
QN-100 NIR Moisture Sensor

Installation Manual

For mechanical and electrical installation contractors, site electricians, and commissioning engineers

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1. About this manual

1.1 Purpose

This manual describes how to install the Absorption Systems QN-100 near-infrared (NIR) moisture measurement system safely and correctly. It covers receiving, site preparation, mechanical mounting, electrical connection, earthing and EMC practice, first power-up checks, and installation verification. It is written for installers and does not replace product calibration or day-to-day operation procedures.

1.2 Audience

Site mechanical fitters responsible for mounting the sensor and HMI

Qualified electricians responsible for power, I/O and network wiring

Commissioning engineers verifying that the installation is ready for optical setup and calibration

1.3 Related documents

Use this manual together with the current revisions of:

AS-MK-SPEC-001 — QN-100 Datasheet (ratings and performance)

AS-PRD-MAN-001 — QN-100 User Manual (HMI operation and configuration)

AS-PRD-MAN-004 — Commissioning Guide (structured first-time setup and sign-off)

Project layout drawings and I/O schedule issued for the site

Site electrical and safety rules

1.4 Symbols used

Symbol	Meaning
 WARNING	<i>Risk of personal injury or serious equipment damage if instructions are not followed</i>
 CAUTION	<i>Risk of equipment damage, measurement error, or loss of IP rating</i>
 NOTE	<i>Important information for a correct installation</i>

2. Safety

2.1 Qualified personnel

Installation must be carried out by personnel competent in industrial mechanical mounting and industrial electrical work, and familiar with local regulations. Only qualified electricians may connect mains or control-panel wiring. Absorption Systems accepts no responsibility for injury or damage resulting from installation by unqualified persons or from failure to follow this manual and site rules.

2.2 General warnings

⚠ WARNING — Isolate and lock out all electrical supplies before opening enclosures or terminating cables. Prove dead with a suitable tester before touching terminals.

⚠ WARNING — The sensor optical window is borosilicate glass. Treat it as fragile. Do not impact the window and do not use abrasive cleaners.

⚠ WARNING — The measurement lamp is a tungsten-halogen source. Surfaces inside the sensor can become hot during operation. Allow the unit to cool before servicing.

⚠ WARNING — Do not look directly into the measurement beam at close range for prolonged periods. Install so that the beam is directed at the process and not into an operator walkway.

⚠ CAUTION — Do not energise the system until all glands are fitted, lids are secured, and earth continuity has been verified.

⚠ CAUTION — IP ratings (sensor IP65, HMI IP54) are only maintained when original glands, seals and lids are correctly fitted and undamaged.

2.3 Intended use

The QN-100 is intended for continuous, non-contact NIR measurement of moisture (and optionally related parameters) in bulk solids, powders and granular materials in industrial process plants. It is not a safety instrument (SIL) unless specifically certified and documented as such for a given project. Do not use the QN-100 as the sole protective device for personnel or critical process safety.

2.4 Handling, storage and transport

Transport in the original packaging where possible; keep upright and protected from shock.

Storage temperature: -20 °C to +70 °C; humidity 10–90 % RH non-condensing.

Do not store outdoors without weather protection.

Retain serial-number labels; record them during unpacking.

2.5 Safety standard and documentation basis

The QN-100 is electrical equipment for measurement and process control. Follow the safety-related installation and user information in this manual. Formal product conformity is declared by Absorption Systems through the EU Declaration of Conformity and the associated technical file; always observe the ratings and warnings on the equipment nameplate.

This manual is intended for the responsible body (the organisation that installs and operates the equipment) and for competent installers acting on its behalf. It must be retained and made available to personnel who install, commission, maintain or decommission the system.

2.6 Safety ratings (installer summary)

Confirm all values against the nameplate and order configuration before connecting supplies. Datasheet reference: AS-MK-SPEC-001.

