Elektrohydraulické regulované systémy

Tlustoš Jiří Seminář CAHP 07.06. 2023

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Elektrohydraulické regulované systémy
Program semináře

09:00 – 09:10 **Úvod, zahájení semináře**

09:10 – 10:00 **Proporcionální ventily, servoventily**

- Oblasti aplikací
- Aktualní stav a trendy

Ing. Jiří Tlustoš, Bosch Rexroth spol. s r.o.

10:00 – 10:40 **Regulované systémy hydrostatického uložení**

- Uložení rotačních platforem
- Adaptivní řízení průtoku hydrostatického uložení
- Simulace nesymetrického zatěžování

Ing. Jakub Martinek, Bosch Rexroth spol. s r.o.

10:40 – 10:55 **Přestávka**

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Program semináře

10:55 – 11:35 **Proporcionální ventily s p/Q regulací**

- Kombinované řízení tlaku a průtoku v uzavřené smyčce
- Příklady aplikací

Ing. Milan Odehnal, Atos spa

11:35 – 11:55 **Elektro-hydraulické systémy mobilní hdrauliky**

- Seznámení s portfoliem firmy
- Příklady realizovaných projektů

Ing. David Straka, Parker Hannifin Sales CEE

11:55 – 12:15 **Větrné elektrárny**

- Hydraulické řídicí systémy větrných elektráren – princip a funkce
- Pitchcontrol - proporcionální rozvaděč s digitální elektronikou a interní zpětnou vazbou

Ing. Martin Čadan, ARGO-HYTOS s.r.o.

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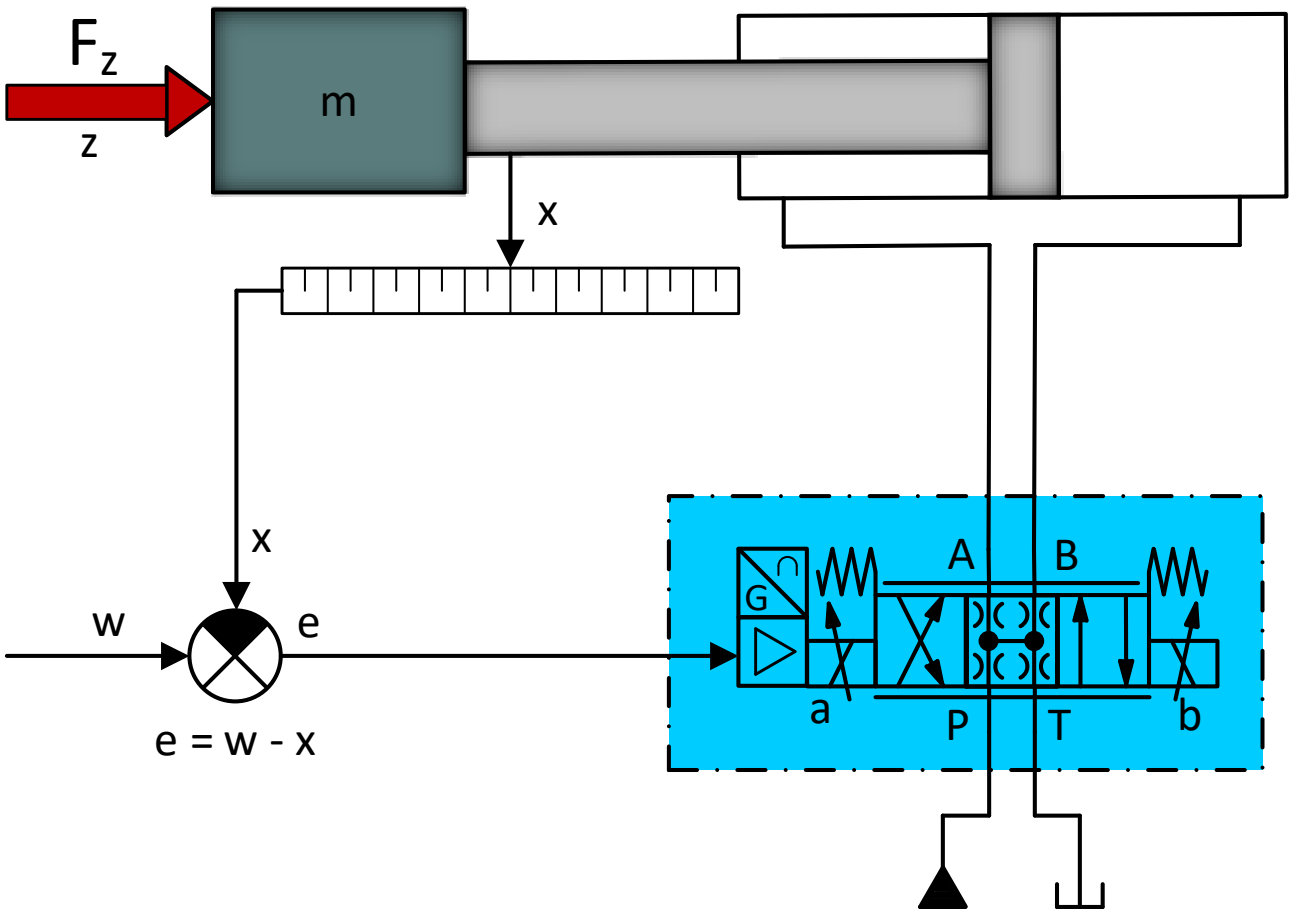
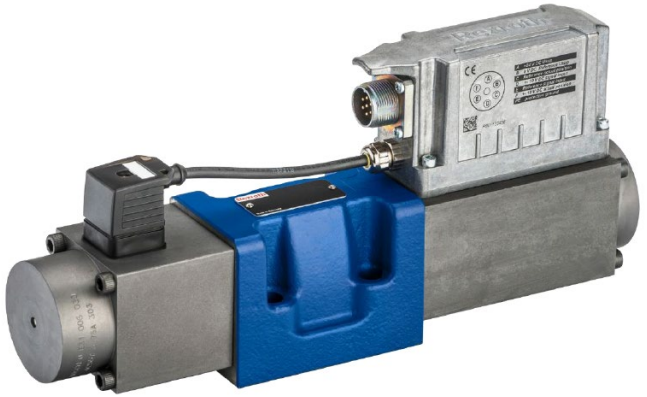
Elektrohydraulické regulované systémy
Úvod do problematiky



w – řídicí veličina
(požadovaná hodnota)
x – regulovaná veličina
(skutečná hodnota)
e – regulační odchylka
z – poruchová veličina



