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DAQ System with BioWare®

Type 5691A1

Data Acquisition and Analysis System for Biomechanics

Data acquisition system for connecting and controlling two multicomponent force plates with integral charge amplifiers. The system is connected to a USB 2.0 port of the PC and operated with the included software BioWare.

- Easy of installation with USB 2.0
- Remote control of integral charge amplifiers
- Powerful data acquisition and signal processing
- Versatile data analysis and filters
- Can be started with external trigger

Description

The DAQ system with BioWare consists of a data acquisition box for one or two Kistler multicomponent force plates and one integral 16-bit A/D converter to digitize the plates' analog output signals. The system is connected to a USB 2.0 port of the PC. The integral charge amplifiers of the connected Kistler force plates are supplied via the data acquisition box and controlled by means of the supplied software (measuring range and reset/operate).
The DAQ system Type 5691A... can also be controlled by 3rd party software that is utilizing the software interface (API) BioWare dataserver.dll. The software interface (API) BioWare dataserver.dll is available for download at the Kistler website.

Application

The Type 5691A1 with BioWare is designed specifically to fully exploit the capabilities of Kistler's piezoelectric force plates Type 9260AA, 9281EA, 9286BA and 9287CA in biomechanics applications. The 16-bit resolution of the measurement signals and high sampling rate of up to 17 kS/s in conjunction with Kistler force plates allow a very wide range of applications. The system as a whole is therefore equally ideal for measuring highly dynamic processes, very small measurands and slow phenomena. The additional options of acquiring any analog signals rather than just those from force plates, with external trigger or pre- and post-trigger capability, underscore the versatility of the system for use in basic research, sports science, gait analysis, neurology, ergonomics, etc., etc.

Technical Data

General Data		
Dimensions	mm	208x65x250
Total weight	kg	2,05
Operating temperature range	°C	0 ... 50

Power Supply Voltage		
Power supply	VDC	11 ... 15
Power consumption	VA	6

A/D-Converter			
Number of channels			16
Resolution (per channel)		Bit	16
Input voltage range (software selectable)		V	±1, ±2, ±5, ±10
Sampling rate (software selectable)		S/s	0,6 ... 50 000
	max. @ 2 channels	kS/s	50
1 Force plate	max. @ 8 channels	kS/s	17
2 Force plates	max. @ 16 channels	kS/s	9,5

Connections		
USB 2.0		
USB In (uplink, to the PC)		USB Type B, female
USB Out (downlink, free)		USB Type A, female

Force Plate 1/2		D-Sub37, male
Input voltage (max.)	V	±15

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External Trigger (trigger-in)			BNC neg.
Input voltage			
Pull-Up resistance 10 kΩ to ±5 V			
	max.	VDC	12
	high or input open	VDC	>3,6
	low	VDC	<0,6
Trigger mode	standard		rising edge
	software selectable		falling edge

Conforms to the CE safety standards (73/23/EG) for electrical equipment and systems:
EN 60601-1:2005, EN 61010-1:2001
and the EMC standards (89/336/EG):
EN 60601-1:2005 (EN 55022 Class B), EN 61000-6-3:2004
(EN 55022 Class B), EN 61000-6-4:2001 (EN 55011 Class B),
EN 60601-1:2005, EN 61000-6-1:2001, EN 61000-6-2:2005

