Primary characteristics

NAF-LinkIT, the intelligent valve controller, is designed to operate pneumatic valve actuators from control systems and electrical controllers with the analog control signal 4-20 mA, optionally superimposed by the HART-communication signal. As an alternative, the digital operation by means of FoxCom, PROFIBUS-PA and FOUNDATION Fieldbus H1 is possible.

NAF-LinkIT can also be integrated into system and application that support FDT/DTM concept according to the specification 1.2. For this purpose the required DTM:s for HART, Profibus and FoxCom are available.

The positioner has the following features:

- Auto Start with self calibration
- Self diagnosis
- Communication HART, FoxCom, PROFIBUS-PA and FOUNDATION Fieldbus H1
- Configuration by means of local keys, hand-held terminal, PC or DCS system
- Very high air output capacity
- Low air consumption
- Particularly low vibration influence in all directions
- Angular range up to 95°
- Supply air pressure up to 8 bar
- Single or double-acting
- Robust design with transparent polycarbonate cover. (Aluminium cover as optional)
- Integrated beacon style indicator
- Mounting on rotary actuators according to VDI/VDE 3845 or direct on NAF actuators
- Protection class IP 65
- Built-in independent inductive limit switches (optional)
- Output for air pressure sensors (optional)
- Option boards for 4-20 mA feedback, two binary inputs or outputs (optional)
- Pressure gauge block (optional)

NAF 370991

Specification

Type: NAF LinkIT, intelligent, electro-pneumatic, valve controller, product code no. 370991-(see page 8).

Function: NAF-LinkIT converts an analog or digital electrical signal to a predetermined position for a pneumatic actuator.
Control parameters and alarm limits can be configured by means of local keys, or on versions with communication (HART, FoxCom, PROFIBUS-PA and FOUNDATION Fieldbus H1) remote, with hand-held terminal, PC, or DCS system.
With applicable software, NAF-LinkIT can also be used to provide diagnostics of valve condition.

Application: Can be mounted directly on a NAF actuator, or with a mounting kit on other pneumatic rotary actuators.
The spindle sleeve of the NAF actuator has a slot to receive the positioner spindle. A driver pin then transfers the rotary motion from the actuator to the valve positioner. The driver pin is spring-loaded for transmission without backlash.

Design: NAF-LinkIT has a very robust and rugged design made for severe applications in the process industry.
The valve controller has a very high air output capacity to fit on large size actuators and valves.
NAF-LinkIT is equipped with an integrated beacon indicator visible through the transparent cover. The beacon has red indicator markings for 90° rotation angle.

Functional specifications

Input

Two-wire system
Reverse polarity
protection. . . . . .standard feature

-D) Without communication

Signal range . . . . . .4 - 20 mA
Operating range. . . . . 3.8 - 21.5 mA
Voltage. . . . . .DC 8 - 48V
Max load. . . . . .320 Ω @ 20mA

-H) With communication HART

Signal range . . . . . .4 - 20 mA
Operating range . . . . . .3.6 - 21 mA
Voltage range of unloaded
input signal. . . . . DC12 to 48V
Max. load . . . . . .420 Ω , 8.4V at 20mA
Communication signal . . . HART, 1200 baud, FSK[1)] modulated on 4 - 20 mA 0.5 Vpp at 1kW load
Input impedance Zi . . . . . Z =320 Ω
for AC voltage 0.5 to 10kHz with <3 dB non-linearity. Cable capacity and inductance see HART standard specifications (e.g. C<100nF).
Note . . . . . Low voltage DCS control systems might have problems driving the control signal, use amplifier TV228 (optional)

-F) With communication FoxCom/digital

Input signal . . . . . digital
Supply voltage . . . . . .DC 13 - 48V
Supply current . . . . . .~9 mA @ 24V
Communication signal . . FoxCom dig., 4800 baud FSK[1)] modulated on supply voltage
Input impedance . . . . . ~500 Ω (0,5 - 20 kHz)

