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Remote Control Monitor

Type 5825A1

Portable Display Unit for Controlling Transmitters and Charge Amplifier

The remote control monitor (RCM) is used for controlling and adjusting different transmitters (sensors with ICA[*)]) and industrial charge amplifiers.

- Calibration of measuring range of transmitters and industrial charge amplifiers
- Two selectable operating modes: "Interval Store" (Intv. Store) and "Adjust Sensor" (Adj.)
- Digital voltmeter with ±10 V input range
- Switchable time constants: "short" (T1)/"long" (T2)
- Compensation of offset voltage with "Tare" function
- Rugged industrial version with impact protection, carrying strap and membrane keyboard
- Analog measurand output (monitor output) of the force signal
- External triggering
- Simple update of the monitor firmware with "Flash Loader" program and data export and export of settings and measurements via RS-232C interface

Description

The remote control monitor is used on site for adjustment of and measurement using sensors with ICA[*)] and industrial charge amplifiers.

Once selected, the connected hardware can be configured (for example, its measuring range adjusted) to suit the application. See Table 5 for overview of all products that can be controlled with this monitor. In the case of older sensors with a voltage output, the monitor can be used as a power supply and simple voltmeter for displaying measurements.

Once turned on, the monitor remains in the measuring mode. Pressing the "Measure" button resets the displayed measurement and the peak memory to zero, and the measurement process can start again. The monitor's menu offers numerous adjustment options. The monitor also provides a number of external connections. For example, the analog output signal of the transmitter or charge amplifier, an external trigger signal or an RS-232C interface can be connected to a suitable system or data acquisition unit.

Its rugged design with impact protection, carrying strap and membrane keypad makes the handy cordless monitor ideal for mobile use in a demanding industrial environment.

Applications

The monitor can be used for:
- Measurement using force and strain transmitters or pressure sensors with integrated ICA charge amplifier electronics
- Adjusting, servicing or powering up industrial charge amplifiers on site

[*)] ICA = Integrated (miniaturized electronic) charge amplifier (sometimes equipped with electronic potentiometer)

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Technical Data

Sensor Input

Input voltage measuring range (FSO)	V	0 … ±10
Max. input voltage	V	<±15
Resolution	mV	5
with oversampling 14 Bit	mV	1
Error		
Voltage	mV	±15
Sampling rate	Hz	<500
Input resistance	kΩ	>480
Low pass filter	Hz	240
(2nd order, Butterworth) –3 dB		
Reset pulse duration	ms	100
(Actuation with "Measure")		
Sensor connection	8-pin Binder round connector (DIN 45326F)	

Sensor Supply U$_{exct}$

Voltage	V	18
Output noise	mV$_{pp}$	<40
(0,1 Hz … 10 MHz, I$_{exct}$ = 18 mA)		
Output current	mA	<20

Control and Monitoring Signals

Monitor Out (sensor signal unfiltered)	V	±10
Series resistance in the signal path	Ω	10
Operate (standard level)		
Output low (Measure = T2 = long)	V	0 … 0,6
Output high (Reset = T1 = short)	V	3,0 … 3,4
Output impedance	Ω	1
Digital input "Ext. Trigger", electrically isolated		
Input low (Trigger off)	V	0 … 0,9
Input high (Trigger on)	V	5 … 30
Input current	mA	0,4 … 2,9
Input max.	V	<30
Pulse duration	ms	>40
Trigger rate	s	≥200
Connection	D-Sub f. 9-pin	

Serial Interface

Interface (standard)	RS-232C	
Baud rate (selectable)	Bd	9 600/19 200
Data format		
Data bits, stop bit, parity	8, 1, none	
Character transmitter	ASCII	

Monitor Power Supply

Battery (IEC 6LF22/9)	V	9
(see accessories)		
External plug-in power pack	V	12
(see accessories)		
Current consumption		
without transmitter	mA	≈23
with transmitter (max.)	mA	100
Battery life (9 V Lithium Battery)		
with Type 5030A… (<18 mA)	h	≈8
with Type 9602A… (7 … 11 mA)	h	≈12
with Type 9833A… (<5 mA)	h	≈28
with Type 9833C… (<8 mA)	h	≈12