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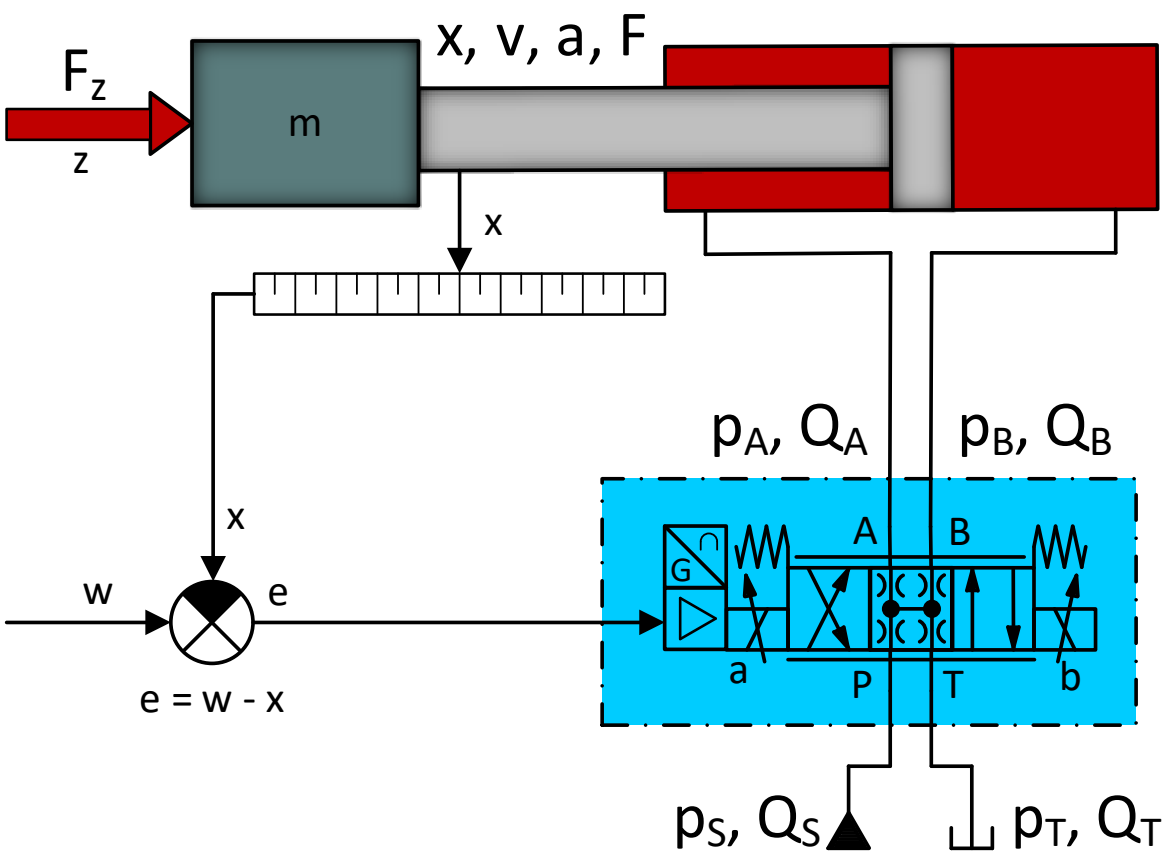
Úvod do problematiky



Výstupní parametry akčního členu:

x – poloha

v=dx/dt – rychlost

a=dv/dt – zrychlení

F=m.a

Vnitřní prametry systému:

p_A, p_B – tlaky v jednotlivých portech akčního členu

p_S – systémový tlak

p_T – tlak v odpadu

Q_A, Q_B – průtoky v jednotlivých portech akčního členu

Q_S – systémový průtok

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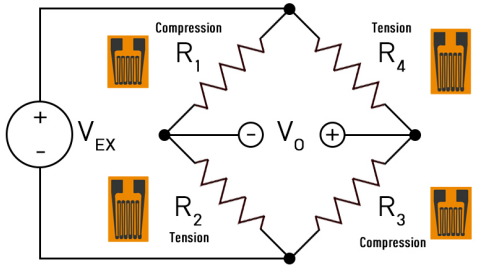
Úvod do problematiky

Polohová zpětná vazba:

Lineární snímače polohy

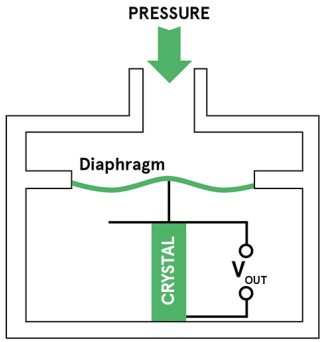
Silová zpětná vazba:

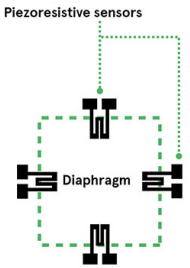
Přímé měření – snímače síly

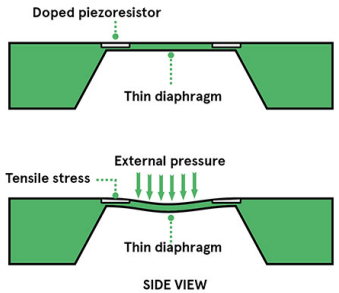


Silová zpětná vazba:

Nepřímé měření – tlakové snímače







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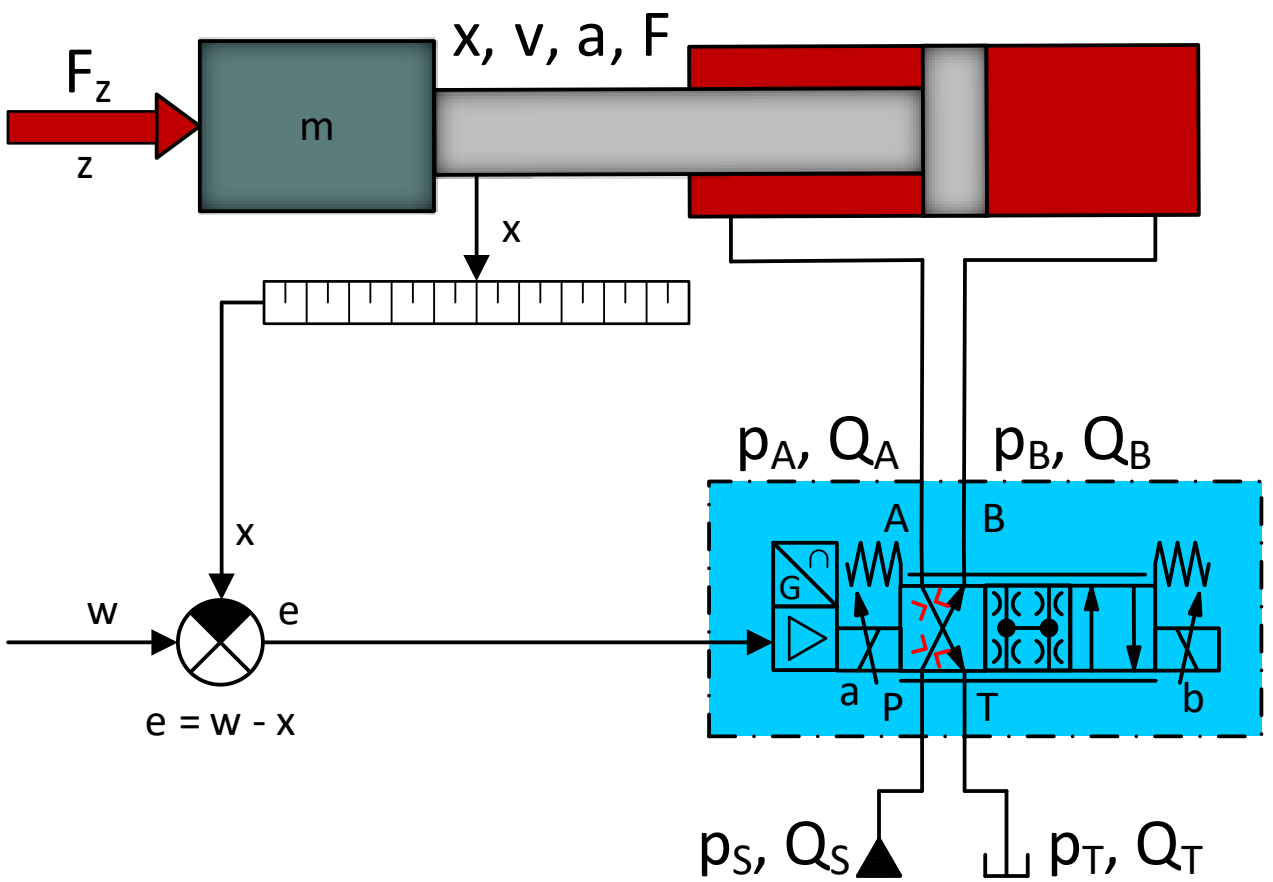
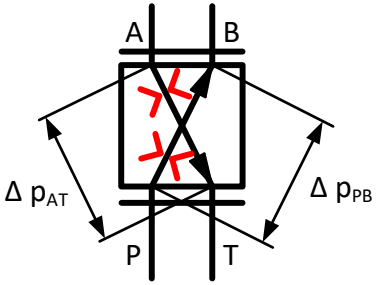
Úvod do problematiky



