NucleoProtect® VET inactivation reagent. The blood collection tubes are compatible with all common Luer cannulas.



### Simple swab removal

The integrated swab holder, designed to facilitate the capture of the swab handle, allows both simple and safe sample collection in the field and efficient sample processing in the laboratory. The swab can be easily removed from the sample by unscrewing the cap.

## Proven inactivation of high risk viruses

Virus	Tested matrices	Reduction of viral titer
■ Foot and mouth disease virus (FMDV)	Bovine tongue epithelium	> 10 <sup>4</sup> / > 99.99 %
■ Bluetongue virus (BTV-5)	Whole blood	
■ Lumpy skin disease virus (LSDV)	Raw milk	
■ Peste des petits ruminants virus (PPRV)	Saliva	
■ Bovine Coronavirus (BCoV)	Saliva	> 10 <sup>4</sup> / > 99.99 %

Effective  
inactivation:  
> 99.99 %

### NucleoProtect® VET reagent inactivates > 99.99 % of pathogenic animal viruses, independent of the background matrix

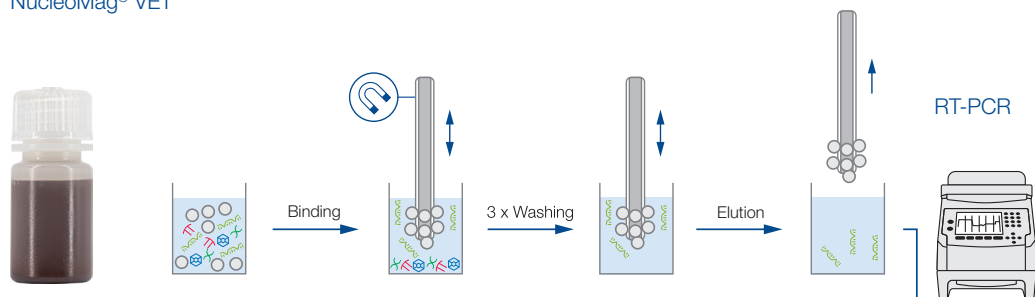
Infectious viruses are immediately inactivated within the NucleoProtect® VET solution, enabling safe handling for both veterinarians and for laboratory staff. The inactivation capacity of the NucleoProtect® VET reagent has been demonstrated for various background matrices and viruses which are known to have different envelope structures as well as susceptibilities to disinfectants: FMDV (small non-enveloped virus), BTV-5 (large non-enveloped virus), LSDV (large enveloped virus), PPRV and BCoV (enveloped virus). The table shows the level of virus titer reduction as shown via the Tissue Culture Infections Dose (TCID) assay (incubation time: 30 min).

These data were collected in a joint collaboration project with the Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health of Germany.

# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

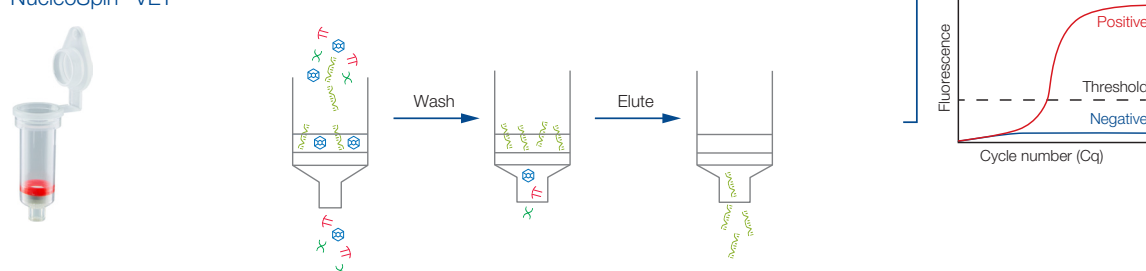
## DNA / RNA extraction from NucleoProtect® VET-stabilized samples

### NucleoMag® VET



Automation support:  
automation-bio@  
mn-net.com

### NucleoSpin® VET



### NucleoProtect® VET sample extraction with NucleoMag® VET and NucleoSpin® VET

Nucleic acids from NucleoProtect® samples can be extracted using either the silica membrane-based NucleoSpin® VET or the magnetic bead-based NucleoMag® VET. The protocols allow the parallel processing of stabilized and non-stabilized samples within the same run.

