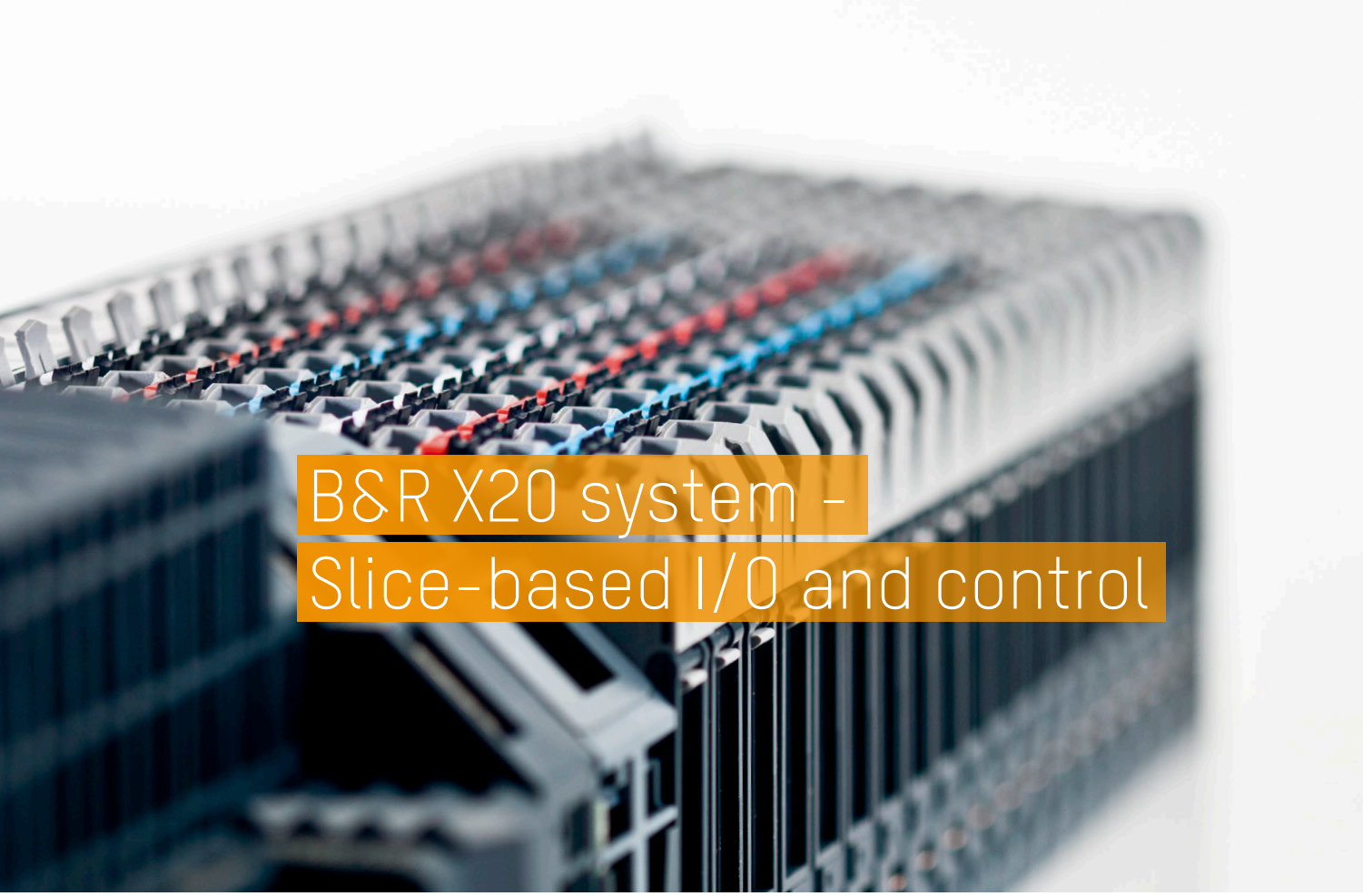
X20 I/O
System overview

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP



B&R X20 system – Slice-based I/O and control

High-speed precision of open and closed loop control for machines and systems – at an attractive price. B&R eliminates this seeming contradiction with the high degree of scalability of their control systems. This makes it possible for B&R to cover all requirements with a single platform – from the smallest controllers all the way up to CNC, robotics and process control applications. What's more, this platform can be programmed and configured – regardless of the hardware being used – with Automation Studio. This compatibility reduces development costs while at the same time protecting investments made throughout the entire life cycle of the machine.