Dimensions

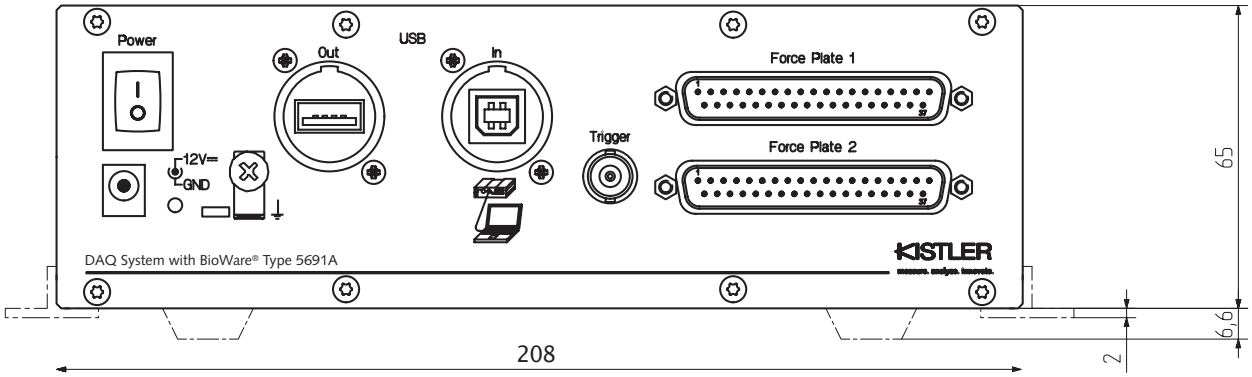
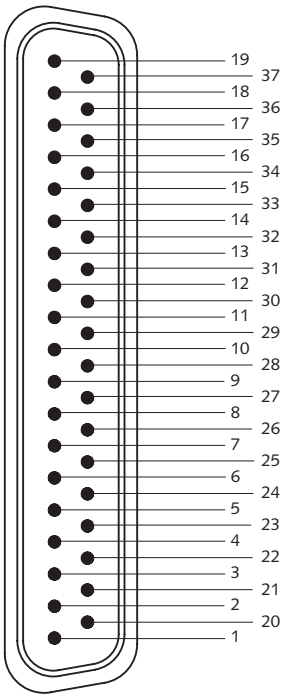


Fig. 1: DAQ system with BioWare Type 5691A1

Pin Allocation D-Sub37, male (Force Plate 1/2)

1	Exct. +12 VDC	20	Data IO5 (reserve)	
2	n.c.	21	Data IO6 (reserve)	
3	n.c.	22	B Range Select Group I	
4	A Range Select Group I	23	Operate/NotReset	
5	n.c.	24	Data IO7 (reserve)	
6	n.c.	25	n.c.	
7	Exct. GND	26	n.c.	
8	n.c.	27	B' Range Select Group II	
9	A' Range Select Group II	28	Control GND	
10	n.c.	29	Control GND	
11	Signal GND	–	**Force Plate 1**	**Force Plate 2**
12	Signal GND	30	CH8 (Fz4)	CH16 (Fz4)
13	Signal GND	31	CH7 (Fz3)	CH15 (Fz3)
14	Signal GND	32	CH6 (Fz2)	CH14 (Fz2)
15	Signal GND	33	CH5 (Fz1)	CH13 (Fz1)
16	Signal GND	34	CH4 (Fy23)	CH12 (Fy23)
17	Signal GND	35	CH3 (Fy14)	CH11 (Fy14)
18	Signal GND	36	CH2 (Fx34)	CH10 (Fx34)
19	Signal GND	37	CH1 (Fx12)	CH9 (Fx12)



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BioWare®

BioWare software is the engine behind the force plate system. It collects data from the force plates, converts the trials into useful information and plots the results. The force plates and charge amplifiers are fully remote controlled by BioWare thus making the system extremely flexible and easy-to-use.

Parameters of Gait

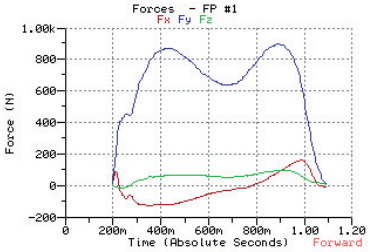

Fig. 2: Ground reaction forces (GRF)

