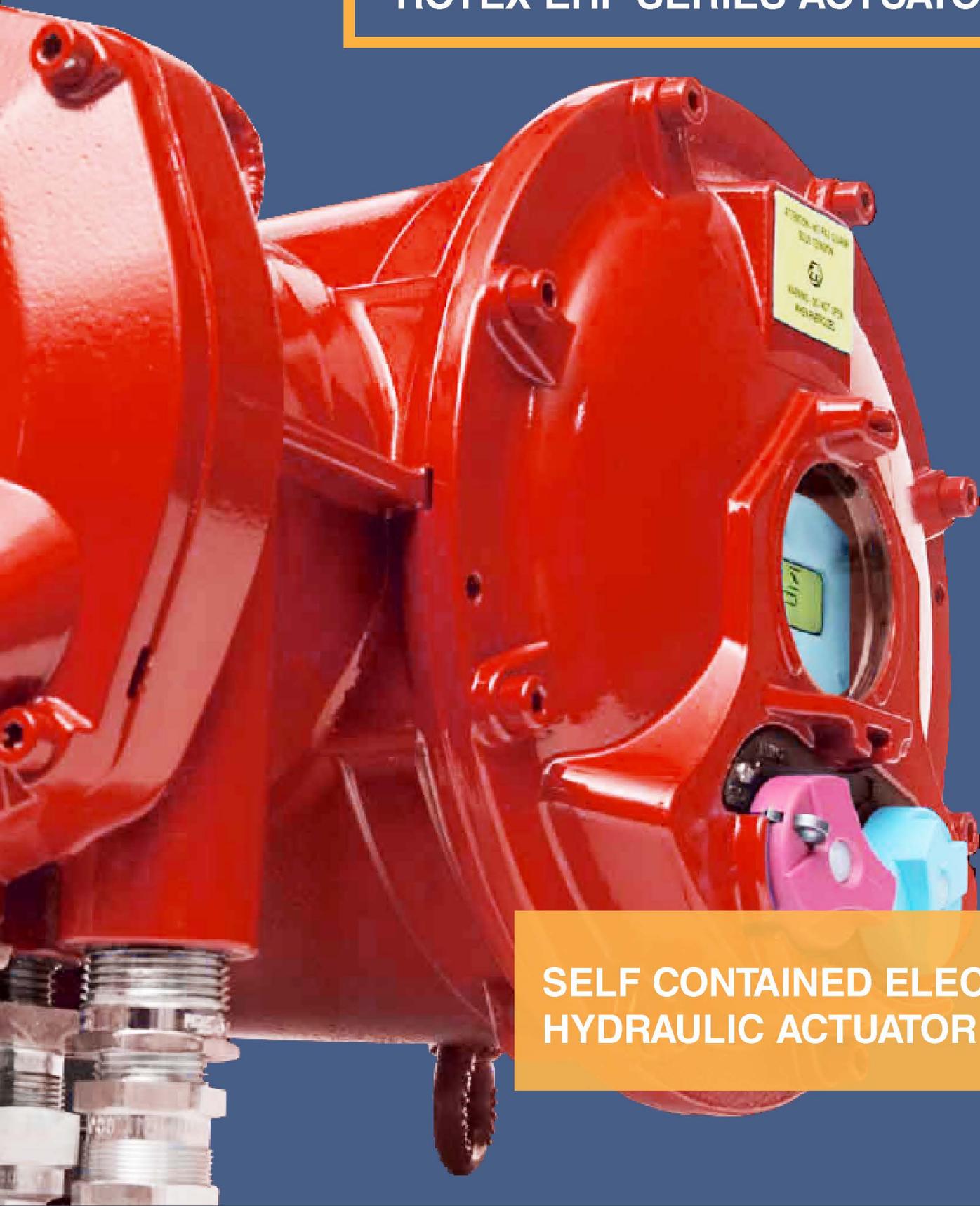


# ROTEX EHF SERIES ACTUATOR



SELF CONTAINED ELECTRO  
HYDRAULIC ACTUATOR

 **ROTEX**

*Engineering For The Future*

**In continuation with the tradition of constant innovation and virtue in engineering, ROTEX, brings new generation compact, modular and for precise control.....**

**Self Contained Electro-Hydraulic actuator series"EHF"**

With the combination of modern electronics and power of hydraulics, ROTEX EHF series is super efficient in providing precise control for high cyclic demand or ESD application. EHF series actuators are suitable for use in system integrated system (SIS). It has functional safety capability including and upto SIL 2 & SIL 3 to IEC 61508:2010.

ROTEX EHF series actuator is suitable for rotary and linear application. It can be customised to suit a given application. EHF series of actuator has an integral electronic control module which drives the electrical motor, pump and solenoid for operations. The logical module is responsible for diagnostics, alarms, fault messages and communication.

ROTEX EHF series actuator can be configured to fail-safe close, open or as fail freeze based on emergency shut-down demand. It can be equipped with potential free switch for independent feedback and alarm status.