Display

LCD graphic display, reflective	pixel	128x64
Number of significant places	digits	4
for measurand display		
Refresh rate of the display (measurands)	Hz	2 … 3

General Data

Memory location for number of data records		
Operating mode "Adjust Sensor"		max. 100
Operating mode "Interval Store"		max. 1 000
Operating temperature range	°C	0 … 50
Min./Max. temperature	°C	0/70
Humidity	RH %	≤50
Degree of protection EN60529	IP	50
Case dimensions		
without impact protection (HxWxD)	mm	150x75x35
with impact protection (HxWxD)	mm	182x92x45
Weight	g	≈500

The monitor complies with EMC regulations EN61000-6-3 (interference emission) and EN61000-6-2 (interference immunity).
The power line adapter complies with safety requirements according to EN60950.
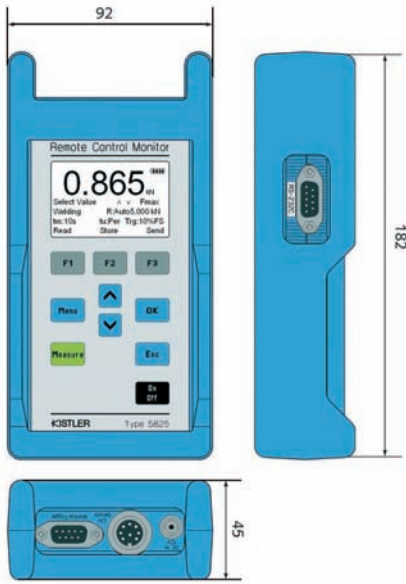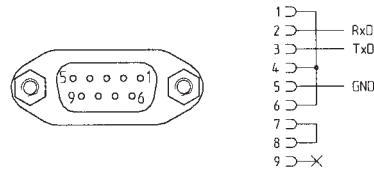
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Case Dimensions

Fig. 1: Case dimensions Remote Control Monitor Type 5825A1 with im-
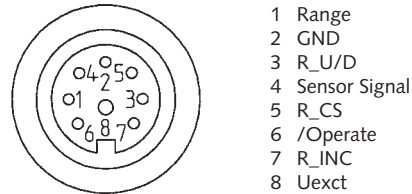pact protection

Connectors

Connector for RS-232C Interface

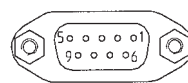### Connector for Sensor/Transmitter/Charge Amplifier

8-pin connector, DIN45326F
Pin allocation

1 Range
2 GND
3 R_U/D
4 Sensor Signal
5 R_CS
6 /Operate
7 R_INC
8 Uexct

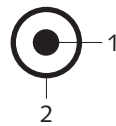### Connector for Analog Signal Output, ext. Trigger Input