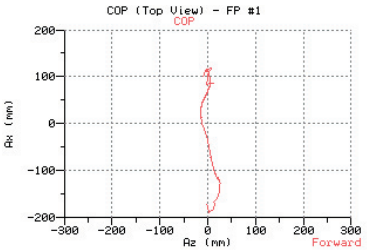

Fig. 3: Center of pressure (COP)

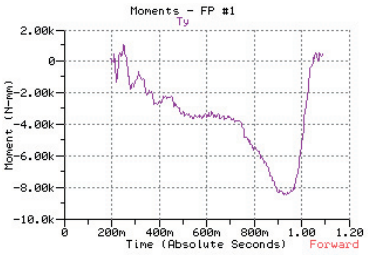

Fig. 4: Frictional torque T_z

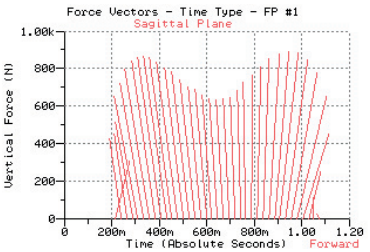

Fig. 5: Force vector

Other Functions

- Coefficient of friction (COF)
- Frequency analysis, statistics, digital filters
- Full Windows® functionality

BioWare provides several performance specific evaluations.

Parameters of Countermovement Jump CMJ

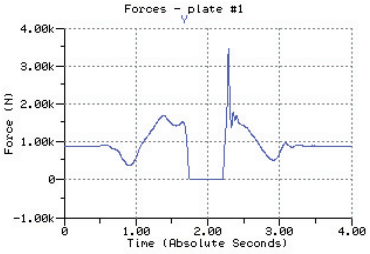

Fig. 6: Jump force

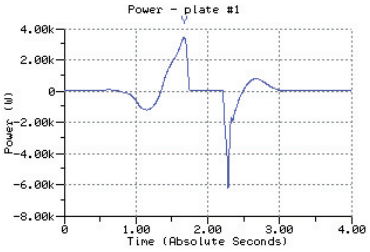

Fig. 7: Power

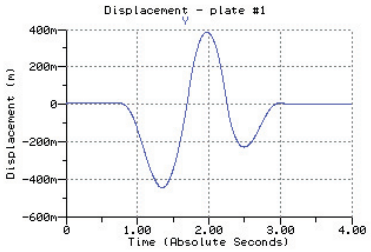

Fig. 8: Jump height (COM)

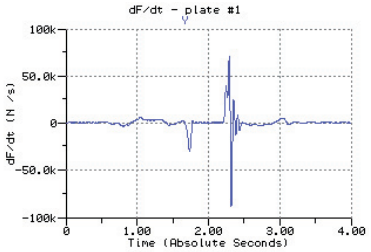

Fig. 9: Force gradient (Explosivity)

Other Parameters

- Acceleration, velocity and displacement of the center of mass (COM)
- Work, energy, impulse
- Statistics, digital filters

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Typical Measuring Chain

			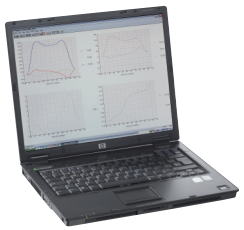
Force Plate with charge amplifier Type 9286BA	Connection cable Type 1758A...	DAQ system (USB 2.0) Type 5691A1	Laptop (provided by user) with BioWare

Fig. 10: Configuration of a typical measuring chain with Kistler DAQ system with BioWare®

DAQ-System with BioWare Version **Type 5691A1**
Data Acquisition and Analysis Tool for Biomechanics
USB 2.0, for max. 2 Force Plates
- USB 2.0 DAQ system with BioWare Type 5691A (16 channels, 16 bit)
- BioWare software
- BioWare Dataserver Interface Library

System Requirements
- Microsoft Windows® 7, Windows® XP or Windows® Vista operating system
- Intel Pentium 4 class processor (1 GHz or higher recommended)
- 2 GB of RAM
- Video Display set to at least 800x600, 256 colors, small fonts selected
- Min 125 MB of free disk space
- Microsoft compatible mouse
- Windows Installer Version 1.1 or later
- Adobe® Acrobat® Reader®
- 1 free USB 2.0 port