Tlakové ztráty na řídicích hranách šoupátka:



Pro jmenovitý průtok: Q_N se uvádí Δp pro jednu řídicí hranu 5 bar

$$Q_X = Q_N \cdot \sqrt{\frac{\Delta p_X}{5}}$$

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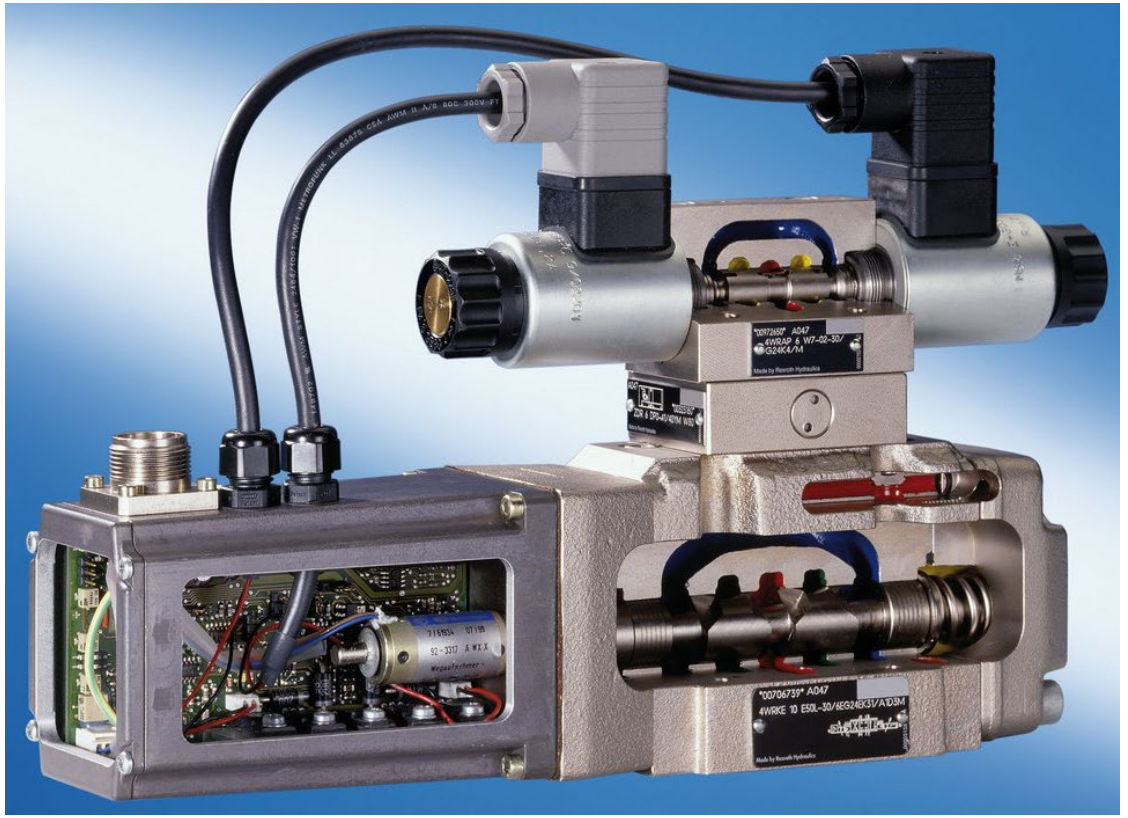
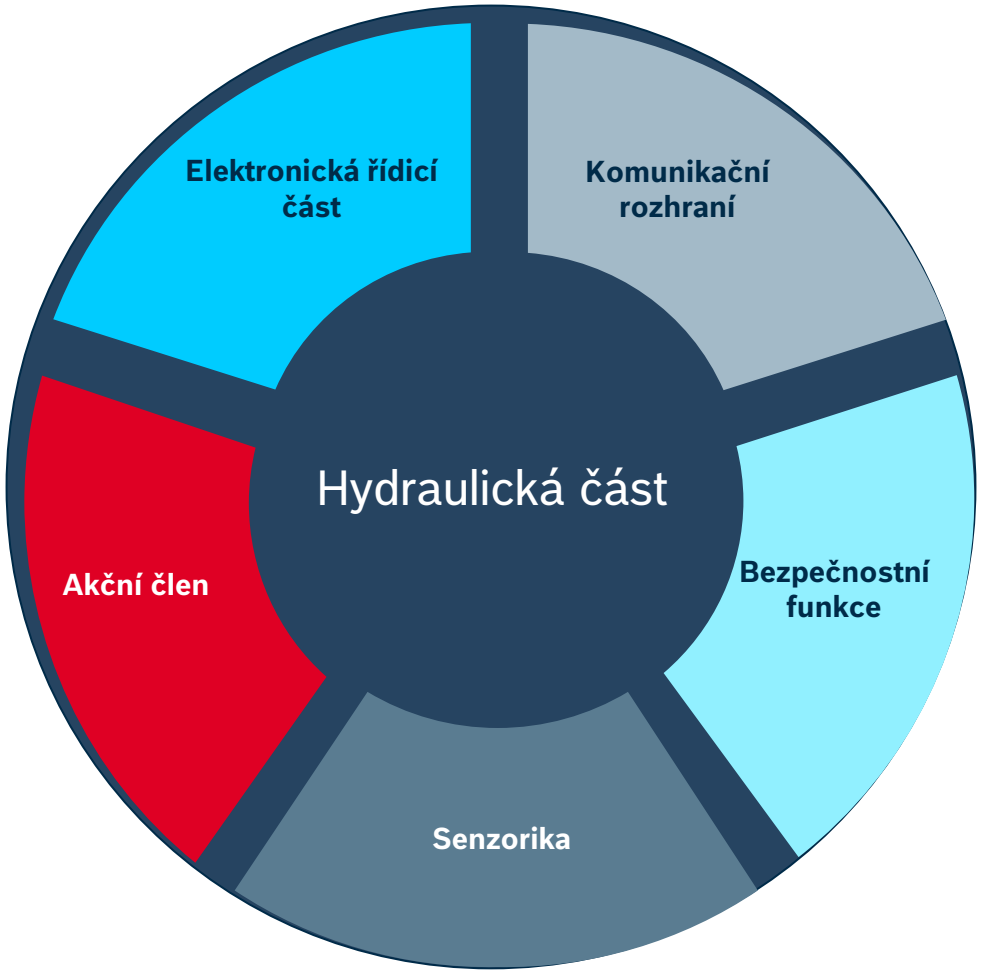
Aktualní stav a trendy