-E) With communication FoxCom/analog

Signal range . . . . . .4 - 20 mA
Operating range. . . . . 3.6 - 21,5 mA
Voltage. . . . . .DC 13 - 48 V
Load . . . . . 650 Ω
Communication signal . . . FoxCom, 600 baud FSK[1)] modulated on 4 - 20mA
Input impedance . . . . . ~500 Ω (0,5 - 20 kHz)

-P) With communication PROFIBUS-PA

Input signal . . . . . digital
Supply voltage . . . . . .DC 9 - 32V
Operating current . . . . . .10.5 mA +-0.5 mA (Base current)
Current amplitude. . . . . .+-8 mA
Fault current . . . . . Base current +4 mA by means of independent FDE-safety circuit
Data transfer . . . . . Acc. to PROFIBUS-PA profile class B, based on EN 50170 and DIN 19245 part 4

-Q) With comunication Fieldbus-FOUNDATION H1

Input signal . . . . . digital
Supply voltage . . . . . .DC 9 - 32V
Operating current . . . . . .10.5 mA +-0.5 mA (Base current)
Current amplitude. . . . . .+-8 mA
Fault current . . . . . Base current +4 mA by measns of independent FDE-safety circuit
Data transfer . . . . . FF Specification Rev. 1.4 Link-Master (LAS)
Function blocks . . . . . AO, Transdeucer, Resource, PID (in preparation)

Configuration

-D) Without communication

Configuration. . . . . with local keys and LEDs

-H) With communication HART

Software . . . . . IFDC / PC20 / FDT software
Hardware . . . . . .Modem MOD991 for PC
Also possible with local keys and LEDs

-E/F) With communication FoxCom

Software . . . . . IFDC / PC20
Hardware . . . . . .Modem PC10
I/A Series System . . . . . FBM 43 for code F
FBM 44 for code E
Also possible with local keys and LEDs

-P) With communication PROFIBUS-PA

Software . . . . . IFDC / PC20 / FDT software
Hardware . . . . . .ProfiCard for PC
Also possible with local keys and LEDs

-Q) With communication Fieldbus-FOUNDATION H1

Software . . . . . Contact NAF for further information
Hardware . . . . . .Contact NAF for further information for PC
Also possible with local keys and LEDs

Travel range

Rotation angle range . . . . .up to 95°

Characteristics

Acting . . . . . configurable: direct / inverse
Split range . . . . . .practicable
Characteristic curve . . . . . .configurable: linear / equal percentage / quick opening/ freely defined with 22 points max. (not version -A and -D)
Angle limitation . . . . . .configurable
Tight close range
with hysteresis . . . . . .configurable

1) FSK = Frequency Shift Key

Travel indication. . . . . mechanical / beacon

Output
Sense of action. . . . . .single or double acting
Output to actuator . . . . . .0 - 100% of supply air pressure

Supply
Supply air pressure . . . . . 1.4 - 8 bar (20 - 115 psig)
Supply air . . . . . .free from oil, dust, water acc. to IEC 654-2

Ambient conditions
Operating cond.
acc. to IEC 654-1. . . . . Device can be operated at a class Dx location
Ambient temperature . . . . -40 - 80 °C
Relative humidity . . . . . .< 100%
Transport and storage temperature . . . . . .-40 - 80 °C
Protection class acc. to IEC 529 . . . . . .IP 65 [1)]

Electromagnetic compatibility EMC
Operating conditions . . . . industrial environment
Immunity according to -EN 50 082-2 . . . . . .fulfilled
Emission according to
- EN 55 011 Group 1, Class A . . . . . fulfilled
- EN 50 081-2 . . . . . fulfilled
NAMUR-recommendation as of May 1993 . . . . . fulfilled

Additional features (not for version -A)

Autostart . . . . . travel direction, zero, span, control parameters (control parameters adjustable via local keys, HART or bus communication)
Position feedback . . . . . via communication (optional: current signal output 4—20 mA)
Alarms . . . . . via communication
optional . . . . . up to 2 alarm outputs, galvanically separated 2 wire (no alarm: < 1 mA, alarm: > 2,2 mA)

1) To fulfill IP 65 the positioner must be pressurised with supply air pressure.