D-Sub 9-pin f

1 Trigger + } store measuring point
2 Trigger –
3 R_CS
4 GND
5 Monitor Out (sensor signal)
6 GND

Connector for Power Pack

12 VDC In: 2-conductor jack according to EIAJ standard

1 +12 VDC
2 GND

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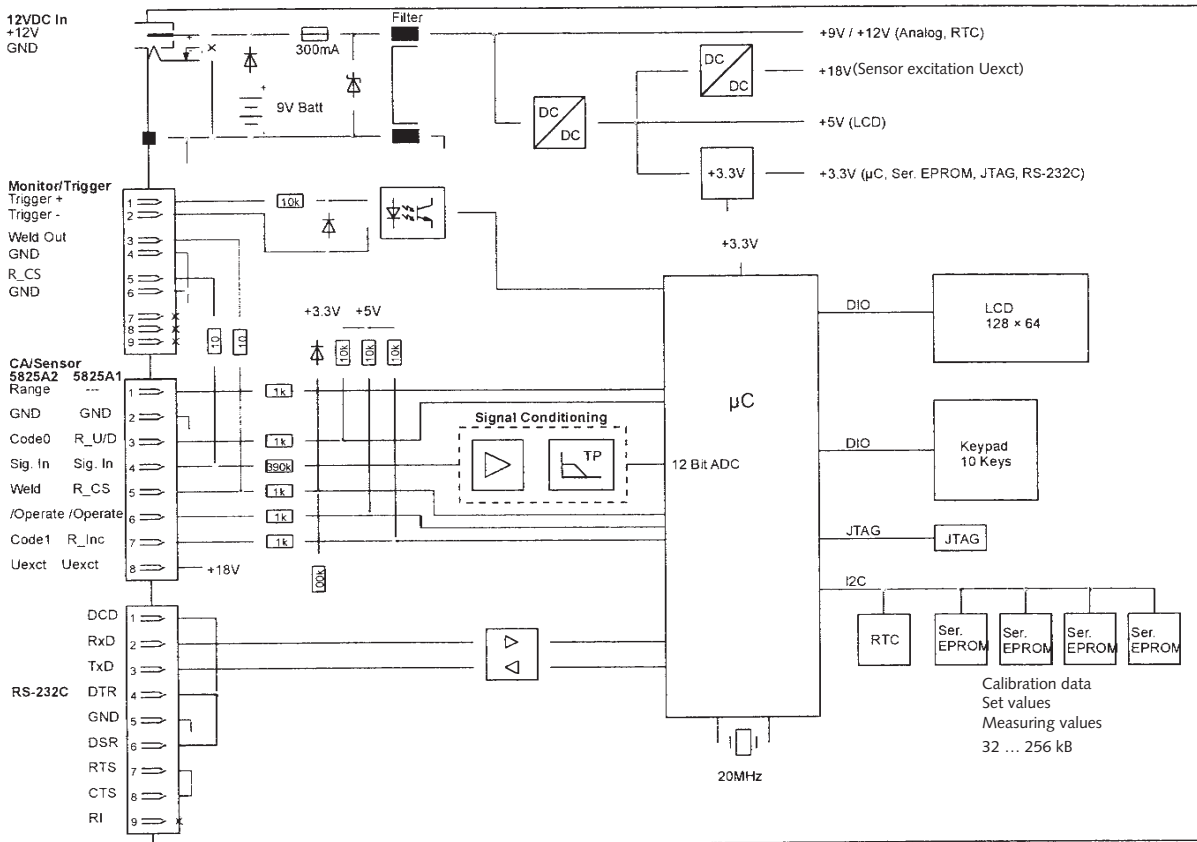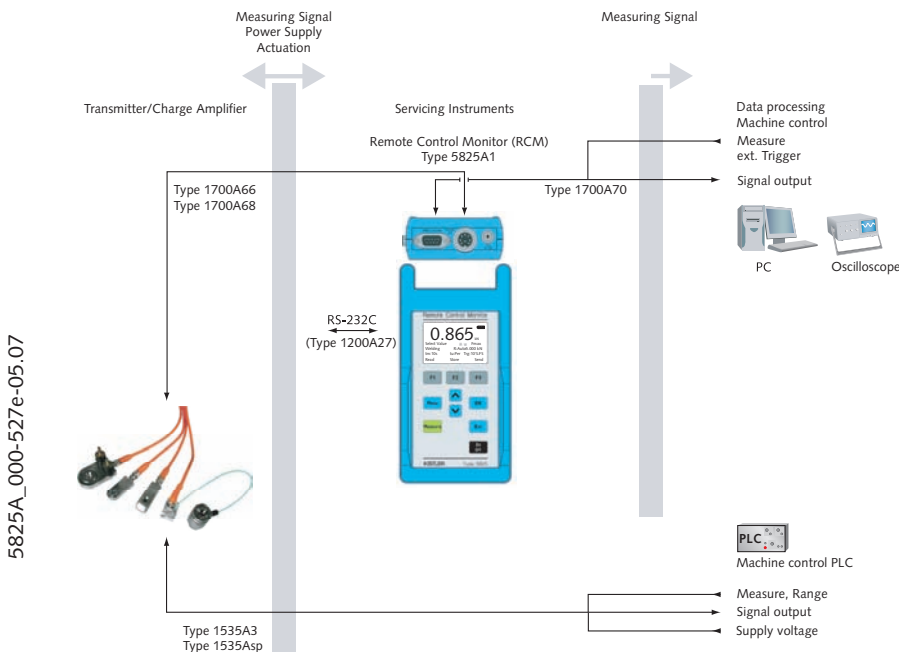
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Block Schematic Diagram