Rating	Value / requirement
Applicable safety standard	EN IEC 61010-1 (as declared in the EU Declaration of Conformity)
Protective class	Class I - protective earth (PE) connection is mandatory
Mains supply option	230 V AC, 50/60 Hz (as ordered / nameplate)
DC supply option	24 V DC (as ordered / nameplate)
Power consumption	Typically < 30 W (sensor + HMI combined)
Inrush current	< 2 A at power-on
Overvoltage category	II (equipment intended for connection to the building installation)
Pollution degree	2 (normally only non-conductive pollution; temporary condensation possible)
Altitude (normal)	Up to 2000 m unless otherwise stated
Operating ambient	0 C to +60 C
Humidity	10-90 % RH, non-condensing
Enclosure (sensor / HMI)	IP65 / IP54 with glands, seals and lids correctly fitted

⚠ WARNING - Do not exceed nameplate ratings. Connecting the wrong supply type (230 V AC vs 24 V DC configuration) may create an electric shock or fire hazard.

2.7 Disconnecting device, fusing and protective earth

Provide a disconnecting device (isolator or circuit breaker) in the supply circuit, readily accessible and marked for the QN-100, in accordance with local wiring rules.

Fit overcurrent protection (fuse or MCB) suitable for the supply type and cable CSA. Protection must be sized for the equipment load (< 30 W typical) while remaining selective with upstream protection where required by site practice.

Connect protective earth to the designated PE terminal before connecting live conductors. Verify earth continuity before first power-up.

After isolation, prove dead before touching terminals. Capacitors or power supplies may retain charge for a short period after switch-off.

2.8 Residual risks

When installed and used as directed, residual risks include the following. The responsible body shall ensure controls remain effective throughout the equipment life.

Hazard	Residual risk	Installer / operator control
Electric shock	Contact with live parts if covers open or PE missing	Isolate before opening; verify PE; refit covers and glands
Burns / heat	Hot lamp and internal surfaces after operation	Allow cool-down before service; do not obstruct ventilation paths if fitted
Optical / lamp	Discomfort from viewing the measurement beam	Aim beam at process only; do not view at close range
Glass breakage	Injury or loss of ingress protection if window damaged	Handle carefully; replace damaged window via Absorption Systems / authorised service
Incorrect measurement used for process decisions	Product quality or process upset - not a SIL safety function	Do not use as sole protective safety device
Lifting / mounting	Strain or drop of ~5 kg sensor / ~4 kg HMI	Use two-person handling where awkward; secure mount before releasing support

2.9 Safety symbols and markings

Observe all symbols on the equipment nameplate, labels and in this manual. Typical meanings:

Symbol / marking	Meaning
 WARNING	Risk of personal injury or serious equipment damage
 CAUTION	Risk of equipment damage, measurement error or loss of IP rating
Protective earth (PE)	Connect to building protective earth before energising
Refer to manual	Read this installation manual and related safety information before use
CE marking	Product placed on the EU market under applicable directives; see Declaration of Conformity

WEEE / disposal	Do not dispose of as unsorted municipal waste at end of life
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2.10 Duties of the responsible body

Ensure only competent persons install and wire the equipment.

Provide a suitable supply, PE, disconnecting device and overcurrent protection.

Keep this manual, the datasheet and the Declaration of Conformity available on site.

Maintain enclosure integrity (glands, seals and lids) so that declared IP ratings remain valid.

Prevent unauthorised access to live terminals and ensure covers are refitted after work.

Schedule window cleaning and inspection so optical and mechanical condition remains safe and serviceable.

3. System overview for installers

3.1 Main components

A typical QN-100 installation comprises:

Sensor head — NIR optical measurement unit in an anodised aluminium IP65 enclosure with borosilicate window and pole-clamp mounting.

HMI — 7" colour TFT touchscreen controller (IP54) providing local display, configuration, I/O and optional fieldbus.

Interconnecting cables — power and communications between HMI and sensor, plus field I/O and network cables to the plant control system.