Online diagnostics . . . . via HART or bus communication
- recognizes pre- and main alarms
- determines number of cycles, movements of the valve
- shows condition of device
- state of position sensor
- exceeding travel range
- actuator is jammed (remaining control deviation),
- Interruption in feedback control system of valve controller

Additional diagnostical possibilities in control operation if equipped with pressure sensors and diagnostics software NAF-eValuate™

Performance specifications

Response characteristics
Sensitivity . . . . . <0.1% of travel span
Non linearity (terminal based adjustment) . . . . . <0.4% of travel span
Hysteresis . . . . . <0.3% of travel span
Supply air dependence . . . <0.1%/1 bar (15 psi)
Temperature effect . . . . . .<0.3%/10 K
Mechanical vibration
10—60 Hz up to 0.14 mm,
60—500 Hz up to 2 g . . . . <0.25% of travel span

Air consumption (steady state)
. . . . . .Appr. 0,4 Nm^3/h @ 5 bar supply pressure

Air output
. . . . . .38 Nm^3/h @ 5 bar supply pressure

Failure handling
Safety position at
- Air supply failure . . . . . .pressure y1 and y2 = zero
- Electric power failure . . . pressure y1= zero and y2 = full supply pressure
- Failure of communication recognized by configurable watch dog with response delay of 0,1s - 24 h
- Behaviour . . . . . configurable as pressure y1/ y2= zero or stop at last value or a configured value
- Diagnostic report . . . . . .via communication
- Historical status . . . . . .is set if alarm was activated at any time (also just short alarms)

Optional equipment specifications

Additional Inputs/Outputs (not for version -A)

-B) Binary Inputs
Two independent binary inputs with internal supply for connection of sensors, e.g. pressure switches. A con-nected switch is loaded with 3,5 V, 150 mA.
Both binary inputs can be used for diagnostics or also for the control functions
- close valve (0%)
- open valve (100%)
- hold last value (configurable)

-F) Position feedback 4 - 20 mA
Angle derivated from valve controller feedback,
Output analog, galvanicaly separated, two-wire system acc. to DIN 19234 for external supply
Supply voltage . . . . . .8 - 36 V DC
Signal range . . . . . .3.8 - 20.5 mA
0% and 100% configurable
device fault . . . . . < 50 µA

One binary output alarm, galvanically separated, failure source configurable
two-wire system acc. to DIN 19234
Supply voltage . . . . . 8 - 36 V DC
Signal range . . . . . 4 - 20 mA
Logic . . . . . < 1 mA, no alarm
> 3 mA, alarm
device fault < 50 µA

-P) Two Binary Outputs (not version -A)
Input . . . . . angle derivated from valve controller feedback
Output binary . . . . . .galvanic separated 2 limit signals open collector
Supply voltage . . . . . external max 16 VDC
Logic . . . . . < 1 mA, limit value not exceeded
> 2,2 mA, limit value exceeded
device fault < 50 mA

Built-in Limit Switch
-T) Inductive Limit Switch (NAMUR)
Two-wire system
Input . . . . . position measured mechanically
Output . . . . . 2 inductive proximity sensors acc. to NAMUR for connection to a switching amplifier with an intrinsically safe control circuit
Current consumption
Vane clear . . . . . > 2,2 mA
Vane interposed. . . . . < 1 mA

For control circuit with the following electrical values
Supply voltage . . . . . .DC 8V, Ri approx. 1 ohm
Residual . . . . . < 10% p.p.
Permissible line
resistance . . . . . < 100 kohm
Response characteristic
Switching differential . . . . .< 1%
Switching point
repeatability. . . . . < 0.2%

-W) Inductive Limit Switch
Model: Pepperl&Fuchs NBB2-V3-E2
Three-wire system
Input . . . . . position measured mechanically
Output . . . . . .2 inductive proximity sensors
Supply voltage . . . . . 10 - 30 V DC

-Y) Inductive Limit Switch
Model: Pepperl&Fuchs NBB3-V4-Z4
Two-wire system
Input . . . . . position measured mechanically
Output . . . . . .2 inductive proximity sensors
Supply voltage . . . . . 5 - 60 V DC