## Key features

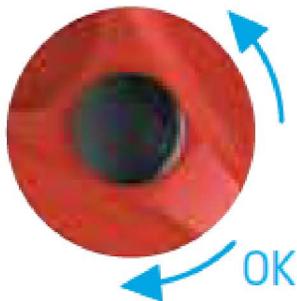
- Modular design, can accommodate modulating and Fail safe option
- Self contained, only requires electrical power.
- Fail-safe close, open or fail freeze.
- ESD option - Logical or hard wired
- Partial stroke test capability
- 4-20 mA or 0-10 VDC input signal optional
- Full featured LCD display for installation, commissioning and operation
- SIL 2 & SIL 3 capable to IEC 61508:2010
- Available torque range from 25 to 6,00,000 Nm for rotary and 1.2 to 8000 kN force for linear actuator
- Water tight up to and including IP68 (10m / 96h) as standard
- EXD explosion proof enclosure
- Extended diagnostics and functionality over various communication networks
- Supported communication network includes Modbus®, Profibus®, Foundation Fieldbus® and HART®
- Data logging and event record capabilities
- Operating temperature -50°C to +70 °C

## Graphical Display

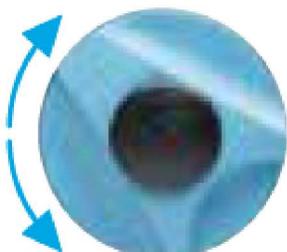
- Large LCD display for better readability
- No abbreviation or short form used.
- Operator don't need to refer manual for setting or calibration.
- User friendly interface.
- On-screen display of diagnostics, alarms and error messages.
- Structured menu for parameters, setups and diagnostics

## Local Control

- Lockable selector switches are provided on control module.
- The selector switch can be used for setting local/stop/remote selection and open/close.
- It can be used for configuration and parameterisation.
- Allows manual operation
- The red selector enables the operator to choose remote control, local control function and stop during operation.
- This selector switch can be locked in each position.



Selector to validate choice



Navigate through menu

## Position Indication LED's

- 2 LEDs (red/green) indicate the position (close/open) at ends of travel
- During open and close operation it blinks.
- Red and green LED can be freely assigned to open or closed positions.



## Local Mechanical Indicator

- Local mechanical indication can be provided as an option
- Shatterproof polycarbonate dome for visibility
- Two piece unique indicator, ensures a life long visibility



## Position Monitoring

- ROTEX EHF series actuator are equipped with contactless feedback sensor
- 360° with freely rotating contactless feedback shaft.
- No dead angle. Can start anywhere and end anywhere.
- Simple Installation. Can be mounted on any type of actuator.
- Contactless, high resolution feedback.
- Position feedback of 4-20 mA output signal.
- Voltage signal (0-10 V) can be obtained by connecting external resistance.

## Pressure Monitoring

- Actuator torque is measured based on pressure.
- Pressure transducer is integrated inside the hydraulic control system
- Real time feedback from the pressure transducer is recorded and diagnostics information is generated based on parameterisation.
- It can detect over pressure, low pressure and valve stuck, if any.
- 4-20 mA feedback signal proportional to actual torque of the valve.

## Emergency Shutdown

- On demand emergency shutdown is the primary feature
- ROTEX EHF system is suitable for use in SIS function in accordance to IEC 61508:2010
- Suitable upto & including SIL 2 & SIL 3 capability
- Can be configured through hardware for Safety Function or can be hardwired to perform fail-safe action.
- On request, additional ESD input can be provided for redundancy.

## ESD Reset

- ROTEX EHF series actuator has safety feature as built in priority.
- Once an ESD demand occurs, the actuator can reinstate only new command to operate or can be configured to manual reset through local controls via setting menu.
- This increases overall process and personal safety.

## Failsafe Option

- Failsafe action can be performed based on following
  - On loss of ESD signal or ESD demand occurs
  - On loss of main power supply. In applications where main power is part of SIS
- In both the above case, the valve will be driven to its failsafe position in case failure of main power supply or ESD demand.
- ESD Input signal - 20 - 60 VDC or 60 to 120 VAC

## Fail Freeze Option

- Main power supply is unreliable and is not part of functional safety.
- On failure of main power supply the operation of the actuator or the valve position is unaffected.
- ESD solenoid valve is separately powered through a 24 VDC ESD input signal and is solely responsible for safety function.

## Double Seal Compartment

- Two barriers fitted with O-rings insure optimum protection against water ingress into the electronic compartment.
- This protection remains effective even if the cover has not been closed properly or if the cable glands have not been tightened.
- Protection is also ensured for the local control selectors thanks to internal reed switches which prevent moisture ingress.