Mounting hardware — pole/tube clamp arrangement for the sensor; fixing points for the HMI enclosure.

3.2 How mounting affects measurement

The QN-100 measures by diffuse reflectance. Product must present a stable, representative surface in the optical field of view at the correct standoff. Installation geometry (distance, angle, product depth, dust, steam and window cleanliness) has a direct effect on measurement quality. Mechanical installation is therefore part of measurement performance, not only mechanical support.

3.3 Interface summary

Interface	Installer summary
Power	230 VAC or 24 VDC (as ordered); combined sensor + HMI typically < 30 W; inrush < 2 A
Analogue outputs	Up to 3 × isolated 4–20 mA; max load 500 Ω per channel
Digital outputs	Solid-state (Crydom DMO063 DC / ASO241 AC) — see section 7.6
Digital inputs	4 × 24 V DC
Network / fieldbus	Ethernet 10/100 BaseT; optional Profinet, Profibus DP, EtherNet/IP, Modbus TCP or EtherCAT (order option)
Cable entry	M16 glands; screened industrial cable recommended

4. Delivery, unpacking and inspection

4.1 Typical scope of supply

QN-100 sensor head

HMI enclosure with touchscreen

Mounting clamp / hardware kit (as ordered)

Cable glands and sealing accessories (as ordered)

Interconnecting cable set

Documentation pack (datasheet reference, this manual, commissioning guide as supplied)

/ NOTE — Exact BOM depends on the sales order. Check the packing list against the purchase order before signing for delivery.

4.2 Receiving inspection

Inspect packaging for transit damage before opening.

Check sensor and HMI for dents, cracked window, damaged glands or missing covers.

Record sensor serial number and HMI serial number on the site installation record.

Photograph any damage and notify Absorption Systems / the delivering distributor before installing.

4.3 Tools and materials typically required

Item	Purpose
Metric hex / Allen keys and torque-capable drivers	Clamp and enclosure fixings
Spanners for gland nuts	Cable entry sealing
Multimeter (VAC/VDC, continuity, mA loop if available)	Power, earth and loop checks
Insulation / earth continuity tester (as required by site rules)	Protective earth verification

Screened industrial cable ($\leq 0.5 \text{ mm}^2$ conductors typical for signal)	I/O and communications
Cable ties, trunking, labels	Dressing and identification
Isopropyl alcohol and lint-free wipes	Window cleaning after install
Site PPE	As required by the plant

5. Site preparation

5.1 Environmental requirements

Parameter	Requirement
Operating ambient	0 °C to +60 °C
Humidity	10–90 % RH, non-condensing
Sensor ingress rating	IP65 (with glands and lid correctly fitted)
HMI ingress rating	IP54 (with glands and lid correctly fitted)
EMC	Install in accordance with industrial EMC practice; system designed to EN 61000-6-2 / EN 61000-6-4
Vibration / shock	Avoid mounting on structures with severe vibration; if unavoidable, use isolation and confirm with Absorption Systems

5.2 Process and optical location

Select a location where:

Product flow is continuous and representative of the stream to be controlled or monitored.

The sensor window has a clear line of sight to the product surface.

Standoff from window face to product surface can be set and maintained between 250 mm and 400 mm (see datasheet).

Steam, splash, heavy airborne dust and direct wash-down jets will not persistently obscure the window (fit air purge or shielding if the process requires it — optional accessory).

Operators can safely access the window for cleaning without removing the sensor whenever practicable.

Ambient lighting changes and highly reflective metal surfaces in the field of view are minimised.

⚠ CAUTION — Do not mount where product can impact the window, or where condensate can pool on the optical face.

5.3 Space and access

Allow clearance around the sensor for cable bend radius, gland access and removal of the cover.

Sensor approximate envelope: 301 × 160 × 186 mm; mass approx. 5 kg.