Programmable logic controllers

With a performance range reaching all the way to Intel® Atom™ CPUs, the X20 system can handle all tasks large or small. This system is extremely compact and highly modular as a result of its unique "slice" system. Perfectly integrated fieldbus connections provide the highest degree of freedom for decentralized machine and system concepts.

Slice-based I/O and control system

There are many different slice-based I/O and control systems available on the market, but the X20 system from B&R is the only one that lives up to the motto "Perfection in Automation".

With the aim for more simple, economical and secure usage, the X20 system is an universal solution for any automated task in machine and system manufacturing.

3 x 1 = One and ultrafast

With reACTION technology, time-critical subprocesses are executed with down to 1 µs directly on the I/O module. Three subcomponents – terminal block, electronics module and bus module – come together to form this module. This modularity results in a system that combines the advantages of both rack and I/O slice systems:

- Prewiring without the module
- Hot pluggable electronics
- Extra bus slots for added options

Highlights

- Intel® Atom™ performance
- Fanless and maintenance-free
- Onboard POWERLINK
- Onboard Ethernet and USB
- Removable terminal blocks
- Hot-pluggable electronics
- 16 channels with total width of only 12.5 mm
- Open for all fieldbus systems
- Ultrafast I/O responses
- X20c

X20

Motor control

Full bridge	Half bridge	PWM motor bridge	Stepper
X20MM3332 3 full-bridge outputs 24 VDC 3 A, 5 A peak	X20MM4331 4 half-bridge outputs 24 VDC 3 A, 5 A peak	X20MM2436 2 channels 2 AB incremental encoders 24 to 39 VDC ±25% 3 A, 3.5 A peak	X20SM1426 1 full bridge for controlling stepper motors 1 ABR incremental encoder 24 VDC, 1 A 1.2 A peak
-	-	X20MM4455 4 channels 4 ABR incremental encoders 24 to 48 VDC ±25% 6 A, 10 A peak 2x 5 V encoder supply	X20SM1436-1 1 full bridge for controlling stepper motors 1 ABR incremental encoder 24 to 48 VDC ±25% 2.5 A, 3.5 A peak
		X20MM4456 4 channels 4 ABR incremental encoders 24 to 48 VDC ±25% 6 A, 10 A peak	X20SM1446-1 1 full bridge for controlling stepper motors Current reduction functionality 1 ABR incremental encoder 24 to 48 VDC ±25% 5 A, 10 A peak

Signal processing

X20CM1201	X20DS4389	X20DS1119	X20DS1319
1 AB incremental encoder 4 digital inputs channels 4 digital channels configurable as inputs or outputs 24 VDC	4 digital input channels 4 digital channels configurable as inputs or outputs 24 VDC 4 edge detection units 4x edge generation with µs precision 4x oversampling NetTime	3 digital channels configurable as inputs or outputs symmetrical 5 VDC 2 digital input channels 24 VDC 1 universal counter pair Linear movement generator SSI absolute encoder, I/O oversampling NetTime	4 digital input channels 4 digital channels configurable as inputs or outputs 24 VDC 1 universal counter pair Linear movement generator SSI absolute encoder, I/O oversampling NetTime

X20DC1073	X20DS1828	X20DS1928
SinCos encoder interface Encoder monitoring 5 VDC and GND for encoder supply NetTime	HIPERFACE encoder interface Encoder monitoring 11 VDC and GND for encoder supply NetTime	EnDat 2.1 and EnDat 2.2 encoder interface Encoder monitoring 5 VDC and GND for encoder supply NetTime

reACTION TECHNOLOGY →

	X20RT8001	X20RT8201	X20RT8202	X20RT8401	X20RT8381
Digital inputs	4x 24 VDC < 1 µs configurable software filter	4x 24 VDC < 1 µs configurable software filter	4x 24 VDC < 1 µs configurable software filter	4x 24 VDC < 1 µs configurable software filter	4x 24 VDC < 1 µs configurable software filter
Digital inputs/outputs	4x 24 VDC, 0.1 A, < 1 µs	4x 24 VDC, 0.1 A, < 1 µs	4x 24 VDC, 0.1 A, < 1 µs	4x 24 VDC, 0.1 A, < 1 µs	4x 24 VDC, 0.1 A, < 1 µs
Analog inputs	-	2x ±10 V, 12-bit 2 µs	-	1x ±10 V, 12-bit 2 µs	2x ±10 V, 12-bit 2 µs
Analog outputs	-	-	2x ±10 V, 12-bit, 2 µs	1x ±10 V, 12-bit, 2 µs	1x ±10 V, 12-bit, 2 µs