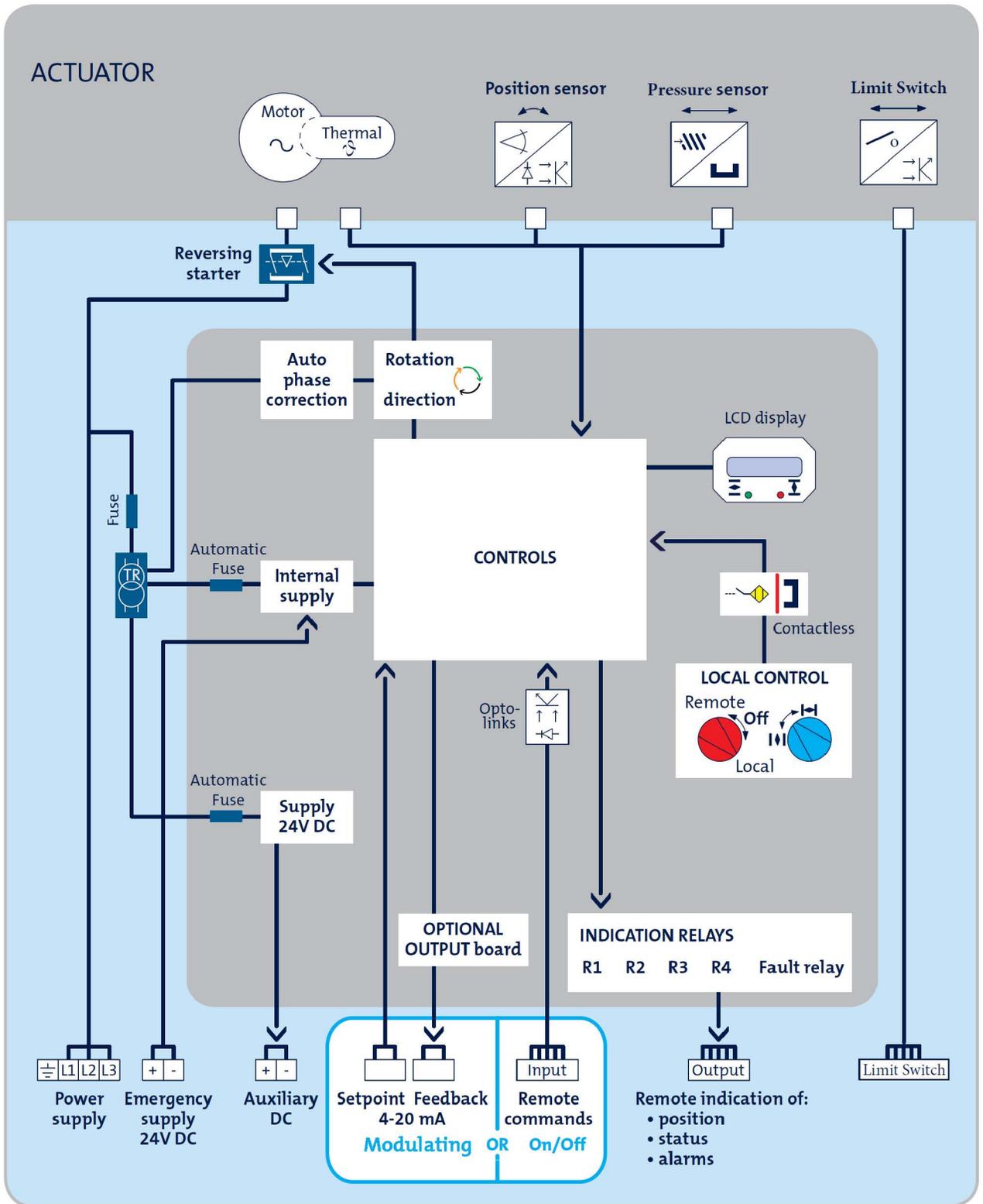
## Remote Mount

- Remote mount distance up to 50 m.
- IP67 remote mount unit.
- Ideal for extreme environments and harsh conditions - high temperature, vibration, frequency and difficult to reach location.
- Shielded cable and circular connector ensures better connectivity and integrity.

## Non-Intrusive

- ROTEX EHF series actuator can be setup non-intrusively.
- Infrared communication - Intelli+® offers the possibility to communicate with a standard laptop through an infra-red link with INTELLI-KIT or INTELLIPOCKET.
- Bluetooth communication (option) - Bluetooth technology which uses radio signals to communicate between the PC

# Control Layout



## Partial Stroke Test

Partial stroke test (PST) is a method to check, detect and ensure availability of safety function on demand. PST physically moves the valve to a predefined position, without affecting or disturbing the current process requirement.

Partial stroke test can prevent unexpected failure of safety function and provides information on current health status of valve and actuator.

### Partial Stroke test can be initiated through -

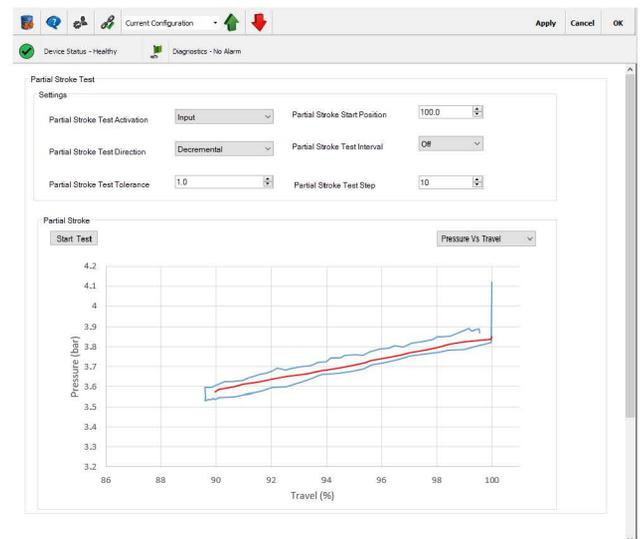
- Handheld
- Remote push button or binary input
- DTM / EDD using asset management system
- Pre-defined configured time interval

**ROTEX EHY series actuator has safety or demand as priority. Any other demands override the test.**

**Test will be aborted and returned to normal operation in case of:**

- Partial stroke fails
- Push button is held >5 seconds
- Safety DEMAND occurs

**Partial stroke test results can be saved and compared over the course of time.**



## Diagnostics

- Logical trend and histogram
- Diagnostics with errors and recommendation
- Alarm based on different threshold.
- On screen notification up to last 3 alarms or errors
- Online Monitoring