HMI approximate envelope: 270 × 189 × 186 mm; mass approx. 4 kg.

Mount the HMI where the display is readable and touch targets are reachable without standing on process equipment.

5.4 Utilities to confirm before install

Correct electrical supply available at the panel (230 VAC or 24 VDC as ordered), fused or protected per site practice.

Protective earth available at the installation point.

Cable routes prepared between sensor, HMI and control system.

Network details agreed if fieldbus/Ethernet is used (IP address or DHCP policy, station name, switch port).

If a powder sampler option is supplied: clean, dry compressed air at the pressure specified for that option.

If Hold Mode with product-loss sensing is required: the product-loss sensor is installed and cabled.

6. Mechanical installation

6.1 Sensor mounting — general method

The sensor is designed for pole / tube clamp mounting. Use the clamp hardware supplied or approved for the project. Project layout drawings define the exact tube size, standoff bracket and orientation for each site.

Offer a rigid mounting tube or structure that does not sway with product loading or walkway traffic.

Seat the clamp faces square to the tube; tighten clamp screws evenly.

Set orientation so the window faces the product surface at the design angle on the layout drawing.

Adjust position until standoff (window face to product) is within 250–400 mm under normal process fill conditions.

Lock all fasteners; re-check orientation after cable dressing.

6.2 Orientation and product presentation

Aim for a full, stable product bed or curtain in the measurement spot; avoid intermittent empty gaps if possible.

If product depth varies widely, choose a location where depth remains sufficient to avoid seeing through to the conveyor or chute wall.

Keep foreign objects (guards, lights, steam pipes) out of the optical path.

6.3 HMI mounting

Mount the HMI on a flat, rigid surface using the enclosure fixing points.

Support the enclosure fully — do not hang it from cable entries.

Orient cable glands downward or sideways where possible to reduce water ingress risk.

Keep sealing faces clean; refit the lid evenly after termination.

Allow space to open the door/lid and to operate the touchscreen with PPE gloves if used on site.

6.4 Cable routing (mechanical)

Separate power and sensitive signal/fieldbus cables where site EMC practice requires.

Respect minimum bend radii; do not pinch cables under lids or clamp plates.

Provide strain relief so that cable weight is not carried by terminal screws.

Label both ends of every cable with the site cable reference.

7. Electrical installation

7.1 Safety before wiring

⚠ WARNING — Isolate all supplies. Verify isolation. Follow site permit-to-work and lock-out / tag-out procedures.

Complete all wiring before applying power. Record cable references on the installation checklist. Terminal identification is printed on the equipment and/or shown on the project wiring diagram — always follow the diagram issued for the serial numbers on site.

7.2 Protective earth and bonding

Connect protective earth to the designated earth terminal(s) on the HMI and as shown on the project drawing for the sensor circuit.

Verify earth continuity from enclosure earth points back to the supply earth bar.

Bond cable screens in accordance with Section 7.7 (EMC).

7.3 Power supply

Supply options are order-specific: 230 VAC or 24 VDC. Confirm the nameplate / order configuration before connecting.

Item	Value / practice
Supply	230 VAC or 24 VDC as ordered
Consumption	Typically < 30 W for sensor + HMI combined
Inrush	< 2 A at power-on
Protection	Fit a suitably rated fuse or circuit breaker in the supply; reverse polarity / overvoltage protection is provided on DC inputs as designed
Isolation	Provide a local means of isolation compliant with site rules

⚠ CAUTION — Do not connect 230 VAC to a 24 VDC-configured unit or vice versa. If in doubt, stop and check the sales order and nameplate.

7.4 Sensor to HMI interconnection

Route the manufacturer-supplied or project-specified interconnect between sensor and HMI. Keep the run as short as practicable and within any maximum length stated on the project drawing. Do not parallel interconnect cables with high-power motor leads in the same unshielded trunking.

7.5 Analogue outputs (4-20 mA)

Up to three isolated 4–20 mA outputs are available for process values. Wire only the channels required.