X20

Energy measurement and synchronization modules

X20CM0985-1	X20AP3111	X20AP3121[1] X20AP3122[2]	X20AP3131[1] X20AP3132[2]	X20AP3161[1] X20AP3171[2]
Energy measurement and synchronization module 5 DO, 24 VDC, source, 1-wire connections, 0,1 A nominal output current 1 DO, Relay/Changeover contact, 30 VDC/230 VAC, 1 A nominal output current 8 AI, 120 VAC/480 VAC, 16-bit 3 AI, 1 A/5 A, 16-bit	3 AI 480 VAC 4 AI 20 mA Calculates active, reactive and apparent power &energy, calculates root mean square values	3 AI 480 VAC 4 AI 1 A Calculates active, reactive and apparent power &energy, calculates root mean square values -[1] / grounding possible[2]	3 AI 480 VAC 4 AI 5 A Calculates active, reactive and apparent power & energy, calculates root mean square values -[1] / grounding possible[2]	3 AI 480 VAC 4 AI 333 mV/ / 4 AI max. 720 mV[2] Calculates active, reactive and apparent power & energy, calculates root mean square values no transformation[1] / Rogowski adjustable (mV/A)[2]

Condition monitoring

X20CM4810	X20CM4800X
Vibration measurement, Integrated data analysis (FFT), 4 AI incl. IEPE supply for sensors, 24-bit resolution, Up to 10 kHz damage frequency	Vibration measurement, Raw data for custom algorithm, 4 AI incl. IEPE supply for sensors, 24-bit resolution, Up to 25 kHz damage frequency

X20CMR010	X20CMR100	X20CMR111
Cabinet monitoring module, Integrated temperature and humidity sensor, Operating data recorder, 512 kB flash for user data	Cabinet monitoring module, Integrated temperature and humidity sensor, Operating data recorder, Integrated Technology Guard	Cabinet monitoring module Integrated temperature, humidity and acceleration sensor, Operating data recorder, 2 PT1000 inputs, 2 DI 24 V, 1 DO 24 V, 0,5 A, 512 kB flash for user data, Integrated Technology Guard

Miscellaneous

X20CM8281	X20CM8323	X20DS438A
Universal mixed module 4 DI, 24 VDC, sink, 1-wire connections, 2 event counters, gate measurement 2 DO, 24 VDC, source, 1-wire connections, 0,5 A nominal output current 1 AI, ±10 V or 0 to 20 mA / 4 to 20 mA, 12-bit or 1 AO, ±10 V or 0 to 20 mA, 12-bit	8 channels PWM output 24 VDC, sink, 1-wire connections 0,6 A nominal output current Current trace Switching time detection	4 IO-Link interfaces Each interface can be configured as a standard input or output IO-Link

Valve control 24 VDC

8 outputs	16 outputs	24 outputs
7XV108.50-11	7XV116.50-11	7XV124.50-11
7XV108.50-12	7XV116.50-12	7XV124.50-12

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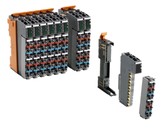

Digital inputs →

2 inputs	4 inputs	6 inputs	8 inputs	10 inputs	12 inputs	16 inputs
24 VDC						
X20DI2371 Sink, 3-wire connections	X20DI4371 Sink, 3-wire connections	X20DI6371 Sink, 1- or 2-wire connections	X20DI8371 Sink, 1-wire connections		X20DI9371 Sink, 1-wire connections	X20DIF371 Sink, 1-wire connections
X20DI2372 Source, 3-wire connections	X20DI4372 Source, 3-wire connections	X20DI6372 Source, 1- or 2-wire connections	X20DI8371 Sink, 1- or 2-wire connections		X20DI9372 Source, 1-wire connections	
X20DI2377 Sink, 3-wire connections 2 event counters, Gate measurement	X20DI4375 Sink, 3-wire connections, open line and short circuit detection	X20DI6373 Sink/source	-	-	-	
5 to 48 VDC						
-	-	-	-	X20DI0471 Sink, 1-wire connections	-	-
100 to 120 VAC						
-	-	X20DI6553 1-wire connections	-	-	-	-
100 to 240 VAC						
X20DI2653 3-wire connections	X20DI4653 2-wire connections	-	-	-	-	-
Namur						
-	X20DI4760 4 event counters Open line and short circuit detection	-	-	-	-	-