### DIAGNOSTICS CAN IDENTIFY THE FOLLOWING ISSUES -

#### Valve faults

- Valve Clogging
- Valve seat or valve build-ups
- Seat erosion
- Increase in friction
- Valve tightness

#### Device failure

- Electronics failure
- Pressure sensor failure
- Feedback sensor failure

#### Actuator faults

- Friction
- Spring failure
- Leakage thru bush, diaphragm, seals, covers, connections

#### External fault

- Unexpected change in supply pressure, (sudden drop or increase)
- Change in rate of flow or change in  $\Delta P$  across the valve

- Monitoring parameter can be configured with three different threshold levels.
- Each threshold level can be classified based on severity and generates a digital feedback signal, once triggered.
- Colour code represents nature of severity. (can be communicated on Hart to control system)  
This enables users to take necessary preventive action.



No Events



Primary - Maintenance Required



Secondary - Maintenance Demanded



Tertiary – immediate maintenance or repair needed

## Communication

The fieldbus, present on a large number of installations, is used more and more to communicate information and commands with multiple actuators and devices wired in series on a single pair of wires. Thus, the number of information available from each actuator can be multiplied while reducing the overall cost of wiring on the site.

ROTEX EHF series actuators can be connected to most of the standard fieldbus available on the market:

- PROFIBUS DP
- FOUNDATION FIELDBUS
- MODBUS RTU
- HART
- Other fieldbus on demand.



For more security, redundant fieldbus ensures continuous operation, even in case of a bus line disruption. Indeed, all elements of the bus line (bus controller, lines, actuators interfaces) are doubled.

Open versus Proprietary systems:

Two physical concepts of fieldbus are available from various providers.

- The «Proprietary» so-called system: This is a technology designed by a device manufacturer for his own needs. A «Proprietary» system not only includes the actuators with the specific bus interface, but also the bus controller located at the line head-end. Only the products proposed by the bus controller manufacturer can be installed on the bus.
- «Open» systems: One using standard international fieldbuses so various manufacturers can supply compatible controllers and interfaces. This type of technology is proven, reliable and offers fast response time.

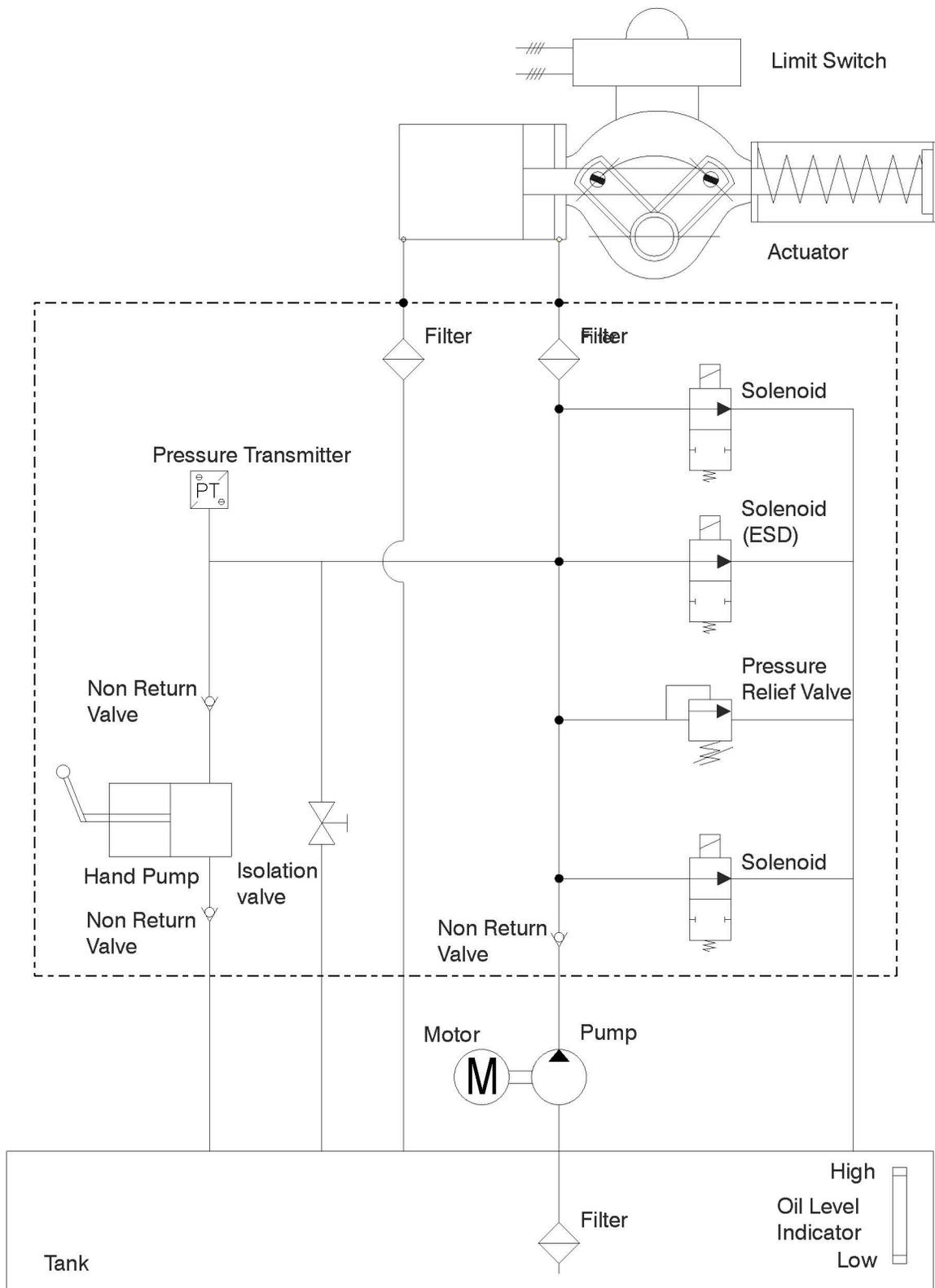
## Communication

ROTEX in collaboration with BERNARD CONTROLS chooses the «open» system for all its fieldbus solutions.