Optional feature
-B) Built-in Pressure Sensors
For output air pressures to actuator
Indicating range . . . . . 0—8 bar
Accuracy . . . . . .0,5 %
Temperature influence . . . 0,5% / 10K (-30 - 80°C)

Connection manifold with Gauges
-M (Manifold with manometer-LEXG)
Lateral attachment to valve controller with 3 gauges
Indicating range . . . . . 0 - 10 bar
Error limit . . . . . Class 1.6

Physical specifications

Materials
Housing . . . . . .Aluminium (Alloy No. 230) finished with DD-varnish white
Cover . . . . . .Transparent polycarbonate, UV-stabilised
Feedback shaft material..... 1.4104

Weight
Double acting . . . . . appr. 1.7 kg (3.75 lbs)

Electric Connection

Line entry	1 or 2 cable glands M20x1,5 for cables of diam. 6-12mm
Screw terminals	2 terminals for input, optional 4 additional terminals for position transmitter and 1 sensor or for 2 sensors, another 4 additional terminals for limit switches, wire cross section up to 2.5 mm^2

Mounting

NAF actuator	NAF standard
Connection to rotary actuators	VDI/VDE 3485 with mounting kit -EBZG-R

Safety requirements

CE label

Electromagnetic compatibility[2)]	89/336/EWG
Low-voltage regulation	73/23EWG not applicable

Safety

(only with optional feature -D, metallic cover)

According to EN 61010-1 (or IEC 1010-1)	safety class III Overvoltage Category I
Internal fuses.	not replaceable
External fuses	limitation of power supplies for fire protection must be observed acc. to EN 61010-1, appendix F (or IEC 1010-1).

Air connection

As standard, the air between positioner and actuator NAF-Turnex is connected by reinforced tubes in PVC.

We can deliver as alternative:

1. Stainless steel pipes

2. Air block with air channels as per picture below.

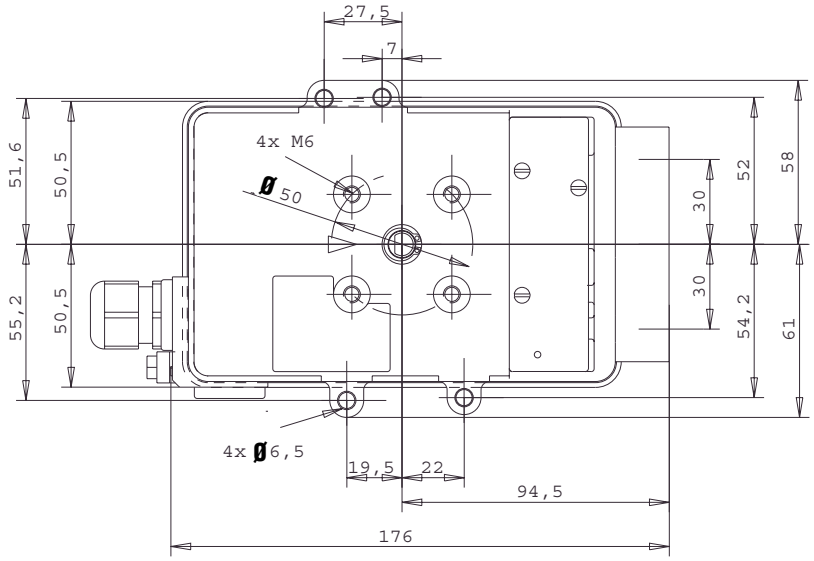
Features

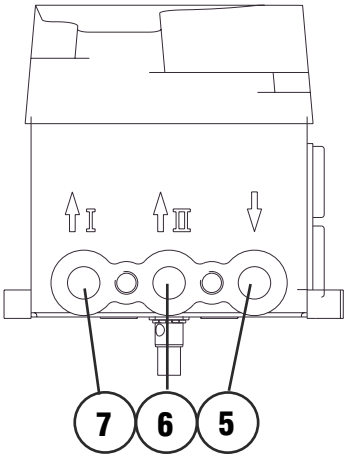
- Safe and easy mounting
- Un-breakable design
- Minimizes leakage risk
- Special design makes it easy and safe to change between direct and reverse action
- Aluminium, anodised and epoxy painted for superior corrosion resistance
- O-ring seals