Struktura regulačního ventilu / servoventilu:





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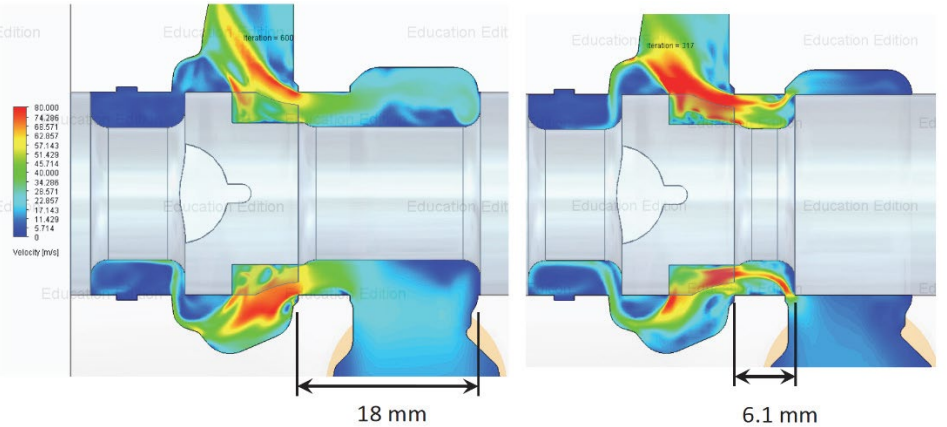
Aktualní stav a trendy

Hydraulická část regulačního ventilu / servoventilu:

- Optimalizace parametrů
- Zvýšení pracovního tlaku
- Optimalizace tvarů průtokových kanálů a šoupátek s využitím CFD
- Vysoká přesnost a opakovatelnost výroby
- Zvýšená opakovatelnost charakteristik



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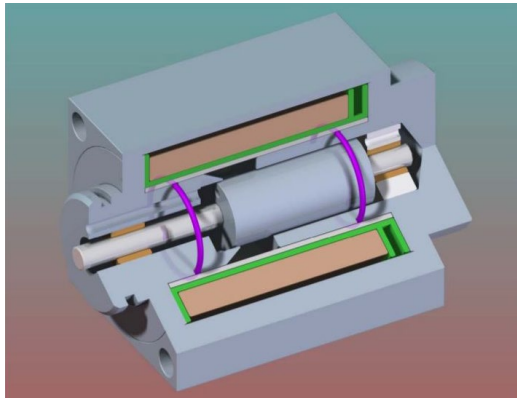
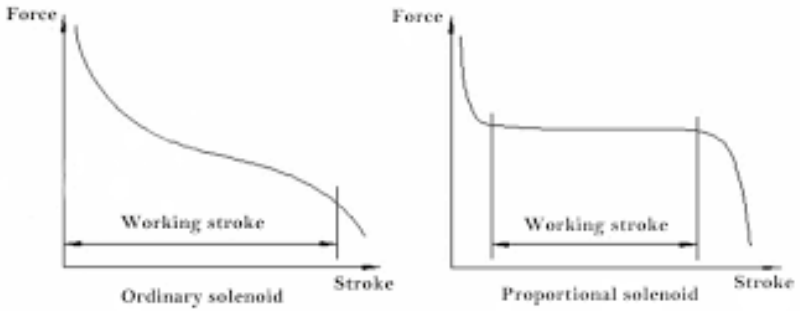
Aktualní stav a trendy

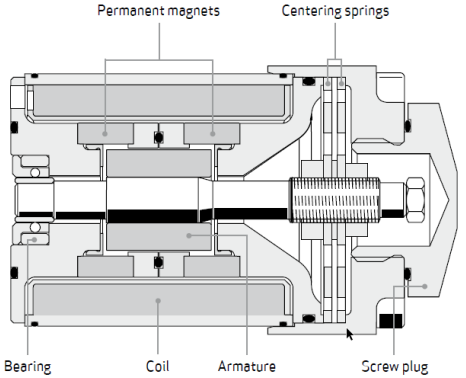
Akční členy regulačního ventilu:

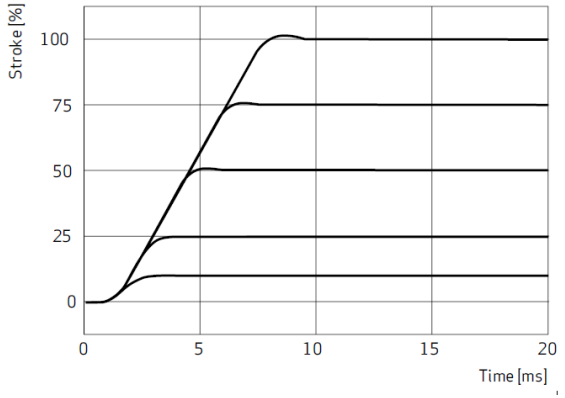
- Proporcionální elektromagnet



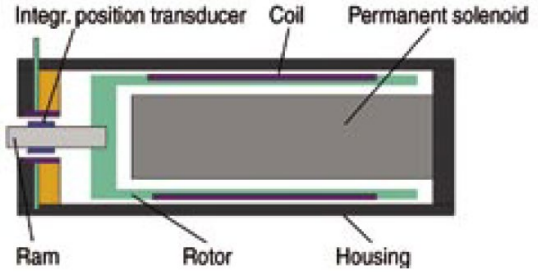


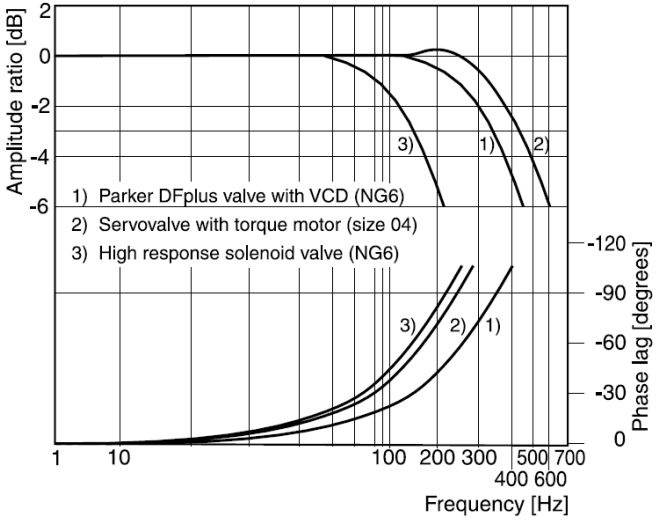
- Lineární motor





- Voice Coil Drive





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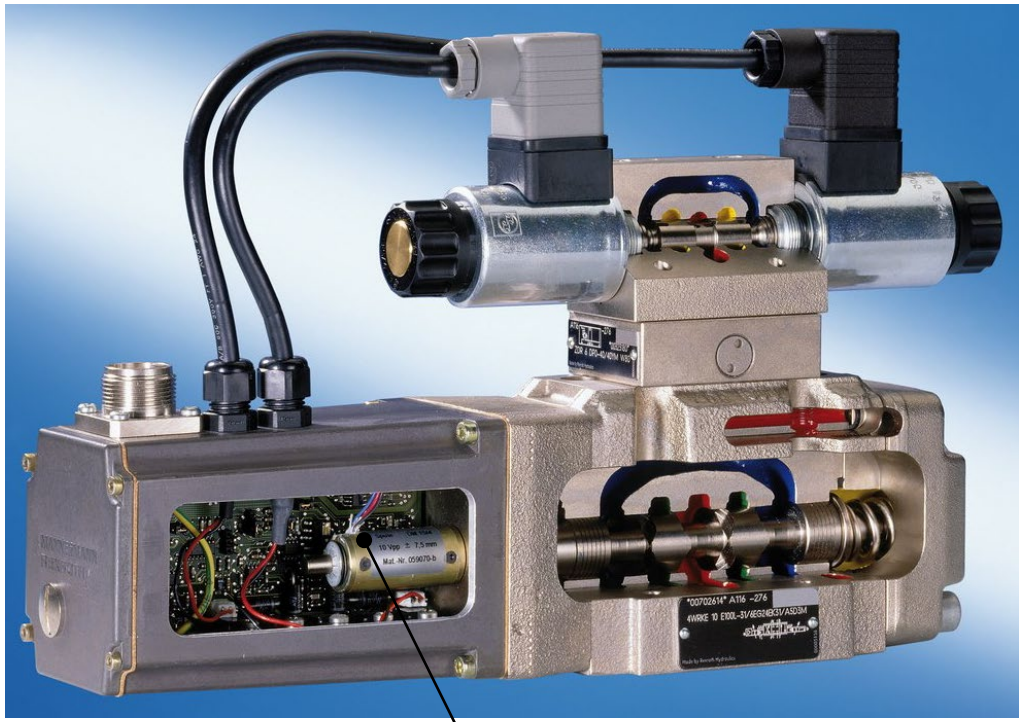
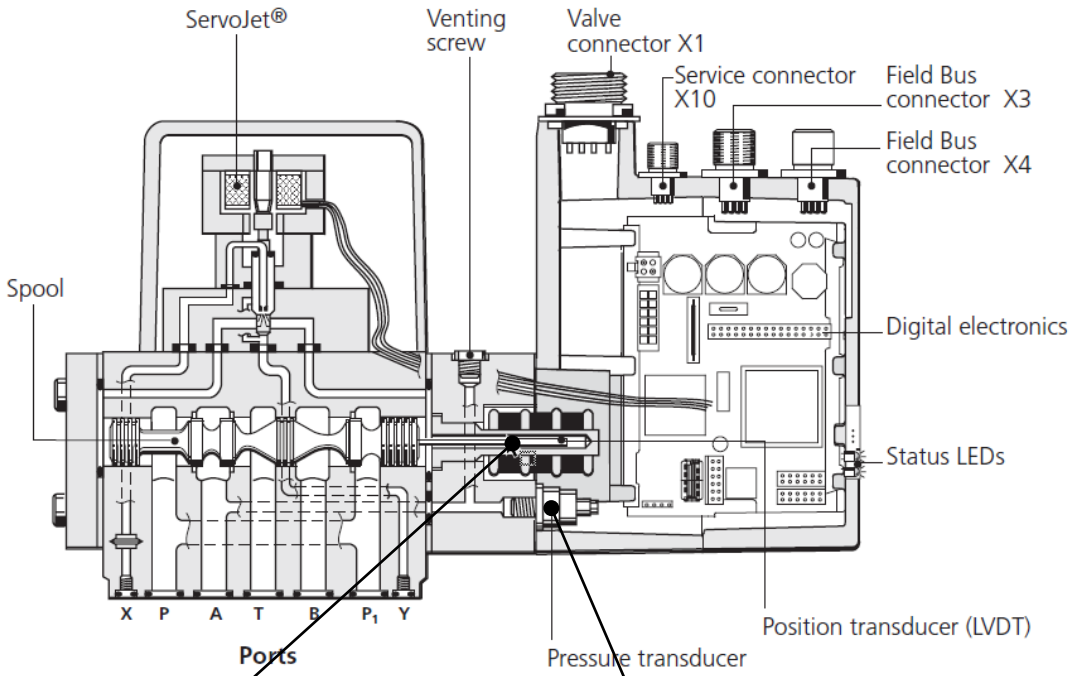
Elektrohydraulické regulované systémy

Aktualní stav a trendy

Senzorika regulačních ventilů a servoventilů:





LVDT snímač polohy šoupátka

Tlakový snímač

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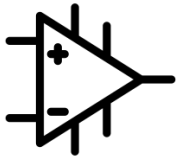
Elektrohydraulické regulované systémy

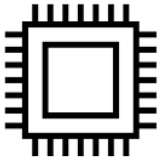
Aktualní stav a trendy

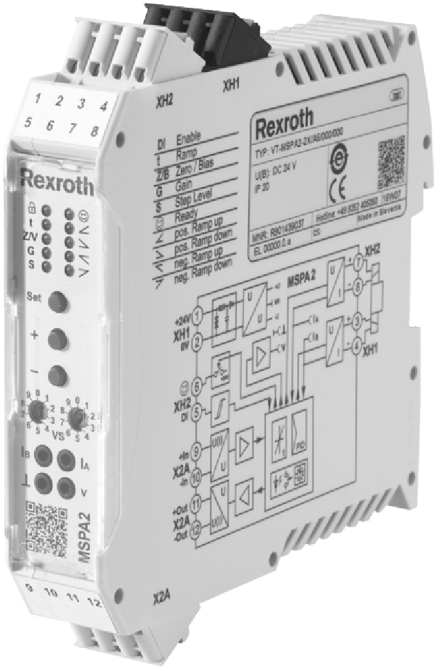
Řídicí elektronika regulačního ventilu / servoventilu:

- Analogová řídicí elektronika



- Digitální řídicí elektronika





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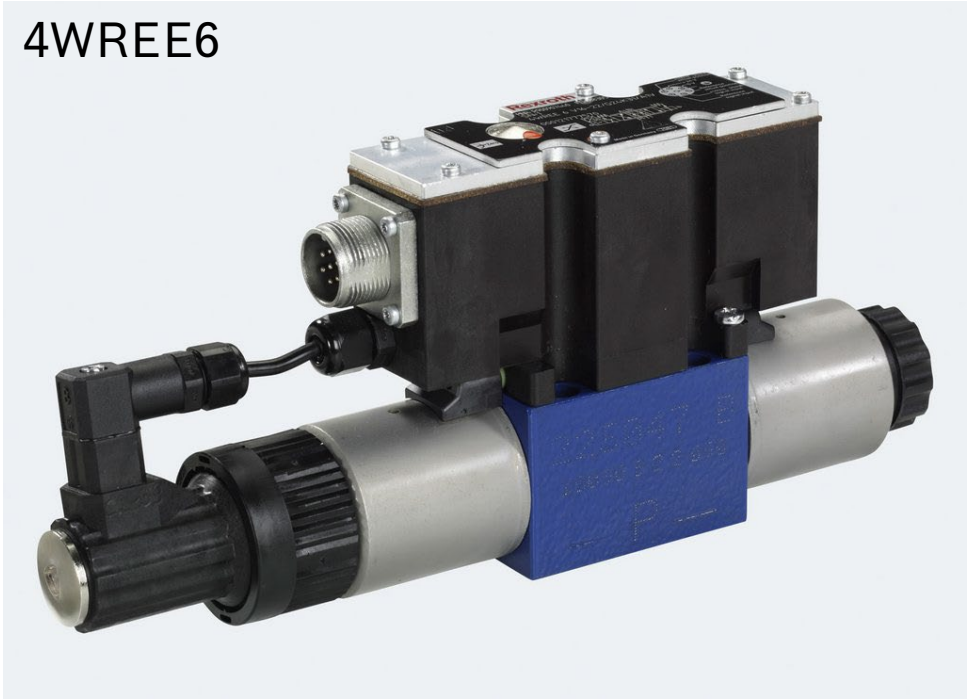
Elektrohydraulické regulované systémy