For optimal extraction of NucleoProtect® VET blood samples using the NucleoMag® VET kit, buffer VIA is needed (see ordering information). For extraction of NucleoProtect® samples using the NucleoSpin® VET kit, buffer PFN is needed (see ordering information).

### Reliable DNA and RNA preservation for molecular testing

NucleoProtect® VET stabilization capacity was tested with all naturally occurring viral genome structures, such as ssRNA, dsRNA, and dsDNA. Nucleic acids are reliably preserved over different storage periods and conditions, making cold chain logistics obsolete and reducing the risk of sample degradation.

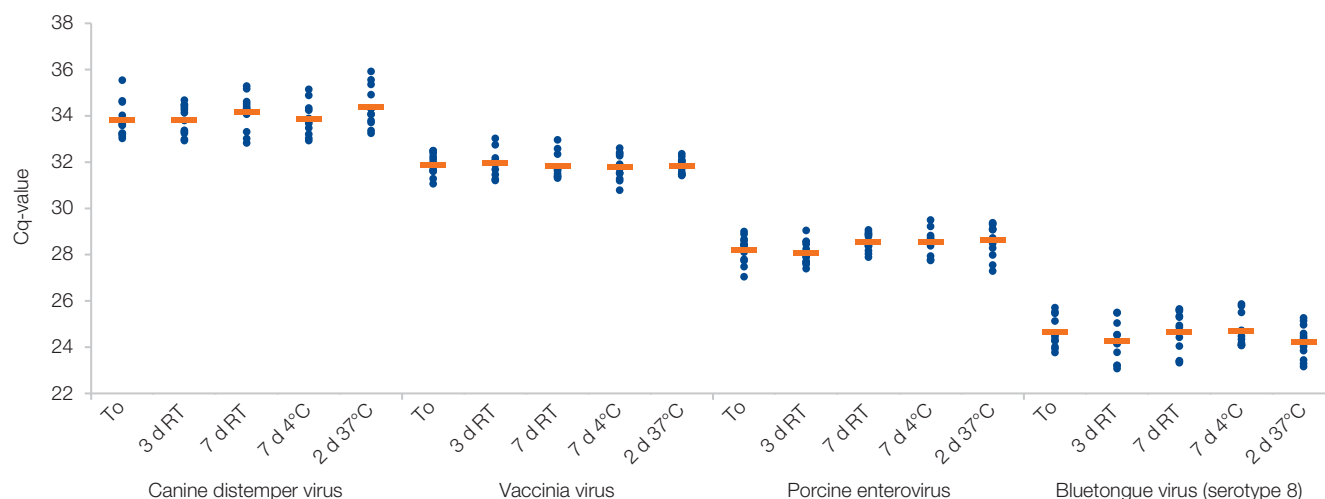
Storage condition	Storage time*
15 – 25 °C	7 days
4 °C	7 days
37 °C	2 days
-20 °C	12 months

\* The specified storage time indicates how long the samples can be stored at the specified condition with a change in Cq-value of < 1 on average, as demonstrated in q(RT)-PCR analyses comparing stored samples to the time point of collection.

Eliminates  
cold chain  
requirements

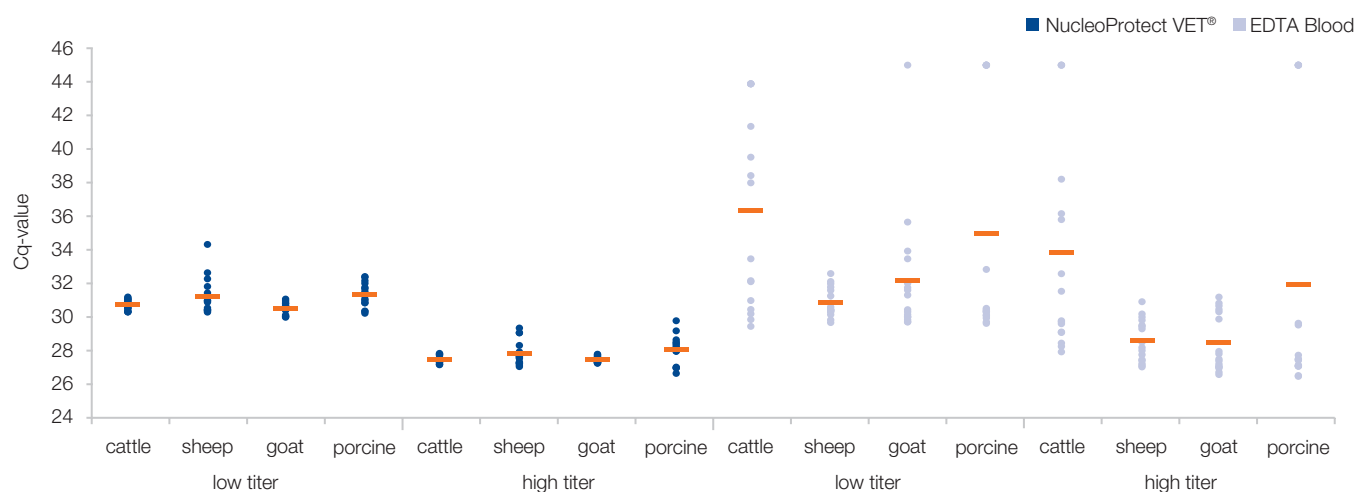
# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