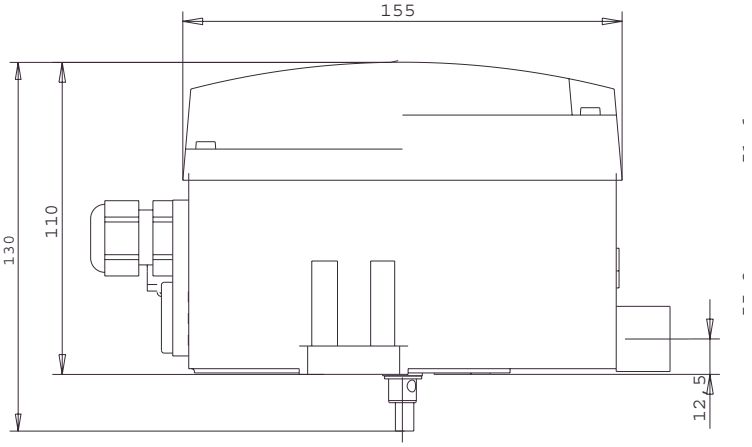
Part. No	Intended for actuator
799925-0	791390/92/94-0
799925-1	791290/92/94-1
799925-2	791290/92/94-2
799925-3	791290/92/94-3

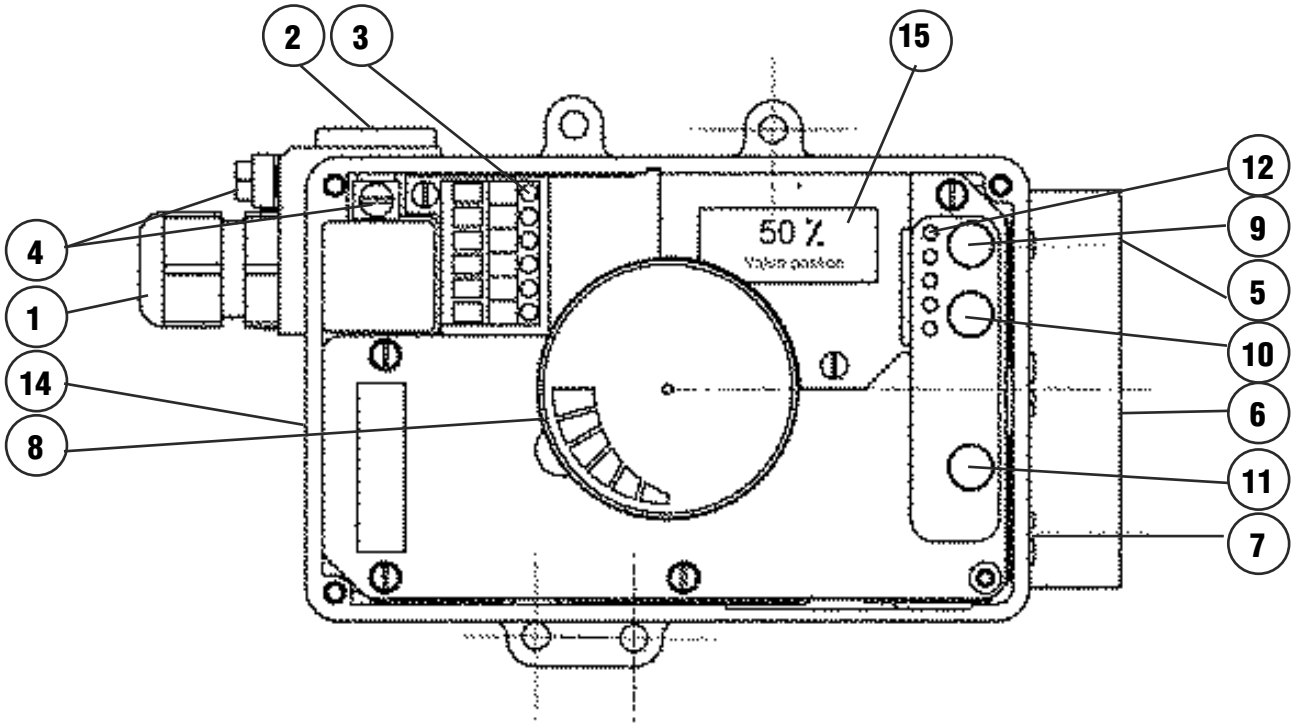
Dimensions

All measures in mm





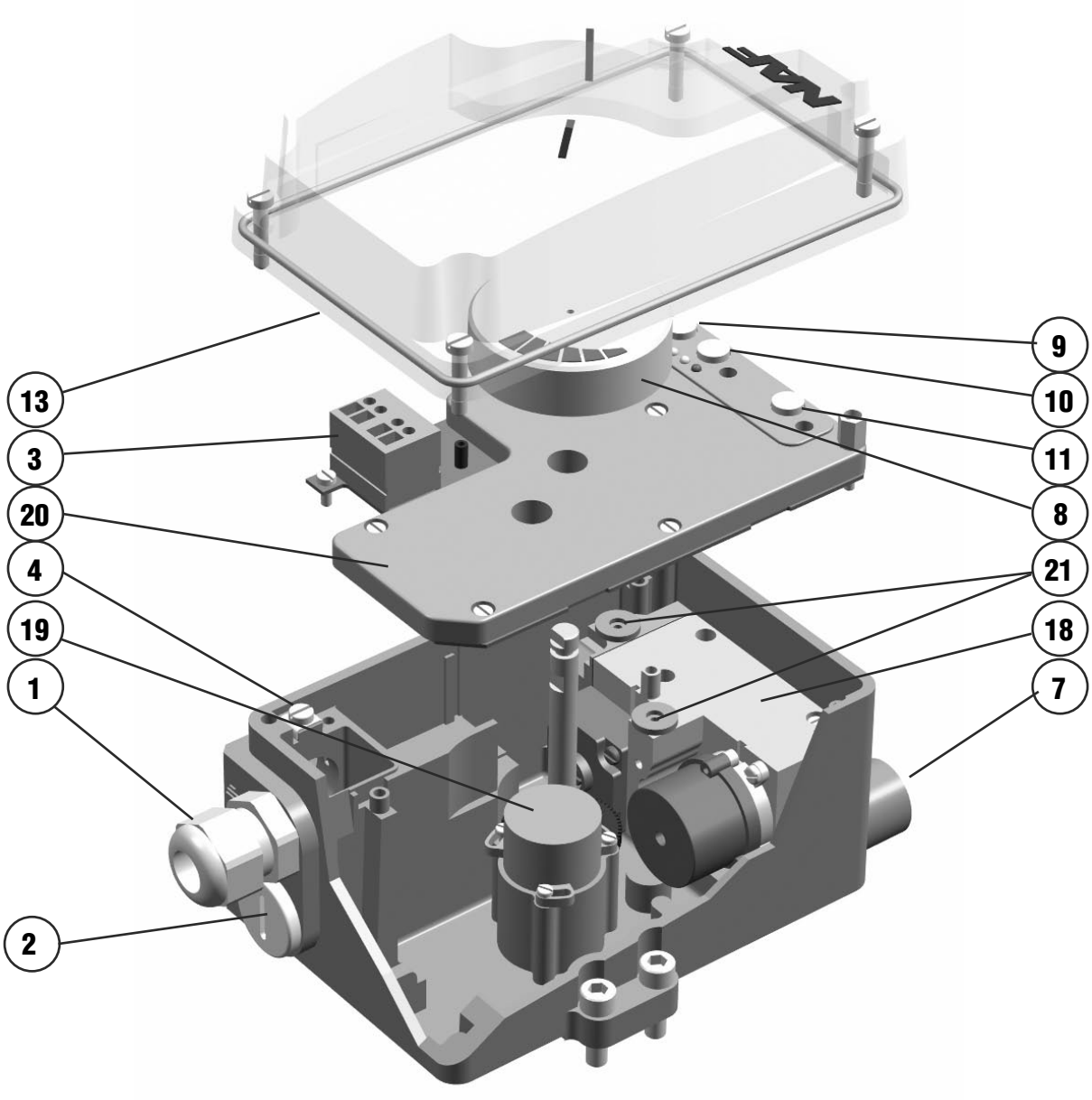




Overview

Position

1	Cable gland
2	Plug, interchangable with Pos. 1
3	Screw terminals (+/-) for input (w)
4	Ground connection
5	Female thread 1/4-18 NPT for air supply
6	Female thread 1/4-18 NPT for output y2
7	Female thread 1/4-18 NPT for output y1
8	Beacon indicator
9	Key UP
10	Key DOWN
11	Key M
12	Status display (1 red LED, 4 green LED´s)
13	Polycarbonate cover
14	Data label
15	LCD
18	Pneumatic unit with spool valve
19	Position potentiometer
20	Printed circuit board with EMC-cover
21	Connection for pressure sensors (optional)



Product code

Example	370991	-C	H	N	S	7	ZZZ	-BV08
	1	2	3	4	5	6	7	8

NAF-LinkIT, Intelligent Valve Controller for NAF double acting actuator, HART-com. and two built-in pressure sensors with LCD-display.

1. Type