Included Accessories	**Type/Art. No.**
• USB 2.0 connecting cable, length 1,8 m	–
• Universal AC/DC adapter, 100 ... 240 V~ 12 VDC	5.510.276
• Self-adhesive base, black, 20,5x7,6 mm	5.211.368
• BioWare software CD-ROM	2812A-05-0
• Instruction manual	2812A_002-312

Optional Accessories	**Type/Art. No.**
• Connection cable for	
– Force platforms w/ integr. amplifier (straight connector)	1758A...
– Force platforms w/ integr. amplifier (angle connector)	1759A...
– Force plate Type 9260AA... with integr. charge amplifier (D-Sub 25)	1791A...
– External charge amplifier Type 9865E...	1769A1
– External control unit Type 5233A2	1500B5
– Analog signals (8x BNC pos.)	1500A67
• Mounting kit consisting of 2 brackets and 4 screws	7.511.339
• BioWare Dataserver Interface Library dataserver.dll: free download from Kistler website	2873A

Ordering Code
- DAQ system with BioWare **Type 5691A1**

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Adobe® Acrobat® Reader® is a registered trade mark of Adobe.

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64ch DAQ System with BioWare®

Type 5695B..

Data Acquisition and Analysis System for Biomechanics

Data acquisition system for connecting and controlling up to 8 multicomponent force plates with integral charge amplifiers. The system is connected to a USB 2.0 port of the PC and operated with the included software BioWare.

- Easy installation with USB 2.0
- Connection of up to 8 force plates
- Remote control of integral charge amplifiers
- Powerful data acquisition and signal processing
- Versatile digital control and synchronization options
- Analog output

Description

The DAQ system with BioWare Type 5695B1 consists of a connecting box for up to 8 Kistler multicomponent force plates and one integral 16-bit A/D converter to digitize the plates' analog output signals. All analog input signals are additionally availagle as unfiltered analog output on two 37 pol D-Sub female connectors. The system is connected to a USB 2.0 high speed port of the PC. The integral charge amplifiers of the connected Kistler force plates are supplied via the connecting box and controlled by means of the supplied software (measuring range and reset/operate).
The DAQ system Type 5695B... can also be controlled by 3rd party software that is utilizing the software interface (API) BioWare dataserver.dll. The software interface (API) Bioware dataserver.dll is available for download at the Kistler website.

Application

The DAQ system Type 5695B1 is designed specifically to fully exploit the capabilities of Kistler's piezoelectric force plates Type 9260AA, 9281EA, 9286BA and 9287CA in biomechanics applications. The 16-bit resolution of the measurement signals and the high sampling rate in conjunction with Kistler force plates allow a very wide range of applications. The system as a whole is therefore equally ideal for measuring highly dynamic processes, very small measurands and slow phenomena. Furthermore, it is possible to acquire any other analog signals (0 ... ±10 VDC) instead of those of Kistler force plates.
The integrated analog anti-aliasing filters limit the bandwidth and increase the quality of the digitized data.
The additional options of acquiring any analog signals rather than just those from force plates, and the versatile digital control and synchronization options underscore the versatility of the system for use in basic research, sports science, gait analysis, neurology, ergonomics, etc., etc.

Technical Data

General Data		
Dimensions	mm	208x70x265
Weight	kg	2,3
Operating temperature range	°C	0 ... 50

Power Supply Voltage		
Galvanically isolated between input-, output- and control-GND (40 V max.)		
Power supply	VDC	18 ... 36
Power consumption max.	VA	<10

A/D-Converter		
Number of channels		64
Resolution (per channel)	Bit	16
Input voltage range (software selectable)	V	±0,1; ±0,2; ±0,5; ±1; ±2; ±5; ±10
Input voltage (max.)	V	±20
Sampling rate max.	S/s	10 000

Analog Anti-Aliasing-Filter		
Cut-off frequency	Hz	500
Order		3.
Type		Butterworth

Connections		USB 2.0
USB In (uplink to the PC)		USB Typ B, fem.