## Application data – NucleoProtect® VET Blood Tubes



### NucleoProtect® VET Blood Tubes reliably preserve nucleic acids of various pathogenic viruses independent of viral titer concentration and animal species

Bovine, goat, sheep, and porcine blood samples were spiked with low, medium and high virus titers of the canine distemper virus (ss(-)RNA), porcine enterovirus (ss(+)RNA), bluetongue virus (dsRNA), or the vaccinia virus (dsDNA). Spiked blood samples were collected in NucleoProtect® VET Blood Tubes and stored according to the indicated storage conditions ( $T_0$  = 2 h at room temperature). Nucleic acids were extracted in triplicate per test time point using the NucleoMag® VET kit and subsequently analyzed via qPCR. The data show 12 Cq-values for each test time point (triplicate extraction for each of the four animal blood types (blue dots) and the resulting mean value (orange bar)). The data indicate that nucleic acids are efficiently preserved independent of animal blood type, virus species or virus titer. The overall Cq variance is below  $\pm 1$  Cq on average.



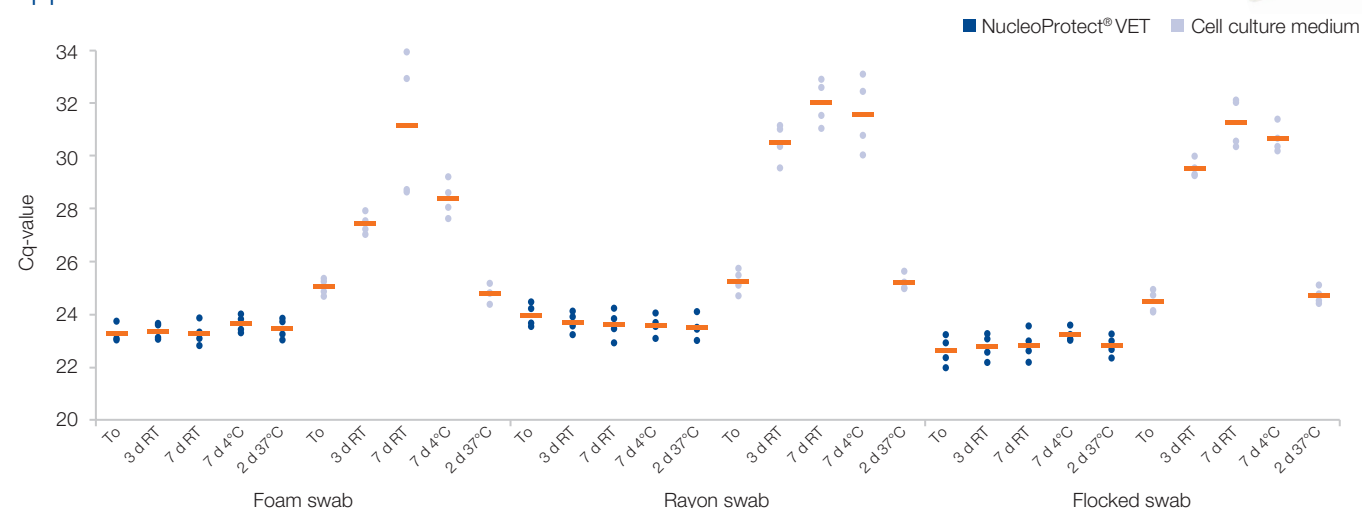
### NucleoProtect® VET Blood Tubes reduce variability and increase reliability of veterinary test results