Fig. 2: Block schematic diagram Remote Control Monitor Type 5825A1

Actuation – Measuring Principle

Fig. 3: Actuation – Measuring principle Remote Control Monitor Type 5825A1

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This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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Summary of Products Controllable with Monitor

Force Transmitter

	Type 9602AA…	Type 9602A…	Type 9833C…
Charge amplifier electronics	ICA[1]	ICA	ICA
Lock	no	no	yes[2]
Adjustable electronic charge amplifier	yes	no	yes[1]

Strain Transmitter

	Type 9234A…
Charge amplifier electronics	ICA
Lock	no
Adjustable electronic charge amplifier	yes

Pressure Transmitter

	Type 6613C2Q…	Type 6615AQ…	Type 7621CQ01
Charge amplifier electronics	ICA	ICA	ICA
Lock	yes[2]	yes[2]	yes[2]
Adjustable electronic charge amplifier	yes[3]	yes[3]	yes[3]

Industrial Charge Amplifier

	Type 5027A…	Type 5030A…	Type 5038A/39A…
Charge amplifier electronics	–	ICA	–
Lock	no	yes	no
Adjustable electronic charge amplifier	no[4]	yes[3]	no[4]

Cable Connection Sensor and Monitor
The pin allocation of the individual types of sensors is not standardized. The sensor have to be connected with special cables rather than directly.

Legends
[1] ICA = Integrated (miniaturized electronic) charge amplifier (sometimes equipped with electronic potentiometer)
[2] must be unlocked for adjusting with the enabling interface Type Z18796
[3] Factory calibrated
[4] adjustable analog charge amplifier

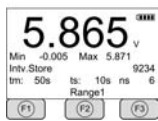## Unlocking with Enabling Interface Type Z18796

Fig. 4: Controlling MiniAmp Type 5030A… charge amplifier with enabling interface Type Z18796

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Description of the Main Functions

Selection between two Operating Modes

5.865 v
Min -0.005 Max 5.871
Intv.Store   9234
tm: 50s   ts: 10s ns   6
Range1
F1   F2   F3

- Interval Store (Intv.Store)
- Adjust Sensor (Adj.)

1. "Interval Store" Mode
(Automatic Acquisition and Storage of Measurements)

Measurement Settings
■ Display Range
□ Sensor Type
□ Tara   OFF
□ Trigger   OFF
□ tmeas   50s
□ ts   10s
F1   F2   F3

Settings
■ Application: Intv.Store
□ Measurement Settings
□ Instrument Settings
□ Memory
□ RS-232C Settings
F1   F2   F3

Once the measurement process has been started by pressing the "Measure" button or by an external trigger signal (Trigger = "ON" must be set on menu), the measurements are automatically acquired and stored at fixed time intervals during the defined measuring time. From the parameters measuring time (tm) and storage rate (ts) entered in the measurement menu beforehand, the program calculates the number of measuring points. During the chosen measuring time the instantaneous value (Instant) is stored at intervals ts as the measuring point with the measurement parameters (for example, sensor type, date/time, measuring range, tare) defined beforehand on the menu. The number of points that can be stored in the monitor in this mode is limited to a maximum of n_{smax} = 1 000.