Digital outputs →

2 outputs	4 outputs	6 outputs	8 outputs	12 outputs	16 outputs
12 VDC					
-	-	-	X20DO8232 Source, 1-wire connections 2 A nominal output current	-	-
24 VDC					
X20DO2321 Sink, 3-wire connections 0.5 A nominal output current	X20DO4321 Sink, 3-wire connections 0.5 A nominal output current	X20DO6321 Sink, 1- or 2-wire connections 0.5 A nominal output current	X20DO8321 Source, 1- or 2-wire connections 0.5 A nominal output current	X20DO9321 Sink, 1-wire connections 0.5 A nominal output current	X20DOF322 Source, 1-wire connections 0.5 A nominal output current
X20DO2322 Source, 3-wire connections 0.5 A nominal output current	X20DO4322 Source, 3-wire connections 0.5 A nominal output current	X20DO6322 Source, 1- or 2-wire connections 0.5 A nominal output current	X20DO8322 Source, 1- or 2-wire connections 0.5 A nominal output current	X20DO9322 Source, 1-wire connections 0.5 A nominal output current	
-	X20DO4331 Sink, 3-wire connections 2 A nominal output current	X20DO6325 Source, 1- or 2-wire connections 0.5 A nominal output current Diagnostic functions	X20DO8331 Sink, 1-wire connections 2 A nominal output current	-	-
	X20DO4332 Source, 3-wire connections 2 A nominal output current		X20DO8332 Source, 1-wire connections 2 A nominal output current		
-	X20DO4332-1 Source, 3-wire connections, 2 A nominal output current, PWM functionality	-	-	-	-
12 to 24 VDC					
-	-	-	X20DO8323 Sink/Source, 1-wire connections 0.5 A nominal output current Full bridge, half bridge. Thermal overload protection	-	-
12 to 240 VAC					
X20DO2633 Triac, L switching, 3-wire connections 2 A nominal output current Zero-crossing detection, phase-angle control, open-circuit detection	X20DO4633 Triac, L switching, 3-wire connections 1 A nominal output current Zero-crossing detection, phase-angle control, open-circuit detection	-	-	-	-
48 to 240 VAC					
	X20DO4613 Controls external power triacs or non-parallel thyristors	-			
100 to 240 VAC					
X20DO2623 SSR, L switching, 3-wire connections 1 A nominal output current Outputs with integrated snubber circuit, integrated full-wave control	X20DO4623 SSR, L switching, 2-wire connections 0.5 A nominal output current Outputs with integrated snubber circuit, integrated full-wave control	-			
30 VDC / 115 VAC					
-	X20DO4529 Relay/Changeover contact 1/0.5 A nominal output current Single-channel isolated outputs	X20DO6529 Relay/Normally open contact 1/0.5 A nominal output current Single-channel isolated outputs			
30 VDC / 230 VAC					
X20DO2649 Relay/Changeover contact 5/5 A nominal output current Single-channel isolated outputs	X20DO4649 Relay/Normally open contact 5/5 A nominal output current Single-channel isolated outputs	X20DO6639 Relay/Normally open contact 2/2 A nominal output current Single-channel isolated outputs			

Digital inputs/outputs →

24 VDC

8 inputs/4 outputs
X20DM9324 8 DI, sink, 1-wire connections 4 DO, source, 1-wire connections 0.5 A nominal output current

Analog inputs →

1 input	2 inputs	4 inputs	8 inputs
±10 V			
-	X20AI2222 12-bit X20AI2237 16-bit	X20AI4222 12-bit -	X20AI8221 12-bit -
0 to 20 mA or 4 to 20 mA			
-	X20AI2322 12-bit	X20AI4322 12-bit	X20AI8321 12-bit
±10 V or 0 to 20 mA or 4 to 20 mA			
-	X20AI2622 12-bit X20AI2632 16-bit X20AI2636 16-bit, oversampling NetTime	X20AI4622 12-bit X20AI4632 16-bit X20AI4636 16-bit	-
±11 V or 0 to 22 mA			
-	X20AI2632-1 16-bit	X20AI4632-1 16-bit	-
4 to 20 mA or 0 to 25 mA			
-	X20AI2437 16-bit X20AI2438 16-bit, HART	-	-
Strain gauge			
X20AI1744 24-bit, 5 kHz input filter Bridge voltage 5 VDC X20AI1744-10 24-bit, 5 kHz input filter Bridge voltage 10 VDC	X20AIA744 24-bit, 2.5 kHz input filter Bridge voltage 5 VDC	X20AIB7441 24-bit, 2.5 kHz input filter Bridge voltage 5 VDC	-