Use screened twisted-pair industrial cable.

Observe polarity at the receiving instrument or PLC card.

Ensure total loop resistance does not exceed 500 Ω per channel.

After power-up, verify 4 mA / 20 mA scaling during commissioning (see AS-PRD-MAN-004).

7.6 Digital inputs and outputs

Digital I/O is 24 V DC. Typical uses include product-loss / hold inputs, alarms and discrete status. Wire according to the site I/O schedule and the terminal labels on the HMI.

Confirm NPN/PNP output configuration against the PLC input card type before energising.

Digital outputs are solid-state relays. Depending on configuration, the output devices are:

- DC output — Crydom DMO063: 0–60 V DC, maximum 3 A
- AC output — Crydom ASO241: 12–280 V AC, maximum 1.5 A

Do not exceed these ratings. Allow for inrush on inductive or lamp loads; use external suppression where required.

Use screened cable in electrically noisy plant areas.

7.7 Fieldbus and Ethernet

Where a fieldbus or Ethernet option is fitted:

Use the cable type specified for that protocol (e.g. Profinet / EtherNet/IP industrial Ethernet cable).

Connect to the designated RJ45 or fieldbus connector only.

Agree IP address, subnet, gateway and station name with the site controls engineer before configuration.

Leave network configuration and byte-swap / endian settings to commissioning (AS-PRD-MAN-004 and AS-PRD-MAN-001).

7.8 Cable glands, screening and EMC

Use the M16 glands supplied or equivalents that maintain the enclosure sealing.

Select gland size for the actual cable outer diameter; tighten to seal without crushing the sheath.

For screened cables: bond the screen in the gland or at the designated screen terminal to create a continuous 360° shield path where the design requires it.

Avoid earth loops on analogue screens — common industrial practice is to earth the screen at the control-panel end; follow the project EMC specification if it differs.

Refit all covers before power-up; unused gland holes must be blanked.

/ NOTE — Good EMC installation practice is essential near VSDs, welders and large contactors. Route signal cables away from motor cables and cross at 90° when paths must meet.

8. Optional accessories at installation

8.1 Air purge / window keep-clean

If an air-purge or similar keep-clean option is supplied, connect clean, dry instrument air as specified for that option. Confirm flow without disturbing the product surface in the measurement spot.

8.2 Powder sampler

If a sampler is included, install mechanical parts per the accessory drawing and connect compressed air only after confirming the correct pressure. Sampler enable and cycle setup are commissioning tasks (password-controlled in the HMI).

8.3 Product-loss sensor for Hold Mode

If Hold Mode is used, install and wire the product-loss sensor so that empty-belt or empty-chute conditions are detected reliably. Incorrect placement is a common source of nuisance holds or missed holds.

9. First power-up and installation verification

/ NOTE — Detailed HMI setup, auto-balance, calibration and analogue trim are covered in AS-PRD-MAN-004 and AS-PRD-MAN-001. This section only confirms that the installation is electrically and mechanically ready.

9.1 Pre-power checks

All mechanical fasteners tight; sensor aimed at product path; standoff within 250–400 mm.

All glands sealed; lids fitted; unused entries blanked.

Earth continuity verified.

Supply voltage matches nameplate.

No loose strands or untwisted screens inside enclosures.

9.2 Power-up

Apply power using the site isolation method.

Confirm the HMI boots to the main operating screen without repeated restarts.

Confirm the sensor is recognised (no persistent communications fault on the status indication).

Confirm enclosures remain cool enough to touch on outer surfaces after 15 minutes (normal low dissipation); investigate abnormal heating.

9.3 Installation smoke checks (no calibration yet)

Touchscreen responds.

Digital inputs change state when test contacts are operated (if safe to do so).

Network link LED / status healthy if Ethernet is connected.

Window clean; no condensation inside the optical path.