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Force Plate 1 ... 8		D-Sub25, fem.
Power supply per force plate	VDC	12
Supply current (max.)	mA	50

Control I/O		D-Sub9, fem.
Galvanically isolated between input-, output- and control-GND (40 V max.)		
Trigger Input/Sync Input (10 Ω Pull-Down)		
High (+12 V max.)	VDC	>2,3
Low	VDC	<1
Trigger Output/Sync Output/Sampling Clock Output/Reserve Output		
High @Iout = 10 µA/2 mA	VDC	>4,9/>4,4
Low @Iout = 10 µA/2 mA	VDC	<0,1/<0,35

Digital Control and Synchronization Options
Trigger-Input
Sync Input
Trigger Output
Sync Output
Sampling Clock Output
Reserve Output

The instrument follows the Directives 2004/108/EG and conforms with the following standards:
EMC Emission: EN 61000-6-4/EMC Immunity: EN 61000-6-2/Product standard: EN 61326-1 (Class A)/Safety: EN 60950-1 (Power Adapter).

Software
The DAQ system 5695B... can be operated with Kistler BioWare or by 3rd party software that is utilizing the software interface (API) BioWare dataserver.dll.

Typical Measuring Chains

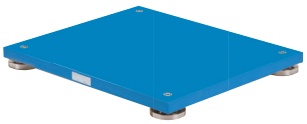			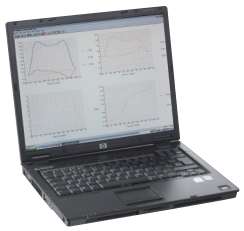
Force plate with charge amplifier Type 9260AA6	Connection cable Type 1700A107A10	DAQ system (USB 2.0) Type 5695B1	Laptop (provided by user) with BioWare

Fig. 1: Configuration of a typical measuring chain with DAQ system with BioWare®

			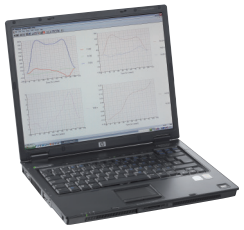
Force plate with charge amplifier Type 9281EA	Connection cable Type 1700A105A10	DAQ system (USB 2.0) Type 5695B	Laptop (provided by user) with utilization of BioWare dataserver.dll

Fig. 2: Configuration of a typical measuring chain with DAQ system with BioWare® dataserver.dll