Temperature inputs →

2 inputs	4 inputs	6 inputs
Resistance temperature measurement		
X20AT2222 16-bit PT100 and PT1000 2- or 3-wire measurement	X20AT4222 16-bit PT100 and PT1000 2- or 3-wire measurement	-
X20ATA312 24-bit PT100 4-wire measurement	X20ATB312 24-bit PT100 4-wire measurement	
X20AT2311 24-bit PT100 4-wire measurement high resolution	X20AT4232 16-bit NTC resistance type 10 kΩ 2-wire measurement	
Thermocouple		
X20AT2402 16-bit Sensor types J, K, N, S integrated terminal temperature compensation	-	X20AT6402 16-bit Sensor types J, K, N, S, integrated terminal temperature compensation
X20ATA492 16-bit Sensor types J, K, N, S, B, R, E, C, T integrated terminal temperature compensation		X20ATC402 16-bit Sensor types J, K, N, S, B, R, E, C, T integrated terminal temperature compensation

Analog outputs →

2 outputs	4 outputs
±10 V or 0 to 20 mA or 4 to 20 mA	
X20AO2622 12-bit	X20AO4622 12-bit
X20AO2632 16-bit	X20AO4632 16-bit
-	X20AO4635 16-bit low temperature drift
4 to 20 mA or 0 to 20 mA or 0 to 24 mA	
X20AO2437 16-bit X20AO2438 16-bit, HART	-
±11 V or 0 to 22 mA	
X20AO2632-1 16-bit	X20AO4632-1 16-bit

Counting

SSI 1 input	SSI 2 inputs	ABR 1 input	ABR 2 inputs	Mixed
X20DC1178 Absolute encoder 5 V Encoder monitoring 1 Mbit/s, 32-bit NetTime	X20DC2398 Absolute encoder 24 V 125 kbit/s, 32-bit	X20DC1376 Incremental encoder 24 V, asymmetrical Latch input Input frequency max. 100 kHz, 32-bit 4x evaluation Encoder monitoring NetTime	X20DC2396 Incremental encoder 24 V asymmetrical Home enable switch 100 kHz, 32-bit 4x evaluation	X20DC2395 1 SSI absolute encoder 1 ABR incremental encoder 2 AB incremental encoder 4x event counter or 2x pulse width modulation Time measurement Relative timestamp 24 V
X20DC1198 Absolute encoder 5 V 1 Mbit/s, 32-bit	-	X20DC1396 Incremental encoder 24 V, asymmetrical Home enable switch Input frequency max. 100 kHz, 32-bit 4x evaluation	-	X20DC4395 2 SSI absolute encoder 2 ABR incremental encoder 4 AB incremental encoder 8x event counter or 4x pulse width modulation Time measurement Relative timestamp 24 V
X20DC1398 Absolute encoder 24 V 125 kbit/s, 32-bit	-	X20DC137A Incremental encoder 24 V, differential Latch input Input frequency max. 300 kHz, 32-bit 4x evaluation Encoder monitoring NetTime	-	X20DC1941 1 resolver input 1 ABR output
-	-	X20DC11A6 Incremental encoder 5 V, symmetrical Latch input Input frequency max. 5 MHz, 32-bit 4x evaluation Encoder monitoring NetTime	-	X20DC2190 Ultrasonic transducer module 2 transducer rods 4 path evaluation Speed measurement 24 V
-	-	X20DC1976 Incremental encoder 5 V, asymmetrical Latch input Input frequency max. 250 kHz, 32-bit 4x evaluation Encoder monitoring NetTime	-	-
-	-	X20DC1196 Incremental encoder 5 V, symmetrical Home enable switch Input frequency max. 600 kHz, 32-bit 4x evaluation NetTime	-	-
-	-	X20DC1176 Incremental encoder 5 V, symmetrical Latch input 600 kHz, 32-bit 4x evaluation Encoder monitoring NetTime	-	-

Integrated automation
Global presence
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open SAFETY

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