Bovine, sheep, goat and porcine blood samples were spiked with low and high viral titers of the bluetongue virus (BTV-8). Samples were either collected with NucleoProtect® VET Blood tubes or as EDTA-blood samples. Samples were shipped to four independent laboratories which extracted the nucleic acids within a time period of 2–7 days post collection using the MACHEREY-NAGEL NucleoMag® VET kit (extraction was performed in duplicates). All eluates were analyzed in duplicates in one laboratory using a qRT-PCR assay with 45 cycles. The data represent 16 resulting Cq-values (blue dots) and the resulting mean value (orange bar). The data show that with EDTA blood collection tubes, the variation in analytical results can be very large, and even false negative results and high losses in sensitivity are possible. In contrast, data for the NucleoProtect® VET Blood tubes show highly reproducible results and minimal variance, regardless of animal species, shipping and storage conditions.

These data were collected in a joint collaboration project with the Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health of Germany.

# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

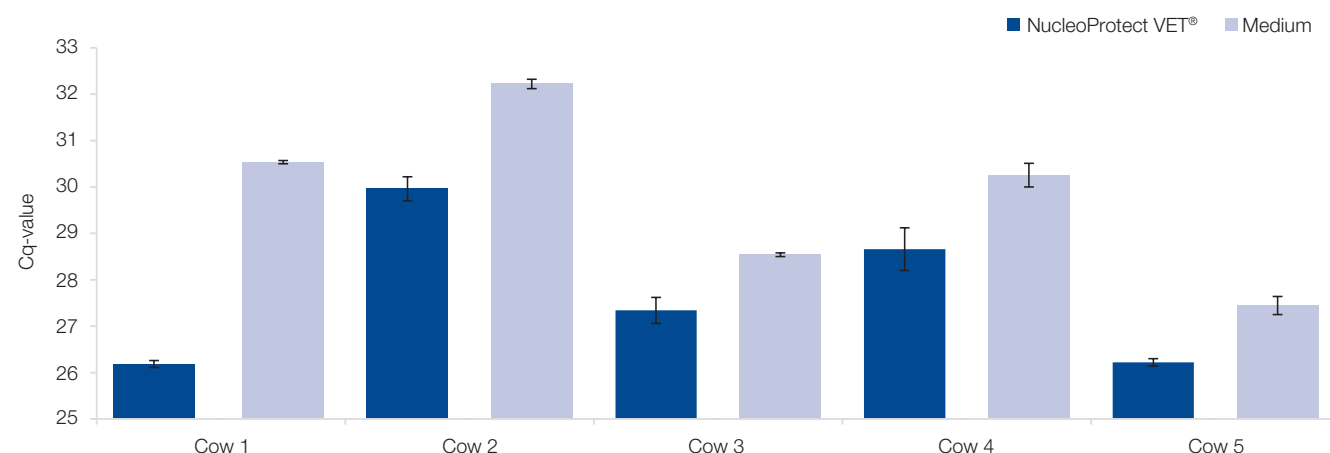
## Application data – NucleoProtect® VET Swab Tubes



### NucleoProtect® VET Swab Tubes increase reproducibility and accuracy of molecular diagnostic testing

Bovine saliva was spiked with lumpy skin disease virus (LSDV). Foam swabs, rayon swabs, and flocked swabs were dipped into the saliva sample for 30 seconds each (n= 4). From each swab type, two swabs were placed into NucleoProtect® Swab tubes and two were placed into screw cap tubes containing 1.5 mL of cell culture medium. The tubes were stored at room temperature, 4 °C and 37 °C respectively for the indicated time period ( $T_0 = 2$  h RT). LSDV DNA was extracted in duplicates from each tube using the NucleoMag® VET Kit and analyzed via qPCR. The data show 4 Cq-values (blue / grey dots) and the corresponding mean value (orange bar). The results show the stabilization of LSDV DNA in NucleoProtect® Swab tubes at the different storage conditions and the high accuracy of detection of LSDV with different swab types. In contrast, the sensitivity of the detection of LSDV in unstabilized swab samples clearly decreases after storage at room temperature or 37 °C, independent of swab type. NucleoProtect® VET Swab tubes can be used with the included swab (flocked swab) or with the swab of your choice.

