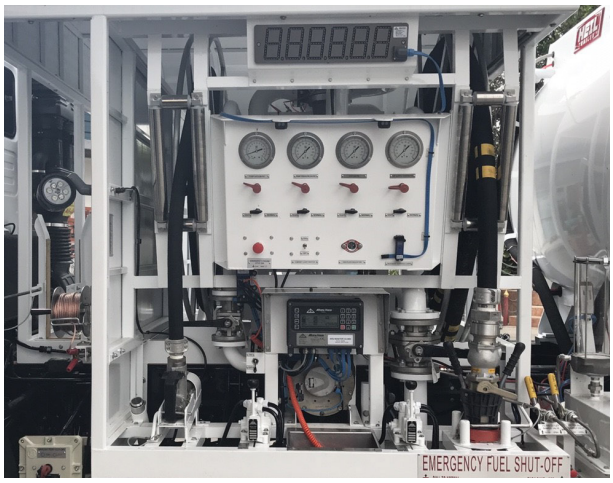
PreciFUEL

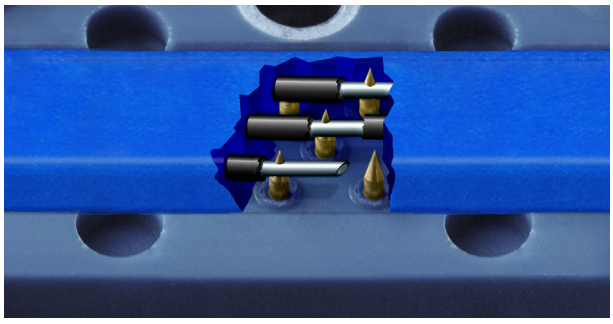
APPLICATION: AIRCRAFT REFUELING

Alfons Haar

PreciFUEL System – the most modern technology available for refuelers and dispensers

- ATEX/IECEx approved bus system PreciBUS (no junction boxes, no PLC necessary)
- Error safe installation of all PreciFUEL components – "LEGO for tanker builders!"
- All electronics 100% potted – no problems due to vibration, corrosion or humidity!
- Maintainable by mechanics!
- Adaptation by configuration – no software debugging required
- Integrated Logbook
- DP monitoring and density sensor optional
- Automatic diagnosis on power up
- Scalability secures investment for future requirements
- System documentation downloadable from each ARU-Master
- Public EN 15969-1 FTL interface to OBC





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Now available for -40°C (-40°F)

Modes

Interlock state secured | Interlock state in use | Actor state enabled | Actor state disabled | Ignore

No.	E8004-0 Mode	E8005-0 Operation	E8011-0 Deadman	interlock left	interlock right	cabinet door	ladder	railing	couplings left	coupling right	line valve pressure	line valve suction	automatic valve 1	automatic valve 2	hose reel brake left	hose reel brake right
1	Fuelling u/w left	Fuelling	Yes													
2	Fuelling u/w right	Fuelling	Yes													
3	Fuelling overwing	Fuelling	No													
4	Defuelling left	Defuelling	No													
5	Recirculation left	Regeneration	No													
6	Recirculation right	Regeneration	No													
7	Gravity discharge	Emptying of residues	No													
8	Pump station	Transfer out	No													
9	Refuelling from ext	Fuelling	Yes													
10	Load compartment	Loading	No													
	Click to add mode															

Indicator lights

Interlocks

Interlock Name	HelpText	E8001-0 Interlock Type	E8002-0 Help Text
Interlock left	underwing nozzle left stowed	Secured in 'on' position	may be bypassed for time limit
Interlock left	underwing nozzle right stowed	Secured in 'on' position	may be bypassed for time limit
Cabinet door	cabinet not closed	Secured in 'on' position	may be bypassed till next loading
Ladder	ladder unstowed	Secured in 'on' position	must not be bypassed
Railing	railing unstowed	Secured in 'on' position	must not be bypassed
Coupling left	couplings not disconnected (L)	Secured in 'on' position	may be bypassed till next loading
Coupling right	couplings not disconnected (R)	Secured in 'on' position	may be bypassed till next loading
Click to add interlock			

M I5 - Master interface

Up to 12 in-/outputs
Adaptive Motor Control
PTO & Handbrake Control

Power supply

10% of conventional systems

Full Lift Control

Lift up/down
Lift antennas
Pantograph drift monitoring
Alarm signals
Lift interlock system (Park position, door, refuelling adapters)

Recovery tank

Automatic draining of recovery tank with venturi, product or external pump!