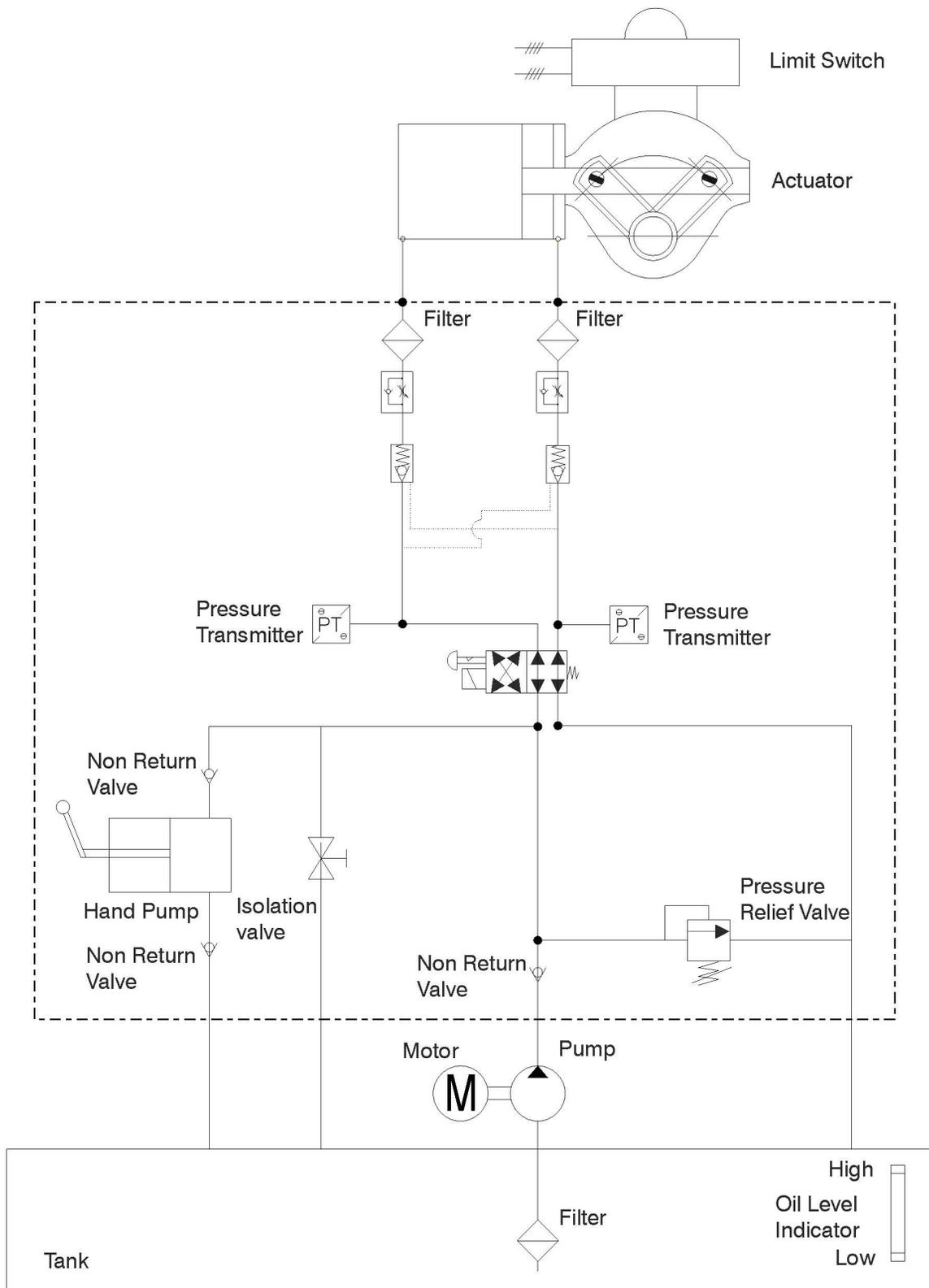


- Based on robust PLC technology and open fieldbus protocol
- Up to 120 actuators and 10km distance
- Fast response time. Standard scan time 1 to 3 s whatever the distance and number of actuators connected
- 1 to 3 lines starts
- Simple or redundant configurations
- Overall start up time reduced to the minimum