These data were collected in a joint collaboration project with the Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health of Germany.



### In-vivo experiments show higher sensitivity for NucleoProtect® VET-stabilized oral swab samples from FMDV positive cattle

Five foot-and-mouth disease virus (FMDV) positive cattle were sampled using standard rayon swabs. The swab samples were subsequently incubated in 1.5 mL NucleoProtect® VET stabilization solution or minimal essential medium for 24 h at ambient temperature and then purified in duplicates using the MACHEREY-NAGEL NucleoMag® VET kit. FMDV RNA was detected using qRT-PCR. Data show the mean value of duplicate samples and the max and min values. The comparison of the mean Cq-values of swab samples stored in NucleoProtect® VET stabilization solution versus minimal essential medium demonstrates the increase in sensitivity, as FMDV is detected between 1.2 and 4.3 Cq-values earlier in the NucleoProtect® VET stabilization solution. *Note:* Samples were collected from individual cattle, resulting in variable viral titers and Cq-values.

These data were collected in a joint collaboration project with the Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health of Germany



# NucleoProtect® VET – Safe sampling and screening for veterinary viruses

## Ordering information

Convenient sampling, inactivation of infectious viruses, storage, and shipment, all made easy with the NucleoProtect® VET stabilization and inactivation solution. Molecular results will be unaffected regardless of whether your veterinary specimens are shipped cold or at ambient temperatures, require multiple days

for shipment, or are frozen for longer term storage. Stabilizing your samples means bringing higher accuracy and less variance into your results. The intuitive design including peel-off barcodes allows easy sampling on farms or in the wild.

Product	Specifications	Pack of	REF
NucleoProtect® VET reagent	Bottled NucleoProtect® VET stabilization and inactivation reagent for filling into own transport or storage vessels	50 mL 500 mL	740750.50 740750.500
NucleoProtect® VET Blood Tubes	Blood collection tube pre-filled with 4.0 mL NucleoProtect® VET stabilization and inactivation reagent for collection of 1.6 mL animal whole blood	50	740755
NucleoProtect® VET Swab Tubes	Screw cap swab collection tubes pre-filled with 1.5 mL NucleoProtect® VET stabilization and inactivation reagent including sterile, individually packed flocked swabs	50	740760
<b>Accessories / related products</b>			
Secondary caps for NucleoProtect® VET Blood Tubes	Sealing caps for NucleoProtect® VET Blood Tubes	100	740756
Secondary caps for NucleoProtect® VET Swab Tubes	Sealing caps for NucleoProtect® VET Swab Tubes	100	740761
NucleoMag® VET	Magnetic bead based kit for extraction of RNA and DNA from veterinary samples, contains NucleoMag® B-Beads, buffers, Carrier RNA, Proteinase K	96 preps 384 preps 9600 preps	744200.1 744200.4 744200.100
Buffer VIA	Needed for the nucleic acid extraction from NucleoProtect® VET collected blood samples using the NucleoMag® VET kit	150 mL	744206
NucleoSpin® VET	Single spin kit for extraction of RNA and DNA from veterinary samples; contains binding columns, collection tubes (2 mL), collection tubes for lysis and elution (1.5 mL), buffers, liquid Proteinase K, Carrier RNA (lyophilized)	10 preps 50 preps 250 preps	740842.10 740842.50 740842.250
Buffer PFN	Needed for the nucleic acid extraction from NucleoProtect® VET collected blood and swab samples using the NucleoSpin® VET kit	5 mL	740121.5

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### Questions? Need custom solutions?

Tailored product adaptations or specific barcodes are available upon request. Talk to a MACHERY-NAGEL representative for product related questions or customization opportunities:  
[support@mn-net.com](mailto:support@mn-net.com)



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MACHERY-NAGEL GmbH & Co. KG · Valencienner Str. 11 · 52355 Düren · Germany

DE +49 24 21 969-0 [info@mn-net.com](mailto:info@mn-net.com)  
CH +41 62 388 55 00 [sales-ch@mn-net.com](mailto:sales-ch@mn-net.com)

FR +33 388 68 22 68 [sales-fr@mn-net.com](mailto:sales-fr@mn-net.com)  
US +1 888 321 62 24 [sales-us@mn-net.com](mailto:sales-us@mn-net.com)