Example 1: Timing Diagram of a Measurement in the "Interval Store" Mode
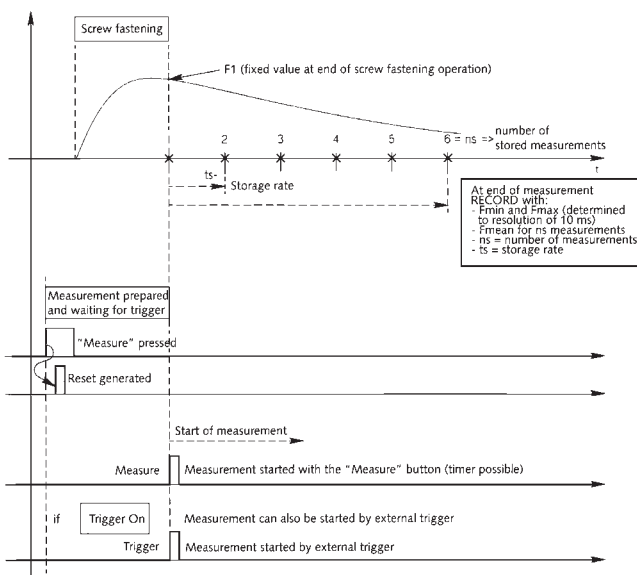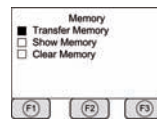

Fig. 5: Timing diagram of a screw fastening operation

Memory
■ Transfer Memory
□ Show Memory
□ Clear Memory
F1   F2   F3

All of the measuring points stored in the monitor can be output as ASCII code, either to its display (choose "Memory/Show Memory" on menu) or via the integrated RS-232C interface ("Memory/Transfer Memory" on menu).

Example 2: Measurement Output to Display of Type 5825A1

```
Show Memory No.    1
Typ 6615   5.11.03   10:36
Range2    Tara:OFF   Tc: T2/Res
DRng:9.999 V    tm:  5s
ts:  1s      Inst: 0,613V
Mean:   1.353 V
Min: -0,005        Max: 2,132
```

### Example 3: Measurement Output Serial Interface RS-232C

Remote Control Monitor	5825A1
Application: Intv.Store	05.11.03 16:33
Measurement Settings:	
Sensor Type	5027
Range	1
Tara	OFF
DisplayRange	9.999 V
tm:	5s
ts:	1s
Mean	1.353 V
Min	-0.005 V
Max	2.132 V
Recorded Measuring Points :	
No. 1	16:33
Instant	0.613 V
No. 2	16:33
Instant	1.607 V
No. 3	16:33
Instant	1.731 V
…	…

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2. "Adjust Sensor" Mode
(Adjustment of Electronic Potentiometer of Transmitters and Industrial Charge Amplifiers)

To protect against accidental adjustment of a connected transmitter or charge amplifier, the "Adjust Sensor" option on the "Instrument Settings/Adjust Sensor" menu is always deactivated after the remote control monitor is turned on and has to be explicitly enabled initially on the menu. To provide additional protection against accidental adjustment some transmitters and industrial charge amplifiers are also provided with an electrical lock (see table on page 5). To adjust the digital potentiometer these products have to be unlocked with an additional enabling interface (Type Z18796) connected between the monitor and the transmitter or charge amplifier.

After activation of the "Adjust Sensor" option any additional unlocking the digital potentiometer of the sensor can be adjusted in the measuring mode. The sensitivity of the sensor can be increased or decreased one increment at a time with the arrow buttons ▲ ▼. The "F3" button is used to automatically reset the potentiometer and set the sensor sensitivity on the minimum value.
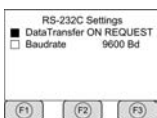
The "F2" button is used to switch between measuring range I and II (if available on the connected hardware). In the case of transmitters or amplifiers with different time constants the "Measure" button is used to switch between the time constants T1 = "short" and T2 = "long".

Adjustment of an electronic potentiometer with the monitor is explained below with the aid of the example of Kistler HighSens strain transmitter Type 9234A…:

Adjusting the Measuring Range

The optimum measuring range of the transmitter can be selected by actuating the integrated electronic system. Adjustment is made with a service unit or directly with machine control system PLC (see Fig. 6).