Aktualní stav a trendy

Řídicí elektronika regulačního ventilu:

- Integrovaná řídicí elektronika (OBE)



- Externí řídicí elektronika

VT-VRPD-2-2X

VT-VRPA2-1-1X

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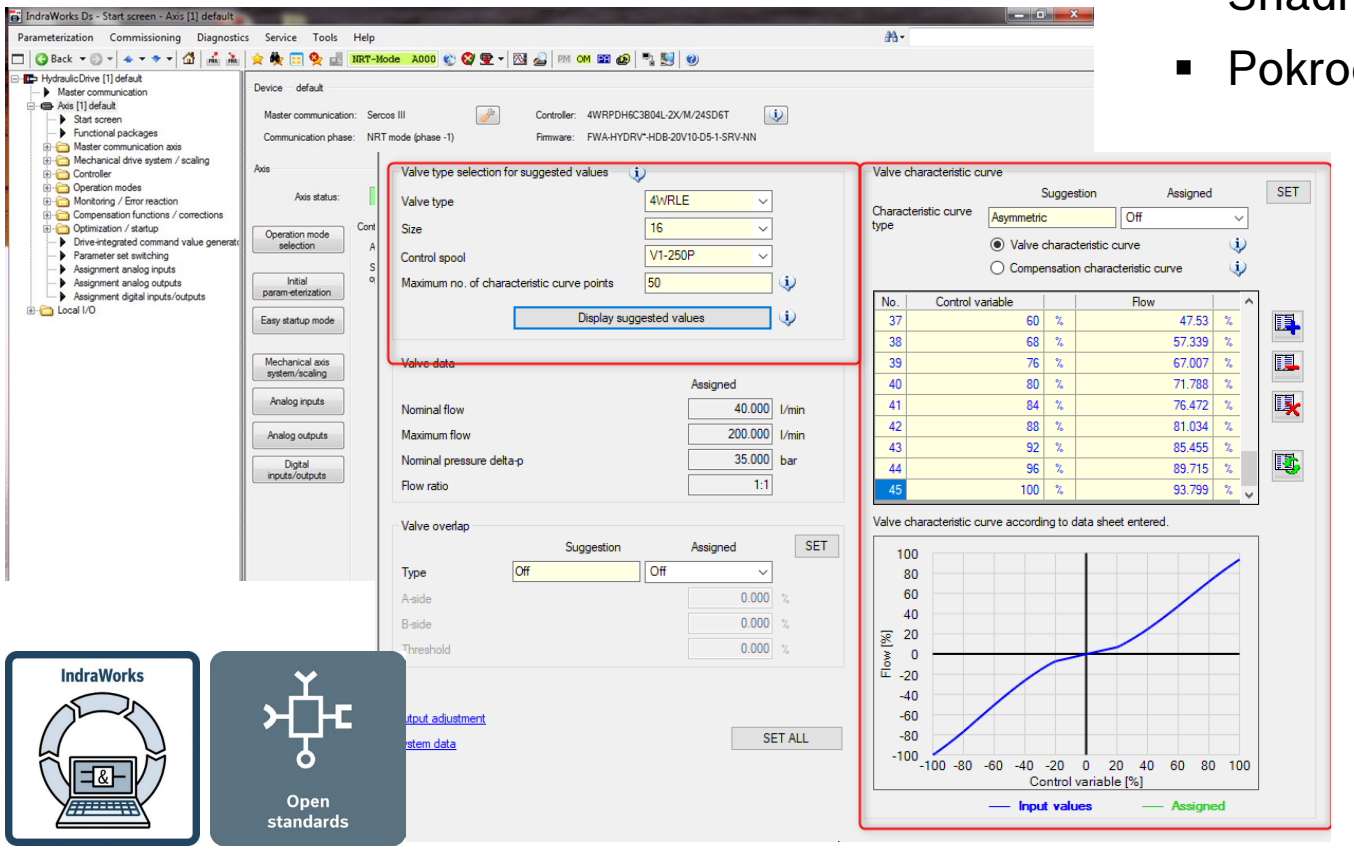
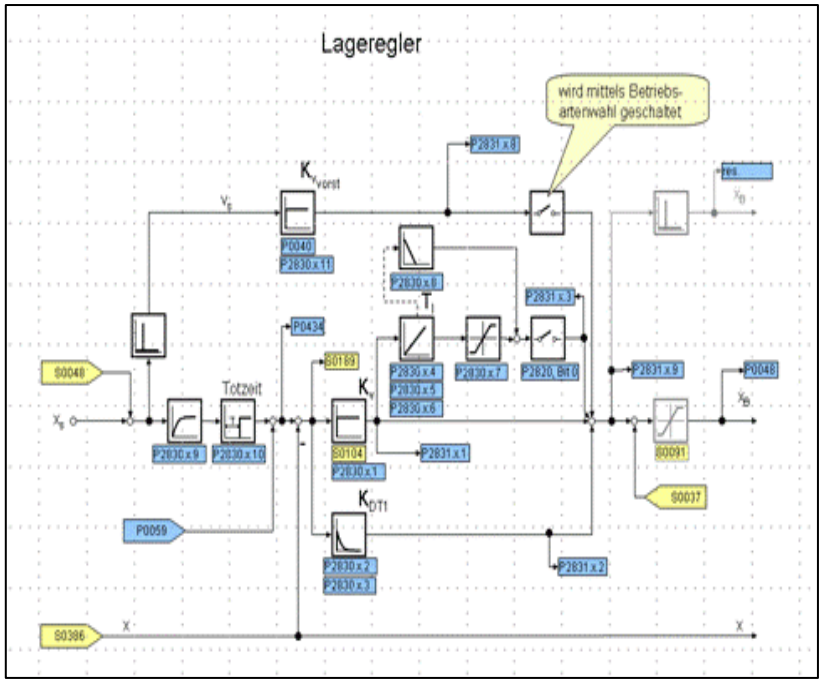
Elektrohydraulické regulované systémy