## Schematics



# Schematics



## Technical Specifications

TORQUE RANGE	Torque	25 to 6,00,000 Nm for rotary and 1.2 to 8000 kN force for linear actuator
ENCLOSURE PROTECTION	Construction	Casting: Cast Aluminium Actuator: Refer DRS Series Actuator Catalogue
	Ingress Protection	IP68 10m / 96h
	Controls location	As standard, the controls are integral to the actuator On option, the Controller can be mounted in a separated box (maximum distance between actuator and controls = 50m)
	Explosion proof ATEX	ATEX Directive 94/9/EC - CENELEC EN 60079-0, EN60079-1, EN13463 As standard: Ex d II B T4 (option T5 or T6) and Ex tb IIIC T135°C (option T100°C, T85°C) On request: Ex d II C T4 (option T5 or T6)
	Explosion proof IEC Ex	IEC Ex - standard IEC 60079-0, IEC60079-1, EN13463 As standard: Ex d II B T4 (option T5 or T6) and Ex tb IIIC T135°C (option T100°C, T85°C) On request: Ex d II C T4 (option T5 or T6)
	Ambient temperature operating range	<ul style="list-style-type: none"> <li>• IIB standard: -20 ... +70°C</li> <li>• IIB low temperature option: -60 ... +70°C</li> <li>• IIC option: -20 ... +70°C</li> </ul>
	External corrosion protection	Standard paint system: polyuréthane paint RAL3020 complying with ISO 12944 (C5) Optional special anti-corrosion protection for marine, aggressive or abrasive atmospheres All cover fasteners captive and stainless
	Double sealing Protection	The control section of the actuator is totally isolated from the terminal compartment to protect electronic components
MOTOR	Motor technology	<ul style="list-style-type: none"> <li>• Single &amp; three-phase TENV type, totally enclosed non ventilated squirrel cage motors, Class F insulated with Integral thermal overload protection</li> <li>• Class F insulated, DC motor with Integral thermal overload protection</li> <li>• Easy to remove with sealed ball bearings fitted at front and rear</li> </ul>
	Motor duty rating	S4 motor service (intermittent service on start-up) to IEC 34-1 <ul style="list-style-type: none"> <li>• S4 - 30% for On/Off operation - up to 360 starts per hour</li> <li>• S4 - 30% for Inching/Positioning - up to 360 starts per hour</li> <li>• S4 - 50% for Modulating class III - up to 1,200 starts per hour</li> </ul>

## Technical Specifications

MECHANICAL SPECIFICATIONS	Manual override	Hydraulic Handpump
	Vibration Resistance	1g (9.8 m/s <sup>2</sup> ) at 10-500 Hz (Contact our marketing dept. for higher vibration levels)
	Lubrication	Actuators are lubricated for product lifetime and do not require any specific periodic maintenance
ELECTRICAL SPECIFICATIONS	Power Supply	The actuators can operate on a wide variety of power supplies: <ul style="list-style-type: none"> <li>• Single-phase: 110, 120 &amp; 230 V - 50/60 Hz</li> <li>• Three-phase: 380, 400, 415, 440, 480, 575, 690 V - 50/60 Hz</li> <li>• DC: 24V</li> <li>• Voltage tolerance: ±10%; Applies for rated torque performance; duty cycle and speed is not guaranteed</li> <li>• Frequency tolerance: ±5%; Applies for rated torque performance; duty cycle and speed is not guaranteed</li> <li>• Maximum starting volt drop: -15%; Actuators capable of starting and running up to speed</li> </ul>
	Cable Entries	Standard configuration: <ul style="list-style-type: none"> <li>• power &amp; signal : 1"1/2 NPT + 2x1"NPT</li> <li>• fieldbus : up to 4x3/4"NPT</li> </ul> Other configurations available on request: plugs, adaptors, ISO thread
	Electrical connection	Ring tongue terminals Internal and external ground rod
	Fuse protection	Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer board Two automatic fuses for low voltages
POSITION AND PRESSURE SENSORS	Position	<ul style="list-style-type: none"> <li>• <b>Contactless sensor</b></li> <li>• <b>Potentiometer (optional)</b></li> </ul>
	Pressure	Pressure measured by piezoresistive pressure sensors based on ceramic

## Technical Specifications

CONTROLS	Power circuit	Integral motor reversing starters (electromagnetic contactors for On-Off, Inching/Positioning, Modulating Class III)
	Display	Back-lit graphics display with a choice of 9 different languages
	On-off remote Control (Hardwired Control)	Command by <ul style="list-style-type: none"> <li>voltage: 10 to 250 V DC/AC (current: 10 mA at 24V)</li> <li>dry contact (use Controller auxiliary 24 VDC supply) Isolated by opto-couplers</li> </ul> Minimum pulse duration: 100ms
	Signaling relays	4 relays: each information can be freely selected <ul style="list-style-type: none"> <li>Contact configuration : normally open or normally closed</li> <li>Minimum current 10mA at 5V</li> <li>Maximum current 5A at 250V AC or 5A at 30VDC (resistive load)</li> </ul> Additional 3 relays board on option
	Fault relay	<ul style="list-style-type: none"> <li>Normally closed &amp; energized SPDT contact</li> <li>Minimum current 10mA at 5V</li> <li>Maximum current 5A at 250V AC or 5A at 30V DC (resistive load)</li> </ul>
	Analogue Control	Input (setpoint) and output (feedback) signals are fully isolated from each other Signal configurations (selectable): <ul style="list-style-type: none"> <li>Input signal: 4-20 mA - output signal: 4-20mA</li> <li>Input signal: 0-20 mA - output signal: 0-20mA</li> <li>Input signal: 0-10 V - output signal: 0-20mA (0-10V with an external resistance)</li> </ul> Analogue inputs: <ul style="list-style-type: none"> <li>in current: impedance of 160 Ohms</li> <li>in voltage: impedance of 11 KOhms</li> </ul> Analogue outputs: <ul style="list-style-type: none"> <li>in current: maximum acceptable load of 750 Ohms at 24 VDC supply</li> <li>In voltage: minimum acceptable load of 50 KOhms (with a shunt resistance of 500 Ohms)</li> </ul>
	Transmitter (option)	Proportional position (0/4-20 mA) and Pressure (4-20 mA) feedback board
	Limit Switches	<ul style="list-style-type: none"> <li>4 Mechanical Limit Switch (SPDT): 120/230 VAC or 30 VDC</li> <li>Proximity Limit Switch NO/NC (Optional): 5-60 VDC</li> </ul>
	Signaling continuity (option)	Allows to use the display and update the open and closed position information (through the signaling relays or Profibus DP) in case of lack of power supply
	Fire protection (option)	<b>30 minutes at 1,000°C</b> <b>Tested to UL1709 criteria</b>