ZONE 0

Overhead display

PreciNODE ODIS -
Red color LED display for better visibility

High efficiency LED illumination

PreciNODE M Lux RGB - multicolor status indicator

Automatic Refill

AFGUARD - free water detection!

For each refueling:
1st. Time: 10 sec >= 15 PPM -> blue blinking signal
2nd. Time: 10 sec >= 15 PPM -> refueling **STOP!**
1st. Time: 10 sec >= 30 PPM -> refueling **STOP!**
Trend analysis for last 50 fuelings!
Log data for all fueling operations since FWS/FM change!

Air monitoring

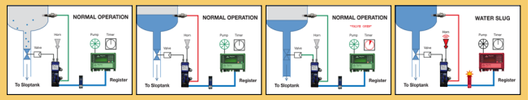
PreciNODE M I1

Flow rate based differential pressure monitoring

PreciNODE M AI4...20mA

Inline water monitoring & water slug detection

PreciNODE M I1



ARU Master 4

Master meter head, secondary meter head, deadman, interlock display

Seamless integration of all control functions in one controller

RFID

Seal-less Pulser

Up to 2 vane meters / turbines

Alfons Haar now also implements state of the art bus technology in aircraft refueling applications

ATEX approved bus system **PreciBUS** for Zone 1

Reduced installation, improved transparency and maintenance simplification, no terminal boxes, plug-in wiring

Cost and weight reduction due to reduced number of components and very light weight devices

Power and communication within one cable

Inline connections and piercing technology results in minimum wiring effort

The PreciBUS members can be contacted at any position of the bus cable

Full scalability, easily extendable, any bus topology is possible

PreciBUS PreciBUS PreciBUS PreciBUS

No more boxes!

Integrated tank level gauging

Fill volume calculated through calibration table

Alarm settings (highs and lows)

Remote stock reconciliation

2-in-1 Overfill Sensor

EuroSENS-LMS integrates individual levels for VOC and truck side shut down

Vent valve control and monitoring

Verifies conditions for fueling operations and brake interlock

Analog input module PreciNODE M AI4...20mA

Plug and play for standard 4-20mA analog sensors (EEx i)

Integrated diagnose functions through PreciBUS

Digital input/output module PreciNODE C I4/O3

Plug and play for 4 standard NAMUR sensors (EEx i)

Reduced pneumatic installation by up to 3 integrated solenoid valves

Additives PreciMIX

Up to 4 additives can be injected with injection verification

Density Measure-ment

Deadman

Wired
+
Wireless

Guided fueling

Automatic valve control embedded into fueling process relieves operator

Observes interlock, vent valve, overfill states etc. with plain text messages on screen

Guided draining

Verification of draining rules and electronic protocol saves overhead

Low level indicator

Ensures minimum level during fueling operations without blocking draining operations

Guided loading

Automatic interlock recognition and valve control relieves operator

LED status indication (foot valve status, overfill warning etc.)