Intelligent Valve Controller for Rotary Actuators. .	370991

2. Version

Double acting	-C

3. Input/Communication

Digital, w/o communication (4-20 mA)	D
FoxCom (4-20mA / IT1)	E
FoxCom (digital / IT2)	F
HART (4-20mA)	H
PROFIBUS-PA	P
FOUNDATION Fieldbus H1	Q

4. Additional Inputs/Outputs

Two Binary inputs	B
Potentiometer Input	D
Position feedback 4-20mA	F
Prepared for additional In-/Outputs	N
Two Binary outputs	P

5. Built-in limit switch

Without	S
Inductive limit switch expl. prot. EEx ia IIC T6 (NJ2-V3-N) [1]	T
Inductive limit switch (NBB2-V3-E2) 3 wire.	W
Inductive limit switch (NBB3-V4-Z4) 2 wire.	Y

6. Cable Entry

M20x1,5 with plastic cable gland	7

7. Electrical classification

Without	ZZZ
EEx ia IIC T4 (cenelec) [2) 5)]	EA4
II2G EEx ia IIC T6/T4 (ATEX) [2) 3)].	EAA

8. Optional Features

Two built-in pressure sensors for output to actuator p_1 and p_2 [6)]	-B
Metallic c	-D
Tag.No. Labeling Stamped with weather resistant color	-G
Tag.No. Labeling Stainless steel label fixed with wire	-L
Custom Configuration	-T
LCD-display with language English/German/Swedish included, for other languages, contact NAF (Display is included as standard) [4]	-V08

Auxiliary

Manifold, gauges manifold (connection 1/4 - 18 NPT)

With three gauges for version double acting LEX 424744078 [7]	-M

Mounting kit for:

NAF-Turnex, when delivered together with actuator.	Included
NAF-Turnex, wh 30416990	
Rotary actuator acc. to VDI/VDE 3845 with 20 mm shaft height (79127X-220,-240)	34920650
Rotary actuator acc. to VDI/VDE 3845 with 20 mm shaft height (79127X-250,-260)	34920651
Rotary actuator acc. to VDI/VDE 3845 with 30 mm shaft height (79127X-270,-280)	34920652

(1) Explosion protection only with Electrical classification EA4 & EAA
(2) Only with Optional Feature -D, metallic cover
(3) Only with input /communication F, H, P and Q
(4) Not with inputs/communication E, F
(5) Only with input/communication D, E
(6) Only with electrical classification EAA.
(7) Can not be combined with Air block

NAF AB
SE-581 87 Linköping
Sweden

Telephone +46 13 31 61 00
Facsimile +46 13 13 60 54
e-mail info@naf.se
Website: www.naf.se

ISO 9001 Certified