## Technical Specifications

SETTINGS	Settings	Non-Intrusive. All actuator settings and parameters are stored in a non-volatile EEPROM memory. Protection by password. Can be done by local command, infrared link or optional bluetooth link (For a good safety level, bluetooth link is limited at 10m)
	Local selectors	The Controller can be fully set via its local display and selectors Does not require any specific setting tool
	INTELLI+ KIT (option)	<ul style="list-style-type: none"> <li>• INTELLI+ SOFT CD-ROM for laptop PC</li> <li>• Infrared module to connect to the laptop (USB) and clip on the actuator window</li> </ul> From update 3.00, INTELLI+ SOFT is also able to manage bluetooth link with advanced torque recordings
	INTELLI+ Pocket (option)	Industrial pocket PC (PDA) <ul style="list-style-type: none"> <li>• Protection: IP65 (option: ATEX II2G EEx ia IICT4)</li> <li>• Shock resistance: 1.2 m (on concrete)</li> <li>• Communication:               <ul style="list-style-type: none"> <li>- with INTELLI+ : Infrared link (40 cm maximum distance)</li> <li>- with PC: bluetooth, IRDA, Wifi (802.11b) as a standard</li> </ul> </li> <li>• Optional USB station.</li> <li>• Operating system: Windows Mobile 2005, 64Mb RAM + 256Mb storage card</li> </ul>
FIELD BUS CONTROLS	Profibus DPV1 (option)	<ul style="list-style-type: none"> <li>• PROFIBUS-DPV1 - RS 485</li> <li>• Baud rate: 9.6 kbit/s up to 1.5 Mbit/s (autodetection)</li> <li>• Communication protocol: PROFIBUS DPV1 slave-cyclic &amp; acyclic</li> <li>• Type of connection: single line (standard) or redundant line (option)</li> <li>• Cable specification: Profibus certified cable only</li> <li>• Line connection without repeater               <ul style="list-style-type: none"> <li>- Actuators per line: 31 max.</li> <li>- Line length: 1.2 km max. (0.75 mi)</li> </ul> </li> <li>• Line connection with repeaters               <ul style="list-style-type: none"> <li>- Number of repeaters per line: 9 max</li> <li>- 30 actuators and 1 Km max. per segment .</li> <li>- Number of actuators per line with repeater: 124 maximum</li> <li>- Line length with 9 repeaters: 10.2 km max. (6.2 mi)</li> </ul> </li> <li>• Scan speed (30 units &amp; 1.2 km): 0.1s (at a baud rate of 93.75 Kbit/s)</li> <li>• Power supply: internal and isolated via INTELLI+®. Optional signaling battery or 24VDC external backup supply update the open and closed position information in case of loss of power supply</li> <li>• Technical approval: operability approved by PNO (Profibus Nutzer Organisation)</li> </ul>