The entire measuring range I: ±600 $\mu\epsilon \approx$10 V and measuring range II: ±60 $\mu\epsilon \approx$10 V can be adjusted to a particular value or signal curve in 100 steps (0 to 99) with an electronic potentiometer. The relationship between the step number (step xx) and the associated measuring range ($\mu\epsilon$) is illustrated in the following graph. When the transmitter is adjusted to the measuring range required, the setting is saved in the integrated charge amplifier electronic system.

Relationship between Step Number (Step, Level Set) and Measuring Range

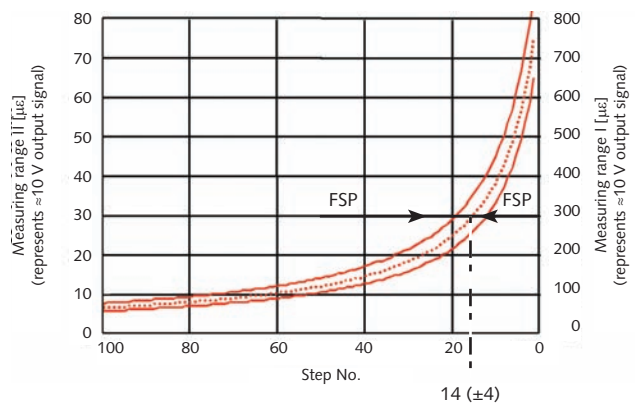| Measuring Range [±$\mu\epsilon$]		Step Number	
Range I	Range II	Step	Tolerance
600	60	2	+2/−1
550	55	3	±2
500	50	4	±2
450	45	6	±2
400	40	8	±3
350	35	11	±3
FSP: 300	30	14	±4
250	25	19	±5
200	20	25	±6
150	15	37	±8
100	10	60	±10
60	6	99	+0/−10

Fig. 6: Distance between measuring range and adjustment step number full scale signal FS ≈10 V

Accuracy of the Adjustment

		Measuring Range I	Measuring Range II
Adjustment step	mV	8,5 … 1 000	8,5 … 1 000
	$\mu\epsilon$	0,6 … 60	0,06 … 6
Adjustment error	% FS, FSP, FSA	0,5 … 5	0,5 … 5

The Preset Measuring Range (FSP)

The strain transmitters of the Type series 9234A1… are preset to a value of measuring range I: ±300 $\mu\epsilon \approx$10 V and measuring range II: ±30 $\mu\epsilon \approx$10 V. The adjustment is made at the Kistler factory during production. The measuring ranges set can be checked using a mechanical input signal (strain signal).

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Setting any Measuring Range (FSA)
To change this setting, the relevant signals must be actuated at pin positions 4, 6 and 7. The adjustment of the measuring range can be carried out in 2 ways:

1. Setting the Measuring Range where the Setting of the Electronic Potentiometer is Known
The measuring range can be set by matching or adjusting the step position (higher or lower). If the step number and thus the measuring range set is known, the newly set measuring range (FSA) can be determined as an approximate value from the table on page 7 or Fig. 6.

Example
Value previously set:
Measuring range I (FSP) = 300 µε ≈10 V ≈ Step 14 (±4)
Correction by +11 steps
New value set:
Measuring range I (FSA) = 200 µε ≈10 V ≈ Step 25

2. Setting the Measuring Range where the Setting of the Electronic Potentiometer is not Known
To reset an accurate step position or measuring range (µε), the step number must first be set to "Step 0" (largest measuring range, transmitter at its least sensitive). The measuring range wanted can now be set and stored starting from the new basis (Step 0).