When these checks pass, hand over to commissioning using AS-PRD-MAN-004.

11. Troubleshooting during installation

Symptom	Likely install causes	What to check
HMI does not power up	Supply missing, wrong voltage, isolation open	Nameplate vs supply; fuses; polarity on DC; isolation switch
Sensor offline / comms fault	Interconnect wiring, screen, power to sensor	Cable continuity; connectors fully home; earth noise; cable segregation
Repeated reboot / unstable power	Undersized PSU, voltage drop, shared noisy supply	PSU rating; cable CSA; separate from heavy loads
4–20 mA reading wrong at PLC	Open loop, reverse polarity, overload >500 Ω	Loop resistance; polarity; card type (active/passive)
Digital input not seen	Wrong voltage, shared 0 V missing, NPN/PNP mismatch	Input wiring; PLC card configuration
Ethernet / fieldbus down	Wrong cable, link down, IP conflict	Link lights; patching; IP plan; connector seating
Condensation or damp in enclosure	Gland leak, lid seal, mounting orientation	Gland size/seal; lid gasket; gland downward
Unstable reading after install (pre-calibration)	Standoff wrong, empty product, dirty window, vibration	Distance 250–400 mm; product present; clean window; rigid mount

12. Technical data for installers

NOTE — Full performance data: AS-MK-SPEC-001. Values below are the installer-relevant extract.

12.1 Mechanical

Item	Sensor	HMI
Dimensions (mm)	301 × 160 × 186	270 × 189 × 186
Mass (approx.)	5 kg	4 kg
Enclosure	IP65, anodised aluminium	IP54, anodised aluminium
Window	Borosilicate glass	—
Mounting	Pole clamp	Enclosure fixings
Finish	RAL 7035 light grey	RAL 7035 light grey
Cable entry	M16 glands	M16 glands

12.2 Optical install envelope

Item	Value
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Measurement mode	Diffuse reflectance NIR
Standoff	250–400 mm from window face to product
Light source	Tungsten halogen (long life, underrun)

12.3 Electrical

Item	Value
Supply	230 VAC or 24 VDC (as ordered)
Power	< 30 W combined typical
Inrush	< 2 A
Analogue outputs	3 × 4–20 mA isolated, ≤ 500 Ω
Digital outputs	Solid-state (Crydom DMO063 DC / ASO241 AC) — see section 7.6
Digital inputs	4 × 24 V DC
Ethernet	10/100 BaseT, RJ45
Fieldbus options	Profinet, Profibus DP, EtherNet/IP, Modbus TCP, EtherCAT

12.4 Environment

Item	Value
Operating temperature	0 to +60 °C
Storage temperature	–20 to +70 °C
Humidity	10–90 % RH non-condensing
EMC	EN 61000-6-2 / EN 61000-6-4
Conformity	CE marked; RoHS compliant

13. Maintenance relevant to installation

Provide ongoing safe access to clean the sensor window; contamination is the most common field measurement issue.

After wash-down, verify glands and lid seals still seat correctly.

If the sensor is removed for maintenance, refit to the same standoff and orientation; mark the mounting position during install.

There are no installer-serviceable optical assemblies inside the sensor. Do not dismantle the optical head.

14. Disposal

At end of life, dispose of electrical equipment in accordance with local WEEE / electronic waste regulations. Do not dispose of as unsorted municipal waste. Return to Absorption Systems or an authorised recycler if a take-back route is available.

15. Document control

Document owner: Production / Applications Engineering. Classification: Public / Customer-facing.

This document is the Absorption Systems QN-100 Installation Manual. Revision 3.1 adds EN IEC 61010-1 aligned safety documentation for installers and the responsible body.

Revision	Date	Description
3.0	2026-08-03	Reformat manual.
3.1	2026-08-03	Added EN IEC 61010-1 aligned safety documentation: ratings, residual risks, symbols, responsible-body duties, disconnect/fuse/PE requirements.

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