## Technical Specifications

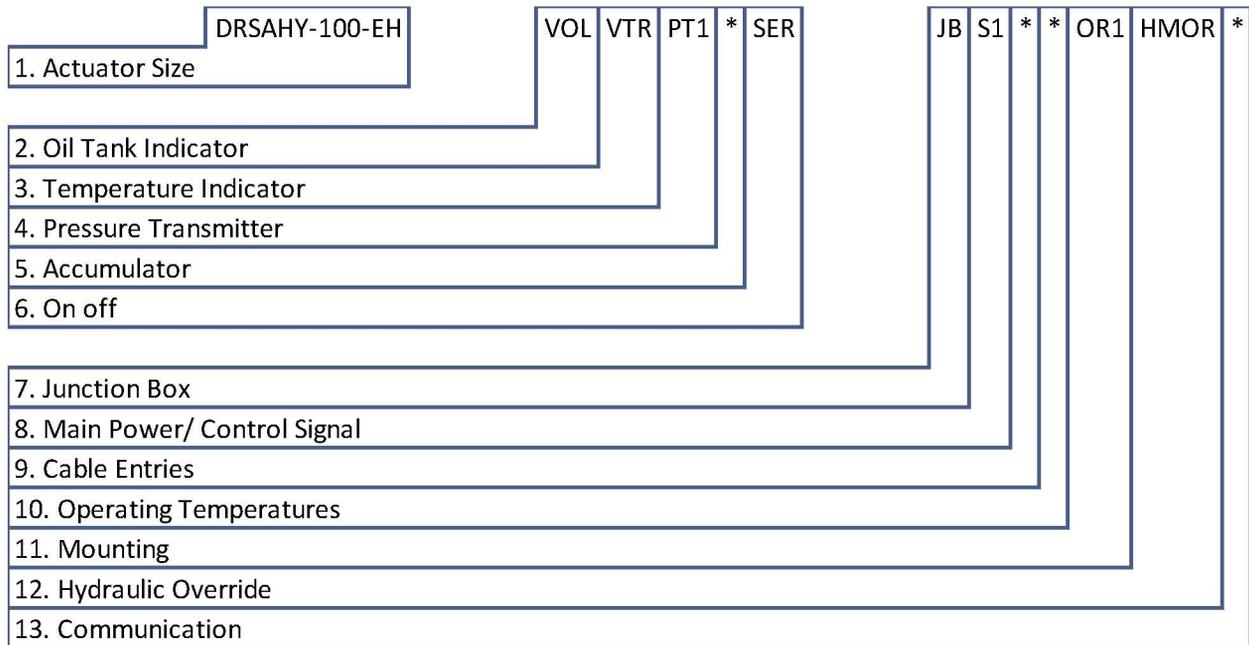
<b>FIELD BUS CONTROLS</b>	Modbus (option)	<ul style="list-style-type: none"> <li>• MODBUS RTU - RS 485</li> <li>• Transmission medium: 1 shielded pair cable</li> <li>• Functions: Half Duplex, asynchronous mode, multidrop</li> <li>• Baud rate: 1.2k to 115 Kbit/s</li> <li>• Format: 8 data bits, 1 stop bit, no parity</li> <li>• Communication protocol: Modbus (slave)</li> <li>• Modbus address: configurable by the actuator menu</li> </ul>
	Foundation Fieldbus (option)	<ul style="list-style-type: none"> <li>• H1 speed = 31.25kBit/s</li> <li>• Fully compliant with fieldbus standard IEC 61158</li> <li>• Physical layer: IEC 61158-2, 2 wires communication</li> <li>• Current consumption: 20mA</li> <li>• Operating voltage: 9 to 32 VDC</li> <li>• Cable specification: Type A (for example: 3076F Belden)</li> <li>• Line connection               <ul style="list-style-type: none"> <li>- Actuators per line without repeater: 31 max.</li> <li>- Line length without repeater: 1.9 km max. (1.2 mi)</li> <li>- Number of repeaters per line: 4 max.</li> <li>- Maximum number of actuators and line length depends on consumption available</li> </ul> </li> <li>• Technical approval: Foundation tested. Several DCS manufacturer operability checked.</li> </ul>
	Hart (option)	<p>Interface: HART, 4-20mA current, FSK modulation</p> <p>Transfer speed: 1.2 kbit/s</p> <p>Protocol: HART 7.4</p> <p>Impedance: 250 Ohms</p> <p>Power consumption: Internal by Intelli+ transformer, External power supply for 4-20mA loop only</p> <p>Actuator configuration: Available through EDD file</p> <p>Connection line: Point-to-Point or Multi-drop</p> <p>Technical approval: approved by Hart Communication Foundation</p>

## Dimensional Drawing

For dimensional drawing and other technical details, contact ROTEX.



## Ordering Code



2 – Oil Tank Indicator	
CODE	DESCRIPTION
VOL	Visual
VTL	Transmitter (Level)

3 – Temperature Indicator	
CODE	DESCRIPTION
VOL	Visual
VTR	Oil Tank Thermocouple
VTT	Transmitter

4 – Pressure Transmitter	
CODE	DESCRIPTION
*	Nil
PT1	Pump (1unit)
PT2	Pump / SOV (2 unit)

5 – Accumulator	
CODE	DESCRIPTION
*	Nil
ACB	Bladder
ACP	Piston

6 – On / Off	
CODE	DESCRIPTION
*	On / Off
SER	Proportional (4-20mA)
SER + F	Proportional with Feedback (4-20mA)

7 – Junction Box	
CODE	DESCRIPTION
*	Nil
JB	Junction Box

8 – Main Power	
CODE	DESCRIPTION
*	220V ac
S1	110V ac
S2	240V DC

9 – Cable Entries	
CODE	DESCRIPTION
*	M25 x 1.5P
CE1	M20 x 1.5P
CE2	1/2" NPT
CE3	3/4" NPT
CE4	1" NPT

## Ordering Code

10 – Operating	
CODE	DESCRIPTION
*	-20°C to +70°C
HT1	-20°C to +125°C
LT2	-30°C to +110°C
LT3	-60°C to +110°C

11 – Mounting	
CODE	DESCRIPTION
*	Vertical stem above valve
OR1	Vertical stem below valve
OR2	Vertical stem & pipeline horizontal
OR3	Vertical stem horizontal, pipeline vertical
OR4	Vertical stem above valve with valve mounting kit
OR5	Vertical stem vertical below valve with valve mounting kit
OR6	Vertical stem & pipeline horizontal with valve mounting kit
OR7	Vertical stem horizontal, pipeline vertical with valve mounting kit

12 – Hydraulic	
CODE	DESCRIPTION
*	Nil
HMOR	Hand Pump

13 – Communication	
CODE	DESCRIPTION
*	Nil
FM	Modbus
FH	HART
FF	FOUNDATION Fieldbus
FP	PROFIBUS



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