> **The storage process saves the set position of the electronic potentiometer. The step number or set measuring range must – if so desired – be documented by the user.**

Definition of the Measuring Range

Measured Value	Measuring Range I	Measuring Range II
FS Max. measuring range	±600 µε ≈10 V	±60 µε ≈10 V
FSP Preset measuring range, Type series 9234A1…	±300 µε ≈10 V	±30 µε ≈10 V
FSA Measuring ranges set to a specific value	±0 … 600 µε ≈10 V	±0 … 60 µε ≈10 V

Printing Out and Storing Measuring Points
The "RS-232C Settings" menu can be used to output the measuring points to the RS-232C interface (see following example):

a) Data Transfer: CONTINUOUS
 The monitor continuously digitizes the measurement and outputs it automatically to the RS-232C interface in ASCII format at a maximum rate of 50 or 100 measurements/s (at 9 600 or 19 200 Bd) in exponential format with three decimal places but no unit (example: "2.260E+01"). The display is not updated in this mode.

b) Data Transfer: ON REQUEST
After the "F1" ("RS/Sto") button has been pressed or an external trigger signal given (when "Trigger = ON" has been set on "Measurement Settings" menu) the measurements and settings are stored and then output via the RS-232C interface in ASCII format. The number of measuring points that can be stored in the monitor in this mode is limited to a maximum of n_{smax} = 100.

Transmission of Stored Measurements
(Example "Data Transfer = ON REQUEST")

```
Remote Control Monitor 5825A1
No. 2  20.08.03  18:00
Sensor Type 9234  Gain Pos 55
Range 1  Tara OFF  Trigger ON
DisplayRange 9.999 V
Instant                    2.252 V
Min                        2.249 V
Max                        2.254 V
```

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Included Accessories

	Type/Art. No.
• Battery, 9 V, Ultralive Lithium Power Cell #U9VL-FP	5.310.023
• Switching mode power supply unit 90 … 264 VAC-12 V DC/1,25 A	5.510.293
• Impact protection	3.750.101
• Carrying strap for impact protection, incl. 2 snap hooks	5.211.533

Optional Accessories

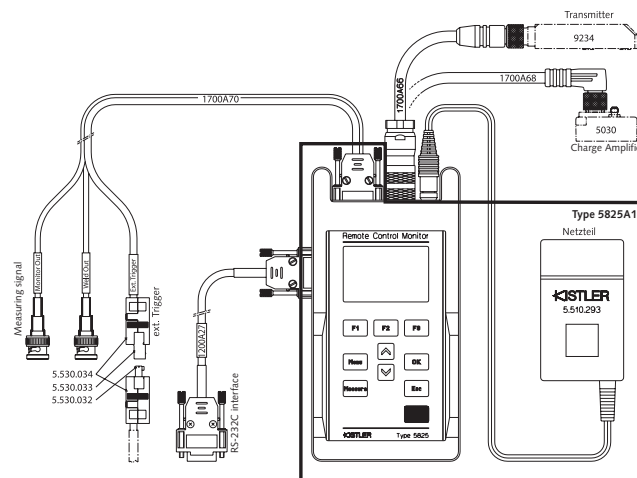|	Type/Art. No.
• RS-232C connecting cable, length = 5 m, PC to Remote Control Monitor	1200A27
• Connecting cable, straight, Lumberg M12 8-pin female to Amphenol 8-pin male, Length 2 m	1700A66
Custom length	1700A66sp
(L_{min} = 0,2 m/L_{max} = 10 m)	
• Connecting cable, angled, Lumberg M12 8-pin female to Amphenol 8-pin male, Length 2 m	1700A68
Custom length	1700A68sp
(L_{min} = 0,2 m/L_{max} = 10 m)	
• Connecting cable, length 1 m, D-Sub 9-pin male to 2 x BNC positive, 1 x terminal (incl. 1 x 5.530.032, 1 x 5.530.033, 2 x 5.530.034)	1700A70
• Mini-Combicon terminal 2-conductor grid 3,81 0,25-1,5 mm^2 (socket)	5.530.032
• Mini-Combicon terminal 2-conductor grid 3,81 0,25-1,5 mm^2 (pin)	5.530.033
• Mini-Combicon cable housing 2-conductor grid 3,81	5.530.034
• Desktop power pack (linear) 230 VAC/50 Hz – 12 VDC/300 mA	5.510.220
• Enabling interface	Z18796

Overview of Accessories

Fig. 7: Overview of accessories

Ordering Code

	Type
• Remote Control Monitor	**5825A1**

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