

CLA-VAL FUELING



PANTOGRAPH

Special fueling arm for **direct refueling** of aircraft, fighters, helicopters and tank trucks

CLA-VAL FUELING

Today military aircraft are mainly refueled with the "direct refueling method" (without tank trucks or dispensers)

Application:	Refueling of all types of military and commercial aircraft as Wide Body Aircraft, Tanker Aircraft, Tactical Aircraft, Helicopter but also airfield tank trucks.
Product:	Aircraft direct refueling arms, called PANTOGRAPHES, refueling directly the aircraft. Hose free stainless steel fueling arms. More than 2400 -PANTOGRAPHES since 1980 in operation worldwide
Markets:	All military and commercial fueling organisations world wide
Our competence:	<ul style="list-style-type: none">• market leader for hose free military direct refueling arms, PANTOGRAPHES• most reliable product• long lasting and nearly maintenance free swivel joints, lifetime up to 20 years• huge economic advantages in purchasing and operation for the user• customised design• also mobile PANTOGRAPHES with various equipment available (flow meter, filter, venturi, hydrant coupler etc.)
User and references:	<ul style="list-style-type: none">• NATO, USAF, US-NAVY, US Coast Guard, US-Army, Air Forces in Middle East and Far East, etc.• Only approved Single Source Supplier acc. to USAFE / NATO spec STS-M and STS-Z1• SSEA approved (USAF System Safety Engineering Analysis Team)• US Strategic Airlift Enroute System of Rapid Global Mobility: specified PANTOGRAPH supplier for all global Enroute hydrant systems

C-130, C-160, C-5, C-17, B-52, B-1, B-2 , B-737, KC-10, KC -135, KC-X, E3A, AIRBUS, ANTONOW, ILJUSHIN



Various accessories available

- flow meter
- venturi operation with hydrant refueling control valves
- filtration
- water / solid sensor with CLAYTON shut-off valve
- refueling nozzle assy
- hydrant coupler, API or MIL
- moveable or permanently flanged to refueling system
- max length up to 40 m
- flow rates up to 1,000 gpm
- pipe size 3", 4" and 5"

1980 the revolution in **direct refueling** of aircraft

- highest refueling safety standards
- no electricity, no motors near the aircraft
- environmentally friendly
- lowest operation cost

CLA-VAL Pantographs



PANTOGRAPH with Fuel Monitor



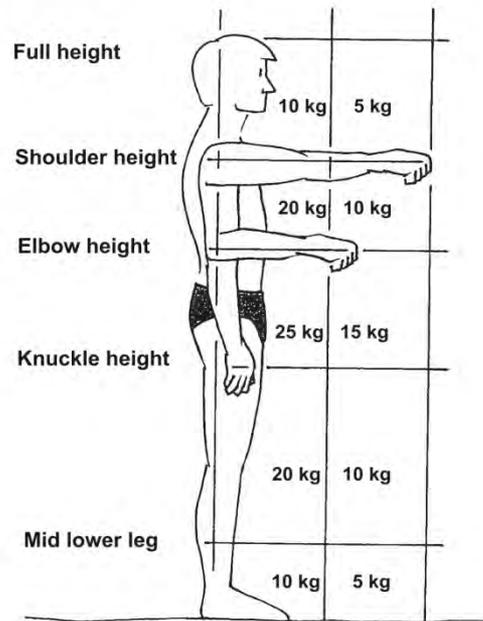
PANTOGRAPH with Filter/Water Separator



PANTOGRAPH with Water/Solid Sensor



Operating 200 pounds weight



MEYERINCK-PANTOGRAPH
One man - stress free handling!

B-737,B-747, DC-10, KC-767, B-767, B-777, AIR FORCE ONE, AIRBUS, ANTONOW, ILJUSHIN



Fueling of military and commercial aircraft

- fuselage refueling (C 5, C 17 etc.)

→ Wide Range PANTOGRAPH

- underwing refueling (B 747, KC 10 etc.)

→ High Reach PANTOGRAPH

MEYERINCK-Flanged Swivel Joints, best in the world

- more than **19,000 swivels in operation**
- nearly maintenance free
- non lubricated
- multi bearings
- double sealing
- high electrically conductive
- only machined, not welded
- average lifetime up to 20 years



A-10, F-104, F-4,F-14, F-15, F-16, F-18, F-117, F-22, TORNADO, MIG 29, HARRIER, MIRAGE, GRIPEN



- refueling of all types of tactical aircraft inclusive F 22
- approved by US-AIR FORCE, US-NAVY, NATO for unlimited use for **Hot Refueling** of tactical Aircraft
- easy operation by one person
- **hose free operation** allows refueling with running engines and hot brakes

for fighter training



DECIMOMANNU / ITALY, one of the largest training airbases in the world

- 104 aircraft positions with 52 PANTOGRAPHs and 52 CLA-VAL-Hydrant Valves
- **no maintenance** on the 572 MEYERINCK-Flanged Swivel Joints since 1986
- vehicle free refueling operation grants highest safety for 104 tactical aircraft
- no aircraft / vehicle collision since commissioning of the Direct Refueling System in 1986
- **lowest operation and maintenance cost in NATO**



CLA-VAL-Hot refueling PANTOGRAPH with flow meter and CLA-VAL hydrant pit valve

For direct refueling

NH-90, BO-105, SEALINX, SEA-KING, AH-64, UH-60, CH-47, BELL, CH-53, TIGER



- **hot refueling** of all types of helicopters with pressure fueling nozzle
- gravity refueling with fueling pistol

prefabricated

Integrated components:

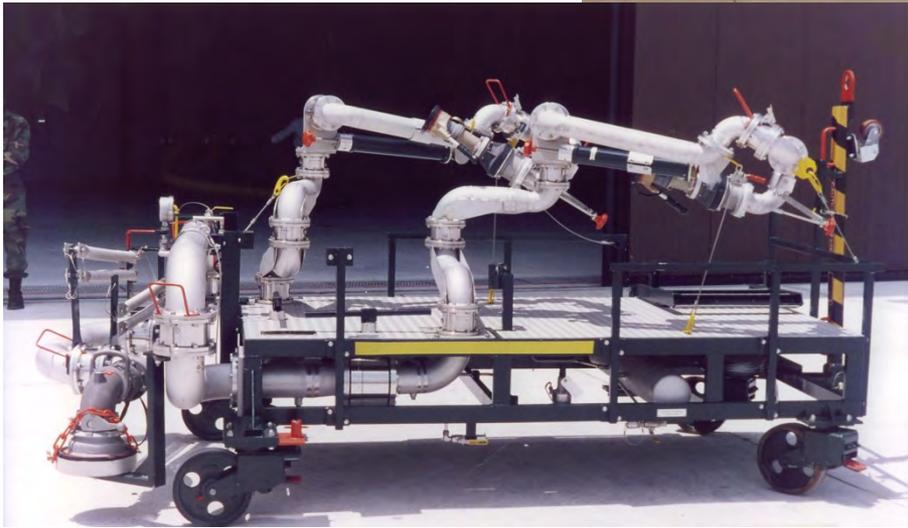
- design and engineering
- skid mounted, underground installation
- control valves for fueling, filter operation, tank level control
 - *rolling cover*
- MEYERINCK-PANTOGRAPH
 - *filter / water separator*
 - *fuel pumps*
 - *ex-proof remote control module*
 - *operation tank*
- flowmeter
- start up and commissioning



MEYERINCK-PANTOGRAPH

**Direct refueling unit
for SAR Helicopter**

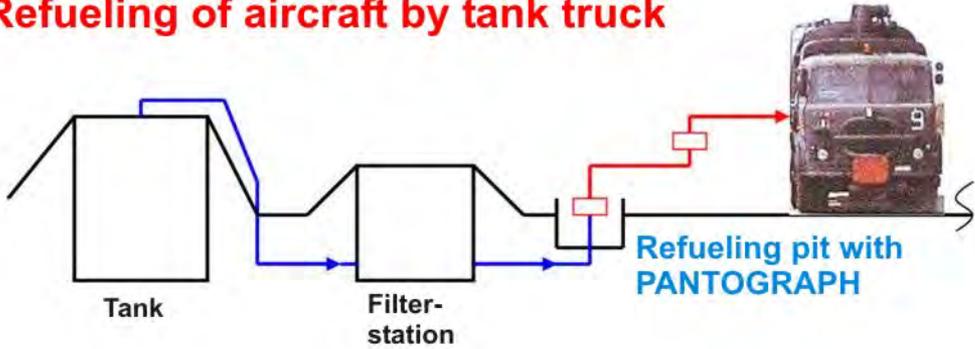
for B2 "SPIRIT"



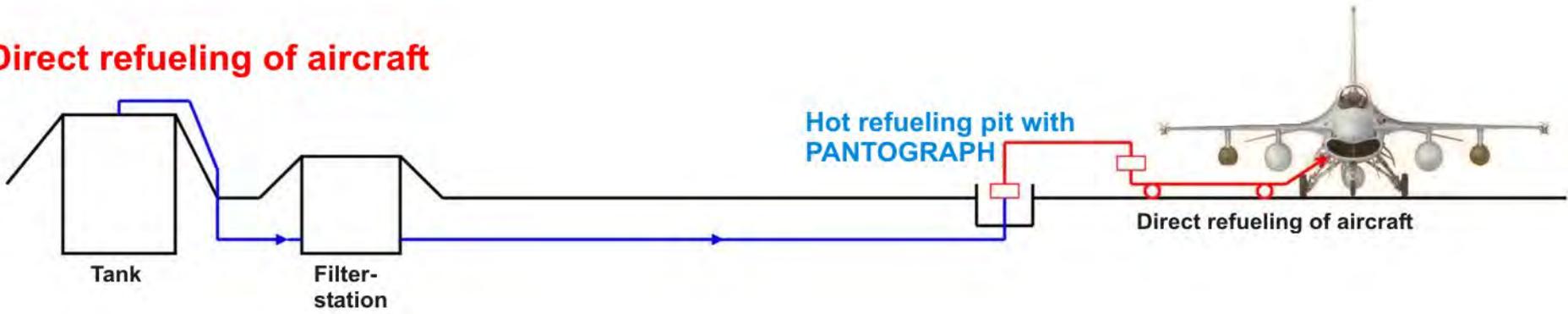
Mobile CLA-VAL-PANTOGRAPH

- hydrant refueling unit
- two refueling arms
- 1000 gpm

Refueling of aircraft by tank truck



Direct refueling of aircraft



for tank truck refueling



MEYERINCK underground "pop-up" PANTOGRAPH

- **"pop up" type**, stored inside refueling pit
- sabotage protected
- easy "hose free" one-person-operation
- all common types of tank truck coupler
- 360° operation of PANTOGRAPH
- proven lifetime of swivel joints up to 20 years

also available as:

- above ground type



Above ground PANTOGRAPH

- flow meter
- control valve



- aircraft can be **defueled at any location** at the hydrant system
- reliable fuel operated pump motor (electricity free)
- **hose free operation** together with MEYERINCK-PANTOGRAPH type WIDE RANGE
- unique MEYERINCK-**Suction Control System** defuels safely any aircraft with or without aircraft on-board booster pumps
- defueling through filter/water separator