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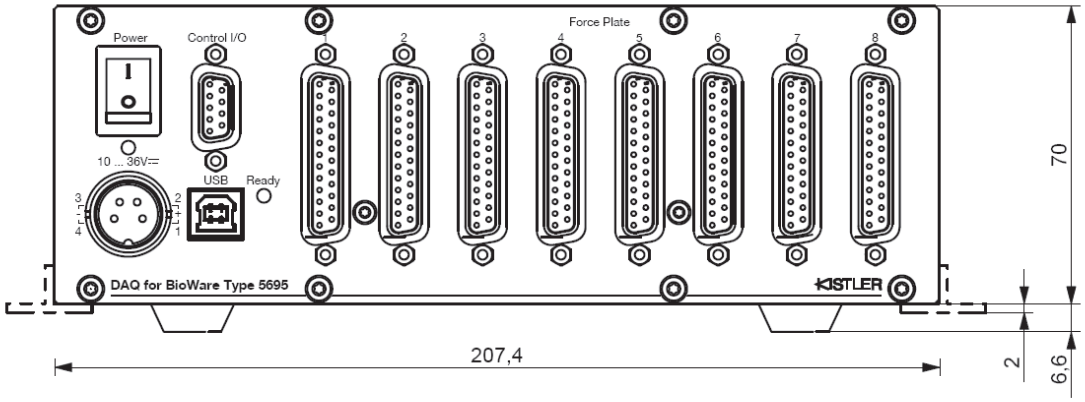
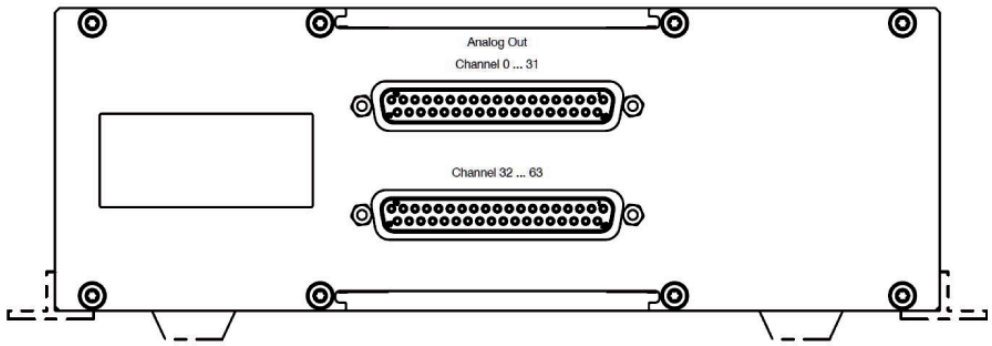
Front View



Back View

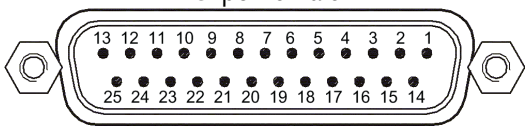


Connections

Force Plate 1 ... 8

Pin	Function	Pin	Function
1	A (Range x,y select)	14	B (Range x,y select)
2	Operate	15	Control GND
3	Fy 2+3	16	Fx 3+4
4	Fx 1+2	17	Fy 1+4
5	Signal GND	18	n.u.
6	n.u.	19	n.u.
7	A' (Range z select)	20	B' (Range z select)
8	Fz 1	21	Fz 4
9	Fz 3	22	Fz 2
10	Singal GND	23	Test / no Test
11	n.u.	24	Overload (n.u.)
12	n.u.	25	Exct. +10...30 VDC
13	Exct. GND		

25-pol female



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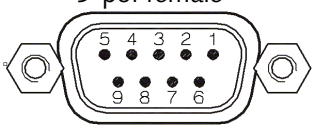
Connections (Continuation)

Control I/O

Pin	Function	Pin	Function
1	3,3 V Input	6	Trigger Input
2	Sync Input	7	GND Input
3	Trigger Output	8	Sync Output
4	Reserve Output	9	Sampling Clock Output
5	GND Output		

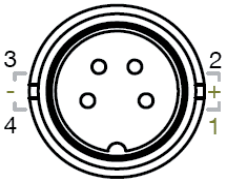
9-pol female



Power 18 … 36 VDC

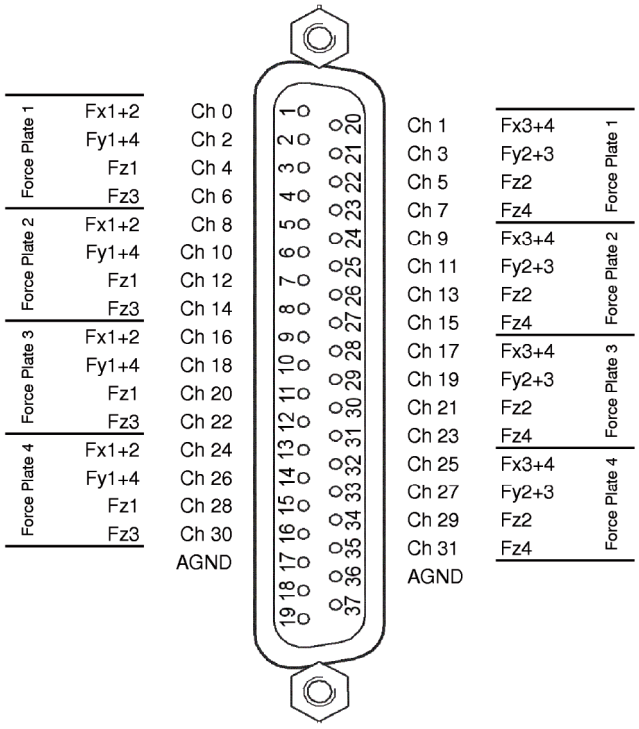
Pin	Function
1	18 … 36 VDC
2	18 … 36 VDC
3	GND
4	GND