Aktualní stav a trendy

Digitální řídicí elektronika regulačních ventilů

- Snadná parametrizace
- Snadná diagnostika
- Pokročilé regulátory





IndraWorks

Open standards

Digital life-cycle management

Fast integration and flexible configuration

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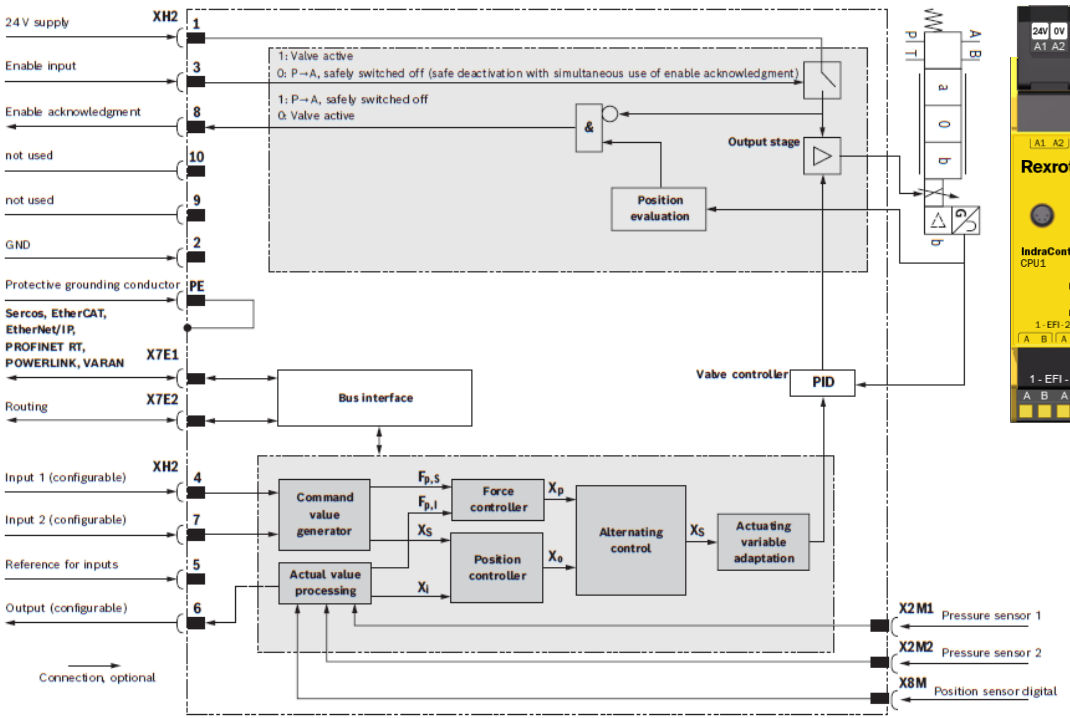
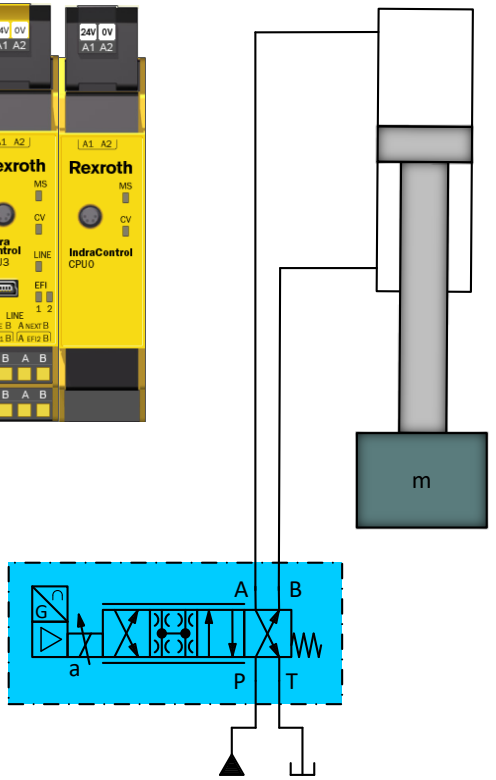
Aktualní stav a trendy

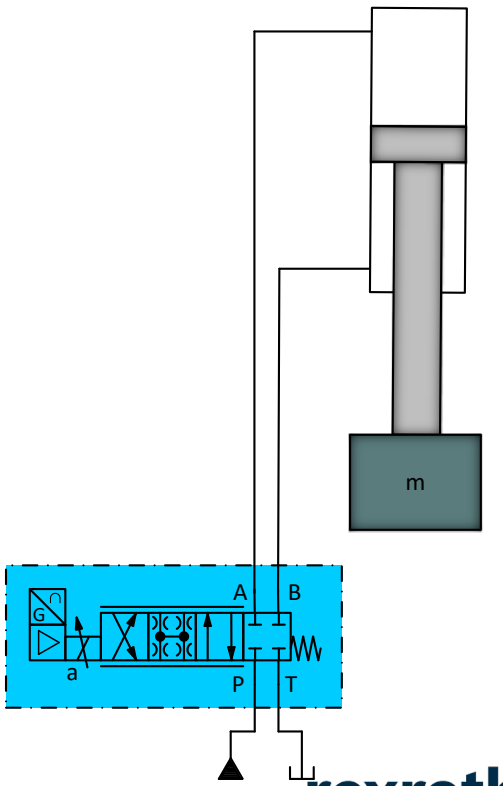
SAFETY ON BOARD

Bezpečnostní funkce „Fail-safe“ :

– Integrovaná bezpečnostní funkce (může být použita do kategorie 4/PL e podle ČSN EN 13849-1)







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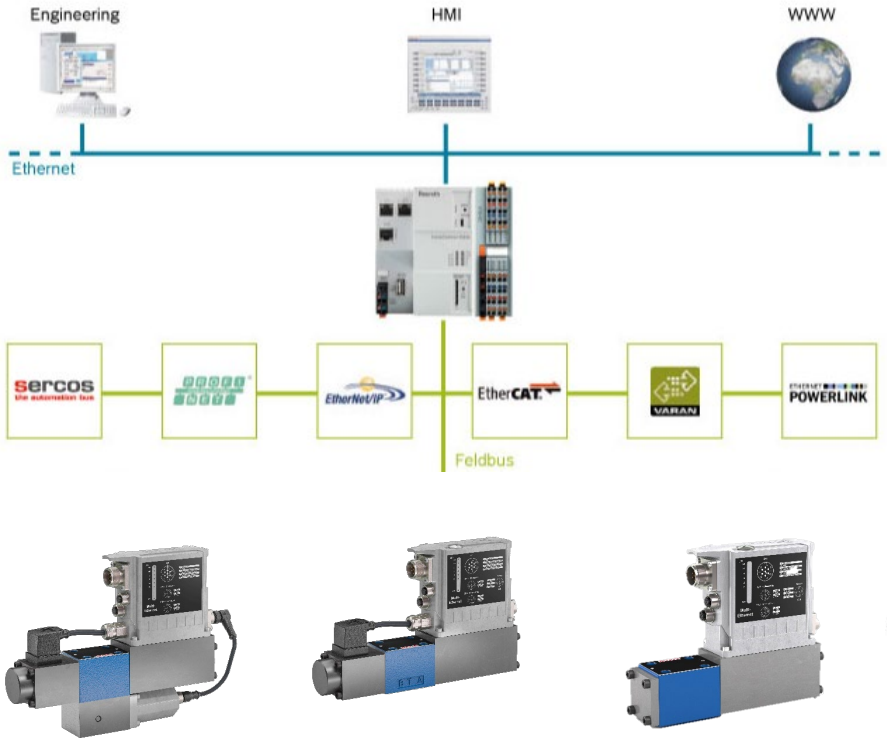
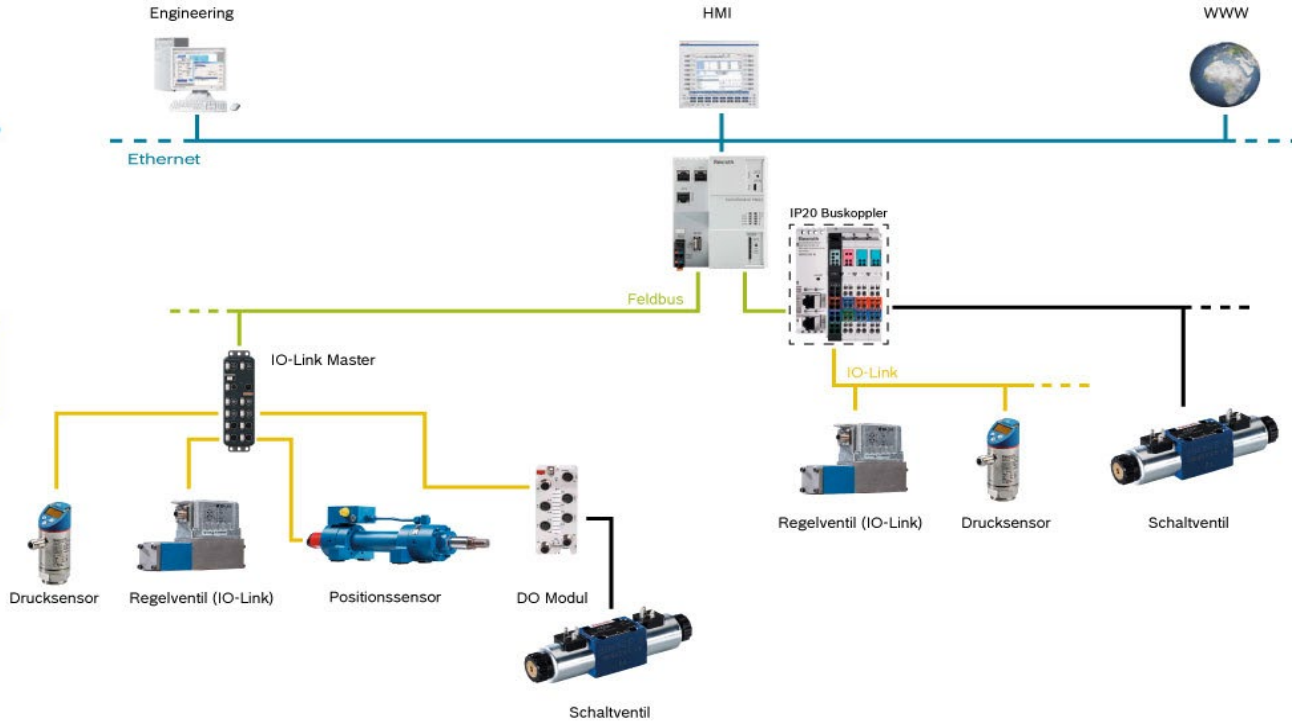
Elektrohydraulické regulované systémy
Aktualní stav a trendy