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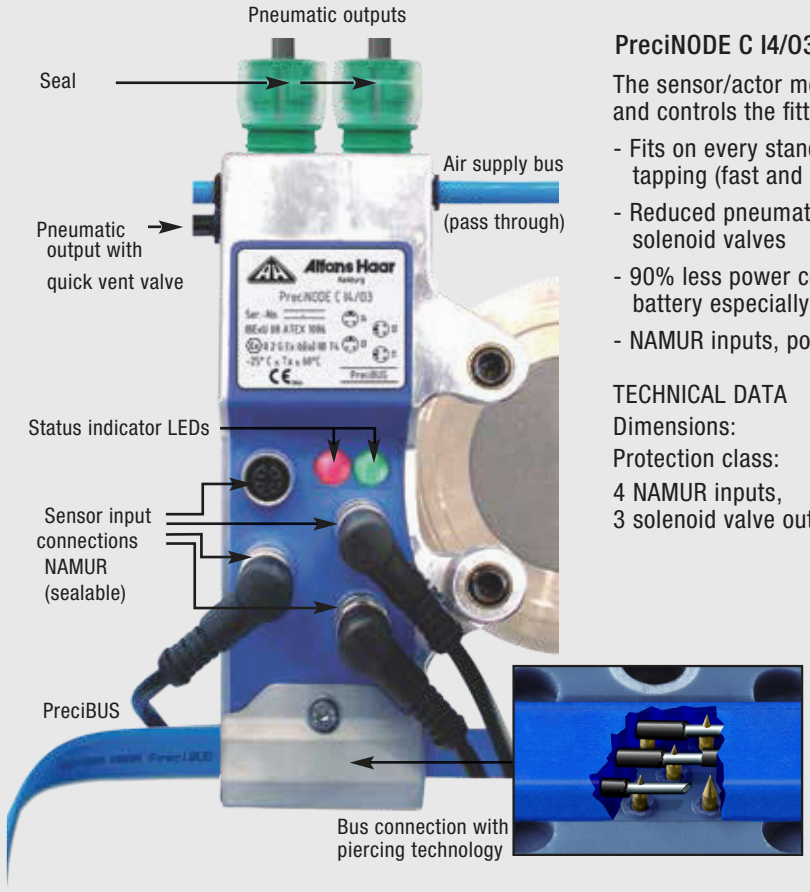


PreciNODE C I4/03

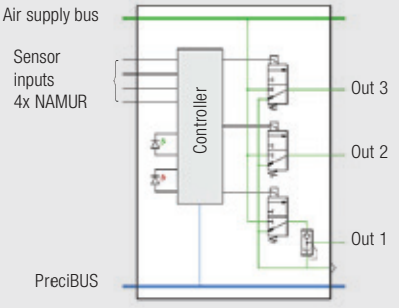
The sensor/actor module PreciNODE monitors and controls the fittings on the truck:

- Fits on every standard flange, no drilling, no tapping (fast and safe)
- Reduced pneumatic installation by integrated solenoid valves
- 90% less power consumption conserves truck battery especially in winter
- NAMUR inputs, potted electronics, manipulation-safe

TECHNICAL DATA

Dimensions:	WxHxD 82x198x33mm
Protection class:	>IP 67

4 NAMUR inputs,
3 solenoid valve outputs



PreciBUS

The AH PreciBUS offers the following advantages:

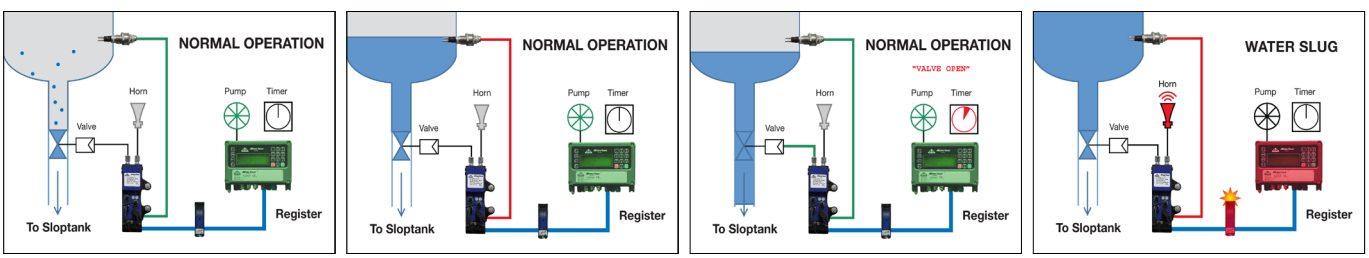
- ATEX approved for Zone 1
- In-line connections and piercing technology result in minimum wiring effort, no terminal boxes, no bolting
- The PreciBUS members can be contacted at any position of the bus cable
- Special AH bus cables prevent from reverse polarity
- Power and communication within one cable
- Easily extendable, any bus topology is possible

PreciNODES

In addition to PreciNODE C I4/03 the following PreciBUS members are offered:

Mini I/O Module (1 NAMUR input)	PreciNODE M I1
Mini I/O Module (1 pneum. output)	PreciNODE M O1
Analog Input Module (4-20mA)	PreciNODE M AI4…20mA
Overhead display	PreciNODE ODIS
LED Illumination Module/ Multicolor status indicator	PreciNODE M Lux RGB
2-Axis Inclination Sensor	PreciNODE M Inclino

WATER SLUG DETECTION



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