M12 4-pol male

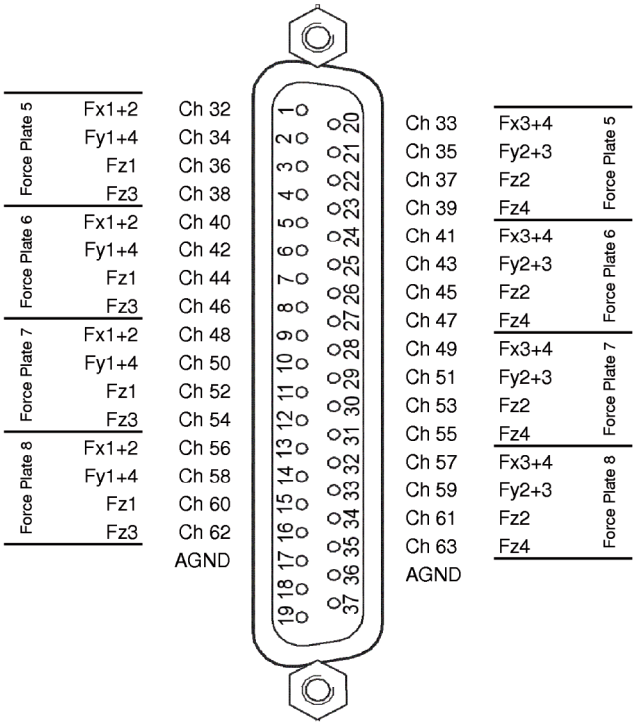


Analog Out

Channels 0 ... 31



Channels 32 ... 63



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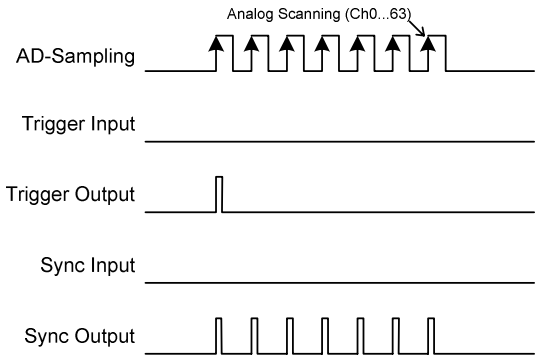
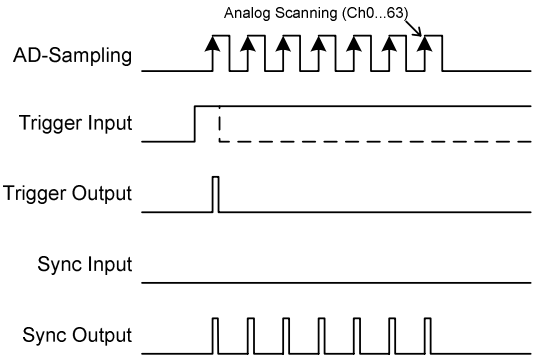
Synchronization

The synchronization signals are available at control-I/O connector. There are four basic functions:

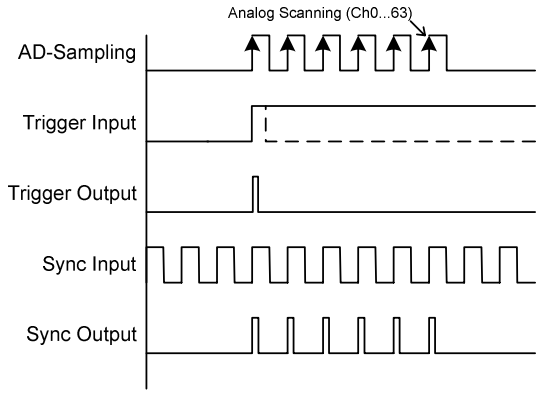
A) The measurement is started on a key and stopped after time of scanning (BioWare). On each analog scan the "Sync Output" generates a pulse. On the first sample, the "Trigger Output" generates a pulse.



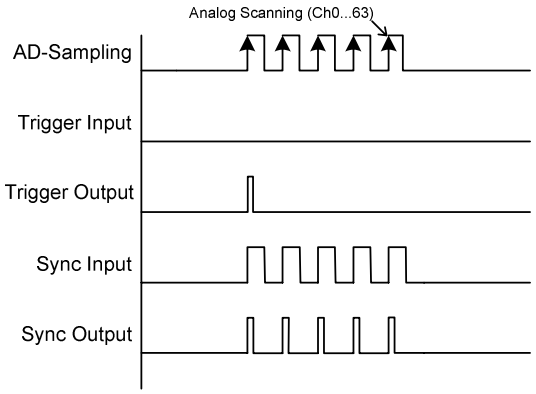
B) The measurement is started by "Trigger Input" and stopped after time of scanning (BioWare). On each analog scan the "Sync Output" generates a pulse. On the first sample, the "Trigger Output" generates a pulse.



C) The measurement is started by "Trigger Input" and stopped after time of scanning (BioWare). The analog scans are synchronous to "Sync Input". On each analog scan the "Sync Output" generates a pulse. On the first sample, the "Trigger Output" generates a pulse.



D) The measurement is exclusively controlled by "Sync Input". The DAQ board executes an analog scan on each pulse of "Sync Input". On each analog scan the "Sync Output" generates a pulse. On the first sample, the "Trigger Output" generates a pulse.



The polarity (rising edge, falling edge, active high or active low) of trigger and sync signals can be selected by the software.

The minimal pulse width of input signals is 10 µs. The signal "Sync Output" can be divided by 2 ... 16, to synchronize a fast force-acquisition (Force Plate) with a lower speed video analyzing system. (Example: Force Plate Sampling Rate = 1 kS/s, Video Analyzing System = 100 Frames/s)

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Included Accessories	Type/Art. No.
• USB 2.0 connecting cable, length 1,8 m	650 099 59
• Universal AC/DC adapter, 100 ... 240 V~ to 24 VDC 24 W	650 091 93
• 4x Self-adhesive feet, black, 20,5x7,6 mm	650 083 06
At Type 5695B1 only:	
• BioWare Software CD-ROM	2812A
• Instruction manual	2812A_002-312

Optional Accessories	Type/Art. No.
Connection cable for:	
• Force plates with integr. charge amplifier (Fischer 19, angle connector)	1700A105A...
• Force plates with integr. charge amplifier (Fischer 19, straight connector)	1700A105B...
• Force plates Type 9260AA... with integr. charge amplifier (D-Sub25 connector)	1700A107A...
• External control unit Type 5233A2 or cable Types 1758A, 1759A,1769A	1700A109A...
• External charge amplifier Type 9865E...	1779A
• Mounting kit consisting of 2 brackets and 4 screws	650 149 00
• Adapter box (control I/O to 6xBNC fem.)	5767
• BioWare Dataserver.dll	2873A-01

Ordering Key

Type 5695B ☐

DAQ System	
without software	–
with BioWare and BioWare Dataserver.dll	1

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