Komunikační rozhraní regulačních ventilů:

- Využití průmyslových sběrnic





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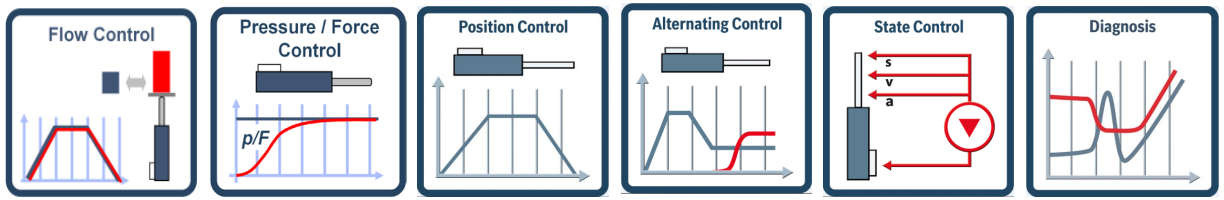
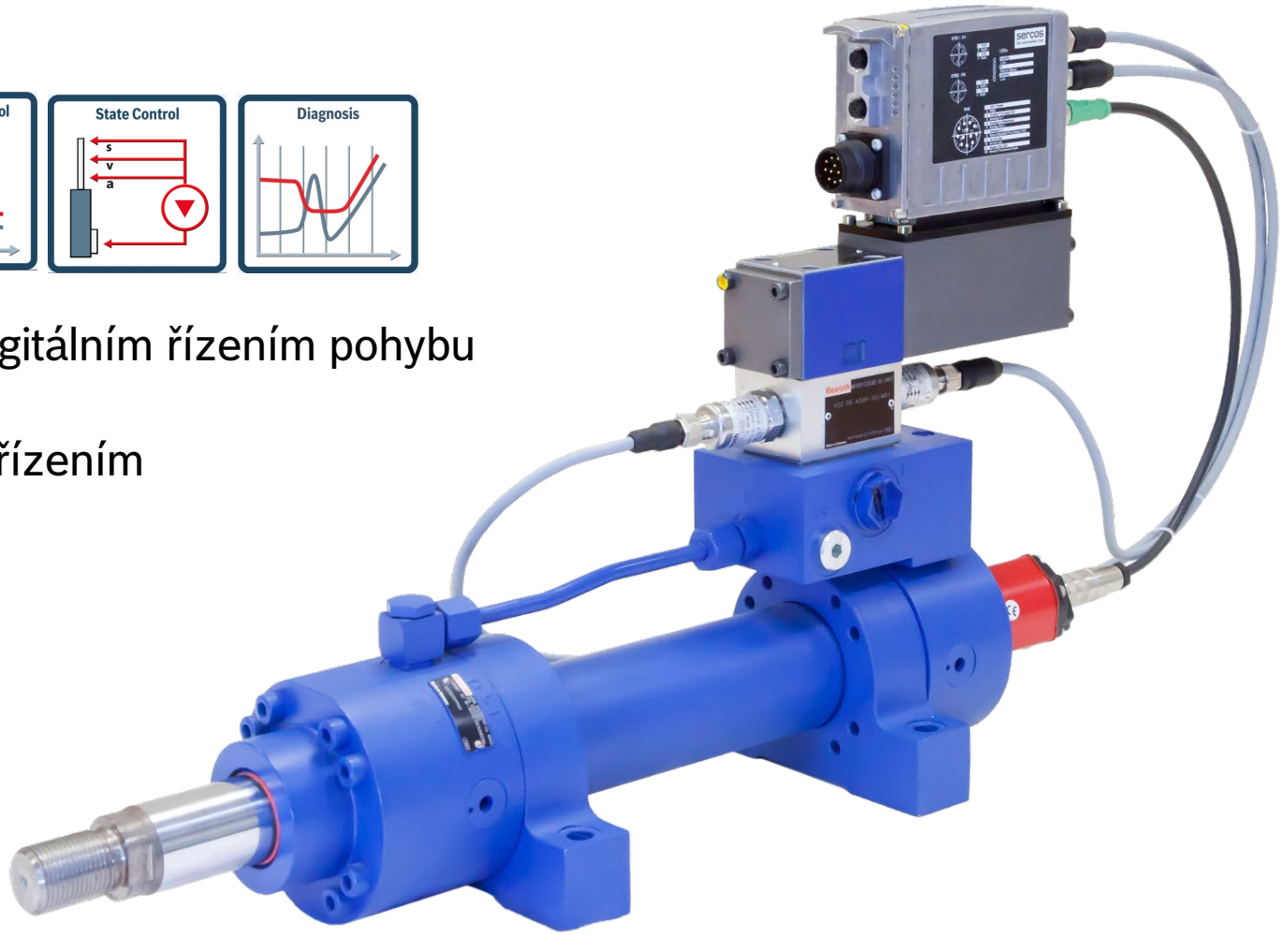
Aktualní stav a trendy



- regulační ventil s integrovaným digitálním řízením pohybu
- regulace polohy, síly, rychlosti
- kompaktní pohon s decentrálním řízením
- rozhraní Multi-Ethernet



SAFETY ON BOARD

i 4.0 CONNECTED INDUSTRY

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Connected Hydraulics
BEYOND
LIMITS